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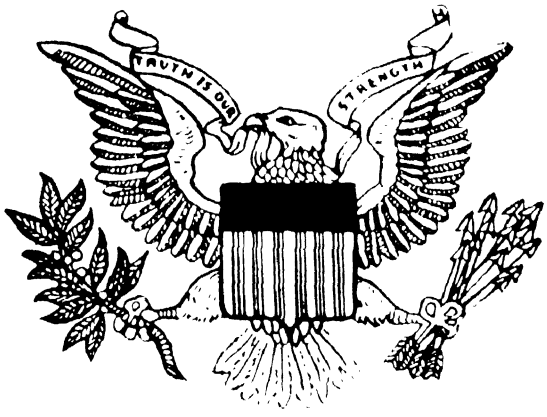

THE DEPARTMENT OF STATE

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N. L. ENGELHARDT
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PLANNING SECONDARY SCHOOL BUILDINGS

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FOREWORD

Since the turn of the century America's program of secondary education has grown with great rapidity. The enrollments have been climbing to high percentages of school-age youth. The curriculum has been broadened to meet the needs of all types of students. There has been expansion downward and upward as the junior high school and the junior college have been established. The services of the school in the library, the cafeteria, the dramatic and fine arts, the home arts, in vocational education, and in physical education have shown significant advancement. School and community interests have been closely joined. Guidance and counseling have become outstanding features of administration. Student activities have been fully recognized for their educational values. In fact, every classroom and laboratory subject has been widened in scope as it has felt the impact of our rapidly changing civilization.

School executives, supervisors, and teachers with high professional training have contributed liberally to the unprecedented growth and adjustment represented by these trends in secondary education. Teaching methods have been improved. Audio-visual means of learning have been introduced extensively. The democratization of the school's management has been accepted as a desirable goal.

As secondary education has matured, much of the success of new ventures depended upon the capacity and character of the school plant. School buildings, of course, are not as flexible as the school program or the curricula. The past five decades have witnessed a steady improvement in the kind of buildings but without sufficient adaptation of the plant to the needs of the educational program. During this period a new type of high school has been in the making, but the emphases in planning were mainly upon safety, sanitation, student circulation, the materials of construction, and the improvement of the utility services. The centralized sites that were sought were limited in acreage frequently preventing the desired expansion. The needs of the curriculum and the philosophy under which the school was to be administered received little consideration in the planning processes. These years produced, however, many high school buildings which will long serve their communities.

The decentralization of American cities, the increasingly popular ownership of automobiles, the necessity for having large sites to meet the need of an expanding curriculum, and the delimitation of a school's enrollment to a workable optimum are influences which in part determine the location and kind of school for the community now compelled to further planning. It seems clear that the regional, comprehensive, coeducational high school will best meet the future needs of most growing American communities.

Boards of education, who would have the approval of future generations, will buy extensive acreages. The recommendations of the superintendent of schools and his staff will be based on a most detailed school building survey, so that the school's location and its size are determined without prejudice. The school superintendent's specifications of educational and community requirements for the new building will include a statement of the philosophy under which the school will operate, the functions to be served in all spaces and a detailed outline with all educational implications for each space. Members of the supervisory, educational, and custodial staffs will have participated in giving clear definition of their aims and the space problems they encounter. The architect will then be provided with the voluminous information which will enable him to fulfill his commission. At this stage of building planning, many conferences should be held until the architect and all other interested parties have achieved a common understanding of the educational aims sought, the nature of the curriculum, and the ways and means to be employed in making the building functional. The early emphasis on mechanistic standards in these chapters has not been decried, but there will appear insistent appeal that in all building

planning, the accepted philosophy, the curriculum and teaching methods always be given the recognition they merit.

In this volume, the authors have endeavored to envisage the secondary school of the future. It will not be a standardized school. American communities will continue to plan and build to meet their local requirements. The school building will be planned to make the curriculum work. It will offer expanded opportunities for learning. It will serve, not a limited number of special minds, but will advance the individual interests of the various types of youth. It will make provision for learning the social arts as well as for growing in physical health and emotional stability. It will be the educational focus of its community serving youth and adults alike. It will become a superior educational and inspirational center for all American youth.

This volume has been long in preparation. During three decades many of the Engelhardt students in school administration in Teachers College, Columbia University, participated in discussions and conferences, the results of which appear in these chapters. Architects, with whom the authors have been associated as educational consultants, have raised issues and offered suggestions that have been incorporated here for school building improvement. During the five year period, 1942-1947, N. L. Engelhardt, Sr., as Associate Superintendent of Schools of New York City in charge of the Division of Housing and Business Administration, supervised the preparation of the New York City Manual of School Planning, modification of which has been included in several chapters. Scores of individuals contributed to the development of this manual. School board members and superintendents of schools and their staffs, who have frequently made valuable contributions to the planning of school buildings in association with the authors as educational consultants, will find many of their ideas incorporated here. Several sections of Volume VII, "Planning Guides for San Francisco's School Buildings," prepared by the authors as a part of the twelve volume school building survey report of that city in 1948 have also been modified or expanded for inclusion in various chapters of this book. In their surveys of the school plant of cities in all parts of the United States, the authors have discovered unusually excellent characteristics of high school buildings, recording of which here has been felt worthwhile for future planners.

This book is thus the product of many minds. Here are brought together ideas, suggestions, and patterns of planning, some new, some old, some tried, and others still to be incorporated in buildings for the first time. Obviously credit cannot be given by naming all the individuals who have made their contributions to these pages. The authors, however, express their thanks to those who have aided in any degree whatsoever.

The authors alone accept responsibility for the theories, principles, plans, and proposals found here. It is their hope that the use of this volume will help in planning the kinds of high schools which American communities should want for their boys and girls.

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New York City
July, 1949

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CHAPTER 1: design in american secondary education

From islands washed by the spray of the Atlantic Ocean to towering redwoods on the Pacific Coast, from the rolling wheat fields of Minnesota to the sunny orange groves of the far South, the doors of America's secondary schools stand open to all. For the first time in the history of man, and this only short years ago, a nation has as a matter of common practice provided the opportunity for all children to attend secondary schools. With all its failures and shortcomings, this is an achievement of truly heroic proportions.

Of profound concern in the planning of a new secondary school building is the architecture of ideas that shapes and forms the educational program for boys and girls. The design of American secondary education based on the credo that all shall have the opportunity to attend is rooted deep in the hopes and ideals of a free people. As with all designs in ideas based upon human rights and obligations, the pattern of secondary education is a living developing thing, reacting to changes in our way of living, changes in the desires and thinking of people, to keener insight into human nature and to increased technical know-how. Throughout, the design is strengthened by enduring principles tested for soundness against the unique requirements of a democratic society.

Schools as an instrument of society are expected to do two things. Since in a democracy the citizens make the major choices, it is important for our society that there be no falling off in ability of the citizens to make, on the average, reasonably wise decisions on subjects ranging from local road repairs to America's position in the world scene. There is hope that in the long run there may be some increase in the group wisdom, although the parallel increasing complexity of society makes this exceedingly difficult of accomplishment. And because democracy places great importance on the individual our society has expected schools to aid each child to develop to the limit of his abilities, his talents and skills, his ability to understand himself, his abilities to take successful part as a member of society, to get along with people and in all ways to be, so far as he is able, a useful, healthy, happy, competent individual in a democratic society.

These are simple but great goals, related basically and representing two facets of our way of life—the individual's responsibilities to society and society's responsibility to the individual.

From these purposes derive the more detailed objectives of the school. Training in citizenship, developing the ability to think, aiding children to learn to get along with others, developing in children healthy bodies and minds, developing good character, providing students with tools of learning so that skills can be acquired useful in later life, gaining of knowledge, learning to use leisure time profitably; these are among the tasks set for our schools.

There never was a time in which the quality of the individual citizen was of greater importance to the nation than the present. The world, since the impact of the Industrial Revolution, has been in the throes of great upheavals marked by economic chaos and world strife. Although differing interpretations of these events are made, we lack perspective for final judgment as to what actually is going on in world society. The increasing complexity of the world we live in, the fall of ideas and things thought indestructible, the fears and anxieties accompanying insecurity of outlook all place heavy premiums on the development of sound individuals with toughness of fibre and sincere devotion to our way of life. Too, America's position of leadership in the world of tomorrow will depend not upon numbers, for our population represents an increasingly smaller fraction of the world's, but upon the ability of our society to produce citizens of high quality. We cannot afford to waste any of our most precious resources.

The nature of our schools, and of secondary schools in particular, has changed not because the purposes of education have varied basically, but because America and the world in which the school operates changed and greater scientific understanding of the processes of education has painstakingly been acquired.

Compare the world of 1870 to 1900 with the present day! Automobiles changing the very way of life; airplanes traveling at speeds several hundred miles beyond that of sound; instant telephone and radio communication with any point on earth; television; and, capping all scientific advance, the unleashing of atomic energy by nuclear fission—for good or for evil—all these products of man's brains accomplished in relatively few years. It shall be many long years before we fully understand the effect of these changes upon human life, let alone making the necessary adjustments in our society. Mechanization of industry and agriculture, growing interdependence of the world, growing urbanization of the world, all brought problems that have been reflected in divergent political and economic ideologies in turn producing both hot and cold warfare.

The challenge to democracy is, perhaps even above the question of relative power and the issue of nationalism against world government, whether or not citizens will be able, with a thoroughness of understanding and insight not yet apparent, to make wise choices out of profound complexity. We cannot afford to make many mistakes.

Schools have of necessity reacted to changes in ways of living. The reaction in general has been overly slow and cautious, but here and there intelligent programs of broad implication have been set in motion and even the most stagnant school has perforce made some adjustments.

In the days of predominantly rural society, before the effects of industrialization and urbanization were really felt, children were an economic advantage to the family. Early in life, children were given important jobs to do around the farm or store. They were important in the life of the family and reflected in early independence, assumption of responsibility and the like, the demands that the family placed upon them. They felt that they belonged, had a place in the family. Difficulty of travel forced the finding of recreation in enriched family life. Oversimplified as this picture is, in the relatively simple economy and political situation of the time there can be no doubt that the home and the community played a major role in the education of children. The school task was simple, to teach the basic tools that were used in everyday life and to prepare the few, all of high intellectual ability, for the professions of ministry and law.

Today, with the growth of urban living and the mechanization of agriculture, the education that children formerly found on the farm, vocational, training in responsibility and sharing the work load with others has disappeared. Children are, economically, a luxury rather than an economic necessity. The automobile, which made driving thirty or forty miles to a movie house a simple thing, has along with other changes helped to mechanize the wholesome family life of other generations. The child, deprived of activities in the home that gave him an important part in family affairs and with the loosening of family ties as he grew out of infancy and dependency came to school a very different person than the one that the old-time school was prepared to educate in the narrow way in which its function had been defined.

Education was forced to take over to a far greater extent the job of helping the child to grow up, a task it shares with home, church, and community. It has been required, to cite probably the major change, to a far greater degree to give meaning, importance, and status to the work of children, something lost when the child changed from a working member to a resident of the home.

Much has been learned through scientific study and experimentation about the way in which people learn. The practical value of training the mind through exposure of all to Latin has been discounted as a means of getting the mind educated. Boys and girls learn to solve problems best when they are interested and the setting of the problem is lifelike. Transfer of training from one field to another is limited by the interest of the learner and by the closeness of the situations in which the transfer of training is to take place. In result, this facet of psychological development has forced a realism into the school program and an emphasis on the boy and girl taking part under condition of interest and meaning in situations reasonably similar to the adult situations in which what was learned in school will be put into practice in life.

The old-time school was a school for the intellect, attended on the high school level by those with high intellects. The community and home life

provided the rest. Schools increasingly are concerned with the combination of mind, body, character, and emotions that make up the child they are charged to educate. Schools, to do their task, are concerned that the child is happy, that the program has meaning and interest to him, and that he achieve a place for himself in the life of the school. Good education comes when the student is operating under the best conditions possible for him.

Finally, the democratic principles that are basic to the schools in this country require that all children, with their diversity of ability, talent, and background, be given full opportunity to develop to the best of their ability. As the high school moved from a program aimed at education of one type of student of high intellect and bookish inclination to educating all, it was committed to individualize its instruction.

Psychological research has proven the soundness of this position. The school as an instrument of society cannot throw into the discard human beings with ability and talent merely because they do not fit into the pattern of book learning traditionally that of the high school. Programs increasingly are broadened and deepened so that all students may obtain an education that will help them regardless of their level of ability or field of interest.

What are the directions modern secondary education is taking to meet these briefly outlined challenges? Some insight into the direction of secondary education in the years ahead may be gained from a study of educational patterns in communities most favorably situated with regard to financial support, climate of opinion, staff, etc., to discover those areas where the light of new insight shows the way to future advances. Studies by Mort, Vincent, and others in the field of adaptation of school systems are illuminating at this point.

In commenting in general about change from "surface education" to "depth of education" Mort and Vincent [1] have described these levels of significance of the school program.

> The first level is skills and knowledge level where the school is satisfied if it teaches a few facts, and the fundamental skills of communication. This is the 1900-model school. This kind of education is no longer satisfactory. Schools better than the 1900-model still teach skills and knowledge, in fact they teach them better but they have gone deeper than this surface level. They have dug into the second level, which is the level of talent development. Better schools . . . assess the tremendous differences in pupils' ability, background, talents and needs and they build far wider horizons in every area of human experience and understanding. They introduce into the life of the youngster those experiences which will make *him* individually fitted for the kind of life his native endowments have equipped him to lead.
>
> The third and deepest level, the level of personal and social competence is concerned with character, citizenship, thinking power. This level is to be found in a high degree only in the best of schools, where all the other levels have reached their highest development also. The school's work at this level will receive even greater expansion in the future as schools break down the walls which encompass them and spread out into the community, including in their educational designs experiences for pupils in local business and industry, in town hall and market place, in home and garden, in meeting place and board room, in church and social agency, on the farm and in the forest. For the modern school has designs on the community, to make its plant part of the school plant, to make its personnel teachers, just as the old "open" community used to be a rich place to develop character, citizenship, work competence, and the tools of common sense.

Vincent, in his book "Emerging Patterns of Public School Practice" [2] found that most favored schools in terms of financing, climate of public opinion, staff, and other factors were significantly in advance of general practice in a number of areas, based upon observed practices in differing types of schools. The favored schools offer helpful experience and directions indicating points of emphasis in school building planning. Most favored schools are characterized in contrast with least favored in several ways, three of which are summarized below:

I CONCERN FOR THE MASTERY OF BASIC SKILLS

The most favored schools teach the basic skills more effectively as they teach the skills in relation to their use. In addition, provisions for teaching pupils how to study are developed in realistic fashion and yield results.

II CONCERN FOR THE CONDITIONS OF CHILD GROWTH

The educational program in the more favored schools tends to provide students with opportuni-

[1] Mort, Paul R., and Vincent, William, *A Look at Our Schools*, New York, Cattell and Co., 1946, pp. 77-78.

[2] Vincent, Williams S., *Emerging Patterns of Public School Practice*, Bureau of Publications, Teachers College, Columbia University, 1945, pp. 49-56.

ties for much practical experience. Thinking is practiced in concrete situations, since it is known that the ability to think is much more specific to the situation than the old methods pre-supposed.

There are opportunities for the practice of activities that lead to emotional growth, for the pursuit of interests in varied fields that tend to reveal aptitude as well as extent and direction of growth. There are opportunities to practice home and family responsibilities, to practice vocational skills, and for practical participation in self-government.

Throughout the study, there are references to the locality—the study of the community, courses of study based on local materials, consideration of local personalities, study of and participation in local government and industries, trips into the community, and museums based upon collections made locally. Such tendencies reveal a possible trend which may in time completely change the school from what we now know it to be—the merging of the school and the community into a common curriculum, the extension of the school beyond the four walls that now largely hem it in.

As the school becomes a practicing laboratory for life-like activities there is a naturalness of the school setting which is engendered by the many purposeful undertakings that lend an air of reality and practicability to the work of the school—the projects, the problems, the conferring, planning, researching and building. This is the practice of teaching the tools of learning in relation to their use, the organization of reading in terms of interest, the provision of reading related to activities outside of school, the opportunities for practical experience. Speech has come into its own—it is used instead of suppressed. These trends reveal the emerging school as an environment purposefully set up for use in the development of desirable attitudes, concepts, character and behavior.

ATTENTION TO THE NEEDS OF INDIVIDUALS

Individualization of attention is put into effect in the most favored schools. The application of the principal of individual difference is to be seen in the teaching of the basic skills, in the variety of opportunities for the pursuit of interests along individual lines, in the individual approach to character development, as a major purpose of extended health services, in the vocations and in the whole extensive plan of individual diagnosis and guidance.

The findings reported above are based, not upon theory but on observed practices in most favored schools. As practices that in time will spread to the large majority of high schools rather than mere theoretical hopeful thinking, these conclusions deserve the most serious attention from those who will plan school buildings for the future.

Characteristics of a Modern High School Program

A recent systematic collection of practices in modern schools in favored communities affords an amazingly complete catalog of modern education.[3] The following section represents a condensation and abridgement of that report, selecting those materials of most direct concern in secondary school building planning. The headings represent "windows" through which various aspects of the modern school program can be viewed.

I TEACHING THE BASIC SKILLS

Many skills are taught in high school. For example, research skills in science and in the library are developed. In the shops, skills basic to ability to use wood and metal effectively are taught. Reading is taught in high school, both in terms of adding differing types of reading skills to the resources of the individual and also of providing remedial reading instruction.

The modern high school has given a new emphasis to speech skills and throughout the school building emphasis should be placed upon discussions, forums, dramatics, speeches, and public presentations.

Skills are developed with considerable attention given to realism and meaning so that, as far as possible, they are taught in relationship to use. Mathematics is applied through, for example, the use of surveying instruments rather than in abstract.

Interest and motivation are keys to success in acquiring skills.

II TEACHING THE BASIC FIELDS OF KNOWLEDGE

A great variety of printed materials is used in the modern high school. In some schools, each classroom is practically a library with vast supplies of pamphlets, newspapers both adult and student, magazines, clippings, and work of former students, as well as books. No single textbook suffices.

Records, moving pictures, models, collections,

[3] Metropolitan School Study Council, *What Schools Can Do*, the Council, Bureau of Publications, Teachers College, Columbia University, New York, 1944.

maps, slides, paintings, charts, blueprints, puppets, catalogs of points of interest in the community are included in the resources used.

In the community are many objects of study and a great variety of people with specialized knowledge available as resources of the school. Trips into the community and around to other parts of the country are common.

The school building is developed so that real productive work experience in a lifelike situation is possible. The cafeteria is used by mathematics and business preparation classes to study handling of money and accounting. The heating plant is one educational asset. Students help in the operation of the school. The laboratory, where experiences in lifelike situations are acquired, is the standard for the educational process. Community studies and investigations are made in the social science laboratory. School elections take on some adult characteristics, the more desirable ones, it is hoped.

Student interests are vital to the organization of the educational program and students participate with staff and public in developing the program of studies.

The work is organized to meet the varying interests and needs of pupils. Refresher courses for those needing help, courses for handicapped student, individual work, and group guidance are used.

III TEACHING THE PUPILS TO THINK

Lifelike situations are capitalized on where students must face problems, find solutions, try them out, and make meaningful decisions. In projects, clubs, hobby groups, children have many experiences in building, conferring, planning, designing, and deciding. Both actual and vicarious experiences are used in carrying out these projects.

Active investigations, obtaining facts and evidence, scientific techniques, research procedures are utilized in training for thinking and in stimulating creative thinking.

It is the teacher's task, many times, to create the atmosphere that will stimulate curiosity and interest which precedes the steps of thinking. The spaces of the building contribute heavily to the success of a good teacher in this undertaking.

IV EXPLORATION OF THE ABILITIES OF STUDENTS

Tests, records, reports, conferences, case studies, and particularly observation by competent teachers are used to find aptitudes. Qualities of leadership, talents of the arts, reading done, work in the shops, all are observed and acted upon by the good school. Aptitudes are also discovered by broad tryout experiences. The wide resources of the school building and the program, particularly in the club or informal educational program, offer time and place to try many types of activity. A high school with 2,000 pupils will have as many as 80 to 100 interest clubs of various types.

Opportunity is provided for developing skills in fields of creative expression and skills in the use of their fields on a spectator or audience basis for recreational purposes.

V DEVELOPING CHARACTER

Knowledge about character is drawn from biography and history, literature, works of art, and moving pictures. Desirable patterns of behavior are learned as a result of the student's repeated experiences in an environment which required him to use these habits over and over again. Students work together on projects or carry on self-government or practice in lifelike situations.

Provision of a wide variety of wholesome activities that are satisfying and of interest to the students in themselves contribute much to character development.

Students take part in determining how the school shall be run and in enforcing the regulations of the school.

Of prime importance is the effect on the student of the teachers with whom he works. Frequent individual conferences, small classes, leisure to get to know the student helps the teacher carry on this major task of education.

VI HEALTH AND SAFETY

The process of health examinations, carried on by nurses, dental hygienists and doctors, is closely related to the teaching of health in the classrooms. After location of remediable defects, the school makes certain that treatment and correction follow. Programs are adjusted, extra rest provided, and physical activities curtailed where such modifications are required.

Health and safety are taught in the classrooms, in the cafeteria, on the play fields, in the corridor, and on the way to and from school. Healthful living is practiced, with students actively organizing and planning, in all parts of the building and site.

The school environment is carefully planned for healthful and safe living for the students. Outdoor sports and recreation for all are vital parts of the school program.

VII PLANNING AND ORGANIZATION OF CURRICULUM FOR HOME COMPETENCE

Home competence is developed not alone in homemaking classes but in correlation with social

studies, science, shop, arts, crafts, mathematics, and language arts. Every girl and, in appropriate courses, every boy must be reached in the high school level. Laboratory experiences, in lifelike situations are developed so that competence in foods, clothing, child care, home management, and social living can be assured for the students.

Productive experiences such as in cafeteria management, gardening, decorating rooms in the school, giving parties and lunches, and caring for small children are part of the program.

VIII VOCATIONAL COMPETENCE

Opportunities must be developed for information, tryout, and experience covering all important occupational areas so that the aptitudes and interests of a wide variety of students can be served.

Visits to industry, a library of vocational information, moving pictures, and people who can provide background on occupations are used to provide information for students.

The modern high school realizes that all courses have vocational value and conscious efforts are made to develop skills necessary to successful vocational competence as well as tryouts and experience in vocational fields represented even in academic areas.

Shops are laboratories for the purpose of tryout and obtaining vocational skills in lifelike situations. To a large extent, the industries and businesses of the community are utilized in this aspect of the educational process.

IX DEVELOPING CIVIC COMPETENCE

Productive activities in the school and the community are used to develop civic competence. Innumerable opportunities are offered in the school for students to undertake and carry through activities useful to the school.

Many activities in the school are patterned after adult situations. Student self-government, student campaigns, and student councils serve as real laboratories in developing civic competence.

Techniques of discussion, group action, sharing responsibility for decisions and changes are used as well as all available printed material. Direct contact with civic officials and interested citizens contribute to the desired results.

X REGARD FOR THE INDIVIDUAL

Teachers and specialists work with individual children, not alone to teach facts, but to discover aptitudes, lead in developing thinking, aid in attaining civic and vocational competence, and develop character. A class of children is never taught. Only individual children learn and grow. Small classes, ample staff, and proper environment aid in this process.

The School Building and the Emerging Design of Secondary Education

We see but dimly into the future. Secondary education, at present in need of clarification and redefinition, particularly presents problems in anticipating in detail the direction it will take. The foregoing section hinted at directions by showing areas in which unusually good high schools differed significantly from run-of-the-mill schools. We can hazard a few guesses as to developments that may be of value in planning school buildings, exercising all the caution that is required in examining predictions, yet not allowing caution to blind one to progress.

1. USE OF THE OUT-OF-DOORS

If there is one aspect of future secondary school programs that can be predicted with reasonable assurance, it is that the out-of-doors will increase tremendously in significance in the educational pattern. The research stresses the need for realism, the psychological discoveries point to the importance of experience in giving meaning, changes in our way of life have shown the gradual uprooting of children from the soil until now a major task of the school is to help boys and girls re-establish contact with earth and nature. Work experience, lost to children as the move to urbanization got under way until now many grow to youth without ever having been tired by manual labor, has grown increasingly important in the school program on the high school level. The importance of learning to get along in rough country, to try out one's powers of endurance and skill is denied by urban environment.

The school of the future will generally provide stimulating educational experiences out-of-doors. Vocational and general educational programs will utilize out-of-door facilities. Large sites with a variety of natural features are required. Farms, nurseries, gardens, construction activities, outdoor classrooms, outdoor dining areas, landing fields,

ponds, streams, outdoor amphitheaters, building of model villages, soil conservation, study, etc., will be found. One precaution, observed at an early stage in the planning process that will pay dividends in the future, is the acquisition of school sites of large enough size to allow for the gradual development of the outdoor program. It is the least expensive educational space that can be bought.

In addition to or in place of such sites, schools will increasingly operate year-around school camps or farms at a distance from the main school plant and the community.

Such camps, of which a number are now operating, will allow for study in the fields and woods of many factors now studied third or fourth hand out of books. Learning to live together, understanding of differing ways of living, study of conservation, farm sociology, and rural economy will be made available to youth. An ideal school program should probably operate in a different environment each year with one year in the mountains, another in the wheat country, a third on the coastal plains. A camp, operated by the school system, affords an opportunity of great importance to savor some of the differences that make this country great.

2. CHANGING CONCEPTIONS OF THE CLASS

A review of the practices actually in operation in modern secondary schools as cataloged in the preceding section will suggest the wide gap that exists between the read and recite program of the textbook schools and the rich program of the modern school. The classroom will more and more resemble a laboratory with observations, materials, evidence, and experiences gained from a wide variety of sources in the room, the school, the grounds, or the community. The classroom will serve as the place of study of all the evidence or material gathered, of group discussions, of dramatic presentation, and of displays. There will be greater reliance upon original documents and studies than upon rehashing in texts. The teacher may work with one, ten, fifteen, twenty, or thirty students, depending upon what is under discussion and what plans have been made. Large groups may get common introductions or learnings about problems that are suitable to lecture or moving picture presentation. The United Nations may be observed in action on television by 500 students at a time. Our idea of standard size classes may well change to adaptation of numbers of students to the problem at hand.

3. THE VARIETY OF RESOURCES

A secondary school that discovers the talents, interests, and aptitudes of its student body, and then directs an individualized program so that each student has the opportunity to develop those talents to the limit of his ability, must provide opportunities for its students to use an enormous variety of resources. On the one hand its library must satisfy youth with wide ranging interest in books, its science laboratory stimulate boys and girls with aptitude in science to go far beyond ordinary high school science, some into the field of original scientific research. The art studios, the music rooms, shops, dramatics, work spaces, radio studios, social science laboratories, work rooms, home arts studios, and gymnasiums must all be developed so that all conceivable types of students shall have their opportunity.

Not only should there be wide range of resources but also varying depth of experiences in each area. The science laboratory should provide space for the youthful scientist who in time may make startling discoveries on the frontier of his field. At the same time, with equal care and solicitude for his development and training, space, equipment, and staff, time should also be available for the training of laboratory technicians and laboratory cleaners. No work, for which a student is fitted, shall be beyond or beneath the level of attention of the school.

In large cities, where the numbers of students make specialization and provision of variety of resources possible on a scale far beyond that of a single or small group of high schools, specialized high schools have been established. New York City has established a large number of such schools including a High School of Science, Music and Art, Machine and Metal Trades, Food Trades, Homemaking, Aviation, Technical High School, Industrial Art, Textile, Needle Trades, Automotive Trades, and similar schools. A report, "Specialized High Schools in New York City," [4] is most illuminating in pointing out the place of specialized schools in the large city.

There has been a recent cooperative development among school systems in which high schools have allocated the areas of specialization so that one high school, offering a wide range of experience as well, would carry its work to a high degree of

[4] Board of Education, City of New York, *Specialized High Schools in New York City*, The Board, 110 Livingston Street, Brooklyn 2, New York, 1946, 264 pp.

specialization in certain fields whereas other areas would be similarly developed in other high schools in the same geographic section. In this fashion wider varieties of resources are made available than would be possible in any one school.

Finally, the modern secondary school to an increasing extent will supplement the resources of the school with those of the community. The industries and offices, stores and warehouses, artists, shopkeepers, labor leaders, artisans, industrialists, and public servants, all will be on the staff and part of the plant of the school. The well-planned school will be provided with spaces in the school plant to germinate and care for the ideas gathered and lessons learned in the community.

Community Use of the School

The high school of the future will be busy day and night with a wide variety of activities for adults. Increasingly, space should be made available for day activities of adults in the schools. San Francisco's vital adult education day program shows the force of such an endeavor. The program for adults will test the variety of resources available in the school plant. Increasingly, facilities of the school will be directly used in the work of the community. The knowledge, skills, and equipment of the school are now used to help farmers in many communities repair their own equipment. The laboratories of the school can be of assistance to industry; the library and the research of students of value to municipal government. Fulcomer's study [5] shows a variety of additional ways in which communities have used the educational plant and staff to mutual advantage.

Education Is Becoming Increasingly a Clinical Service

The secondary school of the future will be even more closely concerned about the good health of its students, health in body and mind. To that end its medical and dental services will be far more intensive and thorough. It will employ adequate staffs of trained counselors, psychologists, and psychiatrists. The work of specialists in medicine will be closely correlated with specialists in the mental health field.

The increasing variety of offering and the heightened interest in the development of each student to the best of his ability will require greater knowledge, closer contact, frequent evaluation of progress, and far better counseling at every step. Only such services, in which the teacher plays a vital part, enable the school truly to individualize its work with boys and girls.

The Entire School Plant Has Educational Value

The secondary school of the future will not be a string of educational cells connected by passageways and serviced anonymously. Corridors flanked by school shops, student government offices, display areas, and exhibition areas will be educational features of strategic importance. Cafeterias, no longer of the eat and run type, will have important educational functions. Here students will put into practice good eating habits, courtesy, and consideration of others. Luncheon time will be a social occasion, a time for meetings of groups for discussions of mutual problems. The cafeteria will take on adult characteristics.

Students will learn and participate in the operations and maintenance of the boiler room, the heating and ventilating system, and scientific cleaning of the school.

Service for Out of School Youth

The high school of the future will not consider its job done when the student graduates or drops out. Its contact with students will remain through extended guidance services, adult programs, and research into the success of its program in terms of adjustment of former students in the adult world. The high school will be ready to aid the former student in providing additional training to upgrade him in his work, to retrain him if necessary, to provide the helping hand as vocational or personal problems arise to plague him.

[5] Fulcomer, Edwin S., *A Study in Changes in American Community Life and Education Affecting the Planning and Utilization of Secondary School Buildings with Reference to Their Use as Community Centers.*

Some schools may well provide centers in the secondary school plant for out-of-school youth, to serve in counseling and also, possibly, as a recreational or social club. Here, in an informal atmosphere, the school can exercise its influence and aid in making the transition from school to adult life.

Services for Students

Increasingly, the informal social activities of students will be utilized in the school program for the development of ability to get along with others and to develop in students an ease in social relationships of real importance to adolescents and of much value in later life, vocationally as well as socially. There will be time in the school day, instead of crowding every hour with scheduled activities, so that practical experience along these lines can be gained.

Perhaps the gradual introduction of student lounges equipped with a soda fountain and recreation rooms, housed in connection with student offices, will become a regular and important part of the secondary school.

Student offices will center around such activities as student self-government with its legislative, executive, financial, in some cases judicial, police, and other functions; the publishing business with newspapers, periodicals, and yearbooks, all student operated; financial and commercial operations such as stores, banks, research organizations, insurance companies; semi-public institutions for the operation of concessions at athletic events, bicycle parking and similar organizations; and production industries such as printing, bakery, and auto shop. It will not be unusual for the cafeteria management, for example, to ask a student research company to undertake a poll of opinion of a sampling of the student body to use as a guide in preparation of menus. When specific problems arise in the school, a student organization can be set up to meet it. The student council as a governing agency can provide real experiences in the relationship between student government and student enterprises of great importance in understanding the meaning of national issues.

In this area, developed in part by the Winnetka, Illinois, Junior High School, for example, there is opportunity to create lifelike situations important to the learning process in an atmosphere of meaning and interest to students. There is probably no better training for citizenship than meaningful participation on the part of students in self-government.

CHAPTER 2: types of high schools and their purposes

The rapid growth of the American high school is often referred to as a phenomenon unparalleled in education. The American people have committed themselves to a policy which provides free public-supported secondary education for all who wish it. No other nation in the history of the world has assumed such a responsibility. From 1890 to 1940 the high school enrollment of the country practically doubled every 10 years. The estimated total for 1941-42 runs over 7,900,000, a figure which is over 11 times the estimated 700,000 of 1900. The number of high schools reported to the United States Office of Education in 1942 was 25,123, a decrease of 344 from the number reported in 1938. This has been caused by the consolidation and elimination of the smaller high schools. In 1938, the last year for which complete statistical details on public high schools are available, these schools employed a professional staff of 314,290 persons. Moreover, it is established that by 1936, 65 percent of the 14 to 17 year age group was enrolled in secondary schools. In 1900 only 3.3 percent of the total public school enrollment was in secondary education, while in 1930 the percentage had risen to 17.1, and in 1934 the figure was 21.4 percent. The total number of public high schools of all kinds reporting to the United States Office of Education was 22,237 in 1930, 23,213 in 1934, 24,590 in 1938, and 25,128 in 1942. Table 1 presents the growth in the number of high schools by enrollment classifications for the years 1930, 1934, and 1938.

TABLE 1. Number of High Schools According to Enrollment Sizes, 1930, 1934, and 1938*

Size of Enrollment	1930		1934		1938	
	Number	Percent	Number	Percent	Number	Percent
10– 24	2,077	9.4	1,470	6.3	1,372	5.6
25– 49	3,866	17.4	3,139	13.5	2,643	10.7
50– 74	3,521	15.8	3,364	14.5	3,051	12.4
75– 99	2,543	11.4	2,795	12.0	2,661	10.8
100– 199	4,603	20.7	5,594	24.1	6,407	26.1
200– 299	1,633	7.3	1,964	8.5	2,561	10.4
300– 499	1,478	6.7	1,696	7.3	2,271	9.2
500– 999	1,421	6.4	1,740	7.5	1,940	7.9
1,000–2,499	934	4.2	1,219	5.3	1,444	5.9
2,500 or more	161	.7	232	1.0	240	1.0
Total	22,237	100.0	23,213	100.0	24,590	100.0

* U. S. Office of Education, Biennial Survey 1937–38, Bulletin 1940, No. 2, Chap. V, Washington, Government Printing Office, 1940, pp. 5–6.

Among the largest high schools in the country several interesting trends are apparent. In 1934 there were 40 high schools with enrollments of over 5,000 each, while the number of such schools had increased to 50 in 1938. However, no single high school in 1938 was as large as the largest in 1934. The average enrollment of the 50 largest high schools in 1938 was 6,700, as compared to 7,500 for the 40 largest in 1934. Among the 50 largest schools, 32 were located in New York, 7 in California, 6 in Illinois, 2 in Pennsylvania, and 1 each in Indiana, Arizona, and Oklahoma. Thirty-five of the 40 largest in 1934 were still among the 50 largest in 1938. The development of evening high schools was

an important factor in raising the total number of largest high schools from 40 to 50 during the four-year period under consideration.

In view of this phenomenal growth, it is not surprising that the problem of providing sufficient building facilities has grown to critical proportions. It would be a mistake, however, to assume that the only factor conditioning the construction of high school buildings is the rapid growth in enrollment from the normal age groups. Other factors exist which make high school planning an exceedingly complicated task. The cosmopolitan character of the current school population, extension upward of secondary education to include post-graduate offerings and the junior college, extension downward to include the work of the junior high school, and increased emphasis on guidance, health, vocational education, and social orientation are additional factors which have entered into the larger sphere of influence under consideration.

Types of High Schools by Organization

On the secondary school level there has been an interesting range and variety of organizations. According to the Biennial Survey of Education for 1934-36,[1] the following types of high school organizations were operating in the United States in the indicated numbers:

Segregated Junior High Schools:		
Grades	6-7	2
"	6-8	71
"	6-9	7
"	7-8	192
"	7-9	1,457
"	7-10	189
"	8-9	22
"	8-10	8
	Total	1,948
Segregated Senior High Schools:		
Grades	8-11	2
"	9-11	55
"	9-12	140
"	10-11	4
"	10-12	546
"	11-12	8
	Total	755
Junior-Senior High Schools:		
Grades	6-7, 8-11	12
"	6-8, 9-11	16
"	7-8, 9-12	1,022
"	7-9, 10-12	1,309
"	6-8, 9-12	19
	Total	2,378
Undivided High Schools:		
Grades	7-11	42
"	8-12	104
"	6-11	10
"	7-12	1,402
	Total	1,558

From the tabulation, it will be noted that the largest number of segregated junior high schools is inclusive of Grades 7 to 9, that the most numerous type of segregated senior high school is inclusive of Grades 10 to 12, that the most frequently occurring type of junior-senior high school covers Grades 7 to 9 and 10 to 12, and that the most common type of undivided high school includes Grades 7 to 12. It may also be noted that the most numerous of the types of high school is the junior-senior high school with a total of 2,378. When this figure is added to the number of undivided high schools, the total mounts to 3,936, or 59.2 percent of high schools of all kinds. In 1938 three-fourths of all the high schools in the country were to be found among the 3-year junior high schools, the 3-year senior high schools, the 3-3-year junior-senior high schools, and the 6-year undivided high schools. In view of the predominance of the grade range from 7 to 12, the question may well be raised as to whether organization of secondary education is tending toward standardization. Is the traditional 4-year high school, which was standardized in the past, being superseded by a 6-year high school, which itself is in danger of becoming standardized?

Planning in Recognition of Local Needs

No evidence is available that this question may be answered in the affirmative. In fact, it may be noted in the previous tabulations that within each type of secondary school there exists a wide range of grade inclusions. For example, the term *Segregated Junior High School* may refer to any one of eight types of grade organization. The same situation is true to a somewhat lesser degree for each of the other three classifications. Moreover, widely expressed and accepted professional opinion holds that the several differences in organization do not necessarily indicate differences in administration, in curriculum, in function, or in purpose. In other words, the organization of a school does not indicate what is going on within its doors or that the school is patterned after any widely accepted standard. However, it may be recognized that the variety of existing organizations indicates the degree to which

[1] U. S. Office of Education. Biennial Survey of Education, 1934-36. Trends in Secondary Education, Bulletin 1937, No. 2, Chap. II, Vol. I, Washington, Government Printing Office, 1937, pp. 10-11.

local school systems are aware of the need for developing a high school which gives promise of fulfilling the studied aims and objectives of secondary education in the local school system.

This generalization lends weight to the growing practice of proceeding to the reorganization of secondary education only after a complete survey of the local community. Such a survey analyzes the social environment, identifies its characteristics, states desirable objectives, and plans building facilities consistent with developing needs. The school plant is an important conditioning factor in every program of education. Moreover, the longevity of the typical school building is such that once erected it will limit or facilitate a program of education for years to come. It is imperative that high school buildings be planned with a long view to the future and with sufficient flexibility to permit any reorganization indicated by application of the survey technique.

Rise of the Junior High School

The junior high school came into existence as a result of an effort to compensate for the deficiencies of the traditional 8-4 plan of organization. It was widely recognized that the 8-4 segregation of elementary and secondary education was at best but a fortuitous compromise between two contending types of organization inherited from Europe. It was apparent that large numbers of pupils were being eliminated from school at or near the ninth grade level. The old grammar school curriculum was inelastic and ill-adapted to the needs of the adolescent years, individual differences were practically ignored, an all but insurmountable gap existed between elementary and secondary education, and the purported benefits of departmentalization and teacher specialization were beyond realization under the 8-4 plan.

Accordingly, it was conceived that it would be advisable to organize curricula and courses of study and erect buildings which recognized the nature of children at adolescence and provided specifically for their several varied needs. It has been urged that this type of organization bridges the gap between elementary and secondary education and tends to eliminate the problem of drop-outs during the adolescent years, makes possible a more adequate enrichment of curricula and courses of study, provides better for individual differences and makes for increased teaching efficiency through departmentalization and specialization, and encourages the exploratory and guidance services requisite to continued learning experience. That the junior high school has developed a certain degree of proficiency in the accomplishment of these objectives cannot be denied. That it will continue as an organizational factor to be considered in the planning of building facilities also appears to be evident.

The Function of the Senior High School

The more specific purposes and objectives of the senior high school have been developed somewhat as a corollary to those of the junior high school and have been modified for similar reasons. Since an accepted function of the junior high school is to bridge the gap between elementary and secondary education, the senior high school is concerned with maintaining the continuity of secondary education through systematic planning with reference to the needs of individuals. Since the junior high school is concerned with the exploratory function of education, the senior high school is concerned with such specialized and terminal curricula as will prepare youth for induction into employment and higher education. It is recognized, however, that a major responsibility of the senior high school is to continue and to enrich general education, and that only such terminal courses should be offered as are indicated by the matured and advised choices of individual students. The present and the indicated future demands of industrial, business, professional, and social life are additional controlling factors in the determination of these aims and facilities.

EXPANDING HIGH SCHOOL SERVICES

Moreover, the senior high school is increasingly concerned with the function of providing for the needs of post-high school youth and of the adult population. Increasingly, it is broadening the scope of its services in a manner which takes on the characteristics of an educational service center for the entire local community. Shops, laboratories, gymnasiums, auditoriums, and all other physical facilities are being adjusted to the needs of these activities. While the adult population is coming into the

high school for educational service, the school is also moving out into the community as a functional institution. Through health and social service and the home project, the high school is becoming a moving force in the home. By similar means, and in order to perform like functions, it is making contacts on the farm, in the factory, in business organizations, and in the professions. The hard-and-fast time schedules which have fettered the work of the high school in the past are being supplanted by a more elastic and functional arrangement which permits close integration with the community. This conception of function bids fair to revolutionize the curriculum of the high school. It calls for drastic revision in the planning of building and other physical facilities.

IMPLICATIONS OF YOUTH SURVEYS

It is a significant fact that youth themselves have been inclined to regard the value of secondary education lightly. In the various recent youth studies, little evidence was available that youth considered high school education essential to earning a living or to living a fuller life. On the other hand, these same youth surveys have shown that there exists a lack of the elements essential to effective living in a democracy. From one-third to one-half of rural youth had dropped out of school because the work was too difficult. Most of them felt stymied in dead-end jobs. As high as 86 percent of them did not belong to any club. Library facilities were not available to 56 percent of rural white youth, or to 96 percent of rural Negro youth. There existed a dearth of opportunities to meet the opposite sex. Three-fourths of the boys and one-half of the girls had never considered marriage. Their contemporaries constituted the chief source of sex information. As high as 16 percent of youth had never gone to a dentist in their lives. In short, the same youth which professed to see little value in high school education, demonstrated a pressing need for service in education, employment, recreation, health, home and family life, and other areas of service commonly accepted as objectives of secondary education.[2]

Two generalizations derive from these facts. First, youth have not been led to understand or appreciate the educational opportunities offered them. Second, despite recognized progress, the school is not a controlling force which coordinates all community organizations in service to youth. It may therefore be expected that the purposes of secondary education will be cooperatively revised to recognize the expanded field of service. Youth will be included in the planning activities, and facilities will be arranged so as to attract young people to the possibilities for continuing self-improvement.

[2] Lister, J. J., and Kirkpatrick, E. L., *Rural Youth Speak*, Washington, American Youth Commission, 1939, 96 pp.
See also Bell, Howard M., *Youth Tell Their Story*, Washington, American Youth Commission, 1938, 273 pp.

The Small High School

The small high school, despite its known inadequacies, continues to flourish in American education. Although it is generally recognized that a worthwhile program of secondary education cannot be developed with small enrollments and meager facilities, the fact still remains that large numbers of small high schools exist and that new ones are being brought into existence in substantial numbers in many parts of the country. Local pride, the desire of parents to keep their children near home, and a local failure to comprehend the factors which constitute a satisfactory high school program are influences which operate to maintain small high schools in many places where consolidation would serve recognized purposes to better advantage. As late as 1938, there were 4,015 high schools in the United States, or 16.3 percent of the total, with enrollments of less than 50, and 1,372 high schools, representing 5.6 percent of the total, with enrollments of less than 25. Table 2 presents comparative figures on the size of high schools by enrollments for a representative 8-year period.

TABLE 2. Size of High Schools by Enrollments for the Eight-Year Period, 1930 to 1938*

Size of School by Enrollment	1930		1934		1938	
	Number	Percent	Number	Percent	Number	Percent
10– 24	2,077	9.3	1,470	6.3	1,372	5.6
25– 49	3,866	17.4	3,139	13.6	2,643	10.7
50– 74	3,521	15.5	3,364	14.5	3,051	12.4
75– 99	2,543	11.5	2,795	12.0	2,661	10.8
100–199	4,603	20.7	5,594	24.1	6,407	26.1
200 or more	5,627	25.6	6,851	29.5	8,707	34.4
Total	22,237	100.0	23,213	100.0	24,841	100.0

*U. S. Office of Education, Biennial Survey of Education, 1938–40, Washington, Government Printing Office, 1943, Vol. II, Chap. I, p. 16.

DECREASES IN SMALL HIGH SCHOOLS

It should be recognized that the extension of efficient high school education, with the accompanying facilities, to all of the children within a state causes many difficult administrative problems. It may also be recognized that it is a practical impossibility to create finally a high school system on a country-wide basis which will not be handicapped in any of its local units by excessively small enrollments. However, it may be assumed that because of the recognized advantages of the larger high school, because of improvement in transportation facilities, and because of the continued pressure of intelligent educational planning, the number of small high schools will decrease despite the steady increase in total secondary school enrollment. This tendency is clearly evident in Table 2. It may be noted that the number and the percentage of smaller high schools decreased definitely during both 4-year periods presented. It is also evident that the larger schools increased substantially with regard to both numbers and percentages and that the largest increases were apparent in the classification having enrollments of 200 or more.

With the phenomenal growth in the total high school enrollment of the country, it is not surprising that the smaller high schools have increased in size. As a matter of fact, rural high schools showed a 53 percent increase in enrollment during the 4-year period 1930-34, while urban high schools increased only 17 percent. When this fact is associated with the data in the previous table (Table 1), it becomes apparent that secondary education is being offered in areas where it formerly did not exist, without increasing the number of small high schools. A fair summary of the situation is that even though an ever-increasing proportion of the children of high school age are attending school and high school facilities are becoming rapidly available in new areas of the country, the actual number of small high schools is decreasing steadily.

STATE AID DISCOURAGES SMALL HIGH SCHOOLS

However, this situation is not the only one which must be taken into account in explaining the tendency toward larger high schools. Many states, including Arizona, Arkansas, California, Illinois, Kentucky, North Carolina, Ohio, Oklahoma, Pennsylvania, Tennessee, Texas, Washington, and Wisconsin, have conducted state-wide surveys looking toward consolidation and other lines of cooperative action for increasing the size of units and the general efficiency of the high school system. State laws, both optional and mandatory, have been passed in order to provide tuition and transportation for students in rural areas. Although the funds for these expenses must be raised from local sources in most cases, the net effect of this legislation has been to eliminate the purported necessity of building small high schools in isolated and sparsely populated districts. Other states have passed laws which not only increased state aid to high schools but also make the payment of such state aid dependent upon a minimum enrollment or average daily attendance. Oklahoma, North Carolina, Tennessee, and Maryland are states which have enacted this type of legislation. Further, state departments of education and other accrediting authorities are inclined to refuse official recognition to high schools which are considered too small for effective operation. Since state aid, in most cases, is dependent upon recognition by the proper accrediting authority, the net effect is to discourage the continuance of very small high schools and prevent the organization of new ones.

LIMITED SITES OF SMALL HIGH SCHOOLS

Because of the wide range of physical facilities used in small high schools, it is difficult to construct meaningful generalizations regarding site, plant, and equipment. However, available research indicates that the adequacy of physical facilities tends to vary directly with the size of school enrollments. Among the smaller high schools, the smallest typically have the poorest physical equipment. Even in rural areas, where it might be supposed that abundant acreage would be available for schools at reasonable prices, the sites for high school plants are very small. Large numbers of them do not provide sufficient space to accommodate the usual secondary school sports. In the past at least 10 to 12 acres have been considered essential for high school sites, yet of 447 small high schools reporting in 1932, a group of 71 possessed a median site of 1.7 acres, 78 of 2.8 acres, 98 of 3.5 acres, 95 of 4.1 acres, and 105 of 4.9 acres, while the median site of the whole group was but 3.4 acres.[8] Significantly enough, the smallest classification of schools by enrollments had the smallest median site,

[8] U. S. Office of Education, The Smaller Secondary School, Bulletin 1932, No. 17, Monograph No. 6, Washington, Government Printing Office, 1933, p. 86.

1.7 acres. Although the median size of the site increased as the classification of schools by enrollments became larger, the median site of no reporting group was as much as half of any widely accepted minimum for high school purposes. A large majority of high schools with enrollments of less than 150 share their grounds with local elementary schools. Such a practice is desirable if sufficient acreage is provided to serve both groups or to develop a community campus. The practice of sharing small sites with elementary school offers, however, a serious handicap to the physical education programs of the small high schools.

PAST INADEQUACIES OF SMALL HIGH SCHOOLS

Because of the failure to provide sufficient land area, few small high schools maintain gardens or the numerous outdoor activities recognized as essential in the program of a modern high school. Special rooms and special services are frequently missing. Library space and library materials fall short of even minimum needs. When enrollments are small it becomes difficult, except at disproportional costs, to include laboratories, shops, swimming pools, activity rooms, auditoriums, libraries, gymnasiums, and music rooms in the planning of a building, unless used for adult or extensive community programs.

DECENTRALIZATION OF URBAN CENTERS

The trend of population toward urban centers is gradually slowing down. Considerable decline in urban population has been shown in the 1940 census. Village and rural population will continue to grow and spread over large areas. It may be argued that young people may be best educated in the environment to which they are native. The use of transportation and dormitories which take children away from their homes for purposes of education in larger high schools may defeat one of the major purposes for which society maintains schools. If a major purpose of education is to develop young people for more effective living in their respective social environments, the consolidation of school districts and concentration of school pupils in larger school centers may conceivably be carried too far. The character of the high school to be provided in the light of population changes and the social and economic complications of the present day should be a matter of intensive study for any community planning new building provisions.

IMPORTANT CONSIDERATIONS IN PLANNING SMALL HIGH SCHOOLS

In the interest of economy and educational efficiency, the number of small high schools should be reduced to a minimum. The possibilities of consolidation, the difficulties of transportation, the accrediting program, and the amount of state aid assist in making a decision. Langfitt, Cyr, and Newsom [4] are impressed with the possibilities for service in the small high school with an enrollment of less than 100. Through comprehensive surveys, state school planning authorities should first establish the need for and the exact location of desirable small high schools. The local community must be analyzed to determine the specific ends to be attained. Curriculum problems and school services should be considered coincidentally with problems of plant and equipment. Sites should be selected and buildings planned only in relation to function. The school should be typical of the community setting in which it exists. It should take on more of the characteristics of the home and of the farm, together with the other elements which are component parts of the constituent territory. Guidance, recreation, health, and transportation facilities should receive the same attention these services merit in planning for larger schools. The out-of-doors should be used maximally in planning the school and in the normal activities of the children. If the local community is unable to finance such a school, the state and federal governments are justified in providing the necessary capital outlay and funds for effective operation. Society can no longer afford to ignore the educational needs of remote and isolated sections of its population. The small high school has an important service to render.

The Community School

The community school concept appears to be of especial significance as it may be related to the services possible in connection with the small high school. Research and practical experience in planning modern educational facilities for children and youth reveal that no basic or insurmountable conflict exists between the needs of the child and of the adult. It is also established that educational facilities other than the schools are not sufficiently available

[4] Langfitt, R. E., Cyr, F. W., and Newsom, N. W., *The Small High School at Work*, New York, American Book Co., 1936, 600 pp.

to the adults of rural and isolated communities. Despite the growth of such organizations as the Farm Bureau, the Home Bureau, and the 4-H Club, and the spread of health services, circulating libraries, rural electrification, and rehabilitation projects, there exists a void in the social, recreational, vocational, and educational lives of areas which might logically be served in these capacities by the community school.

Although it may be recognized that the school is not the only agency in society obligated to serve adult needs, it is increasingly recognized that the school may be more functional in the solution of adult problems. Five general categories of the educational problems of adults have been identified as follows:[5]

1. Adults are faced with socio-civic-economic problems.
2. They are concerned with their homes, home lives, and personal living.
3. Adults need recreation and relaxation after their rather mechanized daily work.
4. Vocational adjustment, readjustment, and advancement become important issues to most people.
5. There are specific groups of people who need the fundamental tools for participation in our society.

The community school is by no means a new development in American life. Pioneer settlements were much inclined to the use of school buildings for social and recreational purposes. Spelling bees, religious services, town meetings, elections, and a various selection of other community activities were centered in the local school. However, as modern life became more complex, the gap between the school and the community became wider. Although many elements contributed to this schism, it is clear that the institutionalized character of school houses acted as a barrier between school and community. There existed little desire on the part of adults to return to the school, and facilities were not such as to accommodate their needs even if they were so inclined.

Integration of School and Community

The foundation of the democratic way of life is in the small local community. Democracy will prosper in the small community to the extent that it studies, discusses, plans, and acts as an integrated unity. The small school has a peculiar opportunity to lead in this field. It must be planned as a recreational and health center. Vocational, rehabilitation, and guidance services must be provided. The library must serve the community as well as the school children. Provision for social gatherings of all kinds may be provided in the building and on the school premises. Auditoriums and outdoor theatres should be planned for these purposes. Choral, band, and orchestral facilities are essential. The school may well be a food, clothing, and home demonstration center. A community museum is a practical project. In short, the areas of possible service are legion. To be most effective such a program must be developed cooperatively in the local community. It seems clear that if the small high school is to justify its existence, it must associate itself intimately with all phases of living in the community it serves.

Consolidation

Although the consolidation of school districts is an influence making itself felt throughout the public school system in all parts of the country, it is significant that the movement is somewhat stronger at the secondary level than at the elementary level. Table 2 presents a comparison of figures for the two years 1930 and 1940.

TABLE 3. Number of Schools of Various Sizes and Types in 915 Rural Districts in 1930 and in 1940*

Type and Size of School	Number of Schools		Difference	Percent of Increase or Decrease
	1930	1940		
Elementary Schools				
1 teacher	41,008	32,664	−8,344	−20.3
2–4 teachers	7,828	7,232	−599	−7.6
5 teachers or more	1,580	1,876	+296	+18.7
Combined Elementary and High Schools				
1–4 teachers	1,549	989	−560	−36.2
5–19 teachers	3,227	3,317	+90	+2.8
20 teachers or more	234	392	+158	+67.5
Separate High Schools				
1–4 teachers	298	215	−83	−27.9
5–19 teachers	585	774	+189	+32.3
20 teachers or more	76	104	+28	+36.8

* N.E.A. Research Bulletin, Progress in Rural Education, Vol. XVII, No. 4, September, 1940, p. 149.

[5] Engelhardt, N. L., and Engelhardt, Jr., N. L., *Planning the Community School*, New York, American Book Co., 1940, p. 4.

From the preceding table (Table 3) it may be noted that the number of combined elementary and high schools with less than five teachers showed a decrease of 36.2 percent during the 10-year period, that the group having 5 to 19 teachers increased 2.8 percent, and that the group having 20 or more teachers showed the remarkable increase of 67.5 percent. Among the several types of separate high schools, the group having 1 to 4 teachers showed a decrease of 27.9 percent, the 5 to 19-teacher group an increase of 32.3 percent, and the group identified by 20 or more teachers an increase of 36.8 percent. Thus, by observation, it is apparent that the number of small high schools is decreasing more rapidly on a percentage basis than the small elementary schools, and, generally speaking, the larger high schools show a more rapid percentage increase in number because of consolidation than do the larger elementary schools. Although the above data have been compiled from a sampling of 915 rural school districts, the trends may be accepted as indicative of the shifting national situation.

As previously pointed out in the discussion bearing specifically on the small high school, there are limitations beyond which the further consolidation of rural schools would be socially unwise. Because of local values which may not be destroyed without damage to select rural communities, doubtless there will always be a need for a considerable number of small schools at both the elementary and the secondary levels. Therefore, the question may well be raised: "Is consolidation approaching the point beyond which it may not go in reducing the number of small schools?"

In an attempt to answer this question, 521 county and other rural superintendents were asked to set forth a comparison of the number of schools now in operation with the number they conceived to be an ideal arrangement. Table 4 presents these comparisons together with the indicated percentages of increase or decrease.

From the table below (Table 4) it is apparent that if the ideal conditions visualized by these superintendents could be brought about, the total number of schools would be reduced by 47 percent. While the total number of combined elementary and high schools would be reduced by only 17 percent, the two smaller types of schools would be reduced by 63 percent and 22 percent respectively, and the group made up of 20 or more teacher schools would be increased by 133 percent. In the case of the separate high schools, the total number would experience no change. The two smaller classifications by number of teachers would be decreased by 41 percent and 11 percent respectively, and the number of 20 or more teacher schools would be increased by 169 percent. Including all kinds of schools represented in Table 4, the number of schools in the three largest classifications would be practically doubled, while the number in the three groups of smaller

TABLE 4. Amount of Further Consolidation Recommended for Their Respective Counties by 521 Rural Superintendents*

Type and Size of School	Number Now In Operation	Number Recommended	Percent of Difference
Elementary Schools	**21,882**	**10,575**	**−52**
1 teacher	16,701	6,108	−63
2–4 teachers	4,190	2,659	−37
5 teachers or more	991	1,808	+82
Combined Elementary and High Schools	**2,721**	**2,267**	**−17**
1–4 teachers	544	201	−63
5–19 teachers	1,942	1,519	−22
20 teachers or more	235	547	+133
Separate High Schools	**544**	**544**	**0**
1–4 teachers	105	62	−41
5–19 teachers	388	345	−11
20 teachers or more	51	137	+169
Total	25,147	13,386	−47

* N.E.A. Research Bulletin, Progress in Rural Education, Vol. XVII, No. 4 September, 1940, p. 150.

schools would be decreased by approximately 60 percent. It should also be noted that the percent of increase recommended for larger high schools, and for larger combined elementary and high schools, is in each case larger than the comparable percentage for the larger elementary schools.

Although it is difficult to estimate the influence of the Public Works Administration on the consolidation movement, doubtless it has had some effect. It has been estimated that PWA has helped to finance over 40,000 different school projects involving construction, repair, renovation, and remodeling, in all types of schools, both rural and urban.[6] But since there are approximately 200,000 rural schools in operation, as compared with only 40,000 projects of all kinds, it seems clear that PWA did not become a dominant influence in the consolidation movement. There is the added fact that PWA was organized by the federal government for the avowed purpose of providing employment for the unemployed. Reconstruction or consolidation of schools were not preconceived objectives of the program, and they entered into the picture only in so far as they contributed to the increase of employment.

Despite the obvious need for further consolidation, it must be understood that it is not purely an *end* to be achieved for administrative purposes. Consolidation can be justified only as a *means* of providing better education for boys and girls. It must also be understood that there exists no single best type or size of consolidated school or administrative district which may be wisely established throughout the country. On the contrary, the oft-repeated but frequently neglected criteria must be applied which proceeds to consolidation and building construction only after a careful survey of the educational, economic, social, and geographic conditions of each local community. By this means only can the cultural values of the local people be conserved and the best interests of the state be enhanced through consolidation.

Vocational Schools

Vocational education in the United States antedated the passage of the Smith-Hughes Act of 1917, and vocational schools operated prior to that time. The federal government has, however, given vocational education its needed impetus by the passage of national subsidy laws. The George-Reed Act, the George-Ellzey Act, and the George-Deen Act which superseded the others when it became effective July 1, 1937, were all designed to broaden the scope of the original Act and were enacted in response to a nation-wide demand for federal aid. The last of the named acts was significant in that it granted federal subsidy for training in the distributive occupations.

Prior to the passage of the Smith-Hughes Act in 1917 approximately 164,000 pupils were enrolled in vocational schools and classes throughout the country. By 1936 the figure had risen to approximately 1,382,000. The economic depression served to emphasize the need for a more functional type of education with the result that enrollments and facilities increased without cessation during the depression years. Between 1918 and 1936 the number of home economics classes in the country increased by annual stages from 323 to 5,587, and the number of vocational agriculture classes from 1,741 to 11,183.[7] Similar increases were apparent in the field of business education and appear to be in prospect in the newly subsidized areas of the distributive occupations.

In view of the large number of people employed in the distributive occupations, it is surprising that the George-Deen Act represents the first positive attempt to provide federal financial aid in this important and numerically large field. The pressing need for such subsidy is obvious when employment statistics in the area are examined. In the total population of the country, one person in every six between the ages of 18 and 25 is employed in the distributive field. A total of 6 to 7 millions of people are employed there regularly. These trades take on approximately 100,000 new employees 18 and 19 years of age each year. Of this number in 1936 only 10,000 have been receiving trades training and, significantly enough, only 10 percent of this number make good in the trade which employs them.[8] In view of these figures, the provisions of the Act which apply to the distributive occupations can be thought of as a much needed and forward-looking step in vocational education. The influence of the Act can be best illustrated by the enrollment in 1942 of 215,049 students

[6] Niles, David, "W.P.A.'s 27,000 School Projects," *Nation's Schools*, 23:20, January, 1939.

[7] U. S. Office of Education, *Biennial Survey of Education*, 1934-36, Washington, Government Printing Office, 1940, Chap. II, p. 18.

[8] Arthur, C. M., "The George-Deen Act and Its Implications," *School Life*, 22:133-34, January, 1937.

in evening and part-time classes in distributive education.[9]

VARIETY OF VOCATIONAL PROGRAMS

Despite the alleged standardizing effect of the federal subsidizing laws, the organization of vocational education in the United States can be characterized only by its great variety, and physical facilities and plants are inclined to show the same variation. In recent years it has been the practice of the federal authorities to accept with little alteration the proposals of the several state boards of vocational education which have been chiefly concerned with the development of curricula to meet the local needs of schools. With increasing accuracy local school authorities are developing programs of vocational education in the light of occupational and employment studies, with full consideration for the needs and interests of the pupils and of the local community in which they reside. Diagnostic selection, guidance, placement, and follow-up services are recognized as essential and are being provided with increasing frequency as a part of standard practice. In fact, the only restrictive influence exercised by state and federal authorities is found in the practice of checking to make sure that the technical regulations set forth in the law, such as teacher training requirements, teacher load, safety regulations, and financial limitations, are carried out.

VOCATIONAL SCHOOL FACILITIES

In rural communities, villages and small towns, and many cities, facilities for vocational education are provided in the same building which houses the secondary school. In larger cities, where enrollments are sufficiently large and funds are available, the tendency is to build separate vocational schools, some of which are highly specialized and representative of particular industries. Even though local school systems provide separate vocational schools, many high schools still maintain programs in industrial arts, home-making, and commercial education, placing major emphasis on the exploratory and general values of the work rather than on vocational preparation. In the vocational schools the tendency is to provide for the complete education of the pupils by teaching related courses in mathematics, English, science, social science, art, and other areas of learning which are related to the major purposes of the students. Physical education,, athletics, dramatics, and musical activities are also included in the curriculum, although the expense for these services is not assumed by the federal government. An undoubted weakness of the George-Deen Act and its predecessors is that they provide only for vocational education in the narrow sense of the term. All other services, which are deemed necessary for the organismic development of the pupils, must be financed from local funds and may not be included in the totals used as a basis for computing federal subsidy.

An unusual type of organization for vocational education is found in the State of New Jersey where the county has been created the unit for support and administration. State law makes possible the selection of a vocational board of education for each county in the state, which board has complete jurisdiction over the program of vocational education provided. It levies a tax for the support of the schools under its jurisdiction, employs and pays the necessary teaching and administrative personnel, and assumes all other responsibilities commonly assigned to boards of education. Similarly, state law in Wisconsin provides for separate boards of vocational education in each community. A few other states have passed permissive laws which authorize local communities to maintain trade and vocational schools under the jurisdiction of specially created boards of vocational education, but the prevailing tendency is to plan vocational education under the control and direction of the same board which is responsible for general public education.

In providing the essential but expensive and specialized facilities for a program of vocational education, independent provision for support and control appears to be worthy of commendation. It has been approved by the National Occupational Conference on the basis of a survey of the vocational schools of Essex County.[10] However, the practice which grants administrative independence to the vocational schools is open to serious question. In Essex County there existed a gross lack of articulation between vocational education and general secondary education with the result that the former was conceived as being quite isolated from the latter. If education is to proceed on an organismic

[9] U. S. Office of Education, *Biennial Survey of Education,* Washington, Government Printing Office, 1944, Vol. II, Chap. II, p. 38, Table 41.

[10] Campion, H. A., Survey of the Vocational Schools of Essex County, N. J., New York, National Occupational Conference, 1939, 167 pp.

basis, it appears that close correlation must exist between all types of secondary schools. It is doubtful that administrative independence contributes to such necessary correlation. Even though a special liaison organization is set up for purposes of joint planning, it is doubtful that integration can achieve the same degree of sufficiency possible under single administrative jurisdiction.

All of the foregoing problems and trends in organizations have profound implications for building and other physical facilities to be provided for vocational education. The situation is further complicated by the rapid changes which are taking place within the field itself. Previous mention has been made of the new emphasis on training for the distributive occupations. In the past major emphasis has been upon such commercial courses as typewriting, stenography, and bookkeeping. The assumption appears to have been that these prepare pupils for the distributive occupations. It appears now that the whole field needs detailed exploration and that curricula must be developed and facilities provided which are more consistent with distributive employment trends. Industrial arts is still conceived widely as an offering which includes manual training, mechanical drawing, metalworking, and other similarly designated courses. The recent trend is toward general shop offerings for exploratory and general educational purposes and the development of such specialized courses as occupational studies indicate. Moreover, part-time and evening schools are faced with an ever-increasing demand on the part of employed youth and adults, much of which is vocational in nature. Society is beginning to demand that the public schools provide the training and retraining needed by employed persons to keep up with progress in the several trades. Unemployed youth, both in cities and in rural areas, must be cared for, either on a full-time or a part-time basis, as the needs of the situation indicate. Agricultural training is expanding to include farm projects. Home economics is developing valuable home projects. Problems of rehabilitation have scarcely been considered, as yet, in their relation to vocational education, but a definite trend in that direction is becoming apparent.

In view of existing trends, needs, and pressures, it appears that the following factors must be considered in planning building facilities for vocational education:

1. The scope and the content of vocational education will continue to expand and to adjust itself internally in accordance with the shifting demands of employing industries. Education for work must be recognized as one of the major objectives of secondary education.

2. An especially large growth may be expected in training for the distributive occupations. Curricula must be developed, and facilities must be provided in the light of occupational studies with particular emphasis on retailing and salesmanship.

3. Federal subsidy must be increased and will probably be expanded to include auxiliary services in connection with locally developed objectives which look toward the organismic development of the individual pupil.

4. Exploratory courses will continue to constitute a substantial portion of the total program of vocational education. Orientation, guidance, placement, and follow-up services are essential to the maximum efficiency of every program of vocational education. Definite provision for these services should be made in planning facilities.

5. Although larger administrative units, such as the county, offer apparent strength to the financial support of vocational education, it is doubtful that administrative independence from general secondary education can make a constructive contribution to the accomplishment of educational objectives. The organismic philosophy of education demands unitary administration for all types of public-supported secondary schools.

6. The needs of post-high school youth and adults must be considered in increasing measure in planning facilities for vocational education. Maximum flexibility must be the watch word in building and other physical facilities.

The Junior College

A comparatively new responsibility which is gradually being assumed by the field of secondary education goes beyond the normal age groups commonly included within the high school range. Attention is being centered on the problems of the post-graduate and the junior college level. It is becoming increasingly difficult for high school graduates to go directly into industrial employment. Industry demands relatively mature and specially trained recruits. Young people in large numbers

have been forced to choose between idleness and continuing in school. In order to bridge the indicated gap, society has provided trade, technical, business, and vocational schools, evening and other types of part-time schools, junior colleges, and other less numerous activities and organizations. Since the junior college movement is coming to represent a definite upward extension of secondary education, a consideration of its growth may be presented as an addition to the previous tabulation of high schools.

Junior colleges first came into existence early in the present century. Only eight, all private institutions, were organized prior to 1900. The oldest one still in active operation is located at Joliet, Ill. Although the growth of the junior college has by no means been as spectacular as that of the high school, or of reorganization at the high school level, it has nevertheless maintained a continued growth up to 461 separate units in 1941-42 with a total enrollment of 141,272. Table 5 presents the figures for the period from 1917-18 to 1941-42 for both public and private junior colleges.

TABLE 5. Growth of the Junior College During 1917–18 to 1941–42*

Year	Number	Enrollment
1917–18	46	4,504
1919–20	52	8,102
1921–22	80	12,124
1923–24	132	20,559
1925–26	153	27,095
1927–28	248	44,855
1929–30	277	55,616
1931–32	342	85,063
1933–34	322	78,480
1935–36	415	102,453
1937–38	453	121,510
1939–40	456	149,854
1941–42	461	141,272

* U. S. Office of Education, *Biennial Survey of Education*, 1938–40 and 1940–42, Washington, Government Printing Office, 1944, Vol. II, Chap. IV, p. 6, Table III.

On the basis of the trend indicated in Table 5, it may be assumed that the growth of junior colleges has not yet reached its peak. In 1942 there were reported 231 public junior colleges with an enrollment of 100,783 and 230 private junior colleges with an enrollment of 40,489. Thus, in a total of 461 junior colleges of all kinds, there was a total enrollment of 141,272 in 1941-42. The average enrollment in publicly controlled junior colleges in 1917-18 was 98 as compared to 436 in 1941-42.[11]

JUNIOR COLLEGE BUILDINGS

Little statistical information is available which indicates the status of the junior college building situation over the country. Plants vary from carefully conceived buildings erected to serve identified junior college needs to make-shift and temporary facilities which act as a definite drag to the educational programs proposed. Since in many cases the junior college grew upward from the high school, it is housed in the same buildings which were originally designed to accommodate general secondary purposes. In other cases, where the junior college developed by amputation from the university, it is housed in any kind of buildings which may have been immediately available. When the junior college developed by decapitation of a 4-year college, it usually acquired the building facilities formerly used by the latter. This situation is particularly apparent among the private denominational junior colleges. In fact, it is quite the exception to find a junior college plant which was conceived, planned, and erected after a thorough-going survey which identified the particular purposes to be served in the local situation. More than half of the now existing junior colleges do not have adequate financial support, sufficient student constituency, adequate plants, or efficient instructional and administrative staffs.[12]

In a study of the housing problem of the junior college in California, Hardesty [13] reported that the junior college program was hampered by building limitations which prevent the development of terminal vocational courses, by former high school plants which were not sufficiently modified for junior college purposes, and by junior college administrators who have failed to grasp and accept the proper functions of their particular schools. Since these handicaps exist in California, which state rates relatively high as a leader in junior college education, it may be assumed that building handicaps and deficiencies are even more apparent in other parts of the country.

It is obviously true of junior college buildings,

[11] U.S. Office of Education, *Biennial Survey of Education*, 1938-40 and 1940-42, Washington, Government Printing Office, 1944, Vol. II, Chap. IV.

[12] Seashore, C. E., *The Junior College Movement*, New York, Holt, 1940, Chap. I.

[13] Report of the Carnegie Foundation for the Advancement of Teaching, Recommendations of the Commission of Seven. *State Higher Education in California*, Sacramento, State Printing Office, 1932, pp. 35-39.

as of all types of school plants, that they should be planned only in terms of the functions to be served by education at the level under consideration. The Carnegie Foundation for the Advancement of Teaching, through its Commission of Seven, suggested five functions as follows:

a. *Curriculum for social intelligence.* A curriculum devised to give the student about to complete his general education a unitary conception of our developing civilization. This curriculum should be provided in all institutions offering education on a junior college level.
b. *Specialized vocational curricula.* A group of specialized vocational curricula more advanced than those offered in high school, aimed to care for the needs of those registrants who will probably soon terminate their schooling to enter occupations.
c. *Preprofessional curricula.* A group of preprofessional courses, preparatory to university professional courses, the nature of which is legitimately determined by professional school requirements of the university.
d. *Preacademic curricula.* A group of curricula preparatory to university concentration in one or more of a group of arts, sciences, and literatures provided by the senior colleges to give an advanced education in some phases of civilization for avocational or civic purposes, or provided as professional preparation for advanced work leading to a professional career of scholarship in research or teaching.
e. *Adult education.* The function of adult education may be associated with the junior college as a supplementary service. . . . Junior colleges are local or community institutions and may well be cultural community centers.

Statements of general functions are valuable for local purposes in that they delimit the service area of the junior college, but it cannot be overemphasized that satisfactory purposes can be identified only by a searching analysis of the local situation. The fundamental question in any particular situation is not, "What are the general functions of the junior college?" Rather, the question is—"What are the specific functions which may be served by a junior college in the local situation?" Having identified these local needs, courses of study and activities may be planned to meet these specified needs, and building facilities may be arranged in a manner which holds greatest promise of realizing the formulated objectives. There exists no reasonable justification for assuming that a junior college may be satisfactorily housed in any kind of building not being used for other purposes. Because of the potential service which may be rendered by a junior college and because of the expense involved, its building facilities should receive the same detailed and specific planning recognized as essential in building to accommodate the needs of every other level of education.

Federally Sponsored Youth Projects

The Civilian Conservation Corps and the National Youth Administration are a type of educational service for youth which developed during the depression years of the nineteen-thirties. In providing work opportunities and recreational guidance, as well as in maintaining the morale of youth, these organizations rendered a notable service. Secondary education has been stimulated to a deeper understanding of its opportunities and obligations by the recognized successes of the CCC and the NYA.

As a result of this stimulation, many high schools now engage in activities which closely parallel those of these semi-educational organizations. Work projects are developed which involve the repair, improvement, and beautification of the local school building and its immediate environs. School and community exhibits are planned and carried out. Studies bearing on the social and economic life of the community are developed. Libraries, parks, playgrounds, and recreational facilities are other projects which are receiving increased attention.

Local Study-Work Camps

New experiences in the out-of-doors, associated with work opportunities, will broaden the education of youth. The development of camp facilities should enlist student participation and students should be encouraged to aid in the building of many of the needed facilities. The work now being carried on in Battle Creek, Michigan, in the use of camp facilities for educational purposes the year round is illustrative.

CHAPTER 3: criteria for high school building planning

The planning of high school buildings rarely proceeds without reference to definite standards or criteria. These criteria should be sufficiently comprehensive to cover all aspects of planning. No phase of the planning should be left to chance nor go by default because of insufficient study. The high school building is a very complicated structure. It serves the individualized needs of many. It must endure over generations. It represents community aspirations and should have an appropriate setting in the complete community plan. The planning of this high school building is a long-time process. Haste results in expensive errors.

Early Standards

Henry Barnard's volume [1] on "School Architecture," published in 1848, was prepared as the result of a definite need for standards in schoolhouse planning. Dr. Barnard collected and interpreted standards for the location, style, and construction of schoolhouses, lighting, ventilation, temperature, seating arrangement, apparatus, library, and yard provisions. The need for standards grew out of wide contacts with schoolhousing conditions as they were to be found during the early decades of the past century. In his introduction Barnard describes his own experiences in the third person, as follows:

> Go where he would, in city or country, he encountered the district school-house, standing in disgraceful contrast with every other structure designed for public or domestic use. Its location, construction, furniture and arrangements, seemed intended to hinder, and not promote, to defeat and not perfect, the work which was to be carried on within and without its walls. The attention of parents and school officers was early and earnestly called to the close connection between a good school-house and a good school, and to the great principle that to make an edifice good for school purposes, it should be built for children at school, and their teachers; for children differing in age, sex, size, and studies, and therefore requiring different accommodations; for children whose health and success in study require that they shall be frequently, and every day, in the open air, for exercise and recreation, and at all times supplied with pure air to breathe; for children who are to occupy it in the hot days of summer, and the cold days of winter, and to occupy it for periods of time in different parts of the day, in positions which become wearisome, if the seats are not in all respects comfortable, and which may affect symmetry of form and length of life, if the construction and relative heights of the seats and desks which they occupy are not properly attended to; for children whose manners and morals,—whose habits of order, cleanliness and punctuality,—whose temper, love of study, and of the school, are in no inconsiderable degree affected by the attractive or repulsive location and appearance, the inexpensive outdoor arrangements, and the internal construction of the place where they spend or should spend a large part of the most impressible period of their lives. This place, too, it should be borne in mind, is to be occupied by a teacher whose own health and daily happiness are affected by most of the various circumstances above alluded to, and whose best plans of order, classification, discipline and recitation, may be utterly baffled, or greatly promoted, by the manner in which the school-house may be located, lighted, warmed, ventilated and seated.

The standards mentioned by this illustrious educator many decades ago are fully as important today. They need reemphasis and expansion in the light of present-day needs.

[1] Barnard, Henry, *School Architecture; or Contributions to the Improvement of School-Houses in the United States*, A. S. Barnes & Co., New York, 1849, p. 6.

Standards and State School Codes

All standards lie somewhere between complete objectivity and complete subjectivity. The experiences of many educators and many communities have resulted in the incorporation in state codes of many detailed standards. These standards vary widely among the states. State regulation and supervision are concerned largely with fire protection, sanitation, heating and ventilation, natural lighting, and some phases of construction. State standards are established primarily for the purpose of protecting public interest and welfare. They aid the smaller communities which are unable to carry on research or to experiment in the development of desirable school plants. Ill-advised and faulty planning is frequently prevented in part by standards established in state code. The review of plans by state departments of education and the state supervision of planning have improved much in recent years and have assisted greatly in the better adaptation of schoolhouses to meet the general needs of children and teachers. When state assistance results in the distribution of uniform plans standardization may certainly be considered to have proceeded too far. Standardized plans handicap the local development of the educational program. They preclude the possibility of fitting the school to the community scene.

In a state school building code standards are preferably outlined in principle rather than with specific reference to details of design or selection of materials and equipment. The rapid improvements which are being made in the field of mechanical design and in building construction will unfortunately be delayed unless the standards which are set up in legal statutes are limited to general guiding principles rather than details. The detail specifications and standards for material, equipment, design, and construction which may enter into the final planning of the school plant should be constantly revised as man's knowledge advances to permit substitution of new materials and processes for old.

Changes in General Criteria for Planning

Many of the high schools built previously to 1910 were planned in terms of a curriculum which prepared for college entrance. Few other educational needs beyond college preparation were considered in the planning of the building. If such criteria were utilized they frequently were unexpressed. Many new emphases have emerged in the program of secondary education. Out of them have come criteria which should be given consideration in future high school building planning. Such basic criteria include the following:

A. Education is not merely a preparation for future life work but it is a process of eventful, constructive, and happy living. Society depends upon education for the integration of its membership in a successful, cooperative, and democratic organization.

B. School and community must be thought of as working harmoniously in the conservation of the resources of childhood and adulthood.

C. The secondary school should plan its facilities to provide for all needs of all children who could reasonably profit from any program of education.

D. The secondary school plant should not be planned merely to meet the needs of traditional age groups but should provide for possible expansion of these groups.

E. The school's function includes teaching of the techniques of civilization, the development of physical well-being, the instruction of all individuals in the ideology of their society, the introduction of students into cultural areas, and the socialization and guidance of the individual toward effective membership in his society.

F. The school plant must be closely interwoven with a comprehensive program of city planning.

G. The school plant should be in harmony with its surroundings, both natural and man-made.

H. The secondary school building should reflect the achievements, the aims, and the highest ideals of the community.

I. The school building should not be institutionalized, but the plant should be thought of as a community in itself where direct contact is given with the problems of living.

J. Good planning is evident in the secondary school plant by the degree to which its space provisions meet the particular needs of the community and are free from stereotypes.

K. The education service rendered in a school plant is constantly changing, thus requiring a high degree of adaptability in construction.

L. With increasing emphasis upon the problems

of the air age, high schools must be planned to provide adequate training for work in a three-dimensional world.

M. The pupil-teacher relationship has also witnessed considerable modification. The teacher today is the companion and fellow-worker rather than the teacher-dictator.

COMMUNITY VARIATIONS

Changes in administration, curriculum, and faculty attitudes vary with the community and with the school. Thus, the planning of a school building becomes highly individualized. It must be done with reference to specific needs in a specific locality at a specific time. Fortunately, the secondary school program has not become standardized. In each community it goes through a constantly evolving process. Some communities are found further along the scale of progress than others. In some communities only slight change has occurred in the secondary school program over a period of thirty or forty years. Such communities may, however, be expected to awaken soon to the need for better adaptation of their programs to the needs of their children. This suggests that no investment of large sums should be made in a secondary school building until all of the workers in the school organization have been given the opportunity of diagnosing needs, analyzing the existing program, and suggesting the curriculum and administrative basis upon which plans should go forward.

ORGANIZATION VARIATIONS

There is no single standardized method of organizing a school program or of assigning space to children. Teaching methods differ among individuals as well as among schools. The length of the school day, the number and length of the class periods, and the size of classes are among the variables to be considered in planning. The manner of use of the auditorium, the stress upon the health and physical education program, and the school's attitude toward music and the fine arts have important bearing upon the features to be included in a new school plant.

CHARACTER OF THE ADMINISTRATION

At one time the administration of a high school was centered in one individual. He was the executive who proposed plans and who disposed of problems. The great advance which has been made in the guidance program for students has changed the status of the high school principal. The democratization of administration has resulted. The teaching staff participates in the determination of policies. Specialists in guidance and in curriculum development have been given responsibilities involving the adaptation of the individual to the school and to life in general. School building planning cannot proceed successfully without the sugestions of all administrative workers as well as teachers in the school. Out of such cooperative planning may be expected to come physical facilities suited to the needs of the school and the community.

Local Statement of Educational Need

The architect has a difficult problem of adjusting the physical requirements of a state code with the educational demands of the local program. The architect must approach the high school building problem with a full awareness of the need for adaptation to a very specialized situation. If the school demands are not highly specialized, it may be questioned whether the local program is sufficiently progressive. The architect must rely upon the local educators for a complete statement of educational need. Such a statement should give the local teaching group full opportunity to express their philosophy and the objectives to be achieved in the school. The teaching staff should be recognized as the group to give the educational inspiration and atmosphere to be embodied in the structure. If participation in planning on the part of the local teaching group is ignored, a poorly adapted school building may be expected to result.

LONG-TIME PLANNING

The planning of a high school building is a long-time process. Sound school administration stimulates study of the educational need long before the building project becomes imminent. The statement of need is a comprehensive document which has grown out of intimate study of the problem by each teacher of the staff and by each department. It suggests educational purpose. It indicates equipment needs. It defines space requirements. It locates the spaces in the general scheme of the building plan.

The statement of need should be consistent with the policies of the board of education. It should make clear the actual use to be made of rooms and should include a schedule of classes and subjects. There should also be indicated the possible extended use to be made of the building beyond the group using it during the school day. The teachers' committee developing the statement of need should be encouraged to submit plans of all the rooms in which their proposals have been incorporated.

In the 1930 decade a public works program, under the jurisdiction of the United States government, forced the rapid planning and construction of school buildings. This was done under the pressure of providing work for the unemployed. Many schools were caught without having made any long-time study of their needs. The resulting plans, in many cases, have proved unsatisfactory. Long-time planning assures a reasonable conformity to local needs, even though rapidity of construction for economic or for other reasons is forced upon a community.

General Standards for High School Sites

Large enrollments, expanding curriculum, the need for various recreational facilities, and the importance of the secondary school in the community plan are reasons determining size and character of site. Illustrations abound in the cities of the United States of the selection of inadequate high school sites with the resulting curtailment of opportunity and limitation of school offerings. With the abundance of land available in most parts of the United States, even costs cannot be considered an adequate argument against the acquisition of at least twenty acres for high school purposes. Many schools which have acquired this amount of land find it insufficient to meet all of their needs. An enrollment of 2,000 pupils, an extensive educational program involving many phases of land use, and housing facilities planned on a unit basis are adequate reasons for high school sites running from 40 to 100 acres of land.

During the decades 1910 to 1940 there was throughout the United States a growing acknowledgment of larger site needs for secondary schools. In 1940 communities as readily purchased 40 to 50 acres of land as they did 20 acres in 1920. The second World War brought about an early recognition of the importance of the airplane and the glider, both for military as well as peace purposes. World War II also stressed the training of youth for aviation service. Early in the war pre-flight aeronautics found its way into the high school curriculum, but the need for training in gliding, as well as flying, was soon recognized. To the degree that gliding becomes a part of secondary school training will increases in school sites be necessary. In fact, secondary school programs bid fair to undergo such extensive change that sites running as high as 100 to 200 acres may become the most satisfactory areas upon which to conduct high school programs.

In the past small colleges with enrollments of 200 to 500 students considered it necessary to acquire large acreages. Their educational programs were in many cases inferior to the secondary school programs of today. It may be argued that what was considered desirable for small college enrollments of yesterday, with their limited curriculum, should be provided the very large high school enrollments of today with their expanding educational offerings. It is not satisfactory to select a small site in a community for a high school building and to provide for recreation, agriculture, and other outdoor needs on another site remote from the building. The secondary school provisions for a single school should all be located on contiguous property. This makes for better organization of the school program and for an enrichment of the school day because of the wider use made of all facilities.

OUT-OF-DOOR CLASSROOMS

The out-of-doors may be used more extensively for educational purposes than has been planned for in many high school programs. This is especially true where climatic conditions are favorable. Out-of-door classroom space costs less than indoor space. Its intelligent use may contribute even more significantly to human development than the use of many of the spaces included within a school building. School building planning insures adequate opportunity for outdoor instruction or activity, not only in the realm of recreation and athletics but in all branches of educational work.

SITE LOCATION

Accessibility of the school is a major criterion in site location. The development of motor transpor-

tation has changed the meaning of "accessibility." This criterion ought, therefore, not to outweigh other criteria in the determination of the site location. Secondary school planning should be incorporated as a definite part of the city plan. The school and its environment should contribute to the attractiveness of a community. The school thus becomes a community asset and will attract the attention of visitors and create favorable attitudes toward the community. Merely building a school as a community asset without making it part of a comprehensive city plan usually becomes an unsatisfactory procedure.

Essential Building Standards

In the past it has usually been considered necessary to plan a high school building as a single building unit. This has frequently resulted in compact buildings of which many of the spaces lacked fresh air and sunlight. Since 1900 the high school building has frequently taken the form of the letters E, H, U, L, and T, or combinations of these and other letters. Relatively few high school plants have been developed with separate building units to house the varied phases of the educational offerings. Larger sites, greater freedom in the pupil-teacher relationship, and curricular changes will tend to encourage the campus idea with separate buildings set aside for definite purposes. The longer school day and greater flexibility in the program of each day will also promote this type of planning.

LOCATION OF SCHOOL BUILDING

Site and building should be treated as a unit in all planning. The building, or the building units, should fit into the natural environment. They should contribute significantly to community attractiveness and should in themselves have educative value for all who see or use the plant. Monumental size may not be an advantage. The building units should be so located that the best possible use may be made of the land adjoining. The open air theater, the garden, the outdoor classroom, and other outdoor facilities should be related as definitely as possible to the indoor facilities provided for similar activities.

Orientation of Educational and Recreational Facilities

No site is well selected, nor is the building well-planned if early consideration has not been given to the problem of orientation. Certain educational activities are best conducted with light from the north. Athletic fields and other recreational facilities must be definitely arranged with reference to the position of the sun when the major program is being carried out.

In considering the problem of orientation of the various units, the following arrangement has been found to be generally desirable:

A. Recitation and activity classroom should be oriented to receive a maximum amount of sunlight except in certain few localities where sunlight is uncomfortably strong. Orientation is desired which allows southeast and east light. West and south light may be considered as third and fourth choices.

B. Drawing and art rooms, physics and chemistry laboratories, industrial shops, and medical offices should be oriented to receive light from the north.

C. Biology laboratories, physical exercise rooms, gymnasiums, locker rooms, swimming pools, libraries, study halls, social rooms, treatment rooms, toilet rooms, and lavatories should be oriented to receive a maximum amount of sunlight during the entire day.

D. The following indicate desirable orientation of various types of outdoor athletic fields:

(1) Baseball: home plate—northwest corner or southeast corner of diamond.
(2) Soccer: main axis running north and south or northwest and southeast.
(3) Basketball: long axis north and south.
(4) Tennis: long axis north and south.
(5) Jumping pits, etc.: players should not be required to face sun.
(6) Football: north and south.

ENVIRONMENTAL CONSIDERATIONS

The building, as well as the outdoor educational and recreational spaces, should be located in the most wholesome environment the community affords. Site selection should be made on this basis. The city plan should provide protection against future undesirable encroachments. Buildings should

be so located on the site that they are readily accessible to the pupil population and to those being transported. All buildings should be set back from the highway so that traffic noises will not interfere with the educational process. Due emphasis should be given in planning to the elimination of any traffic hazards that may develop. Trees, shrubs, and wooded areas may be used to advantage in excluding unsightly adjoining features, or in cutting off noises from highway traffic or other sources. Care should be taken that such protection does not result in the development of traffic hazards. Consideration should be given, in the location of the building, to the prevention of all possibility of odors, dust, dirt, and smoke being blown toward the building from the streets, unfinished playgrounds, open fields, or business and manufacturing districts.

In locating building and play areas topography should be considered. It is desirable that buildings be located on high ground preferably with a commanding view. Approaches avoiding difficult climbs should be selected. Play areas should be on level ground but it should not be so low as to hinder proper drainage and the maintenance of good hard surfaces.

Provision should be made for adequate parking facilities adjacent to the highway. These facilities should be so located that pupils entering or leaving the school property are not tempted to cross the parking areas and thus add unnecessarily to congestion. Accessibility of the auditorium, gymnasiums, and athletic fields to the public should be definitely planned.

Standards for Educational and Recreational Space

SPACE REQUIREMENTS

Space requirements of school plants have been thought of largely in terms of classroom units. The "standard" classroom, varying from 21′ x 26′ to 24′ x 32′, was used to establish a unit of construction which in turn determined the location of bearing walls, columns, corridors, and exits for the design of the building. Classrooms have not exceeded 24′ in width because, at a greater distance, natural light may tend to become ineffective, except as bilateral lighting or high ceiling are used. Bilateral lighting was considered undesirable and high ceilings increased the cost of construction. Then, too, the formal array of desks in rows fitted the classroom size and shape. These factors, all of which are largely a matter of limitations imposed by construction methods or by subjective standards, have tended to limit progressive and purposeful design and to establish the school building on an altogether too standardized and formal basis. New methods of construction do not require the establishment of classroom units. The educator and the architect are both free to think of space requirements in terms of functions and demands rather than in terms of structural limitations. New trends pointing toward greater activity on the part of the pupil, with less attention to formal class work and recitation, do away with the limitations of rows of desks and open up for renewed discussion such problems as unilateral lighting, foot-candles required, and layout of rooms.

These changes in both educational and architectural features preclude any possibility of setting up space standards on any unit basis except as the unit is thought of in terms of pupil-space requirements. Adequate spaces must be provided to accommodate these needs of the educational program:

(1) Floor space for pupil activities in the instructional areas.
(2) Playground space and recreational areas.
(3) Space to meet community and adult purposes and uses.
(4) Space for the housing of school equipment and service facilities.
(5) Space for teaching, supervisory, and administrative staffs.
(6) Space for personnel workers, clerical workers, custodians, and service personnel.
(7) Space provisions for future expansion.

All spaces should make for the proper functioning of teaching methods and curricula aims and should be limited only by a desirable pupil station ratio. The number of pupil stations required in the various instructional and recreational areas, together with the space required at each pupil station, should be determined by the local school executives and the teaching staff.

With an eye to the changing educational program, it is apparent that any standardization of pupil-space requirements in terms of allocation of a definite number of square or cubic feet per pupil station is unwise. Also, any statement of minimum

space required is likely to be interpreted as an optimum rather than minimum figure. Space standards should not be used without application to a specific case. The standards listed below are to be interpreted only as suggestions based on observation and research in actual cases. The spaces are not absolute minimums, and they cannot be considered as optimums except as they are related to a given program. They have been determined subjectively as practical minimums which must be adjusted to meet the definite program of local educational needs.

Entire site

20 to 100 acres for schools from 500 to 3,000 enrollment

Recreational areas out-of-doors

(a) Organized play activities require from 15 to 20 acres as a minimum.[2]

(b) Additional wooded areas, ponds or lakes, pageantry areas, picnic grounds, golf courses, equestrian and bicycle paths, garden areas, extensive lawns, and other areas for future needs may be required.

Recreational areas indoors

(a) Physical education—75 to 100 square feet per pupil station.

(b) Activity classrooms—25 to 30 square feet per pupil station.

(c) Science laboratories—35 to 40 square feet per pupil station.

(d) Art rooms—35 square feet per pupil station.

(e) Music rooms—25 square feet per pupil station.

(f) Commercial and household arts—35 square feet per pupil station.

(g) Shops—50 square feet per pupil station.

(h) Auditorium (except stage)—7 square feet per pupil station.

(i) Auditorium stage—50 square feet per pupil station.

(j) Library—22 square feet per pupil station.

(k) Cafeteria (including kitchen)—12 square feet per pupil station.

In addition, allowance must be made for administrative, guidance, curricular, and service facilities, as well as for other special facilities which may be found necessary or desirable to meet the local educational program.

[2] Butler, George D., "Recreational Planning in Relation to School-Plant Planning," p. 38, *American School Board Journal*, January, 1935.

Expansibility of Building

It is highly important to plan a schoolhouse, or a group of school buildings, so that future additions may be made readily. If this criterion is neglected in the original planning, it usually results in excessive future costs. It also may tend to prevent the development which the future requires. Secondary school enrollments have not yet reached their peak in most communities. Even if the saturation point is reached in the present 6-6 or 6-3-3 or 8-2-4 plan which is followed in most communities, an extension of the secondary school program into the junior college area will bring needs for additional educational spaces. Relatively few communities have found themselves overburdened with educational space. This should be borne in mind when the question of expansibility of school building arises.

The most satisfactory method of providing expansibility is to insure the incorporation of plans therefor in the preliminary drawings. After a building is built, its expansion should be possible without the need for the destruction of any space provided in the original unit or units. If such space is lost, the planners may consider that they have not rendered the best of service. Economically, future additions should be possible without excessive construction cost or large outlays for grading or foundations. Land to be used for future construction should be surveyed and tested along with the surveys and tests of land used for initial units.

The ultimate site and building program should be planned in the light of the relationship of the plant to regional planning, to probable growth and location of attendance areas, to natural conditions of topography and geography, and to the effect of growth and density of the territory immediately adjacent to the site. The determination of satisfactory answers to these factors requires the most careful professional analysis of the specific problem. No superficial study of the situation will suffice, since the question of forecasting future developments must be based on the use of the most satisfactory calculations, plus a large degree of subjective analysis.

The site selected by the educational service should allow for the enlargement of buildings and recreational areas to meet estimated future enrollments without destroying and without requiring alteration of the initial construction. Additions to the building units should not encroach upon recre-

ational or playground areas. From a planning point of view, future additions to the buildings should be so planned as not to exclude light or air from any part of the initially constructed units. As the building units are expanded circulation should be improved for the plant as a whole. Future buildings should be conceived as an integral part of the whole rather than as separate and distinct units which are hard to reach or difficult to administer and supervise.

EXPANSIBILITY OF DEPARTMENTS

Good building planning provides for the expansion of departments or divisions, as well as for the expansion of the entire building. The provisions for the physical sciences may need expansion. The space arranged for the mechanic arts, the household arts, or some other curriculum group, may have become too limited and thus cause the need for building expansion. If the original plan has provided for growth, so that there is reasonable proximity of the spaces being utilized for similar purposes, it may be said that the building was well planned in this respect.

EXPANSIBILITY OF SERVICE UTILITIES

Satisfactory provisions for expansibility should also be made in service systems such as heating, ventilating, plumbing, lighting, and cleaning. The central heating plant should be so planned that additional boilers may be installed to accommodate additional building units and still maintain ease of supervision and operation. The flues necessary for the complete plant should be installed with the initial building program to obviate the additional expense of installation after the building has been constructed. Pipes and ducts required for future units should be laid as required in the initial unit from the central heating plant to the points at which future additions are to connect with the initial building.

If a unit type ventilating system is installed, the problem of expansibility is simplified over that created by a central or plenum ventilating system. Intake and exhaust ducts and central fan rooms, if used, should be arranged and installed to eliminate any necessity of reconstruction of the initial unit to accommodate future additions. Blind ducts may be installed up to the point at which future additions are contemplated obviating the necessity of cutting into floors and walls at a later date.

The plumbing system should be so designed that the future additions will be accommodated at a minimum expense. The original pipes for hot and cold water and drains should be of a size sufficient to handle additions. The installation of taps to the initial system at points where future additions are contemplated will save considerable expense as new sections are constructed.

The original installation of conduits necessary to handle future additions to electric wiring, telephone lines, fire alarm and call systems will eliminate the future expense of cutting into floors and walls of the initial unit. Likewise, if a central vacuum cleaning system is used, arrangement should be made to provide for the extra load and piping necessary when new units to the building are constructed.

Ease of Circulation

The provisions for circulation, i.e., corridors, stairs, and exits, have been almost exclusively a part of architectural design. The function of corridors has been limited to providing ready access to all parts of the school plant. Ease of circulation makes for better building utilization, for greater personal comfort of students and faculty, and probably helps in the development of the school morale. It is without doubt a factor of safety.

Provisions for circulation, including corridors and stairways, add considerably to the cost of construction, occupy a large amount of space, and increase the cost of service and maintenance. In a building using classrooms 22 feet wide, distributed along both sides of a 12-foot corridor, the space allowed for circulation is more than 21 percent of the total cubage of the building and the utilization of this space may not exceed 25 percent. The cost of corridors based on cubage and utilization is very high in contrast to classrooms and other facilities which have a considerably higher utilization.

Good circulation must reduce to a minimum, consistent with satisfactory results and safety, those facilities, such as corridors and stairs, which increase cost and decrease the total building utilization. In addition, it is desirable to use corridors for purposes other than circulation. Home lockers built in the corridor walls offer a satisfactory method of increasing corridor utilization and decrease the

building cubage otherwise required for locker rooms or alcoves. The use of corridors as display spaces and museums saves the space at other points. It is desirable to increase utilization of corridor spaces rather than to decrease width of corridors with resultant congestion and limitation of free circulation.

The design of corridors should be simple and attractive. Obstructions to movement or bottle necks should be avoided in the interest of safety. Complete circulation between buildings, rooms, service facilities, stairs, and exits, should be provided.

In providing satisfactory circulation for the entire school plant consideration should be given to departmental relationships, ingress and egress of students, buildings, playgrounds, and athletic fields. Outdoor areas, transportation facilities, and buildings should be connected in a simple orderly manner which provides desirable sequence and direction for travel of students, supervisory staffs, and the public.

Safety and the Elimination of Hazards

Site planning and building design and construction should be subjected to careful scrutiny in relation to the following principal sources of accidents:

SITES

1. Proximity of traffic hazards
   (a) Major arteries
   (b) Railroad tracks
   (c) Streets which invite speeding such as those receiving high-speed traffic from rural areas
   (d) Roadways without sidewalks
   (e) Curved and blind highways
   (f) Multiple, irregular, blind, and grade intersections
   (g) Steep hills
   (h) Interference of school loading and parking facilities with student pedestrian traffic
   (i) Roadways separating school property
   (j) Playground areas unprotected from streets
2. Recreational areas and landscaping
   (a) Roadways through playground areas
   (b) Improper fencing allowing children to run into streets or off school property to recover balls
   (c) Lack of proper surface treatment of school grounds
   (d) Holes, ledges, rocks, ruts, tree stumps, and ditches which might cause children to fall
   (e) High or abrupt cliffs left unprotected
   (f) Football goal posts left unpadded
   (g) Wire fences either too low or too light for good visibility
   (h) Unprotected construction in progress
   (i) Poorly constructed bleachers
   (j) Improper layout of play areas which cause interference of players
   (k) Interference of pedestrian traffic with players

BUILDINGS

1. Gross structures
   (a) Lack of proper building codes
   (b) Use of inferior materials and labor in construction
   (c) Poor design
   (d) Lack of fire-resistive materials in roof, walls, flooring and flues
2. Interior arrangement
   (a) Unprotected vertical openings, such as stairways, ventilating ducts
   (b) Inadequate distribution of exits and stairways
   (c) Inadequate size of corridors, exits, and stairways
   (d) High risers and slippery, narrow treads on stairs
   (e) Obstructions in corridors
   (f) Doors which open inward or against the direction of traffic
   (g) Inclusion of attic
   (h) Improper maintenance
   (i) Storage under stairs
   (j) Improper protection of danger spots including heating units, fuel rooms, custodian's supply rooms, industrial shops, cafeterias, kitchens, and chemical laboratories
   (k) Lack of automatic control devices and fire warning signals
   (l) Insufficient or inadequate distribution of fire-fighting equipment
   (m) Improper natural and artificial lighting
   (n) Slippery floors in shower rooms and swimming pools

(o) Wells between double stair runs
(p) Turns and blind curves in corridors
(q) Steps into rooms off corridors

3. Facilities and equipment
   (a) Improperly padded apparatus in gymnasiums and exercise rooms
   (b) Sharp corners, rough edges on equipment
   (c) Inadequate waste receptacles
   (d) Improper arrangement in segregating hazards in shops and laboratories
   (e) Unprotected shop equipment, including lack of guards on lathes, grinders, and machine saws
   (f) Drinking fountains, fire extinguishers, and other apparatus protruding from walls in corridors
   (g) Radiators protruding into rooms and corridors
   (h) Low unprotected windows
   (i) Lack of panic bolts on outside exits
   (j) Railings on stairs which are too high or too low
   (k) Use of anything but a wire glass adjacent to fire escapes
   (l) Unprotected motion picture projectors
   (m) Lack of proper fire doors and curtains at critical points
   (n) Unprotected power panels in shops and laboratories
   (o) Easily operable gas fixtures

This list of points on which the planner should concentrate is by no means complete. Hazards develop in the most unexpected places. Major school disasters in which large numbers of lives have been lost have resulted from hazards which were more or less concealed. Architect and educator, in planning the school, must bear in mind that the safety of the individual is a prime consideration. Traffic maps of large cities frequently show a concentration of traffic accidents in the proximity of schools. This suggests that site and surroundings should be so planned that every predictable type of accident may be guarded against. Not only should the building be of fire-resistive construction, but stairways should be on the outer peripheries of the buildings. Small courts in which individuals may become pocketed should be avoided in planning, and all obstructions at exits should be definitely eliminated. Care should be utilized in equipment selection to provide against accidents which can be foreseen. Pointed projections on equipment, easily operable gas levers, and unguarded machinery are illustrations of thoughtless planning.

Sanitation

A clean and sanitary environment is not only an important adjunct to the health of the children, but it is also a valuable part of the educational program of wholesome, clean living. Satisfactory sanitary conditions are difficult to secure unless borne in mind at the time of the selection of the site and in the design and construction of the plant. Superior school sanitation implies cleanliness throughout the building. Attic spaces, custodians' closets, storage rooms, shops and lavatories are all planned so that cleanliness may be maintained at all times. Proper sanitation suggests the need for well-lighted and well-ventilated spaces, and the elimination of narrow courts, inaccessible skylights, congested toilet rooms, and small storage cubby-holes.

Proper control of sanitation begins with site selection. Dust, smoke, and odors originating with railroads, industrial areas, and dump yards present serious handicaps in developing sanitary conditions. The location of buildings on the site should be such as to prevent dust from playground areas entering the buildings through doors and windows and air-intakes. Consideration should be given to direction of winds with emphasis on the prevailing direction during hot and dry seasons. If playground surfaces are properly prepared, much of the dust nuisance can be eliminated. Footscrapers and doormats will help to prevent dirt and dust being tracked into the building.

With a central ventilating system it is essential that the plenum chambers be kept free from accumulations of dust and that the air be washed or filtered before entering the rooms. The air intake should be high enough off the ground to avoid drawing dust into the plenum chamber.

The selection of proper interior building materials will reduce service and maintenance costs. Materials for floors, ceilings, walls, and equipment should be easy to clean and wash. Nonporous materials do not collect dust or show dirt as readily as porous materials. Materials used should have no tendency to crack or craze. Sharp corners and other dust harbors should be avoided. Bowls or troughs

for indirect lighting should be covered.

Plumbing facilities in toilets, lavatories, shower rooms, and drinking fountains should be chosen with the utmost care. Stall walls of nonporous and non-corrosive material are advisable. Fixtures, such as sinks, bowls and fountains, should be of the wall-hung type to permit easy cleaning of floors. Floor and wall material should be non-porous and readily cleaned. Plenty of hot water and soap will be found to be the best deodorant and disinfectant and all materials used in these rooms should be able to withstand frequent washing.

Flexibility in Building Planning

Flexibility may be defined as the adaptability of the school plant to changes in educational, social, and economic policies and conditions. Every school building must be planned for a specific program which will be carried out by a specific group of teachers and pupils. In the planning, however, there should be no denial of the dynamic character of education itself. Within the decades of the 1950's and 1960's, secondary education will no doubt change significantly. The curriculum will not remain static. New relationships in subject-matter will be recognized and methods of teaching will improve. Experimentation will change attitudes toward class size. New subjects will be introduced into the curriculum, and new equipment will be invented or discovered which will affect the teaching process. These, and other imminent educational changes, dictate the need for the greatest flexibility in the planning of school buildings. The greater the degree in which flexibility has entered into planning, the better the school building itself. It seems necessary to design and construct school buildings in such a manner as to permit modification, and perhaps even complete change of layout, to meet new demands which cannot be forecast. Every advantage should be taken of new methods of construction which insure ease of alteration at a minimum cost.

ARCHITECTURAL DESIGN

Flexibility in building should also be considered in the design of the structures. Flexibility suggests a design adaptable to all possible change as time goes on. It also requires that changes in no way interfere with the satisfactory completeness of the design at any stage of development.

EXTERIOR CONSTRUCTION

Changes in interior layout which may be found necessary or advisable may affect the exterior treatment. The location of exits, the butting of interior against exterior walls, the window arrangements in relation to change of room sizes or locations, and the possible necessity for rearrangement of service, administration, or supervisory units are types of items requiring consideration here. As a rule, however, when alterations are made in a building, the plans should be so developed that a minimum of interference is had with the exterior construction.

INTERIOR WALLS

Interior walls and partitions between rooms should be so constructed and installed as to be readily movable or removable. Much thought has been given to this problem of construction in recent years. It has been found entirely feasible to install adequate soundproof walls which may be shifted to increase or decrease the size of rooms in an economical and practical manner. Exterior wall construction should be planned to permit the relocation of interior walls.

It is more difficult in many cases to make corridor walls flexible since they are often constructed as bearing walls or are used to carry ventilating ducts and various conduits. It is desirable, however, to segregate these service facilities and to provide structural members which may permit changes to be made in corridor walls.

FLEXIBILITY IN SERVICE SYSTEMS

It is desirable to arrange and design the service systems, including heating, ventilating, lighting, plumbing, and cleaning, in such a maner as to permit accommodation of any shifting of interior walls or changes in size or capacity of rooms. Consideration should be given such facilities as movable unit ventilating systems, movable heating units, uniform distribution of lighting fixtures or adaptability to position change, and plumbing pipe lines distributed to permit flexibility. All concealed facilities, such as wiring and pipelines, should be accessible through panel openings at convenient locations along the entire run of conduit or pipe.

EQUIPMENT REQUIREMENTS

The concept of flexibility in size and use of rooms makes it practically axiomatic that equipment in the rooms should be movable and adjustable. The flexibility of equipment should make possible the varied use of rooms at all times regardless of permanent changes in structure. Desks and chairs should be readily removable from day to day or hour to hour to accommodate varied activities. Laboratory or shop equipment should be removable although it may be semi-permanently located. Heavy machines or laboratory tables may be electrically wired or have pipe lines connected to them which would require that they be securely fastened to the floor or wall. As an example, belt systems for supplying power to shop equipment should be avoided as the mobility afforded by individual electric motor units on each machine is much to be desired in the interest of flexibility. Partitions for use in shops should allow for continual shifting to meet the varying demands of the work.

ADAPTABILITY TO CONSTANT USE

The utilization of many school plants has been limited to the school day of approximately five to seven hours. Adult groups are being encouraged to use school buildings in the late afternoons and evenings and during holidays. Community use of educational and recreational facilities has been growing apace and may be expected to continue. In many school systems the high school has become the center of many activities adding to the cultural and recreational life of the community. This extended use of the high school plant suggests the segregation of facilities for certain groups, the provision for cutting off parts of the building which are in use from those parts not in use, the extension of toilet facilities to meet the demands of the adult groups, and other provisions growing out of local needs. The placement of flexible gates in corridors is one means employed of securing the segregation of groups desiring to use only one part of the building. The location of entrances and exits for the large building units, such as the auditorium and the gymnasium, and the arrangement of public check rooms and toilet systems at accessible points tend to assist in the further use of the building without too greatly expanding maintenance and operating costs.

Durability and Maintenance

Bonds issued to pay for the cost of school buildings frequently have a life of twenty, thirty, or forty years. It has been considered axiomatic that no debt for capital construction in public affairs should exceed the life of the property for which the money was spent. The materials used in the construction and equipment of a schoolhouse should be chosen to last beyond the period for which the capital indebtedness was incurred.

The selection of materials to be used in construction is frequently influenced by personal tastes of those responsible for design rather than by actual experience in use. Many new materials are being developed and caution must be used in their selection. Actual use of materials is the only real test of their adaptability and, even then, use must be under conditions simulating those of the school.

In the selection of materials, architect, school administrator, school custodian, and school maintenance man should cooperate closely. The ideas of one should be pitted against the experiences of the others. School systems, as a rule, cannot afford to experiment with the materials used in school building construction. Experimentation should be left to private corporations or to research workers.

The durability of building materials is affected by moisture, temperature, weather, dust, and odors. Materials should be nonabsorbent. The exterior materials should be selected on the basis of their ability to withstand the rigors of weather conditions expected in the particular locality. Changes in temperature from winter to summer should not cause cracking. Excessive expansion of materials should be guarded against. Materials which crack or which have sharp corners, crevices, considerable ornamentation, or which are porous will accumulate dust and absorb odors. Materials which are easy to clean and which are not affected by knocks, scratches, and pencil marks will in general be most durable. Metals which rust or corrode are considerably cheaper in initial cost than non-rusting metals, but the labor and expense of continual painting with the possibility of eventual replacement more than outweigh the additional original cost of the more durable materials.

The maintenance of plumbing and electric wiring will be made easier if original planning eliminates long runs of pipe and conduit and if they are

stacked for vertical runs at convenient and accessible points. Simple plumbing equipment of standard design using durable and easily cleaned materials will reduce maintenance costs. Such materials as vitreous china, chrome plating, monel metal, ceramic tile floors set in waterproof cement, and glazed tile walls are well worth their initial cost for use in toilet rooms and lavatories. Devices for operation of plumbing facilities must be positive in action, simple in construction, easily maintained, and standard for replacement parts.

The durability of electric lighting equipment will be increased by using materials which give satisfactory illumination and which do not crack, break, discolor, or collect dirt and dust. Excessive ornateness, deep crevices, or uncovered inverted bowls present difficulties in cleaning. Fixtures should be simple in design, standard in construction, and unbreakable.

MAINTENANCE OF SITE

The maintenance of the site and playground areas will be simplified by the elimination of terraces and slopes of grass which are difficult to mow, the construction of sidewalks with proper foundations to prevent frost or water from undermining the surface, the provision of an adequate watering system for lawns and gardens, and careful attention to selection of flowers, shrubs, trees, and playground surfaces. Fruit and nut trees should be avoided since they will be broken by children. Trees of soft wood, such as soft maples and poplars, easily break and are fast-growing and short-lived. Planning should take into consideration the possibility of replacement. Hardy trees which do not prevent light from entering the building should be selected. Perennial rather than annual flowers are valuable in reducing maintenance costs. Playground surfaces should be easily dragged and rolled and should be well drained and hard packed. An adequate number of sidewalks and footpaths will save much wear of lawns.

SUPERVISION AND TESTING

In general the standard of durability and ease of maintenance may be met by careful supervision and adequate testing of all materials and equipment used. Thoughtfulness in providing materials which will withstand the hard usage of children as well as the normal conditions of weather will do much to increase durability and decrease cost of maintenance.

Design and Beauty

The seven cardinal objectives of the high school program have been set forth as follows:

1. The development of student health
2. The command of fundamental processes
3. The inspiration and knowledge for worthy home memberships
4. The beginning of vocational aspirations and participation
5. The development of proper citizenship
6. The worthy use of leisure
7. The creation of worthy character

That the high school plant may create the opportunity to attain these objectives, it must be planned with a functional concept and provide desirable and comfortable physical facilities in each of its functions. The school design should represent the ideals of the educational program in inspiring the student to active participation in the experiences which the school offers. Just as a building which is located on the top of a hill will, in itself, be inspiring; so gayety in atmosphere, the free use of color, and the achievement of a design which lives in the present era will go far in stimulating the interest of the student in the values of education.

Beauty in architectural design is attained through the development of balance and proper relationship of the parts to the complete structure. Exterior designs which are mere murals of period art, or which function solely in depicting past achievements in architectural designs, cannot be considered beautiful in terms of school functions. An outstanding example of the relationship of function to beauty may be seen in the planning of natural lighting. There is no question of the educational value of adequate natural lighting. It promotes health and creates a desirable condition for the progress of work and study. May a school structure which, through its design, foregoes the opportunity to provide such an important phase of life to the students be said to be a well-designed or beautiful

building? Is it not true that school buildings of the past have only achieved "beauty" by reducing the window area to allow for decorative treatment of the exterior? Contemporary architectural treatment refuses this separation of function and design.

Good design also carries with it the thought of physical comfort. One of the needs which is pertinent to the proper functioning of the educational program is the creation of comfort for the pupils and administrative staff. An intensive activity program suggested by the objectives of secondary education cannot be carried out unless the conditions of work are desirable for the workers. The development of a comfortable building means far more than a design which adheres to the strict standards of sanitation, orientation, circulation, and safety. It implies the simplification of detail, clean surfaces which are not confused with unrelated masses, color treatment which breaks the monotony of standardization in construction and which aids the individual activity through a quieting, restful effect or by stimulation as conditions warrant.

Comfort also infers that natural and artificial lighting will be adequate in strength, simple and positive in operation, and designed to eliminate undesirable features such as uncomfortable brightness or glare. Ventilation and heating systems should be designed to provide comfortable atmospheres with automatic control as far as possible. The elimination of drafts, overheating, cold spots, odors, and stuffiness should be the goal. Plumbing facilities should be attractive, adequate, accessible, and positive in operation to assure maximum comfort.

Proper Acoustics in Schools

The character of the building construction and the materials utilized should not add unnecessarily to the acoustical difficulties of a school building. Corridors, classrooms, cafeterias, and special rooms should be given proper acoustical treatment. A large degree of comfort can be provided if the noises connected with the heating system are reduced to a minimum and if confused noises are largely eliminated where many are working or congregating. The location of noise-producing educational activities at points where there is no conflict with the activities stimulating quieter moods is an indication of careful planning. The soundproofing and insulation of one work area from another, or of a floor from the one above, are needed points of emphasis stressed in good planning.

Student and Teacher Comfort

A school building should be planned so that its occupants may be comfortable. Comfort involves freedom from unnecessary noise, emotional strain, and constant inconvenience. The location of personal service facilities has an important bearing upon the comfort of teachers and children. The ease of access to lighting switches eliminates disagreeable inconvenience. The location of drinking fountains, the character of the equipment, and the height of the installation have a distinct bearing upon the day's attitudes. Ease of circulation, accessibility of spaces with a minimum of congestion in passage, and the adaptability of equipment to educational need are factors which add to the happiness of individuals. There is no one single feature of school building planning in which the comfort of the school workers can be disregarded.

Comfort is related very definitely to equipment. Chairs and desks should be low enough to provide comfortable and natural sitting, writing, and reading conditions. Consideration should be given to varied sizes of equipment to meet differences in sizes of individuals. Work tables should be of such sizes and so arranged that students may work easily and comfortably without strain of poor light or broad surfaces which provide working difficulties.

Environment

In order that environment may play its proper role in education, it should be considered in relation to the following factors:

(a) Attractiveness of neighborhood and elimination of such nuisances as industrial plants, railroads, odors, dust, and noises.
(b) Moral and social surroundings
(c) Relation to community setting
(d) Natural setting

(e) Exterior building and site atmosphere
(f) Interior building atmosphere

The attractiveness of the neighborhood or the lack of it will add or detract from the effective functioning of the school plant. Such distractions as industrial plants and railroads not only add to the difficulties of maintaining sanitary conditions in the building, but in addition create a most undesirable setting for the school program.

The setting of the school in the community, the relation of traffic and transportation to school service, and the contribution which the school plant makes to the general atmosphere of the community should be of utmost concern to educator and architect. The school should have a natural setting with the esthetic advantages gained through the influence of flowers, sun, broad spaces, and inspiring vistas. To forego nature's contributions is to limit the beauty and functioning of the school plant to the mechanical attitude of man's planning. Without question, the exterior of the building and the landscaping of the site can contribute greatly to the desirability of the school plant. Much thought and planning must be given to the creation of a proper atmosphere which will not only enhance the beauty of the plant but which will also carry true educational values.

Functional Distribution of Spaces

The cost of school buildings should be measured not only by costs per cubic foot but also in terms of the cost per unit of space usable for educational purposes. The cost per cubic foot of a building may be low, but the total cost may be excessive because of the small amount of space devoted to educational purposes. Many writers have called attention to the desirability of the elimination of waste by skillful and efficient planning. Excessive space for stairs, corridors, building services, attics, and architectural ornamentation, should be eliminated, if the variations in costs of buildings per pupil housed are to be reduced. In addition, the space devoted to structural members of mechanical items must be made a minimum.

NONHABITABLE SPACES

Nonhabitable space is defined as the difference between total cubic contents and the cubic contents of all habitable spaces within the building. Nonhabitable space includes space devoted to walls, partitions, floors, ducts, hung ceilings, furring, attics, and roofs.

Table 1 shows the analysis of 49 secondary school buildings according to habitable and nonhabitable spaces and functions of habitable space.

The nonhabitable spaces within the buildings studied vary from 16.5 to 47.4 percent of the total cubic contents of the buildings. Those buildings with more than 40 percent of nonhabitable space have gable or hip roofs. A variation from 16.5 to 39.0 percent nonhabitable space was found in buildings with flat roofs.

The elimination of a large amount of nonhabitable space can be accomplished through the use of flat roofs, careful design of structural members, and efficient planning.

HABITABLE SPACES

Large variations exist in the amount of habitable space devoted to various functions within the building. These functions were divided into four major groups, as follows:

1. Building service and circulation
2. Administration, staff, and pupil service
3. Instructional spaces
4. General units including auditoriums and gymnasiums

The percentage of total habitable space devoted to each of the groups was determined for each of the buildings. The results are shown in Table 1.

The space devoted to building services varied from 15.2 to 37.5 percent of the total habitable space. The space devoted to administration, staff, and pupil service ranged from 6.7 to 19.6 percent. Instructional spaces occupied from 20.4 to 43.9 percent of the total habitable space. Auditoriums and gymnasiums and assembly rooms accounted for 13.0 to 42.3 percent of the total. These wide variations are, to some extent, accounted for by different educational programs in various communities. In general, the variations seem to indicate a lack of common understanding of the building requirements for the curriculum. There is a definite indication that much responsibility for these variations fell upon the architects. A study of the buildings built by the three architects in New York state who had designed four or more of the buildings showed the following:

Architect A devoted 70.1 percent of the habitable space to instructional and general units on the average.

Architect B devoted 63.6 percent of the habitable space to instructional and general units on the average.

Architect C devoted 60.2 percent of the habitable space to instructional and generals units on the average.

A similar study of two groups of St. Louis buildings showed that one architect was able to increase the space assigned to similar educational functions 10 percent above that secured by an other architect under the same curriculum requirements.

TABLE 1. Percentage Distribution of Spaces According to Functions for Forty Nine Buildings

Building Number	Percentage of Total Habitable Space Assigned to Various Functions																			Percentages Habitable and Nonhabitable Spaces Are of Total Cubic Contents		
	Building Service					Administration, Staff, and Pupil Service					Instructional Units				General Units							
	Heating and Ventilating	Circulation	Storage	Garage	Total	Offices	Staff	Pupil	Cafeteria	Total	Classrooms	Laboratories and Shops	Library and Study Hall	Total	Auditorium	Gymnasium	Assembly Room	Combination Auditorium-Gymnasium	Total	Grand Total	Habitable Space	Nonhabitable Space	Grand Total
SECONDARY SCHOOL BUILDINGS																				%			
1	4.7%	21.8%	3.2%		29.7%	1.9%	1.1%	5.5%	4.7%	13.2%	8.5%	15.7%	2.4%	26.6%	16.5%	14.0%			30.5%	100			
2	7.0	25.3	1.1		33.4	1.7	1.6	4.4	4.1	11.8	11.5	20.0	1.4	32.9	13.8	8.1			21.9	100			
3	8.5	19.4	9.6		37.5	1.8	0.6	3.2	5.5	11.1	15.6	9.2	3.5	28.3	17.5	5.6			23.1	100			
4	7.1	23.7	1.7		32.5	0.9	2.4	5.8	8.6	17.7	15.2	20.8	0.8	36.8	6.4	6.6			13.0	100			
5	3.0	21.2	2.1		26.3	1.3	2.1	5.9	5.8	15.1	13.4	22.2	0.8	36.4	14.9	7.3			22.2	100			
6	5.4	18.5	2.1		26.0	1.2	0.9	6.0	4.0	12.1	13.2	11.9	4.0	29.1			1.3%	31.5%	32.8	100	66.5%	33.5%	100%
7	3.9	20.4	4.5		28.8	1.3	1.3	8.0	3.3	13.9	11.4	12.4	6.5	30.3				27.0	27.0	100	63.6	36.4	100
8	4.1	15.6	3.4		23.1	2.7	2.2	4.7		9.6	26.0	15.7	2.2	43.9		19.4	4.0		23.4	100	56.2	43.8	100
9	9.0	14.8	10.1		33.9	4.1	1.7	9.1	4.7	19.6	10.8	6.4	4.9	22.1		24.4			24.4	100	64.3	35.7	100
10	4.8	19.6	2.9		27.3	1.5	1.0	6.4	6.3	15.2	13.8	12.3	3.3	29.4	16.2	11.4	0.5		28.1	100	63.3	36.7	100
11	6.4	12.8	3.1		22.3	3.1	0.8	8.8	3.5	16.2	12.8	10.7	3.8	27.3	17.5	16.7			34.2	100	66.5	33.5	100
Means					28.8					13.9				29.3%					24.4%	100%	63.4%	36.6%	100%
COMBINATION ELEMENTARY AND SECONDARY SCHOOL BUILDINGS																							
12	6.6%	13.7%			20.3%	0.8%	0.8%	5.9%		7.5%	26.0%	13.4%	2.3%	41.7%				30.5%	30.5%	100%	68.0%	32.0%	100%
13	11.6	16.3	0.5%		28.4	3.3		7.8	0.6%	11.7	20.3	12.4	5.8	38.5				21.4	21.4	100	67.5	32.5	100
14	4.6	10.2	0.4		15.2	1.2	0.9	4.8	2.4	9.3	17.4	10.4	5.4	33.2	18.0%	24.3%			42.3	100	83.5	16.5	100
15	7.5	15.7	3.4		26.6	1.5	0.8	5.6	2.9	10.8	21.3	9.1	4.9	35.3				27.3	27.3	100	74.5	25.5	100
16	6.0	13.3	0.5		19.8	1.0	1.5	5.2	2.5	10.2	15.8	9.4	6.7	31.9				38.1	38.1	100	76.0	24.0	100
17	7.4	13.7			21.1	1.8	0.8	6.8		9.4	23.4	12.4	5.2	41.0				28.5	28.5	100	67.5	32.5	100
18	5.9	15.3	2.1		23.3	2.1	0.6	5.3	5.5	13.5	26.0	10.3	4.6	40.9				22.3	22.3	100	74.5	25.5	100
19	3.7	11.9	2.4		18.0	2.7	1.3	11.0	3.2	18.2	18.1	9.1	5.4	32.6				31.2	31.2	100	73.8	26.2	100
20	6.3	17.8	3.2		27.3	1.3	0.1	5.4	0.4	7.2	24.8	5.4	3.3	33.5				32.0	32.0	100	65.5	34.5	100
21	4.5	17.5	0.9		22.9	2.1		5.2	3.3	10.6	19.8	9.4	5.8	35.0				31.5	31.5	100	70.5	29.5	100
22	4.2	15.2	0.9	3.2%	23.5	2.6	1.2	3.4	2.6	9.8	17.7	9.4	4.1	31.2	16.5	19.0			35.5	100	75.5	24.5	100
23	8.3	17.1	1.5		26.9	3.1	1.2	5.1	2.9	12.3	6.6	22.2	5.0	33.8		27.0			27.0	100	54.6	45.4	100
24	4.1	17.9	5.4		27.4	1.7	0.6	7.6	4.0	13.9	19.7	10.6	3.1	33.4				25.3	25.3	100	75.8	24.2	100
25	5.9	19.1	1.1		26.1	2.1	1.1	6.3	3.4	12.9	26.0	8.2	2.8	37.0				24.0	24.0	100	79.2	20.8	100
26	5.2	19.6	2.9		27.7	3.7	0.9	6.6	2.5	13.7	21.1	7.0	4.4	32.5				26.1	26.1	100	71.5	28.5	100
27	4.4	17.1	3.7		25.2	3.2	0.3	2.8	4.3	10.6	22.9	8.3	3.8	35.0				29.2	29.2	100	64.6	35.4	100
28	4.9	21.3	3.4		29.6	3.0	0.4	7.3	3.8	14.5	21.7	8.9	2.9	33.5				22.4	22.4	100	66.0	34.0	100
29	6.5	15.3	2.3		24.1	2.3	0.1	9.0	6.6	18.0	25.4	8.2	2.5	36.1				21.8	21.8	100	66.3	33.7	100
30	4.2	20.7	4.1	2.7	31.7	1.5	0.6	5.0	2.1	9.2	12.1	5.8	2.5	20.4			1.0%	37.7	38.7	100	68.0	32.0	100
31	9.1	21.3	0.8	2.9	34.1	2.6	0.1	4.0		6.7	23.2	6.7	2.2	32.1				27.1	27.1	100	75.0	25.0	100
32	6.9	16.7	2.2		25.8	1.8	0.1	9.9	2.6	14.4	25.5	9.2	3.8	38.5				21.3	21.3	100	66.3	33.7	100
33	5.6	16.6	1.7		23.9	2.8	1.7	6.0	4.0	14.5	27.0	10.0	4.8	41.8				19.8	19.8	100	65.5	34.5	100
34	11.5	12.3	2.9	2.9	29.6	3.2	1.9	4.6	1.9	11.6	14.9	9.5	4.5	28.9			0.8	29.1	29.9	100	64.4	35.6	100
35	6.7	16.5	2.0	6.7	31.9	2.7	0.9	8.5	3.6	15.7	21.5	7.3	2.2	31.0				21.4	21.4	100	65.3	34.7	100
36	7.4	20.1	5.5		33.0	2.1	1.1	5.3	2.3	10.8	20.6	10.0	2.1	32.7				23.5	23.5	100	74.5	25.5	100
37	5.9	21.8	5.2		32.9	2.5	1.8	6.2	2.5	13.0	9.9	15.3	3.0	28.2	16.5	9.4			25.9	100	68.2	31.8	100
38	4.9	19.5	1.4		25.8	3.1	1.3	4.1	2.5	11.0	23.9	6.6	3.7	34.2	17.1	11.9			29.0	100	69.0	31.0	100
39	2.5	15.3	1.8	3.1	22.7	2.2	0.8	5.1	2.0	10.1	19.5	11.9	3.5	34.9	14.3	16.7	1.3		32.3	100	66.2	33.8	100
40	6.1	16.3	3.3		25.7	2.3	0.8	9.4	3.6	16.1	23.6	10.5	2.4	36.5				21.7	21.7	100	67.5	32.5	100
41	2.1	19.7	1.5		23.3	2.4	0.7	3.4	2.2	8.7	21.9	12.0	3.1	37.0	17.4	13.6			31.0	100	75.0	25.0	100
42	8.3	14.3	1.5		24.1	2.8	0.6	4.9	2.1	10.4	20.4	9.7	2.9	33.0	18.4	13.1	1.0		32.5	100	83.5	16.5	100
43	4.1	19.2	3.5		26.8	2.2	1.3	5.0	3.9	12.4	24.6	10.6	3.3	38.5				22.3	22.3	100	69.0	31.0	100
44	4.6	17.8	3.3		25.7	1.9	3.7	5.5	4.0	15.1	24.4	7.1	3.4	34.9	13.9	10.4			24.3	100	62.2	37.8	100
45	1.8	13.5	1.2		16.5	2.4	0.7	6.5	2.4	12.0	25.7	8.2	3.6	37.5	16.3	16.3	1.4		34.0	100	73.5	26.5	100
46	5.5	18.8	2.5		26.8	2.8	1.9	5.5	2.2	12.4	22.0	9.5	2.9	34.4	12.7	13.7			26.4	100	66.0	34.0	100
47	5.3	12.1	2.9	6.6	26.9	1.5	1.1	4.2	3.4	10.2	23.6	7.6	2.3	33.5	15.6	13.3	0.5		29.4	100	76.8	23.2	100
48	9.1	14.8	2.2	5.2	31.3	2.1	1.1	5.8	2.7	11.7	20.6	7.8	2.8	31.2	14.0	11.1	0.7		25.8	100	69.6	30.4	100
49	9.1	17.0	4.1		30.2	2.0	1.5	8.2	2.1	13.8	16.7	9.0	3.6	29.3	11.3	13.0	2.4		26.7	100	55.2	44.8	100
Means					25.9%					11.9%				34.3%					27.9%	100%	69.9%	30.1%	100%
Means of All Buildings																				100%	67.6%	32.4%	100%

CHAPTER 4: the changing curriculum

One of the chief identifying characteristics of the current high school population is the ever-widening range of student interests and capacities to be served. In contrast to the homogeneous, college-preparatory group which attended high school prior to 1900, secondary schools are now composed of a heterogeneous assortment of young people with interests as widely variant as those of society itself. The important fact today is that universal secondary education is an established fact. Large numbers of students and little student selectivity is the recognized order of affairs at the high school level. Therefore, the basic problem of secondary education is to devise ways and means for meeting the demands of a society which proposes to keep its youth in school.

Concurrent with the increase in the number and variety of interests represented in the high school population is the tendency to develop a curriculum composed of experiences designed to serve the individual needs of pupils. While it is recognized that there exist certain common elements in the culture to which all students should be exposed, it is also recognized that the development of individual capacities along socially desirable lines is a major responsibility of secondary education. The traditional high school with its single-track curriculum down which all students were forced, as into a common groove, is long since outmoded. The practice of requiring students to learn about a remote and lifeless past in order to prepare for a distant future, which might or might not materialize, is inconsistent with the revelations of modern psychology and with the demands of democratic society. Effective living in the immediate present is the keynote of modern education. The secondary school curriculum is now in a process of reconstruction looking toward this end.

The Lagging High School Curriculum

Although a wide recognition of needed curriculum change is apparent in secondary education, progress in curriculum development has been more apparent in the elementary schools of the country. Much of the research dealing with the psychology of learning and growth has been done at the elementary level. The school life of small children is less inclined toward formalization, more filled with natural sequential learning experiences, more adjusted to individual needs, and better adapted to the need for living effectively in the immediate present. Consequently, elementary school buildings and physical facilities are inclined to be more flexible and utilitarian in design and arrangement and better adjusted to the demand for the organismic growth of children. Studies of the higher grades and secondary schools reveal that the curriculum has been inclined to be more formal at these levels. The natural and psychological means for learning and growth which characterize the lower elementary grades have all too frequently been supplanted in the high school

by formal subjects and courses of study, many of which are remotely related to the immediate problems of youth. The mastery of facts and subject matter seems to have been the paramount objective of the secondary school. Tradition, vested interests, lack of administrative insight, and lack of supporting funds are some of the factors which have operated to maintain a formal, subject-matter dominated secondary school curriculum, ill-adapted to the needs of youth in the modern world.

GROWING AWARENESS OF CURRICULUM PROBLEMS

However, the secondary schools are rapidly adjusting their curriculum programs. One of the most significant trends in secondary education is to be found in the field of curriculum reconstruction and teaching procedures. It is widely recognized that no phase of the educational program is of greater importance and that housing, finance, organization, and administration are significant only in so far as they facilitate the accomplishment of curriculum objectives. Of the total number of research studies reported to the United States Office of Education between the years 1929 and 1932, approximately one-fourth dealt with problems of the curriculum, and between 1932 and 1935 more than one-third of the total were on this subject.[1]

Coordination of Curriculum and Building Planning

To state that curriculum trends have profound implications upon building planning and construction is to express an obvious truism. While it was a comparatively simple task to plan a school building for the traditional curriculum, modern building planning has become as complicated as the curriculum problem itself. Curriculum reconstruction is a continuous process which goes on from day to day, week to week, and year to year. No final set curriculum is possible of achievement. It must move as society moves and as the needs of learners develop. In apparent conflict with this situation is the fact that once erected, a school building will probably be used for 75 years to come. Thus, to house a constantly changing curriculum in a building which is in the nature of permanent equipment constitutes a problem which all but takes on the proportions of a dilemma. If constant change and improvement are to characterize the secondary school curriculum of the future, it follows that high school buildings must be planned in terms of a utility and flexibility never before deemed necessary. If they are not so planned, buildings will become obsolete long before they have served the length of time desirable, as measured in terms of the original capital outlay.

[1] U.S. Office of Education, *Biennial Survey of Education*, 1934-36, Washington, Government Printing Office, 1940, Chap. II, p. 33.

COURSE OF STUDY DEVELOPMENT

One of the most frequently reported forms of curriculum revision approaches the problem from the standpoint of course of study development. The variety of work done in this field ranges from selected subjects within particular high schools to elaborate curriculum revisions, such as those found in the states of California, Texas, and Virginia. From 1930 to 1935, 479 high school courses of study were reported to the United States Office of Education.[2] This number was shortly increased to over 500, and it is probable that the total number is now much higher. The development of new courses of study for the social sciences and English have been most frequent. Other fields which have reported, in the general order of frequency, are mathematics, science, foreign language, home economics, commercial education, health education, industrial art, fine art, music education, agriculture, guidance, library education, safety, character education, and extra-curricular activities. Thus, it appears that practically every phase of the secondary curriculum has received attention from the revised course of study approach.

EXPANSION OF SUBJECT OFFERING

Closely associated with the development of courses of study has been a large increase in the number of subjects offered in the high school. Although this increase has frequently resulted from the pressure of vested interests which assigned certain values to new subjects as such, some of the increase has also resulted from a conscientious desire to serve the expanding and specific needs of youth. Within subject fields a strong tendency has been to develop content in terms of units. In fact, the unit idea has been dominant in most of the popular approaches to the presentation of subject matter, such as the problem method, the project method, the

[2] *Op. Cit.*, Chap. II, p. 33.

activity movement, the Winnetka system, the Dalton plan, the Miller contract plan, the group-study plan, the Morrison system, and the workbook plan.

DEPARTMENTALIZATION

The increase in the number of courses offered and the wide use of various forms of the unit idea have been accompanied by an increased compartmentalization and departmentalization of subjects at the high school level. It is unquestionably true that these developments made a unique contribution to educational progress by breaking away from the traditional set-subject curriculum, by maintaining a greater utility of plant facilities, and by arousing professional education to a realization of its increasing opportunities for service, but it may also be recognized that these devices and trends achieved little reform in the more basic practices of curriculum construction. While the number of offered subjects was increased greatly, few positive efforts were made toward integration of the entire curriculum. Many subjects were added, but comparatively few were dropped out. While departmentalization undoubtedly decreased the teaching load and made for greater skill in the teaching of subject matter, the major emphasis continued to be on content, rather than on the needs of individuals. While the unit idea contributed meaning and sequence to the materials within given subjects, it touched but incidentally upon the larger problem of integrating the continuing experience of youth.

The Fusion of Subject Matter Movement

Although the contributions of the foregoing developments were widely recognized, their deficiencies were also quite apparent. Accordingly, the last 15 years have witnessed the ascendancy of a strong fusion of subject matter movement. Social studies courses were developed from related materials in geography, history, civics, and economics. Language arts arose from a fusion of reading, composition, spelling, grammar, and rhetoric. General mathematics came to the front composed of arithmetic, elementary algebra, and intuitive geometry. General science developed as a combination of physiology, biology, chemistry, and physics, with a liberal consignment of physical geography. General shop arose from woodworking, sheet-metal working, mechanical drawing, and other industrial arts. In short, on the educational front, the "general" became the commander-in-chief who was leading his subject matter legions into new fields of curriculum reconstruction. That the movement toward the development of general courses had, and is still having, a definite effect on building facilities is obvious in all parts of the country. Shops, laboratories, libraries, and general classrooms have been reconditioned with an eye to the requirements of the general courses. New buildings are being planned with inclusive facilities to accommodate the growing demands of this significant trend in curriculum reconstruction.

In the case of the general courses, again it may be recognized that a significant forward step was made. The fusion and the integration of subject matter in related fields was a much needed reform in education. But the major emphasis was still on subject matter as such. Although the intention of the fusion movement was to stimulate pupil interest and to accelerate the learning process, the development did not start with pupil interests. It began with the construction of selected portions of subject matter from related fields and welded them into single courses. While the information spread was more pertinent to twentieth century living and more adaptable to various pupil backgrounds and interests, the guidance and personnel emphases were not conspicuously apparent. The prescription of subject matter to be taken by the pupils, although in new doses, was still a dominating influence.

The Recognition of the Emergent Nature of the Curriculum

It may be that the most significant trend in curriculum reconstruction developed its impetus from a deeper understanding of widely accepted concepts of psychology, of educational philosophy, and of democracy. Although this influence cannot be identified by means of a single name, the elements which compose it stand forth with some clarity. A rational human being does not go any place unless he first decides where he wants to go. He also decides with regard to the means for arriving at the desired place. In terms of curriculum planning, this means that the student must set up his own objectives under the guidance of teachers who are in a position to advise because of their greater maturity and

experience. Purposes and objectives developed by teachers are of no value in the educative process except as they are understood by students and personally accepted by them. If education is to be maximally conducive to growth, learners themselves must share in the development of objectives and in the organization of processes for their achievement. Moreover, these self-imposed objectives are subject to alteration as the learning process proceeds. The single identifying characteristic of democracy in education is to be found in the degree to which purposes are altered, modified, or expanded as the planning-learning procedure continues in successive and related experiences throughout the school life of youth.

Implicit in this discussion is the fact that curriculum construction must be done in terms of life itself and that education is a continuous process incapable of dissolution into isolated parts. However subject matter may be specialized or compartmentalized. Its only justification is to be found in the degree to which it facilitates the resolution of problems recognized and faced by learners in the immediate present. Moreover, as life itself is a continuous process, so learning results from a continuous succession of interrelated and hierarchical experiences. These stimulate the individual to an ever-increasing quantitative and qualitative realization of his potentialities and a more purposeful understanding of the environment and the social setting in which he lives.

The term self-realization has no meaning except that given it by a recognition of individual differences. Not only are individuals different, but these very differences constitute the unique and priceless respects in which individuals are to develop into socially adjusted human beings. Even though it may be granted that there are certain portions of the culture to which all youth should be exposed, it does not follow that contacts with the social heritage must be uniform for all individuals with regard to time, place, age level, or curriculum content. In fact, progressive education recognizes generally that proper provision can be made for individual differences in curriculum construction only when learners participate in the process throughout.

In recognition of the previously discussed concepts of learning by means of curriculum construction, it is now widely held that a curriculum cannot be developed by extrinsic parties prior to its use by learners. No person or organized group of persons can establish a curriculum for the use of other persons for the simple reason that they cannot learn for other persons. This does not deny the place of the teacher or of the curriculum expert in the process, but it does imply that the curriculum must be studied and directed in terms of the individual learner, while the school may be expected to be organized and administered in terms of the community and its needs.

The Guidance Movement

Because of the increased emphasis on the dynamic nature of the curriculum, the wider recognition of democratic procedures in its reconstruction, and because of the increased numbers of high school students, together with the complexity of the curriculum problem caused by larger and more cosmopolitan enrollments, the guidance movement has grown to unprecedented proportions in the secondary schools of the country. Prior to 1930 the development of guidance services was persistent but, nevertheless, scattered and sporadic. However, in the last decade it has developed on a nation-wide scale. It may now be considered an established and indispensable part of the educational program. It is considered to be a necessary service to individual students designed to assist them in making decisions and adjustments, in accordance with their interests and abilities, to the end that optimum results may accrue from their educational training and from their efforts at social and occupational adjustment.

A previously noted trend in curriculum development was the great increase in the number of subjects offered in the high school. This situation made the problem of choice more difficult for students. Departmentalization was another prominent trend. It further confused the student by setting up artificial barriers between the several subject fields. The need for guidance was thus doubly apparent, but because of rigid departmentalization and a lack of understanding of the meaning of guidance, it was frequently forced to make its entry into school systems as an additional subject to be taught or as another department of instruction. This singular status of guidance still exists in larger numbers of high schools throughout the country, but it is gradually being supplanted by what may be properly called the guidance point of view, which permeates the entire curriculum structure and motivates the entire in-

structional staff of the school system as well. It appears that the latter development is assured of continuance and expansion and is therefore of basic significance to school building planning.

Guidance and Vocational Education

Vocational education has been a pioneer in the development of guidance facilities. Through the use of aptitude tests, exploratory courses, personal advisement, occupational study, placement, and follow-up activity, vocational education has sought to render an extended and personalized service to all youth. Moreover, constructive attempts have been made to link the schools more closely with productive industry. Advisory boards, composed of representatives of labor, industry, and other interested elements in the community, have been organized for the purpose of relating the curriculum to the actual needs of industrial employment. Attention has also been centered on part-time education designed to correlate school work with occupations and to balance the growth of students. The retraining needs of employed adults have also entered into the discussions of these advisory bodies.

Broad Concept of Guidance

However, the current conception of guidance may be characterized as being far broader than the vocational aspects of the problem. The need for guidance is apparent wherever the individual is faced with the necessity of making choices. Although the guidance specialist and the counselor are recognized as essential for purposes of coordinating the program, advising with teachers, and diagnosing complicated cases of maladjustment, the teacher is conceived to be the key person in student contacts for guidance purposes. Although courses in guidance and occupational information, together with home-room activities, continue to play an important role in guidance service, extended contacts between pupils and teachers are considered to be the basis from which guidance programs must be developed and the chief means for making them effective. While objective tests and measurements continue in use for purposes of collecting facts, judgments and decisions are more inclined to be based on the cumulative anecdotal records of individual students. Because of the increased demands on the time of teachers and the need for extended personal contacts between them and pupils, teaching loads in terms of class assignments are inclined to become smaller, and arrangements are made which continue and broaden these close associations over periods of time far in excess of the usual length of regular courses. Indeed, the guidance needs of students are such that they can be best served when each individual is known to a single teacher throughout his school life. This arrangement does not exclude contacts with other teachers, but it does give assurance of a more intimate and accurate approach to the guidance problems of individual pupils.

THE HOME ROOM

A noteworthy development in this connection is the growing use being made of the home room type of organization. In many cases the home room has been conceived as a purely disciplinary and administrative device, but it is now generally recognized as a means for the attainment of guidance as well as general educational objectives. Typically, the home room is small. It is usually planned to accommodate but 20 to 30 pupils. Simplicity characterizes its design and arrangement, and democracy characterizes its activities. Perhaps its most important function is to maintain desirable close personal relationship between pupil and teacher over extended periods of time. Teachers come to know pupils well through these long associations and are thus enabled to assume key positions in the guidance program of the school.

Moreover, the home room provides an unusual opportunity to develop understandings and appreciations regarding the environment in which pupils live. Interests may be expanded and experiences unified in a manner not yet approached in the traditional classroom activities. Further, in working, planning, and learning together, pupils in home rooms may be exposed to socializing experiences of great value. Anti-social attitudes among some individuals are more dangerous than the ostensibly illegal activities of the criminal. These anti-social attitudes may be adjusted in the home room by constant exposure of individuals to group activities and by the subjection of minority opinion to the will of the majority. Here, too, the will of the majority may be conceived as a tentative hypothesis subject to change upon the discovery of additional

facts and further discussion. In fact the home room, as it exists in many high schools, is the basic unit in the democratic process.

Whether the activities in the home room be concerned with discipline and conduct, civic training, guidance, methods of study, school spirit, administrative problems, social activities, course of study relationships, or any other phase of school life, they may all be recognized as essentially curricular in nature. Properly conceived, most of the experiences of pupils may grow out of home room activities. These planned and guided experiences may well constitute the curriculum. Building planning should recognize the key position of the home room in curriculum construction and provide facilities which accommodate the emergent social processes carried on there.

The Extra-Curriculum

Special attention may be called to the increased emphasis being placed on extra-curricular activities at the secondary level. In view of recent developments, the term "extra-curriculum" is doubtless a misnomer. It is now recognized that these activities are as much a part of the curriculum as any of the more formal subjects and deserve the same careful attention in curriculum planning. In fact, in contributing to the health, social, leisure time, and vocational objectives of education, it has been demonstrated that the so-called extra-curriculum has been more fruitful than many of the formerly curricularized subjects. In addition to the usual athletic, musical, dramatic, debating, literary, and journalistic organizations represented, clubs and activities are in existence representing a great variety of special interests. Purely social organizations are also coming into prominence. Moreover, the tendency is to allow time for these activities in the course of the school day, as well as to extend the school day itself for them. Building facilities are also being planned for their accommodation. The tendency in this extra-curriculum area has been toward more nearly universal participation by all pupils, less emphasis on competition and on scholarship as a basis for eligibility, more careful supervision by health and educational authorities, and a closer correlation between activities and with the purposes of education as outlined for the local school system.

Conceived from this point of view, the extra-curriculum is not different from the curriculum either as to origin or purpose. They are coordinate parts of the functional whole which composes the continuing educational experience of youth. Emphasis is placed on values which carry over into adult life as well as upon activities which appeal to passing adolescent tastes. Supervision is provided, but authority is not exercised to the point where it interferes with the spontaneity, intiative, and leadership of students. While control of school policies remains with the duly constituted school authorities, the extra-curriculum has been used extensively for the development of school spirit and morale.

The Core Curriculum

The core curriculum movement arose to prominence in the years immediately preceding the first World War. Its progress was interrupted sharply during American participation in that conflict, after which it was taken up with renewed vigor. During the last decade, few movements in secondary education have enjoyed the publicity and growth characteristic of the core curriculum. As a stimulant to educational analysis in terms of democratic values, the core curriculum represents a definite forward step in the progress of curriculum construction.

In reality the term core curriculum covers a wide range of curriculum practices. The more conservative types offer a little more than the traditional, adult-planned, and subject-matter centered courses of study which are taught by conventional procedures. The curriculum under these circumstances is composed of reorganized subjects having little change in content or method of presentation.

In other cases, the core is composed of fused and general subjects such as social studies, language arts, general science, and general mathematics, with major emphasis on the mastery of subject matter. In still other cases, the core curriculum follows the broad fields type of organization in which each field is made up of materials selected from several subjects, the sum-total of which is more inclusive than the sum of the subjects represented. This type of organization is usually built around such areas of experience as protection and conservation, production and distribution, communication and transportation, recreation, esthetic and religious experience, education,

extension of freedom, personal integration, and exploration. The broad fields approach is also designed to encourage a larger participation on the part of both pupils and teachers in planning activities. Typically, an expansion of the bases for measurement and evaluation also accompanies the broad fields type of core curriculum. It is also true that the core is an important organizational device in that type of curriculum construction which emerges as planned experience from the felt needs and desires of the learners. In fact, the core is a method of approach to the problem of curriculum construction which is almost as broad as secondary education itself, but in view of the modern emphasis on the achievement of democratic values through an experience curriculum, the last mentioned type of core is possessed of larger implications for building planning.

A BASIC SIMILARITY

However, despite the range of practice apparent in the various applications of the core curriculum concept, a single basic assumption stands forth with some clarity. This assumption is in effect that certain portions of the culture are of such fundamental importance that all pupils should be exposed to them through planned curricular activities. The contention is that the particular and specialized needs of pupils may be accommodated by means of courses and activities outside the core, while the essential elements of the culture are developed and the immediate problems of living are resolved within the core activities. In the typical situation, about half of the school day is spent on the core curriculum, and the home room is the administrative device often used to put the practice into effect.

Evaluation

A corollary development in connection with the trend toward the emerging experience type of curriculum has been the broadened and refined conception of the meaning and the method of measurement and evaluation at the secondary level. While the technique and the devices for measurement have been constantly improved with regard to both validity and reliability, the movement has expanded from the narrowly objective to the broadly subjective type of evaluation. Emphasis was formerly on the measurement of skills and fact mastery, with an attempt to judge from these objective data the intelligence level of pupils or the progress made in specific subject fields as a result of school experience. Although present emphasis does not minimize the importance of objective tests, there exists a strong tendency to evaluate educational outcomes in terms of the application which is made of acquired facts, skills, and principles, and in terms of desirable intellectual and social traits.

This shift in the method and purpose of measurement in education can no doubt be traced in part to the growing awareness of the fact that high schools are not producing citizens who are intellectually competent to assume the responsibilities devolving upon the individuals of a society which proposes to remain democratic in spirit and method. For example, the Regents Inquiry,[3] a survey of the schools of New York State, reported that the pupils leaving high school, whether by graduation or drop-out, constituted a group skilled in academic facts, recognizing their rights as free citizens in a free country, but unconcerned about civic responsibility, and not awake even to the immediate and local problems and issues which will shortly confront them as citizens, voters, and taxpayers. It was also suggested that the effectiveness of high school education should be measured in terms of its ability to prepare pupils for citizenship, for further living and wholesome recreation, for vocations, and for social competence. Many other comprehensive surveys, dealing with the curriculum, have emphasized similar objectives. In view of these emphases, it appears that the use of the evaluative technique will grow as the need for curriculum justification becomes more apparent.

IMPROVEMENT IN TESTS AND MEASURES

As previously indicated, tests and measures have been much improved in recent years. Many individuals and organizations have contributed to this progress. The Cooperative Test Service [4] has undoubtedly rendered a notable contribution to the increased validity and reliability of tests. The simultaneous use of test batteries, rather than single scattered tests, is recognized as a significant development. Batteries allow for the great variation in the abilities of pupils, they provide a more accurate

[3] Spaulding, F. T., *High School and Life*, Report of the Regents Inquiry, New York, McGraw-Hill, 1938, 377 pp.

[4] American Council on Education, Report, Eighth Educational Conference, Cooperative Testing Service, Washington, The Council, 1940, 208 pp.

basis for comparisons, and the total scores are more valid and reliable than those of single tests. In the preparation of tests, teachers are strongly inclined to emphasize the ability of pupils to apply principles rather than their ability to recall facts. The Progressive Education Association, through its emphasis on the appraisal of educational outcomes and its attempts to search out intellectual and social traits, has given impetus to the evaluative movement. The Cooperative Study of Secondary School Standards,[5] which began in a few scattered states as an effort to verify the standards of accrediting authorities, has now grown into a full-fledged movement of self-analysis and evaluation.

It may be generalized that the increased interest in and the improved techniques of evaluation have been factors in causing the secondary school curriculum and the methods used in its development to move toward a greater degree of functionalism. As the curriculum comes closer to the emerging needs of learners, it will doubtless be subjected increasingly to intensified and refined evaluative processes.

The Curriculum for Adult Education

The increased emphasis upon adult education throughout the country has exerted a notable influence on the high school curriculum. As time passes, it may be assumed that the curricular offering for these purposes will be characterized by the dynamic approach and the functional outlook which identifies the more progressive secondary curriculum trends. Fortunately, planning for adult education is slowly becoming a part of the curriculum responsibility of the American high school. Educators have been impressed with the fact that adults come to school only as long as they feel they are getting value received from the courses offered. Compulsory attendance laws are not factors operating to keep adults in school as is true in the case of children and youth. The feeling that benefits are forthcoming is the only controlling influence which maintains attendance in adult education. This situation has forced a consideration of curriculum problems in terms of studied and identified adult needs. Lay advisory councils have been organized which, among other things, study the curriculum needs of adults in the community. The assistance of labor, industry, finance, business, and the professions is solicited in this cooperative work. Community surveys and analyses are conducted with a view to discovering essential social and educational facts. Vocational training and retraining receive major emphasis. Recreation, health, and avocation are receiving increased attention as legitimate curriculum enterprises. Community problems, such as housing, zoning, public improvements, taxation, parks, social services, and public utilities are centers about which courses in adult education are being organized. The public forum is rapidly occupying a place of prominence in adult curriculum construction.

[5] Cooperative Study of Secondary School Standards, General Report, Evaluation of Secondary Schools, 1939; Evaluative Criteria and Educational Temperatures, 1940 editions; George Banta Publishing Co., Menasha, Wis.

Broadening of School Environment

A significant fact is that not all of these activities are carried on in the school as such. They are carried on in the home, on the farm, in the factory, and any other place where the needs of adults may be served most effectively. The school staff is recognized as a source of professional advice and guidance, but its territory for service is as wide as the community itself. The school building is the center about which the program revolves, but activities are by no means confined there. The major emphasis is to bring the school into such an intimate relationship with adult problems that it comes to be an indispensable and controlling part of community life. Comparatively few high schools have reached this degree of sufficiency, but definite progress is apparent. The curriculum for adult education must grow from the people under the guidance of the school staff. Buildings must be planned for maximal utilization by adult groups. Failure to do so means failure to serve one of the most pressing needs of education in modern society.

Trends Not Mutually Exclusive

Although the various trends apparent in the reconstruction of the secondary school curriculum are frequently discussed in isolation, it is of importance to note that they are by no means mutually exclusive. For example, the home room is found in practically every type of curriculum program from the traditional subject-centered school to those which

develop the curriculum from the emerging experience of youth. Likewise, the core curriculum may be composed of traditional subjects, fused subjects, broad fields, or the cooperatively planned activities of learners. Tests, measurements, and evaluation are a part of every type of curriculum development, although their application varies from the perfunctory use of occasional tests to inclusive evaluative processes which constitute an inseparable part of the dynamic total. The unit idea for the development of the materials for instruction and learning may be found in any of the several types of curriculum construction.

The relationship which exists among curriculum practices is doubtlessly due in part to the tendency of some schools to borrow the techniques and devices used successfully in other schools. However, a more meaningful interpretation is that a widespread consciousness of the problem is being put into effect through procedures which appear to fit the needs of the local situation. The interrelated and overlapping status of curriculum development is evidence of a desire to attack local problems by means of devices and techniques which possess some demonstrated value.

Use of Modern Equipment

The need of modern equipment is common to the several types of curriculum approach. Educators quite generally are impressed with the fact that the moving picture and the radio embody ideas of basic importance to education. Visual and auditory aids to teaching are included in the programs of every kind of school, regardless of variations in the basic philosophy of curriculum making. In the diagnosis and treatment of the physically handicapped, the value of mechanical equipment is universally recognized. Many types of tests and measures are made more accurate through the use of mechanical equipment and scientifically developed physical appointments. In short, regardless of the method of approach to the problem of the curriculum, mechanical and scientific devices are available which facilitate its development, simplify its administration, and make the measurement of progress more accurate and meaningful. In planning the physical facilities for a program of education, it is highly essential that mechanical devices be provided which ease the teaching load, stimulate the learning process, and validate the evaluative process necessary for measuring the results as well as the methods of curriculum planning.

Attempts to Stimulate Curriculum Change

The crisis associated with the outbreak of the second World War has undoubtedly been a factor stimulating increased interest in high school curriculum construction. With powerful international forces operating, which appear to be no less threatening, the schools have been placed in a position where they must justify their existence in terms of contribution to the national welfare. National organizations, special commissions, and others concerned with the improvement of secondary education have conducted studies looking toward this end.

C. H. Judd has urged fundamental changes in the curriculum of secondary education deemed necessary for a more adequate solution of the youth problem.[6] Although it antedated the military crisis in international affairs, a special committee of the Department of Secondary School Principals, under the chairmanship of T. H. Briggs, approached the problem by analysis of the major issues in secondary education.[7] Some of the publications of the Educational Policies Commission are highly suggestive of preferred curriculum content and methods.[8] The Progressive Education Association in its eight-year experiment involving 30 schools brought much light to bear on the efficacy of new educational methods as compared to the more traditional techniques.[9] The Implementation Committee of the National Association of Secondary School Principals, under the chairmanship of Will French, has accepted the responsibility of discovering and setting forth the particular respects in which secondary education might increase its effectiveness. This committee [10] has identified the

[6] Judd, C. H., Changes in Secondary Education Necessary for the Solution of the Problems of Youth, Bulletin of the National Association of Secondary School Principals, No. 88, February, 1940, Chicago, The Association, 1940, pp. 39-52.

[7] Briggs, T. H., Issues of Secondary Education, Bulletin of the National Association of Secondary School Principals, No. 59, January, 1936, Chicago, The Association, 1936, 372 pp.

[8] Educational Policies Commission, *Learning the Ways of Democracy,* Washington, The Commission, 1940, 486 pp.

[9] Progressive Education Association, *New Methods vs. Old in American Education,* New York, Bureau of Publications, Teachers College, Columbia University, 1941, 56 pp.

[10] Dodds, B. L., That All May Learn, Bulletin of the National Association of Secondary School Administrators, No. 85, November, 1939, Chicago, The Association, 1939, 234 pp.

educationally neglected elements in the population. It has described their characteristics and needs. It has made constructive suggestions for the improvement of opportunities among the educationally neglected.

Because it summarizes the best critical and constructive thought available, *What the High Schools Ought to Teach,* prepared by a special committee for the American Youth Commission of the American Council on Education, is of particular importance.[11]

Needed New Curriculum Elements

In view of the known deficiencies of the high school curriculum, it has been urged that provision be made for the inclusion of important new elements. Instruction in reading should be continued and emphasized at the secondary level. The ability to read is a complex of many skills. This fact is of basic importance because intellectual progress is directly related to the ability to read. Most textbooks are inappropriate for the development of reading skill because they represent condensations of great quantities of material.

Since the ability to work for eight hours a day is not a natural trait, the schools must also devote time to the development of this ability. The various Federal Youth Work Projects developed in part because of the failure of high schools to encourage wholesome attitudes with regard to work and to sponsor planned work opportunities. This is not a responsibility which should be assumed by the schools alone. Some families can provide work for children. Some youths can provide work through individual inventiveness if given proper stimulation and guidance. Private employers may provide work on a part-time basis. The community, the state, and the nation may provide work for youth in a wide variety of ways. Schools may provide work in shops and laboratories, but their key responsibility should be to coordinate and integrate work experience in all of the places it may develop. This implies that high schools must yield some of the preferred hours of the day for work, and that school credit must be given for successful work experience. Psychologically, this procedure is sound. Potentially, youth may develop from school life no more valuable attribute than the ability to work. Curriculum planning should recognize these essential facts.

Another element urged as essential in secondary curriculum planning is a modernization of the social studies. Individual schools can do little to revitalize this essential area of human relationships, but a united attack by the entire profession holds promise of making progress. Increased and unified attention must be given to such problems as housing, conservation of human and natural resources, community planning, cooperatives, pressure groups, the stock exchange, corporations, labor organizations, systems of exchange, international relations, consumer needs, investments, and public education. The social studies should be organized about such types of central issues, and more time must be allowed for such learning experiences. Special attention must be given to the organization of curriculum materials with due regard for the maturity levels of pupils. In addition to emphasis on reading skill and work experience as activities supplementing each other, high schools must educate youth to solve the problems of living together in a democratic community. The possibilities of the social studies are limitless for this purpose.

The improvement of reading skills, work experiences, and the social studies have been stressed as being of fundamental importance in curriculum construction. A fourth element deals with instruction concerning the personal problems of youth. Guidance services must be recognized as of utmost importance in the associations between pupils and teachers. Courses in physical and mental health should be offered to all pupils. Practical psychology may be presented in a manner which will enable youth to avoid hundreds of mistakes in conduct. Physical health may well deal with such problems as diet in relation to family income. Problems of family life may well be associated with the teaching of biology and sociology. To postpone such training until college entrance is in effect to miss most of the pupils, for a relatively small number of them enter college.

Readjustment of Conventional Subjects

If the high school curriculum is to make proper provision for the development of reading skill, for work experience, for the social studies, and for learning with regard to the personal problems of

[11] American Youth Commission of the American Council on Education, *What the High Schools Ought to Teach,* Washington, The Council, 1940.

youth, it follows that adjustments must be made in the content and the time allotment of the conventional subjects. Practically, there exists no necessity for maintaining the traditional courses of study in their present position of prominence. The values in such courses, identified with the expanding needs of youth, should be discovered. Composition, literature, and other English courses should give more time and effort to the development of reading skill, library exploration, and the practical applications of the materials of instruction. From the various courses in pure mathematics there should be extracted and presented materials fundamental to the needs of youth in a modern society. Mathematics for the purpose of mental discipline cannot be justified in a functional curriculum. The alleged values received from foreign languages do not justify the time spent by many youth on those subjects. Their needs can be better served through courses in general language which combine the values commonly claimed for specific foreign language courses. The teaching of history should drop the traditional chronological treatment and emphasize the great achievements of civilization together with the evolution and the spread of democratic ideals. In the field of the natural sciences the major emphasis should be the development of scientific thinking. In short, the new curriculum should stress those essentials which enable pupils to grow more effective in solving their personal problems and in living together successfully with their fellows.

Deeper Implications of Proposed Changes

Curriculum reconstruction must go further than mere changes in the contents of courses. There must be created an understanding in young people of the value of the new curriculum. Pupils must be encouraged to participate actively with parents, teachers, and supervisors in planning the program. The administratively imposed curriculum will lack the dynamic qualities inherent in cooperative procedures. Constructive efforts must be made to move away from the atomistic and the compartmentalized instruction toward unifying educational experiences. Constant efforts must be made to discover and cement relationships among the several fields of study. The temporal continuity of school life should be a controlling factor in all curriculum planning activities. Creative expression should not be confined to the verbal alone, but should be encouraged throughout the learning process with special emphasis on the graphic arts, the plastic arts, music, and industrial arts. Thus, although curriculum reconstruction implies drastic changes in the course of study content, its deeper implication is that methods and purposes must be revitalized through shared planning, recognition of the principles of organismic psychology, development of temporal continuity, and stimulation of creative expression.

The Ninth Grade Curriculum

The first year of the traditional four-year high school usually presents a minimum of the desirable curriculum characteristics. Despite efforts to bridge the gap between elementary and secondary education, the ninth grade continues to be a most serious problem in curriculum construction. Advancing from the general curriculum of the elementary school and the liberal curriculum of the junior high school, pupils suddenly find themselves facing a limited and prescribed group of subjects which have appeal only for the "academically-minded." The net result is drop-outs, failures, and disillusionments in large numbers that cannot be justified.

If distinctions are to be made at all, the ninth grade curricula offering should be made the most capitivating. The tone of pupil attitudes toward high school work is doubtless determined at or near the beginning of their secondary school experience. Little justification exists for maintaining the most uninviting curricular offering at the point where attitudes are most strongly shaped. Application of previously mentioned curriculum procedures is especially needed at this level that learners may be started on their path, equipped to meet further problems with the interest and vigor which grow from creative experience.

Implications for Building Planning

In view of modern curriculum trends which emphasize the immediacy of the problems of youth, the continuity of experience, the integration of home, schools, and community, and the inculcation and practice of democratic ideals, high school buildings

must be evolved on a functional basis never before realized. In contrast to the conventional building, the modern high school must be designed as a place for living. The monumental aspects of building design and construction will be supplanted by practical and utilitarian conceptions of school architecture. The traditional classroom will be displaced by functional units in which pupils and teachers may plan and carry out an integrated and meaningful series of experiences. Corridors will become something more than mere places to pass through. They will be conceived in terms of their contribution to education. Museums, display cases, and art galleries will figure prominently in corridor utilization. The library will be of central importance. Workrooms and laboratories will provide opportunity for shop, music, and theater activities. Here the more academic subjects, such as science, mathematics, language, arts, social studies, and mechanical arts, will also find their expression. The radio, sound pictures, and other visual and auditory helps will be items of standard equipment. Soundproofing and air-conditioning will be treated as economical necessities. Mechanical devices which assist in evaluation and which facilitate the learning activities of the school will be provided in sufficiency and will be closely related with the community served by the school. Teachers will be provided with quiet offices and sufficient clerical and stenographical assistance to permit them to devote their energies to learning activities. Appropriate conference rooms will be provided for the activities under the guidance of each teacher. The desirable ends sought in a democratic society will furnish the basis for planning. They should be organized in terms of teacher and learner needs and be made the real determinants of space characteristics.

The facilities of the high school will not be confined to the building as such. The site will be no less important to the learning process than the building itself. Outdoor recreational equipment may well be the same as that provided for use by the community. Theaters, tennis courts, swimming pools, and other types of recreational facilities are a necessary part of the community school project. Farms and camps will constitute a regular part of school life. Buses will be used for transportation to and from school activities, as well as for touring purposes. Full camping equipment will be a necessity. The farm and the factory will be normal places to carry on school-guided services.

In short, the modern high school will become the natural center about which much of community life rotates. It will be the nerve center which provides guidance and direction for all learning activities in the community. It will be the place where modern youth is guided into national service whether of the war or peace variety. Before World War II, the Civilian Conservation Corps and the National Youth Administration thrived as evidences that the secondary schools were not providing fully for the education of youth. These services arose from a conviction that youth must be educated in a more practical manner than heretofore. World War II has reemphasized this conviction. The regional youth center, which provides for a complete integration of the school and the community, makes possible a functional program of education for children, youth, and adults. It introduces youth into the problems and complexities of national and international service in a technological age and must offer physical facilities and advantages far beyond that which has ever been conceived before as appropriate to the secondary educational program.

CHAPTER 5: location and planning of sites

The size and character of the school site affect in large measure the educational program of the secondary school. Small sites occupied very largely by the building itself limit the expansion of the curriculum. They tend to narrow the educational program to the confines of the indoor classroom, laboratory, and subsidiary spaces. The program of secondary education should invite contact with nature. Out-of-door facilities can, as a rule, be provided at less expense than spaces constructed within a building and can furnish opportunity for activities which might be otherwise denied. Athletic and recreational fields adjacent to the school building are a necessity. The changing program of secondary education makes it just as essential that arrangements be made out-of-doors for many other activities, such as theatricals, pageantry, class work, building projects, agricultural instruction, and a wide range of others. Boards of education plan wisely for secondary education when they select secondary school sites sufficiently large to provide for very comprehensive land as well as building use.

Close Interrelationship of School Site and Community Plan

The educational program and the facilities to be provided for schools in any community are closely related to every phase of the social character and economic condition of the region involved. Types of homes, shifts in population, utilities, and esthetics, each have a profound bearing on school planning. Likewise, school planning may in turn bring changes in these community factors. The new school may have a definite influence on the style of architecture of buildings round about. The placement of the school may affect population trends and may influence transportation methods. The equipment of new school grounds with satisfactory play apparatus may widely affect child and adult habits in a neighborhood. Significant financial losses no doubt result to communities because of failure to plan in terms of community, social, and economic conditions.

A widely accepted psychological theory emphasizes the importance of environment among all those factors which influence the lives of human beings. Even the best teachers cannot overcome the detrimental effects of an undesirable environment. A modern school building will certainly contribute more effectively to the welfare of the children if it is placed on an adequate site in a suitable environment. Foresight in planning is essential to assure the maintenance of desirable environmental conditions throughout the life of the building. In planning a high school primary consideration must be given first by educator, architect, and the public to the relationship of site selection and planning to the many elements involved in community welfare.

Relation to Residences and Population

POPULATION FORECASTING

School sites should be purchased well in advance of actual need. The school population and future trends in population must be determined with as high a degree of probability as possible. School enrollment, not only at the time of planning but throughout the life of the plant, should be studied. The site provided should be of a size adequate for future as well as present demands. Where it may be impossible

to secure the entire site at the outset, it is certainly essential to consider the possibilities for expansion. Where population studies indicate a trend toward stabilization or decrease, recognition should be had of such evidence as the planning proceeds.

Factors affecting future high school enrollment may include the demand for skilled labor in industry, child labor laws, technological developments, increasing family wealth, popular acceptance of the high school program, decrease in private and parochial school enrollment, improved high school facilities, decreasing birth rate, increasing survivorship rates, adult educational demands, expansion of high school curricula, and immigration and emigration both between school districts and countries.

Forecasting of school population plays a vital part in every site program. Forecasting is reasonably safe only over a short period of time. Therefore, the forecasting process should be continuous and should progress without interruption as an administrative procedure.

DISTRIBUTION OF RESIDENCES AND POPULATION

Community forecasting alone does not suffice in planning school facilities. Districts within the community will vary considerably from the general community trend, just as communities will be above or below the average for the country as a whole. The population per unit of area will not be consistent throughout the community. The development of new residential areas, the increase or decrease of apartment growth, the actual density of population in relation to the possible density and the encroachment of industrial or commercial establishments in old residential sections are important factors entering into the determination of desirable sites. Techniques have been developed by which a reasonably accurate determination of expected development can be made. An objective study of a community and its educational problems remove site selection from politics and presure upon boards of education from purely local interests. The comprehensiveness of long-range planning for site selection will show each site in relationship to the others as the city develops. A cooperative spirit in carrying forward a program of this sort is developed as citizens and staff members grow to understand the ways in which the long-range plan will meet their particular problems.

As long as standards of site size can be maintained, it is desirable to locate the site as near as possible to the center of the population to be served. This arrangement aids accessibility and increases the potential population which the school may serve, thereby creating a more economical unit. The center of population should be selected in terms of predicted growth rather than of existing conditions. In suburban areas this will frequently mean that residences may be on only one or two sides of the site when selected. However, normal growth will place the site in the center of population before many years have elapsed.

SCHOOLS SERVE RESIDENCES

Students attending high schools usually come directly from their homes. Schools should be recognized as service agencies for the homes of a community. This suggests that high school buildings should not be centered in a community and be thought of somewhat as a commercial asset. They should be located where the homes are or will be. Many communities have had the vision to select large sites on residential fringe with the result that within a few years' time the residential development surrounding the school has exceeded any previous expectations. New school buildings, well located on adequate sites, tend to increase assessed values in their areas. Properly planned school plants may be expected to be financed in no small part from the additional values accruing on the tax books from homes built by those attracted to the new developments.

CHARTING POPULATION

Several methods have been developed for indicating the distribution of residences and population around a given site. The dot map has proven most useful in offering a graphical representation of the factors involved. One dot map may show residences, homes, and apartments. Another map may show pupil distribution. Another will show residential building permits and water meter connections to indicate trends in growth over a period of years. On these dot maps circles may be drawn centering on a possible site. The radius of the circle will be a measure of maximum travel distance, and the prospective school enrollment may be ascertained from the population within the area of the circle. The sizes of these circles should vary with population density and the optimum size of the school. Travel distance will be the third limiting factor. Squares instead of circles have been used for this purpose in

an attempt to eliminate areas which fall outside of tangent circles. However, when tangent circles of equal size have their centers at the apexes of an equilateral triangle, the area between the circles is less than 2 percent of the total area. It would seem, therefore, that the advantage of one over the other is of little importance. Instead of using either circle or square, it is frequently better in irregular territory to indicate the approximate location by means of arrows, the lengths of which may be varied to meet the requirements in each direction.

DISTANCES FROM RESIDENCES

Modern transportation has changed man's attitude toward travel distances. Rapidity of change in methods of transportation and the mobility of population have altered community opposition to long travel distances for high school students as they go back and forth from home to school. Most standardized travel distances appearing in educational literature were fixed upon before the automobile and motor-bus became so universally used. School administration today readily solves its transportation problems. Transportation is always associated with other problems of parking, safety, bus maintenance and garage planning.

As for walking distances, it is generally agreed among educators that the maximum distances which pupils should be required to walk to school are one to one and a half miles for junior high schools (usually Grades 7, 8 and 9) and two miles for senior high schools (usually Grades 10, 11, and 12). If public transportation is used, the time in transit should preferably not exceed thirty minutes, which on the average is equivalent to four and a half miles. If school buses are furnished the time spent on a one-way trip should not exceed forty-five to fifty minutes.

Attitude of parents, climatic conditions, time required, condition of walks and roads, and topography of the terrain contributing to fatigue are factors which should be considered in relation to the solution of each local problem. If the school grounds are to be made available for play at all times, the recreational areas should be readily accessible. Studies made by recreational leaders indicate that the effective drawing radius of any playground is at least one-quarter of a mile.[1] It is conceivable that with a properly developed high school recreational program, this distance might be increased to a twenty-minute walk of about one mile.

[1] Curtis, Henry S., *The Practical Conduct of Play*, Macmillan, 1922, p. 188 ff.

OPTIMUM SIZE OF HIGH SCHOOL

A major problem in determining distances between school and residences served is that of securing a sufficient enrollment to make possible a comprehensive high school program. This raises the question of, "What is the optimum size for a high school?" The answer has not been arrived at by any research or experimental basis. Attitudes concerning size vary with the experiences of communities, and the practices followed in the organization of high schools. Obviously, the size of the enrollment will present no unusual difficulty in a school situated on a hundred or more acres of land with separate structures housing subdivisions of the curriculum or of the school organization. Large enrollments create serious problems in administration and guidance in buildings originally planned for less capacity and lacking in the space facilities and the general spatial arrangements required when larger groups are brought together. Individual guidance, student-teacher contacts, school morale and a well-operating administration may all be maintained with a large enrollment whose interests have been fully conserved in the original planning. A proper distribution of the administration and guidance responsibilities, the provision for teacher and pupil freedom from harassments which good planning foresees, and the stress upon human comfort and adaptability of plant to living needs are features which must have been considered in the planning. The mere inflation of a school originally planned for small enrollments into a structure to house large groups obviously is not a satisfactory practice.

When a school plant is actually planned in every detail to care for the enrollment it houses, the question of optimum size is settled. School planners have not been flexible enough in their thinking as high school enrollments have increased. The general features of a high school plant seem to have become more or less crystallized in their minds. The high school plant is not a building or group of buildings patternized according to the theories of any one decade. On the other hand, it is the planned site and the structures adapted to meet the needs of a community and of a specified enrollment. A city block with a three or four-story building can meet the needs of only a limited enrollment. Deductions concerning optimum size of a secondary school

cannot be drawn from such situations with much satisfaction or accuracy.

High school enrollments have proven satisfactory under prevailing housing conditions when they ranged from 1,200 to 3,000. This range seems to make possible a rather wide curriculum offering at a cost which most communities can meet. Enrollments up to 8,000 and 10,000 in some of the largest cities have met considerable opposition. This has resulted, without doubt, from the failure to plan satisfactorily to meet the needs of such a large group. A sufficiently large and adaptable site or campus, a building or a series of buildings developed with full understanding of the school's needs, and adequate means of access to the school through well-organized transportation aid significantly in solving the problem of optimum size. If one of these three factors in planning is ignored, the school size must be adjusted accordingly. The school enrollment should, however, always be sufficiently large to make possible a curriculum varied to meet the needs of the students. The school site should not be selected in terms of a fixed enrollment but should be sufficiently large to provide for reasonable additional increases.

POPULATION DISTRICTS

In cities, population is frequently segregated because of topographical barriers which are not spanned by bridges or made otherwise passable for transportation. The isolation of racial groups also creates a problem. Man-made subdivisions of population also occur, such as division by railroad tracks or by high-speed automobile roads. Sometimes bodies of water or extensive restricted residential, industrial, or commercial areas offer obstacles to good high school site selection.

Practically every site program must be adapted to an existing situation. Undesirable population segregations due to factors mentioned above, should be broken down. The high school should provide the utmost of opportunity for democratization and mingling of all groups. Coordination of high school planning with city planning will frequently solve many of the problems which railroads, geographical barriers, and traffic arteries present.

Such cooperative planning is entered into with difficulty when school building needs are urgent. A long-time program anticipatory of school building needs brings the best results from the combination of city and school planning.

Modern city planning includes school plant planning as an integral part of all residential development. The neighborhood unit, the restricted residential area, prescribed zones of land use, and the less well-regulated residential subdivisions can be considered satisfactory parts of a complete city plan only as provision has been made for public educational service. Park and playground authorities should also be invited to participate in the advancement of the school site program. Park facilities used extensively on holidays and week-ends only by the general public may constitute a real educational asset if cooperation among the various municipal bodies is secured in the early stages of planning.

In high school site selection consideration should also be given those adjacent territories which may be consolidated with, or annexed to, the community for which the plan is being developed. School surveys have brought to light many instances of adjacent communities which have built their own high school plant separately when early cooperative action and consideration of costs might have resulted in a single plant with a more extensive program and more acceptable educational provisions. With the costs of education mounting, it is reasonable to assume that more American communities will look forward to regional high school planning and will ignore artificial municipal or governmental boundaries.

Zoning

Boards of education and educational officers should be greatly concerned with the problems of zoning. Zoning regulates the use of land and buildings within a city in the interests of general welfare, health, and general safety. Zoning regulations tend to safeguard the community's investment in the school plant. They may assist in keeping undesirable commercial building away from the school environment. When enforced for residential areas, zoning regulations assist in preserving desirable population areas. They may regulate traffic conditions about a school and may keep industrial developments properly segregated.

It is customary in zoning to classify land areas in the following categories:

Residential—dwelling houses
Residential—apartment houses
Business

Industrial—light
Industrial—general

The school district should be carefully studied in relation to these several zones. To include within the drawing radius of the school any large extent of business or industrial areas will tend to create small uneconomical school units or force travel distances which are excessive.

The district selected for the school site should be made up principally of residential areas reasonably compact and unified. Residential zoning should be assured within a radius of one and one-half to two miles of the school.

Existing School Sites

Tradition, school loyalty, and a misplaced emphasis upon community routine give an importance to existing school sites frequently not commensurate with their real worth. When old high school structures need replacement, it is almost axiomatic to assume that the site upon which it is located will not suffice for the present-day and future high school program. The original site was selected and the building was erected to meet the needs of a limited group of students. The curriculum was largely college preparatory. With high school enrollments mounting to the point where a very large percentage of students of high school age is attending, curriculum requirements dictate a much larger site than was usually set aside for the high school developed in the latter part of the nineteenth century and the beginning of the twentieth century.

Because the site is already the property of the community and is usually paid for, public pressure seeks to continue its use for high school purposes. Even the standards used in site selection of four and five decades ago are again brought to the front and made the arguments for the continuation in use of what was originally provided. Many communities which have built their high schools within the past three decades have already regretted that their new plant investment was made upon a limited site although it was centralized and had proven acceptable in previous decades. In most communities, boards of education will serve their communities best if decisions on site program are made only after most comprehensive studies have been made of the community and its environment, and of the educational needs which are to be met in the new planning.

The Commercial and Industrial Areas of Cities

Areas devoted to commerce and industry present an environmental problem which may be considered from two angles. First, such areas have in the past been poorly planned. Polluted air, odors, smoke, and noise have prevailed. Factory and loft buildings have been designed entirely from the industrial efficiency point of view and without consideration of esthetics or beautification. Second, the pupil as a part of the educational process cannot receive adequate training without knowing life in its industrial and commercial phases. With this latter consideration in mind, it may seem desirable to some to place high school pupils in direct contact with existing industrial conditions. There is undoubtedly much of value in this point of view. However, if the school is to be maintained as the guide in the educational process, it is reasonable to assume that it cannot function properly without selection of, or control over, the environmental factors.

It should also be recognized that contact with a particular industrial situation may limit educational opportunity. Even though the school is remote from commercial and industrial areas, the school program can be so arranged that the contacts with these activities of man can be provided when curriculum demands require. Except under the most desirable industrial or commercial conditions, it is probably best for the welfare of the children that the school site be located at a considerable distance from areas devoted to such enterprises.

Commercial enterprises which may be unhealthy or immoral must be avoided. Cheap lunch counters, pool rooms, roadhouses, and the like should not be tolerated. Certain city districts present hazards to life and limb. Heavy trucking may be carried on there. Airplane traffic may have its center there. Explosive materials may be stored therein, or a whole building area may be in the process of reconstruction. Reason dictates the avoidance of such districts. The school should also be placed at such distances from sanitariums, hospitals, and non-public schools that there will be no conflict because of noises or traffic.

Site Selection for Vocational High Schools

Site selection has been poorly done with respect to a large proportion of secondary schools offering vocational work and instruction. Standards utilized in site selection for cosmopolitan high schools are frequently ignored in the case of vocational schools. It is not difficult to understand why this has been true for apparently the emphasis had been upon placing the vocational school where it was readily accessible to industrial areas. The land uses of vocational schools vary slightly, if at all, from the land uses of the cosmopolitan school. The vocational students require recreation. The curriculum needs expansion. The out-of-doors can furnish opportunity for many types of vocational school activities if the program is arranged for them. Parking space is required, out-of-door space for servicing cars can frequently be used, agriculture may well be included in the curriculum, and simple construction work should be planned for on the site. These, and many other educational needs, suggest large sites for vocational schools.

Accessibility to industrial and commercial plants is frequently best secured through a well-conceived transportation program carried on under the auspices of the school. It is urged that no vocational school be planned until criteria for site selection have been studied.

High School Site Selection with Reference to the Community's Recreational and Cultural Opportunities

ACCESSIBILITY TO PARKS

In one sense the secondary school plant of a community should not be thought of as merely including the site and the building units specifically set aside for this purpose. The community's library, its museum, its art galleries, its theaters, its parks and playgrounds provide as great opportunities for education as the school building itself. These cultural and recreational facilities of the community should be thought of as adjuncts or annexes to the school plant. The school program should be so organized that these ancillary educational centers may be utilized at any and all times during the school day. Good city planning seeks to eliminate duplication between the school and other community facilities and yet endeavors to provide all of the facilities which can be well used in the educational process. In selecting and developing a high school site, due consideration should be given to the opportunities which other community facilities offer for the advancement of the secondary school program.

School boards today are acquiring high school sites from 20 acres up. Many high school sites of 30, 40, 50, and even 100 acres are a matter of record. When such acreages are being selected out of all the community's land, it is obvious that park and school planning should go hand-in-hand. The degree of necessary coordination will be determined by the function designated for particular park areas. Parks may be either for the purpose of adult or child recreation. The former type of park should be freed from intensive play for, otherwise, grass will not grow and the trees, bushes, and flowers may soon be destroyed. Children's play areas should be distinct from adult parks in order to permit quiet relaxation for adults away from noisy neighborhoods.

Other factors which contribute to the argument for correlation of community parks and schools include ease of organization, manner and cost of supervision, and educational utility. The school should have on its staff the best recreational leaders in the community, whose services may readily be made available for adults and children alike by proper planning. Community park areas are also useful in promoting nature study, hiking, horseback riding, golf, and scout craft. Park areas adjacent to schools may prove very satisfactory for winter recreational sports, such as skating, skiing, toboganning, and the like. The fact should be stressed that recreation in the winter is just as necessary and desirable a part of the school program as recreation in the fall and spring months. Throughout the recreational program emphasis should be made upon opportunities for all —of both sexes—rather than upon the training of a few of the male sex.

The coordination of park and school out-of-door recreational facilities should not be thought of as limiting the standards for school sites. There are always certain kinds of activities that can only be engaged in on the school site itself. The park facilities should be thought of as additional provisions. There should be an enrichment of the school recreational program because of this coordination.

ADULT USE OF THE SECONDARY SCHOOL

The demand for more extensive programs of adult education has led to the greater use of high school instructional facilities. Night classes, public forums, theatrical productions, and recreational opportunities are being promoted for adults by many school systems. These trends give to the school an even greater place in the community social life. No longer can the school be thought of as merely a place to which children go for a limited time during the day. More and more it is becoming the hub of community life for adults and children alike with its extensive facilities available for use from early morning until late at night.

This growing conception of the relation of school to community requires much consideration at an early stage of site selection. Accessibility is of great importance. Although it may be satisfactory to transport children by bus or trolley to a distant school, it is not to be expected that adults so remotely situated will make as much use of the facilities as would be the case if the school were located adjacent to the residential areas.

Topographical Features of the High School Site

School sites and buildings have been recognized by many as a valuable contribution to the esthetic development of the community. Witness the desire of the lay public to place their school buildings on main traffic thoroughfares where they may be seen by everyone passing through the community. To resort to such appeals may be an easy way to attract attention to the community, but is most certainly opposed to the best educational interests of the locality. It does serve to illustrate the underlying desire to achieve a degree of beauty and appeal in community planning.

COMMANDING SITE

The high school has frequently been called the "People's College." In it are often focused the educational interests of the community. It is well, therefore, that the site upon which the school is placed should have, where possible, a commanding elevation. It is pleasing if a long-range view over the city and surrounding country can be secured from the school. The site need not be level, although sufficient level areas should be available for playgrounds and athletic fields. Areas partially wooded, with natural contours, may offer attractive opportunity for development. Cliffs or extreme gradients should be avoided in the interest of safety. It should be borne in mind, however, that a site which features most of the characteristics of the local terrain is probably the most satisfactory from the educational point of view.

MAINTENANCE AND NATURAL FEATURES

The natural characteristics of the site should be maintained as far as possible. The effort in planning should be to protect trees, streams, lakes, and typical local developments just as far as can possibly be done. The contributions that nature has made to the site may offer splendid educational opportunity which could not otherwise be duplicated. The out-of-doors should be thought of as a place in which students live and grow in a social, physical, and educational sense. Whenever natural facilities can be utilized for educational purpose the site plan should incorporate such suggestions.

Unhealthy or hazardous natural conditions should be avoided. In this classification are included marshes, stagnant water, and dumps. Dense woods with much underbrush should be separated from the school by wide fire breaks to assure adequate protection in dry weather. Rivers and lakes which are adjacent to the site should be properly protected to prevent accidents to children playing near these bodies of water.

Consideration should be given to the susceptibility of the site to flood conditions when bounded by a river. Tests should also be made to determine whether or not the river has underground tributaries which may cause sinking or improper drainage of the site.

THE PLACEMENT OF BUILDINGS

In the selection of a site consideration should be given to proper placement of a building or building units. It would be unwise to select a high school site of such a shape that educational spaces could not be given their preferred orientation. It would also be unfortunate to be required to locate structures on a site so that they are hidden from view or cannot be given the proper setting with reference to the other features of the site. Access to the building for service purposes should also be given full consideration as the site is being selected.

SOIL CONDITIONS

Because of the varied uses of land in a high school program, care should be taken in site selection that no educational purpose will be defeated because of failure of the land to meet requirements. Buildings should be placed upon a substantial land or rock base. Experimentation in placement of buildings on filled-in land may prove uneconomical. In the development of the site, care should be taken to conserve all top soil. The cost of preparation of the site for use for its various purposes should be given full consideration in the original building budget.

The problems of drainage usually merit special care. If solutions are secured early in the planning, much more satisfactory soil conditions will result. Rapidly flowing water should not be permitted to wash out drives, lawns, or play areas. Drainage should be away from school buildings. Underground drainage will be found essential where soil does not drain readily or where play areas require rapid drying. It should be borne in mind that the care given soil and drainage problems on the high school site may be used as educational illustrations in connection with some of the work of the school.

LANDSCAPE FEATURES

Sites have value in proportion to the number and quality of natural characteristics. Every meritorious natural features should be conserved. Trees, shrubs, brooks, ponds, and rock outcroppings may add to the completeness and attractiveness of the high school development.

Site Selection with Reference to Traffic and Transportation

REGIONAL HIGHWAY PLAN

The increase in automobile traffic, the demands for high speed, state-wide highways, and the development of suburban areas by reason of travel convenience have pointed to the necessity of a comprehensive regional highway plan. Many counties and states have developed such plans, constructing parkways and arterial highways and joining communities, yet routing traffic away from local congested points. These trunk highways have three important bearings on the determination of the location of the school.

First is the problem of hazards created by high speeds of travel on these routes. When the school is so located that children are required to walk along the side of such highways, or when they are required to cross them at automobile levels, serious accidents are inevitable regardless of rules and regulations. Second, the noises originating from automobiles moving at high speeds may become a nuisance equally serious to railway and street car lines. Third, these main arteries frequently divide a community or tend to discourage expansion across the thoroughfare. This is a normal consequence of the difficulty of crossing these highways. Unless bridges or underpasses are provided at every cross-street, the intercourse between the districts on either side of the highway will be discouraged.

In most cases the school districts must be fitted to the regional highway plan. Consideration should be given not only to those highways already constructed, but with almost equal emphasis, to those which are planned for the future. School sites should be well removed from sections bordering on arterial highways unless adequate protection in the form of frequently spaced bridges or underpasses is provided, together with wide park or restricted areas paralleling either side of the road.

COMMUNITY STREET PLAN

Many high school sites are selected without due regard to the community street problem. No school building should be located except with definite relationship to the major and subsidiary streets of a community street plan. Hundreds of youths will use the building every day. The arrival and leaving periods of fifteen minutes to a half hour will be times of utmost congestion. Private automobiles will be dropping or receiving some students. Motor-buses will serve others. Some will be seeking parking stations. Others will be walking or moving rapidly. At other times in the day large groups of adults arriving in automobiles or on foot will seek to use special parts of the school. The coordination of site selection with community planning is a prerequisite.

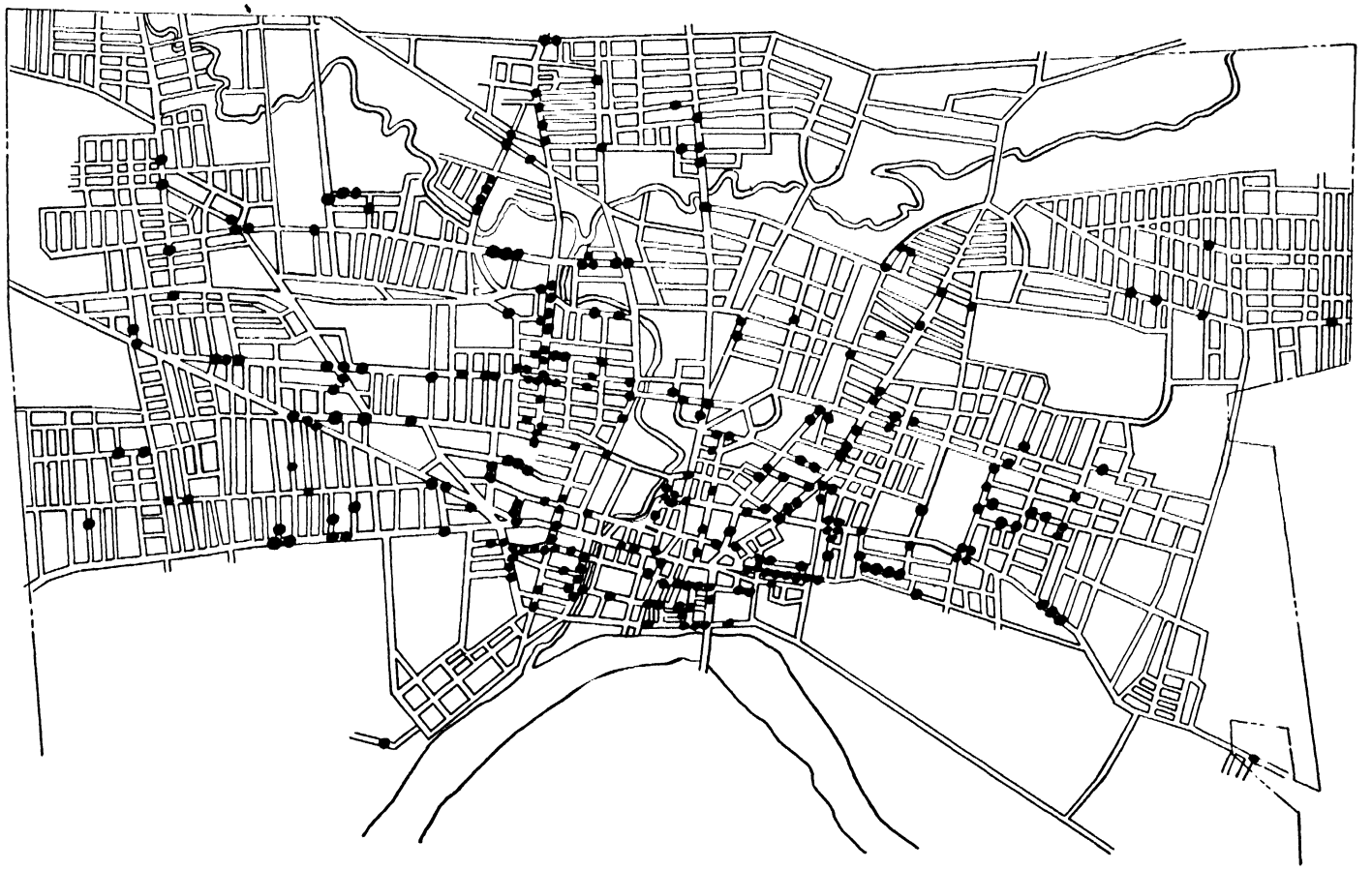
Safety for children entering or leaving the school site takes its place as the first principle of site planning. School sites should be planned to reduce to a minimum the number of street crossings necessary for children to reach the school enroute from their homes. The streets that must be crossed should be relieved of heavy traffic. Re-routing traffic to avoid school centers is primarily a matter for the police,

but cooperation in making plans at the time of selection of the site will assist materially in achieving the desired ends. If primary thoroughfares must be located near the school, it is highly desirable to provide pedestrian underpasses or overpasses at points where children must cross. These underpasses not only eliminate possibilities of accident, but also permit the traffic to move steadily without being required to stop frequently to allow children to cross. School buildings and play areas should be set back not less than 100 to 150 feet from the adjacent streets to permit of clear vision and adjustment to new situations as the students leave school or approach school.

In relating the site to the street plan, it is desirable to prepare an accident map, pupil traffic map, and motor vehicle traffic map. The first map will indicate by dots the points at which accidents have occurred and will assist in avoiding such areas. The motor vehicle map should show, by actual traffic count, the density of traffic at the various hours of the day when children are coming to or going from school. The pupil traffic map will show the routes to be followed and density of pupil traffic. By comparing the latter two maps, it is possible to visualize immediately the conditions and possible hazards involved. The direction of traffic flow should be considered. It is found advantageous for school traffic to parallel business traffic when it moves in an opposing direction.

The following diagram shows a traffic accident and traffic danger point map for the city of Hartford, Conn.[2] Each black dot represents an accident that has happened to a school child. The circle represents what has been found to be a major traffic hazard street intersection. Such data as these should aid in making intelligent site decisions.

[2] Strayer, G. D., Engelhardt, N. L., and Others, *Foreword to the Fundamentals in Education.* (Report of the Survey of the Public Schools of Hartford, Conn.) Bureau of Publications, Teachers College, Columbia University, 1937.



A Traffic Hazard and Accident Map, Hartford, Conn. Each dot indicates a traffic accident involving children. Taken from "Forward to the Fundamentals of Education", the Report of the Survey of the Public Schools of Hartford, Conn., Division of Field Studies, Teachers College, Columbia University.

DIVIDED SITES

Another source of accidents, as well as inconveniences, is found in those cases where the school site is divided by a street with the building on one side and the play fields and other facilities on the opposite side of the street. It has also been found, when the city street plan is not completely studied prior to site selection, that streets have been planned although not yet constructed through the site. Such street locations should be determined well in advance of site purchase and arrangements made to have the right-of-way condemned and assigned as school property.

The high school and its site have such great importance in the total scheme of community plan that public streets running through a site can well be sacrificed. Hardly any street can be of such importance that it should be permitted to interfere over decades with the chief educational program of the community. If streets are permitted to cut through a school site, overpasses or underpasses must be provided. The saner and simpler way would be to secure the cooperation of the responsible authorities in closing streets of this kind and of rerouting traffic to make superior school site planning possible.

PUBLIC SERVICE LINES

Public service transportation usually includes auto-bus lines, trolleys, and railways. Their use with reference to safety, convenience and conveyance must be taken into consideration in site planning. The use of these forms of transportation by school children will probably increase rather than decrease. Larger school units, consolidations of school districts, and the realization of the necessity for large school sites located remotely from built-up areas will have a far-reaching effect on the transportation facilities to be provided. Facilities must be provided at the school for the safe loading and unloading of buses. School bus routes should avoid as far as possible routes of heavy commercial traffic. Loading stops along the route should be protected by police restrictions on parking so that children may board the bus at the curb and not take the chances which accompany stops in the middle of the street.

When commercial buses use streets adjacent to the school building, the noise of starting and stopping may become a nuisance factor. Similarly trolley lines, although frequently useful in transporting pupils, should be located at least one block from the school in order to eliminate the noise nuisance.

If the school owns its own transportation buses, the garage and service problems require consideration in site planning. The parking of these buses, and the transfer from bus to school buildings in inclement weather, are features which must be considered in the early stages of planning.

WALKS AND PATHS

Sidewalks, hiking paths, and bicycling paths should be planned for student traffic. The tendency to leave off the sidewalks on major traffic thoroughfares adds to the hazards which confront children moving to and from school. Sidewalks are an essential part of a street plan. All streets leading to the school should be provided with sidewalks of adequate width and maintained in good condition. Unless the sidewalks are sufficiently wide to handle the pupil traffic, it may be expected that adjacent lawns will be damaged.

Probably the most desirable approach to the school is secured by paths through park areas. There are several advantages to such an arrangement, first among them being the separation of street traffic from pupil traffic. Hazards are reduced and interference with homes adjacent to the school is eliminated. The environmental influences of the natural park atmosphere are certainly highly to be desired. Some recently planned communities have been so laid out that approaches to the school from all points are by way of large park areas. Such a path leads through Rock Creek Park to the Eastern High School of Montgomery County, Md.

Bicycle paths may be frequently provided without great difficulty or high cost. Wherever possible, they should be included as an essential part of the planning of the approaches to the school site.

Advance Site Selection

School sites should be selected and purchased well in advance of need. This is the practical way of best serving educational interests as well as making each site a definite part of the whole educational pattern. It also provides best for the articulation of community and school planning. If sites are not selected in advance, the result will be less adequate sites or more poorly located sites. Site selection in anticipation of needs results in economy. Several

studies have proven this point.[3] As an illustration, the Report of the Surevy of the Schools of Chicago, Ill.[4] makes a comparison of three sites acquired for future use and three sites acquired for immediate use. In the former case the average cost per acre was $8,574, while in the latter case the average cost was $123,299 per acre. In another case the cost of three recently acquired sites was $72,338 per acre, compared with three sites purchased fifteen years ago at $2,713 per acre. Even adding the loss of interest and taxes the average cost per acre of the three oldest sites is now equivalent to only $6,547. The Chicago report sums up the situation by stating:

> "It is evident that even the loss of interest and loss of taxes added to the original purchase price does not challenge the advantage of long-advanced purchase of school sites. With these factors added, the old sites have been costing the district one-eleventh as much per acre as the three sites that have been acquired most recently."

Boards of education should accept the responsibility of having comprehensive plant surveys made of their school districts and of adopting recommendations growing out of such surveys and then proceeding to site selection on a carefully planned financial budget covering a period of years. This is one of the most important services which school boards can render communities.

Securing the Site

The process of securing a school site, from selection to final purchase, is a rather complicated procedure. The Report of the Survey of the Chicago school system in 1932 lists thirty-seven steps which occur in the selection, approval, authorization, and ultimate purchase of each site in that city.[5] In order to complete all of these steps the time consumed averaged more than a year and a half. There is no question that this detailed procedure reacts unfavorably on school plant planning. It demands accurate forecasting of needs, tends to increase property values while the procedures are in progress, and increases the overhead cost of site purchase.

The major steps which are required in school site procurement may be outlined in the following terms:

1. Determination of need and approximate location of site.
2. Selection of site after studies of topographical features, soil condition, atmospheric conditions, etc.
3. The selection of alternate sites which will stimulate competition in units prices.
4. Official approval of location by the school board. Authorization to proceed with purchase according to a definite plan.
5. Determination of number of property owners involved, together with names, titles, tax records, plot locations, and sizes.
6. Securing proposals of sale from owners.
7. Securing appraisals from competent and reliable bodies of land values and various sites.
8. Counter-offers sent to owners on basis of appraisals.
9. Options secured, outright purchase made, or condemnation proceedings instituted if counter proposal is not acceptable.
10. Topographical surveys and photographs of property are made.
11. Payment is made by school board.

RIGHT OF EMINENT DOMAIN

The forty-eight states give school authorities the right of eminent domain for property desired for school purposes. The conditions under which this right is exercised vary among the states.[6] Where school boards exercise this right over private property it is necessary that reasonable compensation be made to the owner. In case the party holding title to the property refuses to sell, the board goes through condemnation proceedings in securing title. This power of eminent domain must frequently be exercised where unreasonable prices for school sites are asked. The experience of one city, namely Chicago, indicates that the exercise of this right has resulted

[3] Engelhardt, Fred, Hegel, N. H., and Womrath, G. F., *Selecting Sites for School Buildings*, p. 19, University of Minnesota, Minneapolis, Minn., 1928.
Engelhardt, N. L., and Engelhardt, Fred, Planning School Building Programs, p. 121, Bureau of Publications, Teachers College, Columbia University, 1930.

[4] Report of the Survey of the Schools of Chicago, Ill., Vol. IV, p. 120, Bureau of Publications, Teachers College, Columbia University, 1932.

[5] Report of the Survey of the School of Chicago, Ill., Vol. IV, pp. 122-123, Bureau of Publications, Teachers College, Columbia University, 1932.

[6] Engelhardt, N. L., and Engelhardt, Fred, Planning School Building Programs, Appendix A, p. 543 f., Bureau of Publications, Teachers College, Columbia University, 1930.

in prices as reasonable as could be secured through any other practice. The report of the survey of Chicago indicates that the board at that time resorted to condemnation proceedings in all cases.[7] It was found that no more advantageous purchases could be made by direct negotiation with the owners. In a study of 41 sites in that city which were secured by condemnation, it was found that the price set by the court was only five percent greater than the value assigned by the appraisers for the board of education. Eleven of the 41 sites were condemned at values below the appraised valuation, while 30 sites were valued by the court above the appraisal price.

Options to purchase are frequently desirable in that prices are maintained while other negotiations are proceeding. If an owner offers to sell at a reasonable price, the option may be taken while negotiations with other owners are going ahead. Similarly, options may be secured to cover purchase at any time over a period of years. Such long-time options make possible the holding of property until such a time as the school board may find definite need for it either as a new site or for expansion of an adjacent site. Options to purchase should always be incorporated with leases of property on which the school board plans to make improvements or build.

GIFTS OF LAND FOR SCHOOL SITES

Of 1,530 private gifts to the public schools, studied by Odell [8] in 1932, 366 were designated for sites, additions to sites, or playgrounds. This type of private gift to public education should be encouraged. Odell recommends that gifts carry general rather than specific restrictions. This suggests that gifts should not specify the location of the land but should suggest the purpose to which the land should be put and permit the board of education to select the site which fits in to its comprehensive school plan. Gifts of land which cannot conform to an organized and approved plan should not be accepted. No economy will result in the long run. In other words, private gifts should not be permitted to divert boards of education from the superior practice of following a scientifically developed plan for site selection.

[7] Report of the Survey of the Schools of Chicago, Ill., Volume IV, p. 124, Bureau of Publications, Teachers College, Columbia University, 1932.

[8] Odell, William R., *Gifts to the Public Schools*, p. 12, published by William R. Odell, 525 West 120th Street, New York City, 1932.

The Determination of Size of School Site

There is no single standard for size of high school site. The size can not be set up according to a formula expressed in number of square feet per pupil or fixed area of the school building. Each new high school development requires that the size of site be fixed only after a careful listing of all requirements. The general tendency on the part of communities is to secure school sites which are too small to meet the requirements of the modern educational program. As future needs become pressing, it will be found very difficult, or very expensive, to add to existing sites. Frequently such additions involve the purchase of homes and of land whose value has been greatly enhanced in the minds of the owners.

The community's interests are best conserved when large sites are secured for high school purposes. The experience of communities which have purchased large sites within recent years shows that sites of 20 acres are common, that acreages running from 20 to 50 are being found necessary, and that some school boards have shown the wisdom of buying 100 acres or more to meet the secondary school needs of their communities.

CHECK LISTS OF AREAS TO BE CONSIDERED IN THE DETERMINATION OF SCHOOL SITE NEEDS

Secondary school sites which are planned only for a building and a single athletic field with its stadium were no doubt selected without any complete study of how the site might be utilized more widely in the educational and recreational program. The following list of areas includes items incorporated in many site plans. The list will provide opportunity for checking against local needs. As future needs appear, the incorporation of a large unassigned area in the original site plan will have proven its worth.

CHECK LIST OF AREAS

A. Required Building Area
   1. School building or buildings
   2. Transportation garage
   3. Field house
   4. Caretaker's cottage
   5. Agricultural sheds or barns
   6. Greenhouse
   7. Storage sheds
   8. Stadium
   9. Out-of-door swimming pool

10. Heating plant
11. Housing for animals
12. Bicycle shed
13. Amphitheater
14. Boy Scout or other clubhouse for boys
15. Girl scout or other clubhouse for girls
16. Shelter house for out-of-door group protection against storms
17. Flagstaff and base
18. Community memorials

B. Areas Required to Service or Protect Buldings and Occupants
1. Areas provided for building expansion
2. Necessary set-back from streets
3. Sidewalks and pedestrian approaches to buildings
4. Automobile driveways
5. Fuel, garbage, and supply service drives
6. Bus loading and unloading area
7. Service loading aprons
8. Parking areas for auditorium, gymnasiums, and outdoor events
9. Bicycle approaches
10. Landscaping adjacent to building
11. Building court areas fully safeguarding sunlight and air in adjoining building units

C. Out-of-door Educational Areas
1. Terraces directly adjoining first floor classrooms
2. Out-of-door shop areas adjacent to shop unit
3. Area for student construction of model cottage
4. Storage, dressing, orchestra, and audience areas for amphi-theater
5. Pageantry areas
6. Out-of-door classroom areas for biology, plant life, and agriculture
7. Protective spacing of educational areas from interference.

D. Playgrounds and Play Fields

In junior-senior high schools which serve children of the 7th to 12th, or 7th to 11th, grades, playground facilities must be varied to meet the needs of both the junior and senior high school groups.

1. American football field running north and south surrounded by a quarter mile track with a 220-yard straightaway and jumping pits
2. Doubles badminton court
3. Singles badminton court
4. Baseball field for boys
5. Playground baseball field
6. Basketball court for boys
7. Basketball court for girls
8. Clock golf course
9. Four-wall handball courts
10. Single-wall handball courts
11. Field hockey courts
12. Ice hockey rink
13. Soccer football field for boys
14. Soccer football field for girls
15. Doubles tennis court
16. Singles tennis court
17. Volley ball court
18. Speed-ball field
19. Soft-ball field for boys
20. Soft-ball field for girls
21. Roller skating area
22. Archery range
23. Outdoor baseball courts
24. Horseshoe courts
25. Croquet courts
26. Six-man football

E. Other Recreational and Educational Areas
1. Hard-surface play area
2. Areas assigned to scoutcraft
3. Picknicking grounds including wooded area
4. Pond and stream for skating, fishing, boating, miniature boat-sailing, and casting
5. Hiking trails
6. Riding stable, riding ring, and bridle paths
7. Golf course—9 or 18 holes
8. Automobile driving instruction area

F. Protective Areas for Play and Recreational Spaces
1. Adequate set-back from streets to prevent conflict with traffic
2. Essential spacing between play areas
3. Playground areas adjacent to building for rest and lunch periods
4. Area required for spectators and their seating
5. Areas needed for duplicate adult activities
6. Areas for expansion

G. Other Land Uses
1. Formal school lawns, flower beds, trees, and shrubs
2. Individual student gardens
3. Experimental planting areas
4. Play areas for young children of the nursery group used in the home-training department

H. Unassigned Areas Held in Reservation for Future Needs

AREA DEVOTED TO BUILDINGS

The main educational buildings will occupy an area varying from one-half to five acres. The original plan of such buildings should include outlines of all anticipated additions. The major building should be set back from adjacent streets a distance of at least 100 feet. The area required for each building, and the territory allotted to set-backs, must be figured for each individual school. Frequently, a large building requires for its set-back an allowance of an area equal to that of the building itself. The mistake should not be made of delimiting the set-back area.

The total area required for buildings and their protective spacing will vary greatly depending upon the size of the school, the character of the planning, and the adequacy of the plan. A normal total allowance for building areas on a high school site will fall within three to five acres. The requirements, however, may be two or three times these amounts.

SERVICE AND PROTECTIVE AREAS FOR BUILDINGS

The areas designed for service should present no conflict in the purposes for which they have been developed. The approaches for patrons and students should be separated from the driveways or service areas designed for fuel, garbage, and supply delivery. Separate hidden areas should be set aside for ash and garbage removal and for coal delivery. Walks and drives should serve as directly as possible the purposes for which they have been planned. Student walks are preferably 10 to 12 feet wide. Driveways to be used by the school buses should be so located as not to interfere with children who walk to and from school. All loading and unloading should be done on school grounds rather than on adjacent streets. This is a precaution against traffic hazards.

Very frequently parking space is inadequately planned. The school site should have parking areas in close proximity to the auditorium, the gymnasium, the administration unit, the various athletic areas, and the out-of-door theater area. A distinction may be made between major parking areas and minor parking areas which are provided at strategic points of need. Parking areas should be determined on the basis of 120 square feet per car. An acre of land will accommodate 190 cars when parking is not supervised, and 275 cars if a traffic officer directs the parking.

Obviously, the service areas for a high school must be fully conceived before the total area needed for this purpose can be determined.

OUT-OF-DOOR EDUCATIONAL AREAS

If terraces are planned adjacent to classrooms, the sizes will equal or exceed the indoor space set aside for the same purpose. In other words, a classroom 24′ x 30′ may have its space duplicated on an out-of-door terrace directly adjoining. Provision for out-of-door dramatics may be made adjacent to the building in such a way that the building space is used as the stage and the audience is grouped on ground prepared for that purpose next to the building itself. The seating of people out-of-doors can be figured on the basis of 10 square feet per seat. An outdoor amphi-theater with its auxiliary spaces for dressing, properties, attendants, orchestra, and audience will require at least an acre of land to provide for an audience of 400 to 500. The stage and its setting should be allowed to retain all of the natural characteristics that are worthwhile in the site itself. Therefore, usually more than an acre will be required. This is exclusive of parking and protective spacing.

If education in the high school is to be made real, much of the construction work carried on will duplicate what men do after their training has been secured. The building of cottages, the construction of a large boat, the laying of walls and walks, and the construction of garages are types of out-of-door activities in which students may be expected to engage. The minimum provision in any high school for these activities would be an acre of land. In many high schools the provision would be four or five times this amount.

Pageantry areas may be associated with the regularly landscaped and the open areas of the site. There should be broad open spaces in which spectacles can be presented and can be seen by large numbers of spectators. The exact amount of land that needs to be set aside for this purpose cannot be determined in advance for any particular school, but the emphasis is placed upon the need for open spaces with backgrounds of trees and buildings.

Out-of-door classrooms can be planned on the basis of 25 square feet per pupil. These classrooms may be formed naturally on a hilltop, or in a grove

of trees, or at the water-side or near the botanical gardens. Three or four of such classrooms ought to be planned for every school, and more for schools with large enrollments.

SPECIFIC AREAS FOR PLAYGROUNDS AND PLAY FIELDS

Physical education and recreation are part of the school curriculum because they make for better living by people engaging in them, they assist in the socialization of the participants, they develop the human body, they enrich the leisure-time of people, and they add to the sum total of human happiness. The school should teach those health and physical education activities in which the participants will engage in the pursuit of life's interests. Children should be encouraged to do in school what they normally would do otherwise. The program in health and physical education should be broad enough to make provision for all individuals of both sexes and of varied interests. No school can consider its facilities adequate in this field which concentrates upon competitive athletics among small highly trained groups and ignores the great mass of its student body.

The total amount of space required for recreation as a comprehensive part of the curriculum will depend upon the character of the school student body, the integration of the recreation and play program with the entire program of the school day, the kinds of play and recreation predominating in the community life, and the size of groups to be expected to participate at any one time in any given type of program. The educational statement of need presented to the architect at the beginning of his service in planning a school building should give specific answers on these points. It should be recognized that the recreation and play program will be somewhat informal and will endeavor to place responsibility upon students and develop initiative and self-reliance. Mere guessing at the space needs will prove an embarrassment in future programs. The educational administrator, the architect, the staff in the recreational and health fields, as well as other staff members, should be invited to join in setting up the requirements which will meet the philosophical educational aims of the school.

The areas required will vary according to the individual school. Each school must analyze its enrollment into the groups requiring special provision in recreation and games. Boys and girls must be thought of separately in many activities. The younger children in a six-year high school must be separated from the older groups. Special attention should be accorded to the physical handicapped. The pre-vocational aspects of many activities should be considered. For example, high school training in golf may open opportunities for a livelihood in the field of professional golf.

SAMPLES SUMMERIZATION OF A HIGH SCHOOL'S PLAY NEEDS

The statement for a specific school situation may take the form of Table 1. An analysis of the space necessary for each activity, and of the number of players that may use the space at any one time, indicates that the space required per player varies from 18 square feet for simple games to 6,000 square feet for baseball. Table 1 suggests a layout for recreation and play in a four-year high school with a capacity of 2,000 pupils where it is assumed that the faculty has outlined the program for the school. It indicates the areas required for each activity, suggests the number of games that may be in progress at any one time, the total areas required for the school, and the total number of participants.

TABLE 1. Sample Statement of a High School's Needs for Recreational and Play Space

Activity	Area Required (Sq. Ft.)	Number of Games in Progress at One Time	Total Area (Sq. Ft.) Required	Maximum Number of Pupils Accommodated	
				Boys	Girls
Baseball	62,500	2	125,000	36	
Football	57,600	1	57,600	22	
Soccer	49,500	2	99,000	44	
Field hockey	54,000	2	108,000		44
Basketball	3,600	2	7,200		20
Tennis	2,808	15	43,120	40	20
Softball	25,600	2	51,200	20	20
Volley ball	1,800	3	5,400	16	32
Handball	680	4	2,720	16	
Croquet	1,800	1	1,800		8
Clock golf	576	1	576		8
Horseshoes	500	4	2,000	16	
Hand tennis	640	4	2,560		8
Paddle tennis	880	2	1,760		4
Touch football	28,800	2	57,600	44	
Dodge ball	2,000	1	2,000		30
Tag games	1,400	1	1,400		30
Ring games	625	1	625		30
Totals			570,561	254	254

The capacity of these play areas would be sufficient to care for all pupils in the school if there were four recreational periods during the day. The area occupied by the games is approximately thirteen acres, to which should be added an additional 20 percent to allow for proper spacing and non-inter-

ference, bringing the total area required for play fields to approximately fifteen or sixteen acres. The possibility of combining certain fields used for games which are played in different seasons, such as football fields and baseball diamonds, should be considered as a desirable means of conserving space. Schools of lesser capacity will not need as many play fields, although it is desirable to maintain as great a variety of games as is possible. If adult activities are to be carried out on the school grounds, it will be necessary to increase the facilities accordingly.

PLAY PROVISIONS FOR JUNIOR HIGH SCHOOL CHILDREN

In junior-senior high school some of the recreational and play provisions will serve both the junior and the senior high school groups. Segregation should, however, be made for certain kinds of activities which will be indulged in by the junior high school children apart from those of higher age levels. Such facilities may include horseshoes, quoits, hand tennis, playground baseball, basketball, and volley ball. Provisions for hard baseball will require a diamond scaled down to not more than 82 feet square.

PLAY PROVISIONS FOR SENIOR HIGH SCHOOL CHILDREN

Standard dimensions for games and activities of interest to the older boys and girls of high school age are shown in Table 2.

TABLE 2. Dimensions for Games and Activities for High School Students

Game	Length	Width	Notes
Archery	150 yds.	30 to 100 yds.	Turf
Badminton—Doubles	44′	20′	Turf, cold asphalt
Singles	44′	17′	
Baseball	300′ to 200′	300′ to 200′	90′ to 60′ diamond
Playground Baseball	160′	160′	Turf
Basketball—Boys	94′ to 60′	50′ to 35′	Cold asphalt
Girls	100′ to 69′	50′ to 35′	Cold asphalt
Clock Golf			Diameter 20′ to 30′ putting green
Croquet	60′	30′	Level lawn
Deck Tennis	40′	18′	Turf
Field Hockey for Girls	300′ to 255′	180′ to 135′	Turf
Football	360′	160′	Turf
Handball	34′	20′	Concrete or asphalt
Horseshoes	50′ to 40′	10′	Dirt or clay pits
Lacrosse	450′ to 390′	225′ to 210′	Turf
Shuffleboard	52′	6′	Concrete or wood
Soccer	330′ to 300′	195′ to 120′	Turf
Softball	200′ to 125′	200′ to 125′	60′ to 45′ diamond
Tennis—Doubles	78′	36′	Clay, asphalt, turf
Volleyball	60′	30′	Turf or asphalt

FOOTBALL FIELD

The football field should be rectangular, 360 feet in length and 160 feet in width. The details of the field should follow Figure 1. The surface should be turf. The marking should be with lime thoroughly slaked. The goal posts should have a minimum of 20 feet in height, should be placed 18′6″ apart, and should have a horizontal crossbar 10 feet from the ground. Bleachers should be at least 15 feet from the side lines. Provision should be made in the field house for service to players before and after practice and before and after games.

BADMINTON COURTS

Doubles badminton courts should be 44 feet long by 20 feet wide. The placement of the net and the location of the service and boundary lines are shown in Figure 2. The surface should be of turf. The singles badminton court should have dimensions 44 feet by 17 feet. The arrangement is indicated in Figure 3.

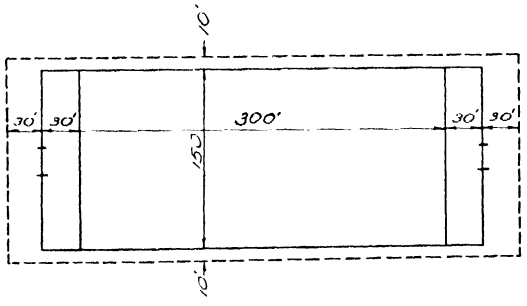


Fig. 1

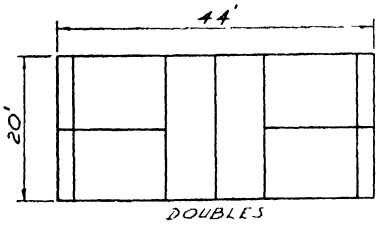


Fig. 2

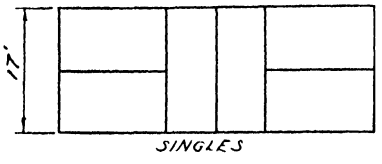


Fig. 3

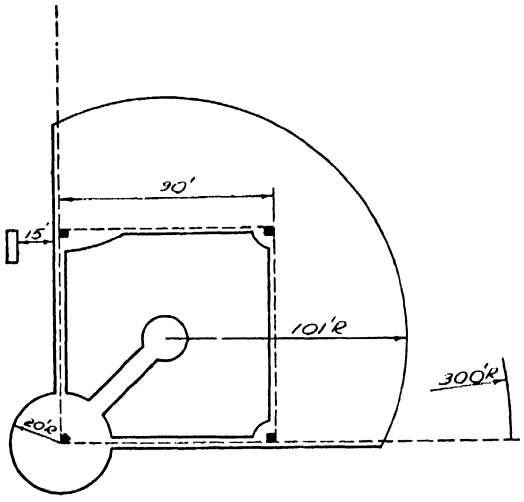


Fig. 4

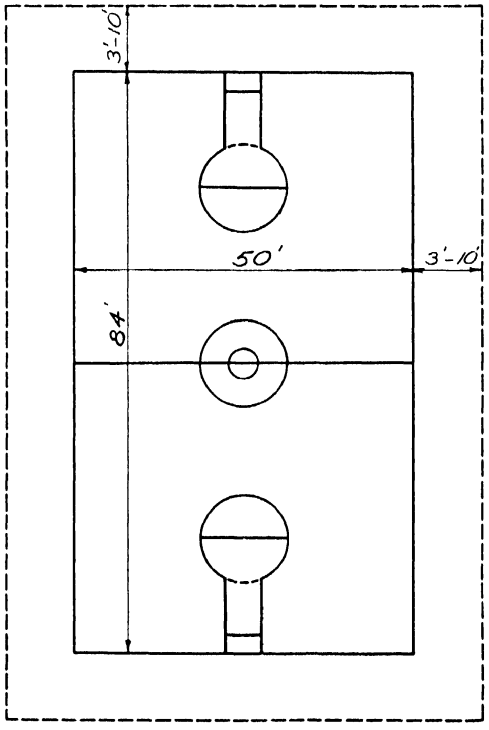


Fig. 5

BASEBALL

The regulation size of diambnd measures 90 feet square and requires a field at least 300 feet square. The diamond should be so arranged that direct sunlight will interfere to a minimum with the players. Protection of the batter and catcher is most important. The order of preference for the position of home-plate is (1) northwest corner, (2) southeast corner, and (3) northeast corner. Level ground with a good turf is essential. The baseline areas should be "skinned." There should be complete freedom from stones, glass, or other obstacles. Lime lines should mark the boundaries. A substantial woven wire backstop 90 feet from the home plate should be provided. Bleachers for spectators are desirable. Provision for more than one field is desirable. With proper overlapping, the dimensions for each field may be reduced to 250 by 250 feet. Layout for baseball field is shown in Figure 4.

PLAYGROUND BASEBALL

This provision may be made for both boys and girls. Games may be played upon the regular baseball grounds or on grounds following the dimensions of 160′ x 160′. A turf area is desirable.

BASKETBALL COURTS

Basketball courts should be of clay and loam, or grass, or on specially prepared surfaces. Asphalt, oil macadam, asphalt and sawdust, or cement courts have been found useful for basketball, handball, volley ball, and other similar games.

The dimensions of the court for boys are 84′ x 50′, as shown in Figure 5. The high school girls' court may be 45′ x 90′. The junior high school court for boys or girls may be 70′ x 50′. The long axis of the court should run north and south. The backboards should be solid and perpendicular, with basket loops not more than 10 feet from the ground.

HANDBALL

The handball court requires a hard surface wall of concrete or wood at right angles to a floor of asphalt, oil macadam, concrete, or wood. The floor should have a slight slope away from the cross wall. The maximum height of the wall is 20 feet, for junior high school pupils from 10 to 16 feet, with a

wire extension at the top. The wall surface should be free from obstructions of any kind.

A unit of handball courts can be constructed for four courts, which would require only three walls. The unit would be in the shape of an "H." Open-air handball courts should be surrounded by planting. Figure 6 indicates the dimensions followed for the one-wall handball court.

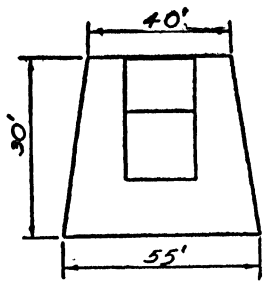


Fig. 6

FIELD HOCKEY

The field hockey area should be level, open, and well-drained, with a turf surface. The long axis should run north and south. Figure 7 shows maximum and minimum dimensions, the maximum for older girls and the minimum for younger girls.

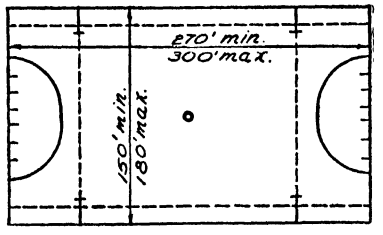


Fig. 7

ICE RINKS

Figure 8 shows the dimensions and layout of the ice hockey rink. The over-all dimensions are 200 feet by 85 feet. The location of players, boxes, and the penalty box is indicated. If the school site includes a natural pond this should be developed for ice hockey as well as for skating purposes. Adequate drainage should be provided and the pond, or rink, should be shallow so as to reduce hazards.

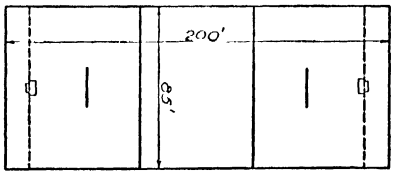


Fig. 8

SOCCER FIELD

The soccer field should be level and of turf. The main axis should run north and south, or northwest and southeast. The dimensions of the soccer field should follow those of Figure 9. The maximum dimensions are for boys, and the minimum for girls.

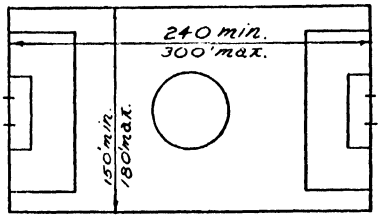


Fig. 9

TENNIS

Tennis courts should be of turf, clay, oil, macadam, asphalt, concrete, or cork surfaced. The surface should be smooth, hard, dry, non-slipping, and free from dust. Surface water drainage should be provided by a very slight slope in four directions from the center of the court if the surface is not sufficiently porous to drain rapidly. All tennis courts should extend north and south on the long axis. Only doubles courts should be provided.

The duplicate use of tennis courts as skating rinks in cold weather should be planned by providing a low curb around a battery of several hard-surfaced courts.

Figure 10 gives the dimensions for doubles tennis courts.

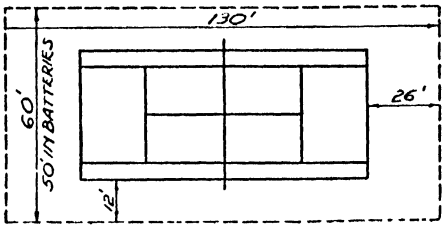


Fig. 10

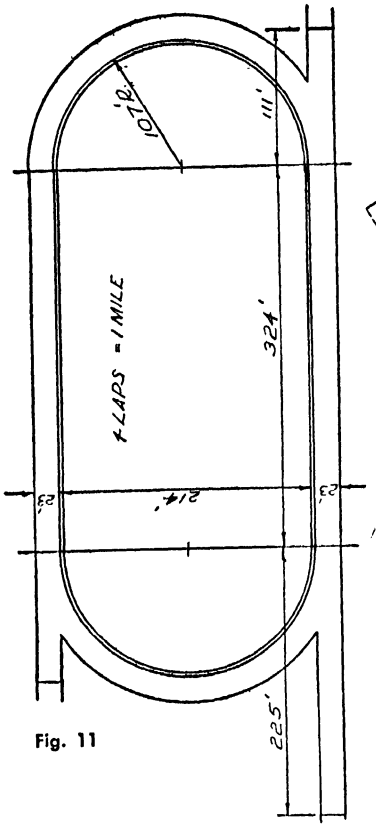
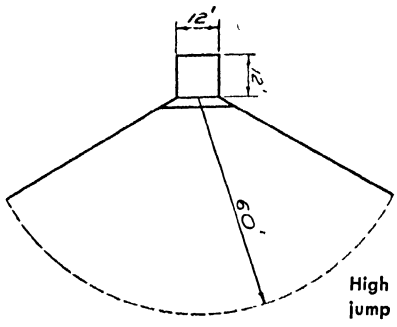
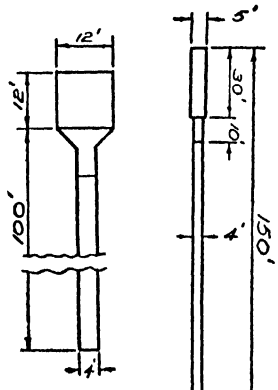


Fig. 11



High jump



Pole vault

Broad jump

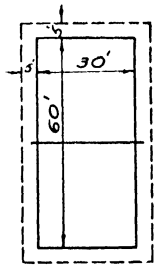


Fig. 12

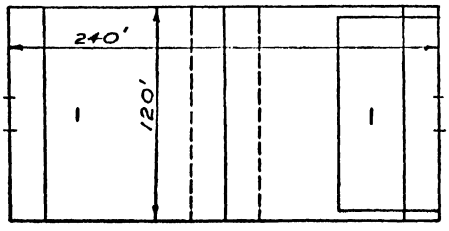


Fig. 13

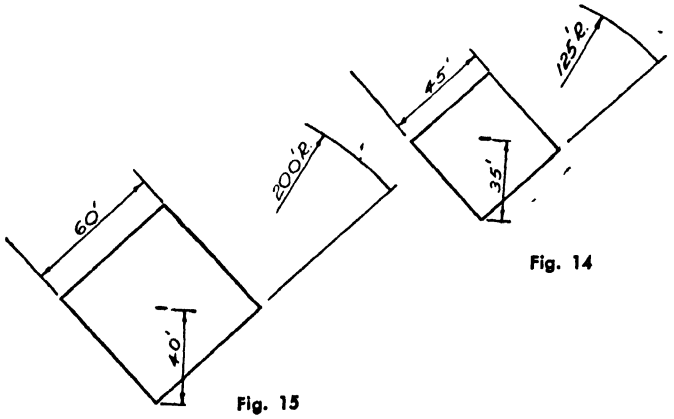


Fig. 14

Fig. 15

RUNNING TRACK WITH STRAIGHTAWAY

The running track should be oval and should measure one-quarter mile to the lap. The track may enclose the field in which some of the other major sports are played. One side of the track should extend in a straight line to provide a straightaway 250 yards long. The width of the straightaway should be 20 feet, and of the turns and backstretch at least 15 feet. The track should not be banked at the curves. The track should be planned to drain quickly and should never be in a soft, soggy, or slippery condition. The track surface should be of packed cinders.

Figure 11 shows the running track with straightaway, together with provisions for high jump, pole vault, and broad jump.

VOLLEY BALL

The volley ball court should be 60 feet by 30 feet. The surface should be turf. Basketball courts may be used for this purpose. If the same area is used for several sports, then movable volley ball standards should be provided. Figure 12 shows the dimensions of the volley ball court with the placement of the net. The volley ball court for junior high school children may be reduced slightly in size.

SPEEDBALL

The recommended size of the speedball field for high school use is 240′ x 120′. Oval posts are placed 18′ apart with crossbars at 10′ height above play level. Figure 13 indicates the dimensions for the playing field.

SOFTBALL FIELDS

The softball field utilizes a 60′ diamond. Batting radius for high school and adult use is 200′ from home plate. For junior high school use the field may be reduced to a 45′ diamond and a batting radius of 125′. A number of soft ball fields should be provided. Overlapping of fields allows the batting radius for the high school game to be reduced to approximately 160′ (Figures 14, 15).

ARCHERY

The maximum length of the archery range is 150 yards with width varying from 30 to 100 yards. Care should be taken to control any possibility of

traffic across the range as well as proper protection back of the target. The usual match distance is 100 yards for men and 60 yards for women (Figure 16).

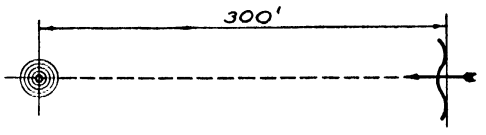


Fig. 16

HORSESHOES

The distance between stakes is 40′ for men and 30′ for women. Boxes 6′ x 6′ should be installed around the stakes. An overall length of 50′ is the minimum for the men's game with a width of 10 feet (Figure 17).

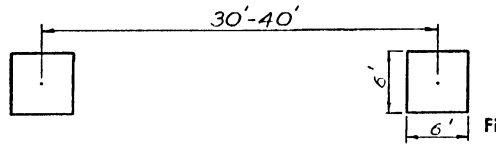


Fig. 17

CROQUET

60′ x 30′ of level lawn provides appropriate space for this game (Figure 18).

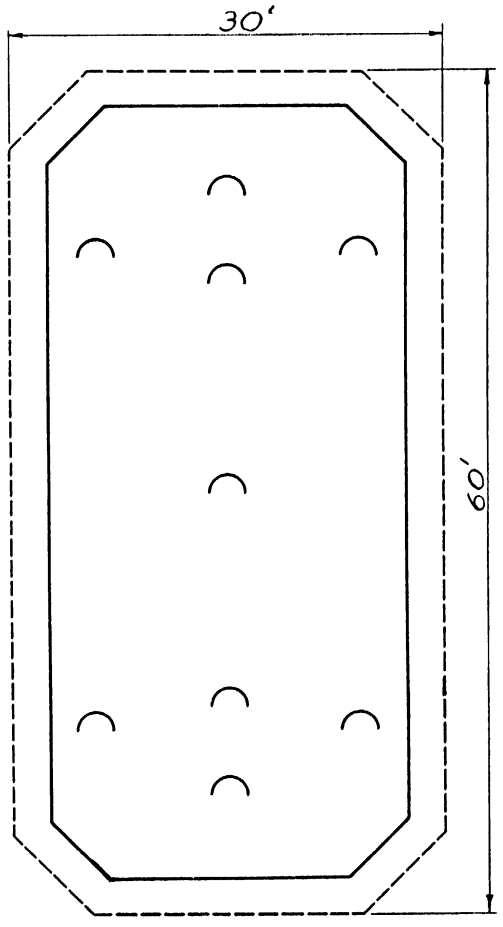


Fig. 18

OTHER RECREATIONAL AREAS

A hard surface area should be provided for games and recreation during seasons when the playgrounds are too wet or soft, as in the early spring or during thaws of snow. For such play areas, elasticity should be sought in the specially prepared surfaces. Concrete is least desirable.

Club activities are encouraged in the modern school. Many of these activities require special out-of-door provision. This is particularly true of the Boy and Girl Scouts. The proposed club program of the school must provide the decision for such facilities as must be considered in planning the school site. A rendezvous for Boy Scouts consisting of a camp site, with a hut, on a wooded knoll alongside of water may easily be developed on certain types of sites. Similar provisions might be made for the Girl Scouts.

It may be feasible to set aside picnicking grounds to be used by science, history, langauge club, or any other of the many small school groups that find frequent opportunity for this informal activity. Here can be provided a protective shelter, out-of-door cooking arangements, and appropriately designed tables and benches.

If water for skating, boating, and the like is not available on the site, it may be feasible to make a pond or other provision for this purpose. The effort should be made to use such a water supply for every reasonable educative and recreational purpose. A fish hatchery may be planned on its brink. Fly fishing and casting may be taught here. Plans may be developed for out-of-door swimming classes. Aquatic classrooms may be planned on the water's edge for aquatic plants and the animal life.

The site may be sufficiently large and spacious so that a limited amount of hiking trails can be blazed. Following the initiative in European schools, hiking may be pursued much more actively by American boys and girls. Hiking, like many other school activities, will take the student away from the schoolgrounds. If hiking has become, or gives promise of becoming, a major recreational activity, it may be desirable to plan an extensive hiking route. This should include shelters for overnight travel located in the shape of a fan from a central radius, each far enough apart for one day's travel. With six such shelters a party, or an individual, could hike for a day at a time and return to a base each night.

Relatively few high schools have incorporated horseback riding as a part of the school curriculum, although many school camps have made it an important part of the camp program. The few schools which find it possible to include this type of activity will require a riding stable, a riding ring, and bridle paths.

Opportunities for golfing as part of the high school recreational program have been provided in a number of schools. Golf courses with a limited number of holes have been established. Proximity to municipal golf courses has made possible the use of those facilities. Wherever possible, a golf course with a number of holes adjusted to the size of the site should be incorporated.

Clock golf provision can readily be made in every school and can be used by both the boys and girls.

With the constantly growing emphasis upon the need for better automobile driving throughout the country, the schools will be required to give instruction in automobile driving. A section of the school site, with grade variation and curves, may be set aside for this purpose. Approximately an acre will suffice for the initial instruction and for a limited amount of practice in driving.

UNIT AND HARMONY IN SIGHT PLANNING

A well-planned high school provides for the varied needs of so many different individuals that conflicts may result unless the utmost of care has been taken in the initial planning. Noises from recreation areas should not disturb quiet groups. Travel back and forth from school buildings to out-of-door facilities should not be circuitous nor across areas being used for other purposes. Each planned facility should be given its proper setting, with sufficient space between it and other facilities, and between it and the highways so that interference and hazards will be reduced to a minimum.

It is particularly necessary that space be provided between play areas so that participants running after a ball will not hit other persons or fixed obstacles.

With the school day becoming longer, facilities for rest should be provided. Out-of-door rest spaces may well be incorporated at strategic points near the building, or at places where there is a minimum of interference on the site. Rest spaces for junior as well as senior high school children are needed. The lunch and recess periods will find greatest use being made of these rest spots.

The high school grounds should constantly attract groups of people not only for participation in play itself but also for witnessing activities in which the students engage. Seating arrangements are frequently required for groups attending. The seating provision in a fixed stadium should be figured at 3 square feet of land area per person seated. Storage facilities will be required for knock-down bleachers.

GARDEN AREAS

A section of the school site should be set aside for garden areas which furnish opportunity for experimentation and plant study, as well as for productive activity. Such garden areas may include sections for horticulture, small fruit and berry culture, truck gardening, and experimental areas. Space should be provided for individual garden plots of an interesting size. One acre of fairly level ground may accommodate plots for approximately 280 children.[9]

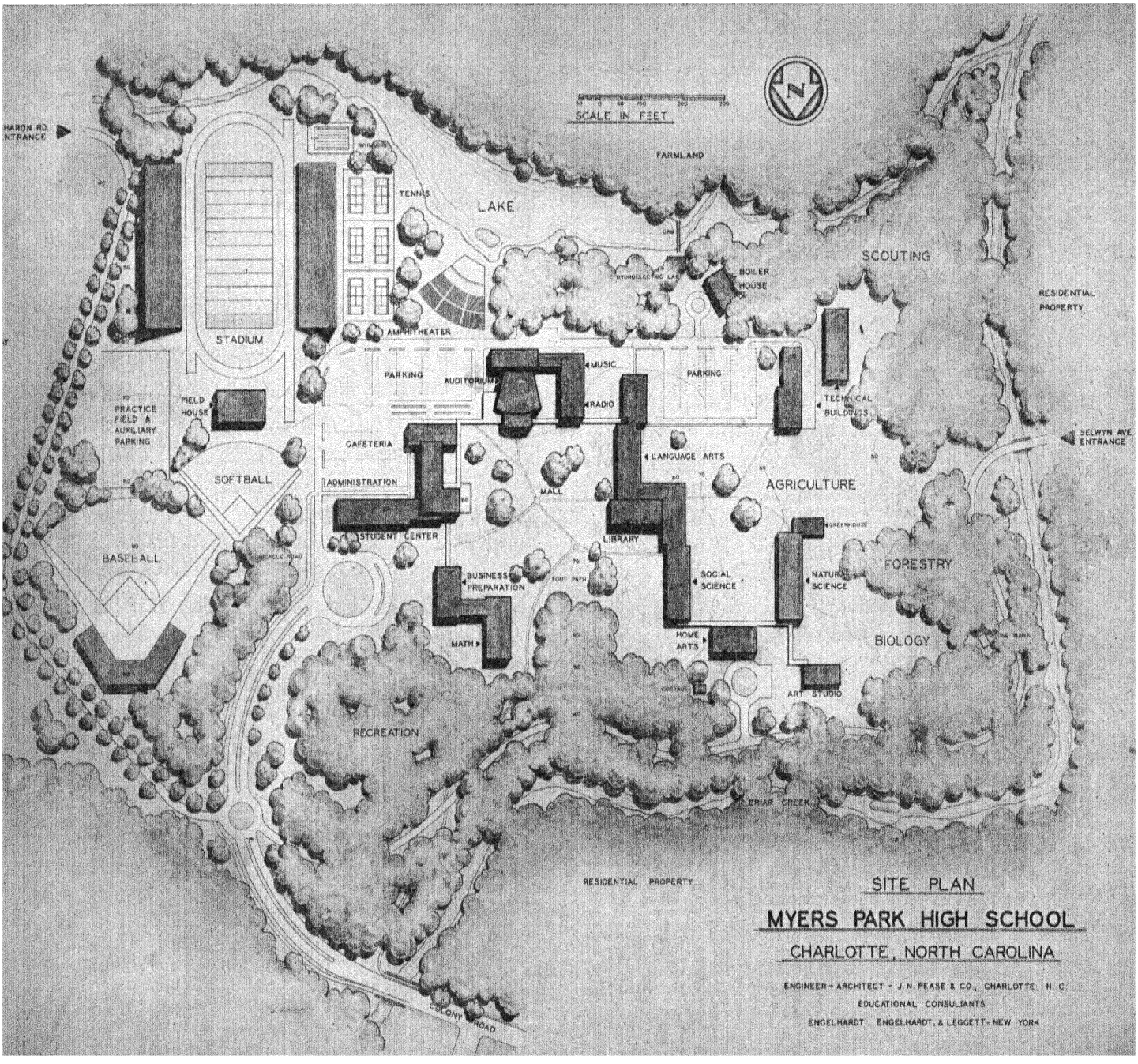
A greenhouse or small conservatory is desirable in connection with biology and natural science experiments. This may be constructed as a part of the main building, or it may be a separate structure adjacent to the school garden plot.

A field house may be required for the storage of implements and materials, as well as for instructional work. Instruction in the care of bees, fowl, and domestic animals may be included as a part of the school curriculum. If so, special care should be given to their segregation and proper housing.

PLAY AREAS FOR NURSERY AND KINDERGARTEN GROUP

High school courses in home arts are given a

[9] Greene, M. Louise, *Among School Gardens*, p. 150.

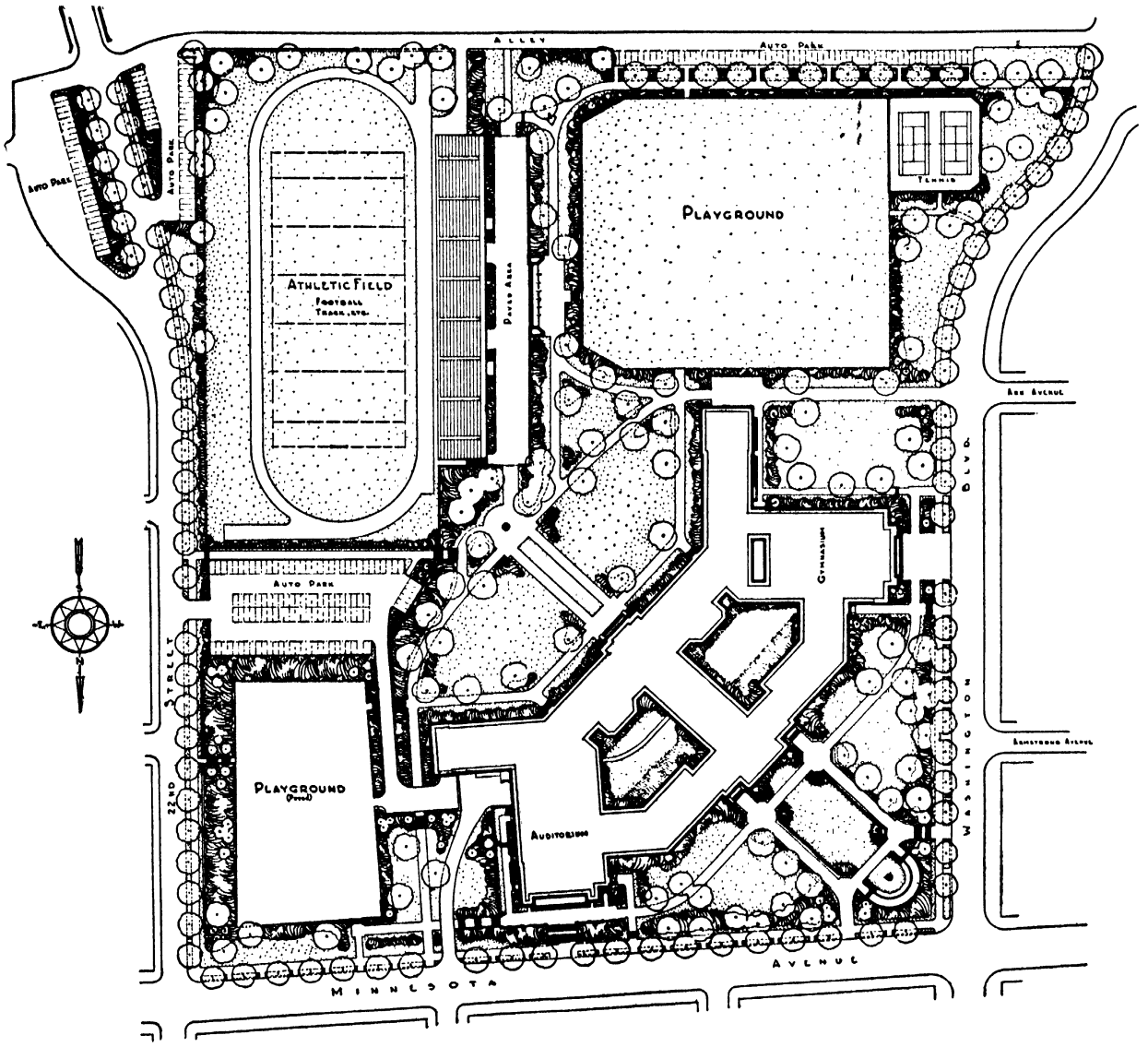


The Site Development Plan for a Modern High School
Charlotte, North Carolina
J. N. Pease & Co., Architects. Engelhardt and Leggett, Educational Consultants.

realistic turn in modern schools by bringing in very young children and making provision for their care and instruction by high school girls. If these children are housed in the high school, it becomes necessary to provide play facilities for them which are fully segregated from other facilities so that safety is guaranteed.

UNASSIGNED AREAS

The high school educational program is constantly expanding. The effort is being made to meet all reasonable needs for the development of youth. It is reasonable to expect that the future will bring forth new demands for land use in high schools. It is therefore wise to plan a high school site so that some land is unassigned and awaits future developments. It probably is more economical to buy this land in advance than to be required to purchase when the need is urgent. Plot plans should indicate land designated as "Unassigned."

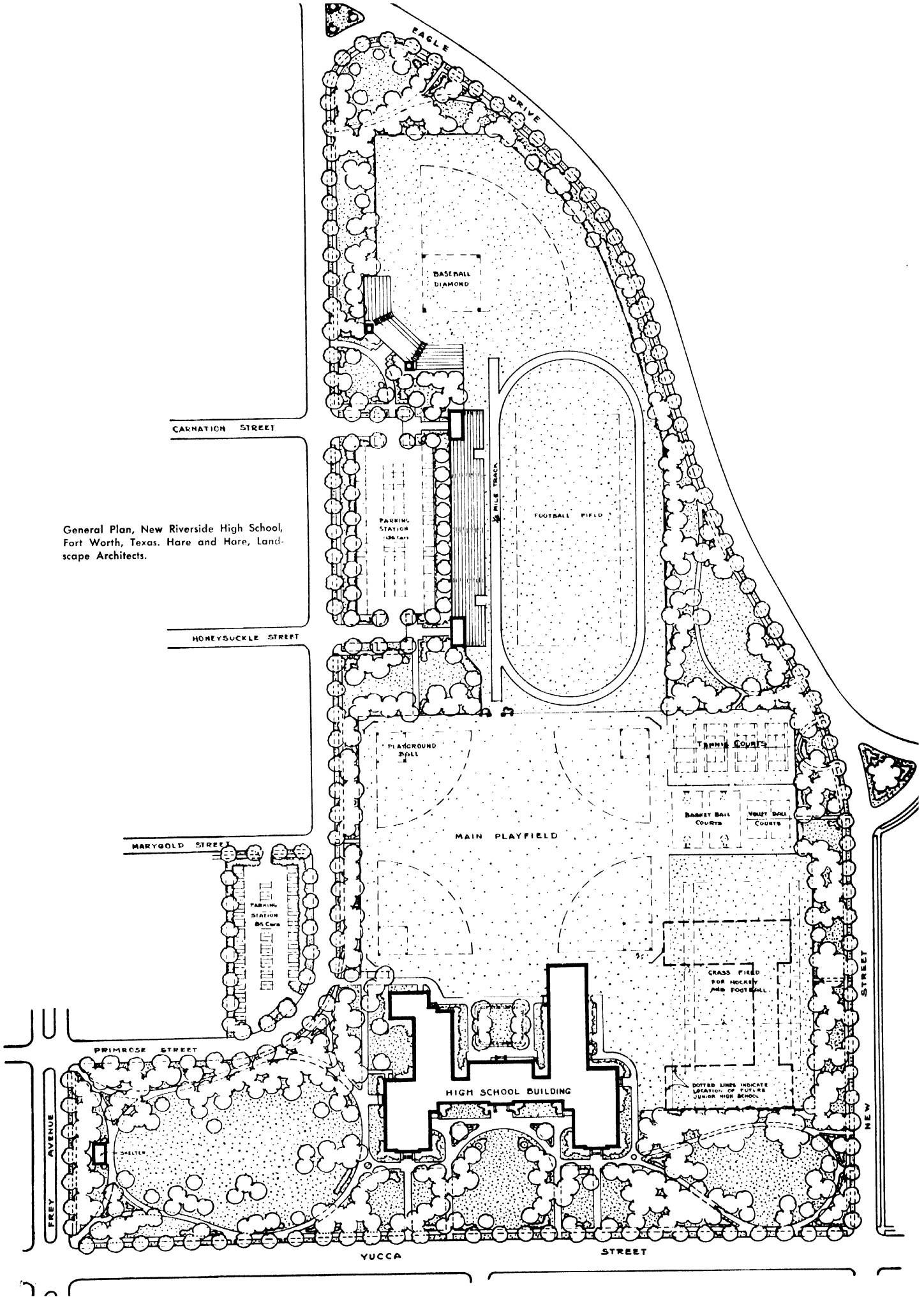


Estimating Total High School Site Needs

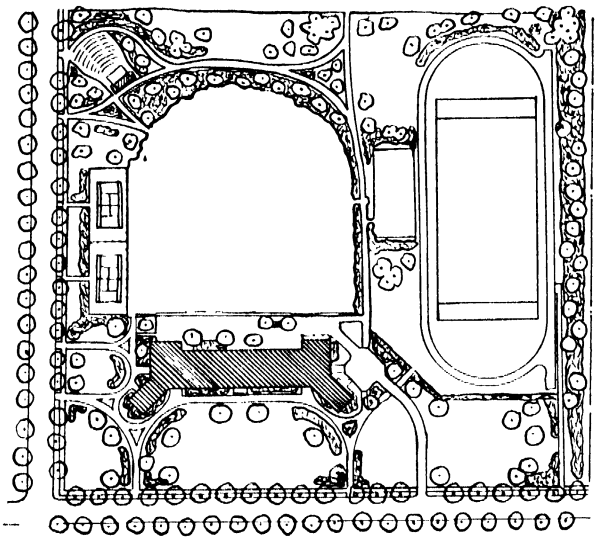
In Table 3 is presented a summary showing minimum and maximum, as well as optimum, space provisions for a high school of 2,000 pupils. The figures included here are of necessity roughly gauged for a school program. Many features of school work must be assumed. Wide variations from these figures will occur in the case of some schools.

TABLE 3. Areas Required for a High School of 2,000 Pupils (Figures Show Acreages)

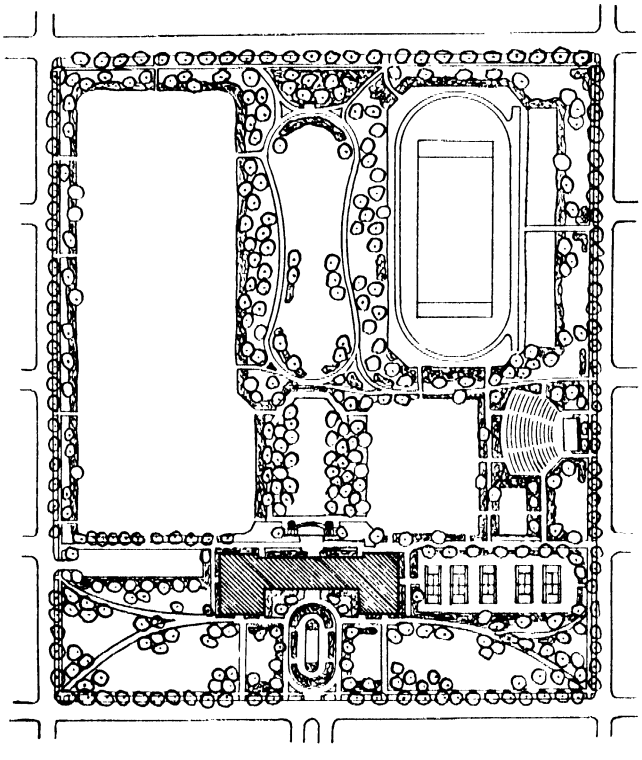
	Minimum	Maximum	Optimum
A. Required building areas	3	18	5
B. Areas required to service or protect buildings and occupants	1	2	1
C. Out-of-door educational areas	1	5	2
D. Playgrounds and play fields	10	40	16
E. Other recreational and educational areas	2	15	9
F. Protective areas for play and recreational spaces	1	5	1
G. Other land uses	1	10	3
H. Unassigned areas held in reservation for future needs	1	5	3
Total	20	100	40



General Plan, New Riverside High School, Fort Worth, Texas. Hare and Hare, Landscape Architects.



General Plan for Meadowbrook Junior High School, Fort Worth, Texas. Hare and Hare, Landscape Architects. Far left, tennis courts with play area to their right; center, basketball and volley ball court; far right, football and track field.



General Plan for Arlington Heights Senior High School, Fort Worth, Texas. Hare and Hare, Landscape Architects. Far left, grassy play field; far right, slope for bleachers overlooking football and track field; lower right, paved play field.

Utility Services for School Site

Site selection should be influenced by the possibility of making service utility connections at reasonable costs. Consideration should be given to the sewage disposal problem prior to selection of the site, keeping in mind the relative elevation of existing sewers and probable elevation of the school building as well as the distance over which the connection must be extended. It is equally important that a satisfactory water supply be available. Drinking water should be obtained from the main city supply, if at all possible. Spring water should not be used because of possible contamination. If necessary, wells may be either driven or drilled as conditions require. Nearby connection to high pressure fire hydrants is mandatory.

Landscape Planning

The landscape planner should participate in the selection of the school site. Landscape planning should begin with site and building planning and should continue throughout the process. To delay the landscape plan until after the building is finished will result in added expense and compromises in adaptation to fixed units. The most desirable effects of planting and the beautification of the grounds can only be achieved through well-defined purpose and unification of all areas in the total scheme. There should be a landscape master plan developed at the beginning of the project and it should be adhered to as plans go forward, making changes from time to time in land use.

The landscape plan should be developed on a topographical map showing one or two foot contours. The map will indicate the best way for drainage, relationship of site to surrounding streets and terrain, location of trees, and other natural features. The landscape architect in cooperation with the building architect will orient the building and plan play areas, gardens, drives, walks, trees, etc., prior to the commencement of construction. This will allow for most economical placement of excess dirt which is removed from building foundations, and will save trees, top soil, and other valuable natural elements. Of equal importance, however, are the unity and correct orientation of buildings and play areas which advance planning assures.

Some Other Specific Considerations in Site Selection and Planning

The following list of items has been brought together in condensed form to assist in the review of details affecting site selection and planning.

A. Building
   1. Orientation to secure southeastern or southwestern exposure in all rooms.
   2. Placement in corner or on one side of site. Never in center.
   3. Provision for future extension.

B. Drives and Walks
   1. Accessibility to building for pedestrian and auto traffic from all main streets.
   2. Safety by separation of pedestrian and vehicle traffic.
   3. Separation of service drives.
   4. Directness of walks thereby discouraging shortcuts across lawns.
   5. Ramping of sidewalks where grade does not exceed 12 or 15 percent. Steps undesirable.
   6. Placement of sidewalks ranging in width from 8 to 12 feet depending on volume of traffic.

C. Building Setting
   1. Set back from streets at least 100 feet.
   2. Provision of ample open spaces around building to accommodate children not in actual play.
   3. Use of washed gravel areas near building where ground is in constant use.
   4. Placement of grass surface over approach areas so as to avoid damage through play.
   5. Provision for adjacent automobile parking and service areas. Servicing to be concealed from principal view.
   6. Beautification of building by proper planting.

D. Recreational Areas
   1. Proper orientation of athletic fields.
   2. Connection to locker rooms, building, and streets by walks.
   3. Protection from streets or adjacent private property by fencing.
   4. Proper spacing of fields to avoid interference of one group of players with another.
   5. Provision for student gardens removed from play areas.

6. Provision for orchard or fruit garden.
7. Inclusion of woods for nature study and scout craft.
8. Provision for grove for picnics, outdoor classes, or rest periods.
9. Arrangement for an outdoor theater in natural depression, if available.
10. Provision for good drainage of all recreational areas and avoidance of soil erosion.

E. Planting
1. Securing of good top soil.
2. Planting of strong, hardy deciduous trees and avoidance of evergreens and thick foliage near building which might exclude light from windows.
3. Placement of large trees near building in keeping with massiveness of structure.
4. Location of shrubs at least twenty feet from building when windows begin at ground level.
5. Elimination of trees near play areas where they might be subject to damage.
6. Selection of plants for toughness, hardiness, and freedom from disease.
7. Retention of all trees possible. Planting of native trees and avoidance of thorny trees or those bearing fruits, nuts, berries.
8. Seclusion of unsightly places or poorly developed adjacent property by trees, thick growth of hedges or shrubs.
9. Covering of blank walls with vines or fronted by trees.
10. Use of perennial flowers only in well protected beds.

CHAPTER 6: specimen educational specifications for secondary schools

Secondary school needs vary markedly from community to community. It is therefore necessary for the school administration to present its educational needs to the architect with clarity and definiteness. The educational specifications should be a document of considerable volume. They should leave no doubt in the architect's mind of the functions and scope of the program to be advanced in the proposed structure.

The educational specifications for a new school building should include the following:

(a) A statement of the educational philosophy which the school authorities expect will be followed in the use of the building.
(b) Program of space requirements for all features of the building.
(c) "Do's and Don'ts," with reference to placement, approaches, architectural design, materials of construction, interior finishes and plant operation, growing out of the experience of the maintenance and operating staffs of the local school system.
(d) Proposed layouts of spaces recommended by members of the local teaching, supervisory, and administrative staffs.
(e) Proposed standards for all architectural documents to which there will be adherence in the planning.
(f) Statements or check lists covering such important educational emphasis as "pupils' working heights," "storage needs," "sound systems," "clock needs," "stairway standards," and the like.

Such a comprehensive document of educational specifications causes the early review and approval of items that must have decisive action. The earlier agreement is reached on many of these issues, the less will the work of planning be handicapped. The procedure suggests long-time preparation before the green light is given for the beginning of preliminary drawings. Early participation by faculty and students who are to use the building will forestall many future embarrassing interruptions in the preparation of drawings.

To expedite the preparation of the program of space requirements, comparison may be sought with what other secondary schools are including in their plans for use of space. The following are illustrations of what is being done in various parts of the country.

Illustration I

PROGRAM OF EDUCATIONAL AND COMMUNITY REQUIREMENTS FOR CENTRAL HIGH SCHOOL, LOUISVILLE, KENTUCKY, 1948

This school will serve as a comprehensive high school for Negro boys and girls in the City of Louisville. It will also serve as a community center since the building is strategically located—with reference to centrality of the areas in which the Negroes live. The site will be bounded by Chestnut Street to Esquire Street, Eleventh Street to Twelfth Street. The planning intent is to make every square foot of site areas and every feature of the building contribute to the educational advancement of the people whom they serve—the boys and girls and the adults who use the facilities.

Program of Space Requirements

SECTION I: REGULAR CLASSROOMS

1. Ancient and foreign 3 rooms—23′ x 25′
2. English rooms—9 rooms —23′ x 35′
3. Guidance rooms 2 rooms —23′ x 35′
4. Mathematics rooms—7 rooms —23′ x 35′—planned as a unit
5. Social Studies rooms 7 rooms 23′ x 40′—planned as a unit

SECTION II: DRAWING AND ART

1. Mechanical drawing—2 rooms each 1200 square feet
2. Window display laboratory—322 square feet
3. Applied art studio (with storerooms)—2000 square feet

SECTION III: HOMEMAKING

1. Clothing Laboratories—4 rooms each (1260-1400) (two, dressmaking; one, clothing designs; one, mending and laundry)
2. Advanced Cooking (966 each)
3. Model Home Suite ..... 966 square feet
4. Nursery Unit (to take care of 15-20 children) Play area, sleeping area, laundry, with observation space, bathing, toilet, kitchenette ..... 2500 square feet
5. Food Trades, and Tea Room Service ..... 1800 square feet
6. Beauty Culture ..... 1200 square feet

SECTION IV: SCIENCE

1. Botany and Biology Lab.—1 for plants, 1 for animals .....each 966 square feet
   and prep rooms .....each 483 square feet
2. Physics Lab. (2) .....each 966 square feet
   and prep room ..... 483 square feet
3. Chemistry Lab. (2) .....each 966 square feet
   and prep room ..... 483 square feet
4. Science Classrooms (3) .....each 805 square feet
5. Dark Room ..... 322 square feet

SECTION V: COMMERCIAL

1. Bookkeeping ..... 966 square feet
2. Business Machine Room ..... 966 square feet
3. Business Practice—Clerical ..... 966 square feet
4. Stenographic ..... 966 square feet
5. Typewriting ..... 966 square feet

SECTION VI: MUSIC

1. Music Room—Choral
   Planned as small auditorium for public use and audio-visual studio—to seat 250
2. Band and orchestra room—isolated, acoustically treated ..... 3000 square feet
3. Library and Listening Booths ..... 1200 square feet
   1. Broadcasting Studio—planned in above or separately

SECTION VII: AUDITORIUM

1. Auditorium body—seating 2000 (with balcony)
2. Stage loft and wings—approximately 30′ by 50′
3. Dressing Rooms—Entire space under stage with dressing compartment and large areas for groups
4. Property Room—650 square feet—directly accessible to stage
5. Orchestra space—12′ wide but no depression or pit
6. Projector space—140 square feet
7. Lobby—900 to 1000 square feet
8. Public toilets—1 for each sex—green room should be considered, also rest rooms, 200 square feet each adjacent to toilets
9. Coat check room—make adequate provision—perhaps by duplicate use of other space
10. Ticket Booth—2 spaces, 30 square feet each
11. Telephone Alcove for public use of telephone and insertion of booth
12. Stage-craft shop planned nearby in conjunction with other shops

SECTION VIII: LIBRARY

1. Library reading rooms—two of 75 capacity each
2. Stock and Work Room ..... 644 square feet
3. Librarians' Office ..... 322 square feet
4. Dead storage space ..... 224 square feet
5. Library classroom (regular classroom unit)
6. Student alcoves for two groups—6 to 10 each, off library
7. Reading reference room—to seat 100

SECTION IX: CAFETERIA

1. Cafeteria kitchen (public observation space).... 900 square feet
2. Main Dining Room ..... 5200 square feet
3. Serving Counter Units (two double units) ..... 850 square feet
4. Cold lunch counter ..... 200 square feet
5. Store rooms—food ..... 350 square feet
   auxiliary ..... 150 square feet
6. Dietitian's Office ..... 100 square feet
7. Refuse and can washing room ..... 100 square feet
8. Help's toilets and locker ..... 300 square feet
9. Teachers' Cafeteria—served from main kitchen 850 to 1000 square feet
10. Dishwashing unit—acoustical treatment and ventilation ..... 275 square feet

SECTION X: GYMNASIUM

1. Girls' gymnasium—size 60′ x 80′—no spectators—not tied in with boys' gym
2. Boys' gymnasium—two gymnasiums with electrically operated partition and total seating capacity of approximately 2500—partial permanent and partial folding. Game courts—50′ x 84′

3. Administration offices—one for each sex....each 200 square feet
4. Physical Examination Room ..... 322 square feet
5. Small game room (one for each sex) ..... 750 square feet
6. Locker rooms—700 boys, 800 girls
   (80 dressing lockers, 700 box lockers)
7. Shower Rooms (Lane shower for boys)
   (800 box lockers and dressing lockers connected with showers. 20 shower heads with 4 dressing lockers for each)
8. Gym Toilets (adjacent to showers and lockers)
9. Store Room—1 for each gym ..... 300 square feet for boys
   100 square feet for girls
10. Community store room ..... 300 square feet
11. Visiting team for 35 visitors, with showers, dressing rooms and full length locker space. No connection with other locker spaces and special lock control
12. Laundry and drying space ..... 750 square feet
    Indicate possible future location of swimming pool—with future access to both gym areas.

SECTION XI: ADMINISTRATIVE AND STAFF FACILITIES

1. General office ..... 644 square feet
2. Principal's private office ..... 322 square feet
3. Assistant Principal (Attendance) ..... 322 square feet
4. Records File Room ..... 322 square feet
5. Guidance Room ..... 480 square feet
6. Mimeograph Room ..... 240 square feet
7. Record Vault ..... 322 square feet
8. Medical and Dental ..... 1200 square feet
   and Rest Rooms
   (boys' and girls')
9. Conference—Community and faculty ..... 750 square feet
10. Evening School office ..... 322 square feet
11. Sound Control ..... 100 square feet
12. Teachers' Service Spaces
    a. Teachers' Rest Rooms—one for each sex at a southern or eastern side of the building, preferably on the second floor
    b. Toilet Provisions—for both men and women teachers readily accessible from any teaching station
    c. Teachers' Work Room—space of half of the regular classroom size to be used by teachers for work during their unassigned period

SECTION XII: STUDENT ACTIVITIES

1. Social Room—in conjunction with living room in home unit or cafeteria (planned as a part of either) ..... 966 square feet
2. Student Activities ..... 644 square feet
3. Student Council Room ..... 322 square feet

SECTION XIII: SHOPS

1. Building Construction Shop—35′ x 77′ (vocational)
2. Tailoring Shop—24′ x 56′ (vocational)
3. Clothing-cleaning Shop—24′ x 35′ (vocational)
4. Auto-mechanics ..... 3600-4000 square feet
5. Foundry and molding ..... 3600 (?) (more or less
   (See Page R. 134) see instructor)
6. Electrical Shop—23′ x 55′
7. Plumbing Shop—23′ x 55′
8. Printing Shop ..... 1500 square feet
   (see instructor)

SECTION XIV: PLANT SERVICE ROOMS

1. *Boiler Room*
   The space should be provided for the needs of the present plant as well as for addition up to 30 per cent as a maximum of future space increases for the building. It should occupy a central location and be on one level. The Custodian's work shop may adjoin the boiler room with easy visibility between the two. The Custodian's supply room should be adjacent to his work shop and the Custodian's help room should be near the boiler room.
2. *Fuel Storage Space.* To carry at least one-half year's supply.
3. *Fan Room*
   The fan room for ventilation processes will be needed only in relation to the auditorium, gymnasium, and cafeteria. The zone system of ventilation may be desired. The intake of fresh air must be above the first story height.
4. *Incinerator*
   The incinerator should service every floor and be so located that the utmost of safety is provided.
5. *Meter Room*—near engineer's entrance ..... 125 square feet
6. *Switchboard Room* ..... 320 square feet
7. *Furniture Storage Room* ..... 320 square feet
   The planning should make for a most economical storage of new as well as broken-down equipment. There will be storage here of practically any type of equipment and furniture used in the school. The room should be readily accessible to stairways and to the major receiving room.
8. *Janitor's Supply Store Room* ..... 125 square feet
   This store room should be equipped with metal shelving and bins. Provision should be made for carrying at least a half year's supply of paper towels, toilet paper, soap, cleaning compounds, and other materials used in the cleaning processes. The architect should acquaint himself with the local practices so that complete provision may be made.
9. *Garden Tool Storage* ..... 125 square feet
   This space should be located where it is most readily accessible from the out-of-doors. It should provide for all tools and equipment used on the lawns, shrubbery, trees, and all exterior care of a building.
10. *Custodian's Workshop and Store Room* ..... 320 square feet
    This shop serves the janitor and his assistants. It should be adjacent to the boiler room and should be useable by the Custodian for minor repairs in the heating, plumbing, or electrical systems. This Custodian's room will require the following equipment:

    A heavy duty work bench, a woodworking bench, a heavy duty steel counter and shelf, a steel tool cabinet and bins, a steel rack with adjustable shelves, a tool storage placement board and hooks, a steel rack bracket for pipe and lumber, a galvanized steel oily waste can—5 gal., a galvanized steel rubbish can—20 gal., a steel stool with channel braces, a woodworking vise, a machinist's swivel pipe vise, a direct light fixture with utility outlet, an emery wheel electrically driven, an electric utility outlet at bench top, a cleaning tool holder and rack, an electric wall switch for ceiling lights, an electric ceiling light fixture and globe, an above-grade vent for supply room, a steel shelf rack with barrel storage, and a glass cutting board.

11. *Helpers' Locker Room* ..... 125 square feet
    The architect should ascertain the amount of custodial help of both sexes which will be required in this school. The help's locker room should provide lockers and dressing space, adequate lunch space, a hot plate provision, and toilets. These custodial help rooms should be considered separate from those required for the cafeteria.
12. *Janitor's Sink Closets* ..... 37½ square feet
    These closet spaces are designed for storage of supplies and equipment and for disposal of waste water.
13. *Engineer's Closet for Oil and Greases* ..... 80 square feet
    The Engineer's Supply Closet located in the boiler room is used for the storage of oils, grease, and paints. The shelving is arranged to provide storage for drums of oil, large cartons, etc. A rack is provided for long step ladders. The floor is finished with oil-resistant, waterproof floor dressing.
14. *Elevators*
    One for general service use and one for transportation of handicapped individuals. Both may be passenger operated.
15. *Dust Chute and Dust Bins*
    They should conform to a fire code regulation and be fully protected from hazards both at the intake and in the basement.
16. *Receiving and Shipping Room* ..... 320 square feet
    The receiving and shipping room should be readily accessible from the street and should be the center of the major supply rooms. Stored in this room should be the tools required for opening

crates and cases and the like. There should be a place for the storage of materials used in preparing materials for shipment. This room is designed as the first step on entry of materials to the building and as the last step for checking materials leaving the building.

17. *Access Chambers*
These chambers will be made sufficiently wide to permit men to work easily behind all plumbing installations. These chambers should not be designed as store rooms, but merely as places of access to repair needs.

18. *Eraser Room*
The eraser cleaning room requires a space of 40 square feet and is equipped so that the custodian may readily clean erasers with a vacuum device. The school should have two supplies of erasers, one supply cleaned during the day while the second supply is in use in the classrooms.

19. *Key Room* ..... 80 square feet
This room should be near the Custodian's Work Shop and should be equipped with a key board and numbered hooks to correspond to room numbers. There should be a complete file and a small work bench with key-cutting machine.

SECTION XV: PERSONAL SERVICE SPACES

1. *Toilet Facilities*

The Student toilet provisions should follow the recommendations of the Study on Sanitary Facilities in Public Schools, published by the American Council on Education, 740 Jackson Place, Washington, D. C. Care should be taken to avoid an excessive number of fixture installations. Fixtures should be provided on each floor for both sexes in proportion to the total number of pupils stationed on each floor. Ease and access from the library and cafeteria, gymnasium, and study hall should be safeguarded. All toilet rooms should have outside natural light. The girls' toilet rooms should be equipped as powder rooms. All toilet rooms should be provided with shelving at strategic places on which students may place books and other educational materials.

Special attention should be paid to the installation of equipment, partitions, and accessories, such as toilet paper and soap so that there will be permanence in the construction and a minimum of temptation toward vandalism.

Other toilet facilities should be provided in the dressing rooms of the stage, in the health suite, in the administration suite, in the teachers' rooms, in the custodial employees' room, and in the cafeteria help's room. Public toilets must be provided near the auditorium and near the gymnasium. Toilets must also be provided in major locker room in the gymnasium as well as in the gym instructors' offices. Provision should also be made for those who use the playground and are not given access to the main building.

2. *Washing Facilities*

Wash bowls should be installed to provide at least one bowl for each 50 students. In addition, washing facilities will be needed at special points, such as in the laboratories, the dressing rooms offstage, and in certain offices. Washing facilities should also be available for students entering the cafeteria on their way to lunch.

3. *Drinking Facilities*

Drinking fountains shall be provided on each floor and be suitably located with respect to the gymnasium, cafeteria, and auditorium. All drinking fountains in passageways shall be of the recessed type. The number of bubbler units shall be provided on the basis of one for every 200 pupils on each story; minimum of two on each floor and one in each shop. All drinking fountains shall be limited to 2 bubbler units.

4. *Shower Facilities*

The Lane type shower shall be provided for boys in connection with the locker room for the gymnasium. Four booths to one shower should be provided for girls. An instructor's shower should be provided for each of the gym instructors. Shower space should also be provided for the engineer and male help. They should be near the help's locker room.

5. *Locker Facilities*

(a) Home room lockers will be inset in corridor walls. There are single tier lockers, preferably 12" x 15" x 72". At least one locker should be provided for each student up to 125% of the schools' capacity. This will make it possible to use a number of lockers for evening school purposes.

(b) Gymnasium Lockers. It is estimated that there will be never an excess of 150 individuals of either sex using the gymnasium and recreation facilities at the same time. This means that each gymnasium should have 150 double tier lockers, size 12"x 15" x 36". In addition, there should be individual box lockers in which students will keep their shoes and other gym clothing when they are not using the gymnasium facilities. These box lockers will be 12" x 15" x 12" with a total number of half of 110 per cent of the building capacity for each sex. The locker rooms and shower spaces for adult evening use and for visiting team use should be provided entirely separately from that set aside for the regular school use.

6. *Gymnasium Bleachers*

Flexible gymnasium bleachers which push back against the wall will be used in each gymnasium. A maximum number of sets should be provided without interference with the floor area needed for game use. These bleachers should be so arranged that there is complete visibility over the entire playing area for all spectators.

SECTION XVI: COLOR SCHEME

The artistic use of color can add distinction, beauty and educational values to this building. Color should be considered with reference to the age groups to be served, the orientation of spaces, and the general purposes of spaces. Variations in color may be stimulating. The interior of a school building should in no sense be monotonous in appearance.

Color schemes must be thought of as inclusive, applying equally to equipment, trim and wall and floor finishes.

A green glass chalkboard may contribute more to the color scheme than a slate blackboard.

The architect will aid in the approval of color schemes if he will prepare a chart or two showing his color proposals for the review of the educational groups.

Color should be used to give the widest possible diffusion of light and to wipe out dark spots in rooms.

Illustration II

THE NEW MYERS PARK HIGH SCHOOL, CHARLOTTE, NORTH CAROLINA

Program of Space Requirements *

SECTION I: STUDENT CENTER

1. *Cafeteria*

1-A	Main dining rooms seating 600	7500 square feet
1-B	Kitchen	1000 square feet
1-C	Serving counter units (2 double units)	850 square feet
1-D	Store room—food	350 square feet
1-E	Store room—auxiliary	150 square feet
1-F	Dietitian's office	100 square feet
1-G	Refuse and can washing room	100 square feet
1-H	Help's toilets and lockers	300 square feet
1-I	Dishwashing unit	275 square feet
1-J	Teachers' dining room	1000 square feet

* All areas given are approximate.

Notes: Include platform stage as part of cafeteria dining floor area. Desirable to use either separate rooms or provide methods for separating sections of the main dining room for small group use. Architect will want to avoid large, barren, noisy atmosphere too often typical of cafeterias. Considerable attention should be given to matter of circulation in this unit. There should be no cross traffic, easy and speedy service for 600 students at a time. Students returning trays to dishwashing unit should not cross serving or exit lines of travel. The

kitchen should be designed for efficiency in operation. Access from kitchen to serving counters should be easy and of short distance. Serving area for teachers should be separate from students. Provide for direct delivery of supplies to kitchen area. Large quantities of milk must be handled and kept under refrigeration. A separate sandwich, milk and ice cream selling counter may be desirable to speed service.

It should be possible to design this unit so that during good weather students may lunch out-of-doors. Ease of access of dishwashing unit to out-of-doors lunching area and circulation should be watched.

2. *Student Offices*

2-A	Publications office	900 square feet
2-B	Three student organization offices at 300 sq. ft.	900 square feet

3. *Soda fountain and luncheonette* ..... 1800 square feet

Notes: This space is to be used for vocational training, business management and also for social room purposes. The room should be provided with a fireplace, a movable partition that will section off the soda fountain section and equipped with comfortable furniture.

4. *Student Store* ..... 300 square feet

Notes: The student store should serve the distributive trade training program, business courses, window display and the like. Here might be sold student publications, insignia, tickets, extra supplies, items produced by students and the like. A central location and a large display window are required.

5. *Guidance Offices*

5-A	Dean of boys	300 square feet
5-B	Dean of girls	300 square feet
5-C	Conference room	480 square feet
5-D	Psychologists, and other guidance personnel —2 offices, at 300 sq. ft.	600 square feet
5-E	Waiting room	

Notes: The waiting room, to seat 10 students, should serve also for library of guidance material, information about jobs, college catalogues, etc.

One unassigned guidance office may serve as an evaluation or testing room, where students who desire to do so may come to take aptitude, personality, achievement tests as part of the guidance process.

The guidance unit should have access to the record file room of the administrative unit.

6. *Health Unit*

6-A	Waiting room	300 square feet
6-B	Medical examination room	300 square feet
6-C	Eye examination space, 23' x 3'	
6-D	Individual audiometer examination room	50 square feet
6-E	Dental examination room	300 square feet
6-F	Girls' rest room	400 square feet
6-G	Boys' rest room	400 square feet
6-H	Health record room	100 square feet

Notes: The health record room should be designed to relieve professional personnel of clerical duties. The eye examination space should be unlighted by windows with an illuminated eye chart at one end. The space should be marked off at one foot intervals. The standard distance is 20 feet. The individual audiometer examining room should be as close as practicable soundproof. In addition, it is most important to design one classroom near the health suite equally soundproof for purposes of scheduling group audiometer tests in such a space.

The entire suite should be designed for student vocational training. Receptionist, clerical worker, doctors' and dentists' assistants, and care of sick (in connection with rest rooms), all can be given practical useful training that may well be of distinct vocational or try-out advantage.

7. *Administrative and Staff Facilities*

7-A	Reception and waiting room	400 square feet
7-B	General office	600 square feet
7-C	Principal's office	300 square feet
7-D	Assistant Principal's office	300 square feet
7-E	Conference room	750 square feet
7-F	Records file room	300 square feet
7-G	Mimeograph room	250 square feet
7-H	Evening school office	300 square feet
7-I	Teachers' work room	500 square feet
7-J	Teachers' rest rooms	each 400 square feet

Notes: The reception and waiting room should serve the entire administrative office. A service desk and telephone connection to the offices is desired. The general work space is for the clerical and other workers who should not be subjected to constant interruption. Ease of access of record room to teachers, guidance, and administrative personnel is required yet it should be under constant supervision to avoid unauthorized access to confidential records.

The administrative unit should be of easy access by students and public.

8. *Employment Office*

8-A	Waiting room	
8-B	Record room	100 square feet
8-C	Office	300 square feet
8-D	Intervew rooms, 2 at 50 sq. ft.	100 square feet

Notes: The waiting room may be part of guidance or general waiting room. This space should be closely integrated with the guidance offices. A large bulletin board advisable in corridor near this space.

9. *Supply Room*

Notes: This should serve the student center for supplies.

SECTION II: AUDITORIUM CENTER

1. *Auditorium*

1-A	Seating area	1000 capacity
1-B	Stage	approx 30' x 50'
1-C	Dressing rooms	space under stage
1-D	Property room	650 square feet
1-E	Projector space	140 square feet
1-F	Radio or sound system booths	
1-G	Lobby	900-1000 square feet
1-H	Public toilets—one for each sex	
1-I	Ticket booth	
1-J	Telephone alcove	
1-K	Orchestra space, no pit but 12' wide, clear, flat area in front of stage	

Notes: Zoned heating, direct access to out-of-doors from auditorium, ease of access, nearness to parking area are all important factors. No balcony should be planned. There should be easy travel to both the auditorium seating area and to the backstage spaces for both student and community use. Scenery loading direct from stage is desirable.

2. *Stagecraft Shop* ..... 1200 square feet

Notes: Part of the space should exceed 16' in ceiling height for preparation and storage of scenery flats. There should be ease of access through double doors to the stage. Light woodworking equipment, cutting table and sewing machines, stands for model theaters with lighting outlets for study of scenery design, painting area and storage space is needed.

3. *Photography Studio* ..... 1200 square feet

Notes: A large, high ceilinged open floor space is desired. Here sets can be erected for photography work. Moving pictures can be shot at least in part here. Storage for film and equipment, light control, outlets for floodlights, soft pine floor for installation of sets, dark room and small costume change rooms are required.

4. *Broadcasting Studio*

4-A	Broadcasting studio	1200 square feet
4-B	Waiting room	300 square feet
4-C	Office	200 square feet
4-D	Work room	800 square feet
4-E	Equipment room	500 square feet
4-F	School sound system	100 square feet

Notes: Ultimately, or in the present plant, broadcasting space will be desired. In large part the equipment can be made in the radio shop. The FM radio tower will be in a separate location. Space 4-D is for rehearsal, script writing, program development and the like. A transcription turntable is needed in the control console. There should be a soundproof glass partition between the reception space and the studio. The control room may be a part of the equipment room with glass soundproof window to studio. The entire unit should function through either broadcasting or school sound control system separately or simultaneously. There should be a large number of points in the school at which microphones can be plugged in and programs originate. The system should also serve the playing field, gymnasium and auditorium for amplifying purposes.

5. *Additional Optional Spaces*

5-A	Rehearsal rooms each	400 square feet
5-B	Head of department office	300 square feet
5-C	Art exhibition gallery	
5-D	Musical instrument storage	

SECTION III: OUTDOOR AMPHITHEATER

1. *Music and Stage Shell*

2. *Outdoor Seating for Large Groups*

Notes: This facility should be so located, if possible, so that performers can use the auditorium center facilities for dressing rooms, etc. There should be large dressing room or waiting space under or off the stage. The stage should be large enough for pageants, concerts by large orchestras, graduation exercises. Ample off-stage space is desirable. Alternate arrangement is to provide a complete outdoor theater with a sod stage banked by planting. This type is necessarily small, seating fewer. In any event, careful study of acoustics is required. Use of the school amplifying and broadcasting system should be assured.

SECTION IV: RADIO STATION

1. *Tower*

2. *Broadcasting, Transmitting Facilities*

Notes: Discussed under auditorium unit.

SECTION V: LIBRARY BUILDING

1. *Reading Rooms* ..... total 5000 square feet

Notes: It is suggested that two reading rooms and a reference room be provided within the total space requirement. The combined seating capacity should be 200 students. There should be a minimum of 1250 feet of shelving with a minimum volume capacity of 10,000 books. Shelving should not exceed 7′ in height.

2. *Library Service Spaces*

2-A	Stack room	500 square feet
2-B	Librarian's work room	500 square feet
2-C	Library office	300 square feet
2-D	Conference—Seminary rooms, 3 at 200 sq. ft.	600 square feet
2-E	Audio-visual materials center	500 square feet
2-F	Student operated bookshop (optional)	500 square feet
2-G	Listening booths, 3 at 50 sq. ft.	150 square feet

Notes: The student bookshop could serve as vocational training in the distributive trades as well as in business courses. Window display space and shelving required. The audio-visual materials center should store the collection of films, maps, charts, and transcriptions. Space for previewing films, projector truck storage, repairing film and playing transcriptions is needed.

SECTION VI: FIELD HOUSE

1. *Playing Area* ..... minimum 90′ x 150′

2. *Stage*

3. *Folding Bleachers for Spectators*

4. *Service Spaces*

4-A	Instructors' offices, 2 at 200 sq. ft.	400 square feet
4-B	Physical examination and first aid room	300 square feet
4-C	Small game rooms, 2 at 750 sq. ft.	1500 square feet
4-D	Locker rooms—1000 boys, 1000 girls 100 dressing lockers, 1000 box lockers	
4-E	Shower rooms—20 shower heads	
4-F	Gym toilets	
4-G	Store rooms—Boys	300 square feet
	Girls	100 square feet
	Community	300 square feet
	Seats—depending on local requirements	
4-H	Visiting team room	
4-I	Laundry and drying space	750 square feet

Notes: Instructors' offices require lockers, shower and toilet facilities. Local requirements may call for coaches' room with similar facilities.

A large stage with off-stage space may be located at one end of the field house when it is required that large groups be accommodated. Storage for portable seating should be provided.

Girls' locker room should be provided with combination dressing space, lockers and showers, for 80 with box-type lockers for 1000. Boys require Lane type showers with minimum of 20 shower heads.

For spectators, folding bleachers prove quite satisfactory. Spectator space should be provided up to 1500 seats. Particular care should be given to circulation and ease of exit from spectator area. Parking for 500 cars is desirable near the field house.

The field house should be so located that the shower and locker rooms can serve the outdoor sports spaces. In addition, consideration should be given to the location of the field house and the use of the shower and locker rooms in connection with the outdoor pool.

SECTION VII: TECHNICAL BUILDING

1. *Shops*

1-A	General shop or shops	each 1500 square feet
1-B	Automobile shop	3600-4000 square feet
1-C	Radio and technical electricity	1500 square feet
1-D	Advanced metal shop—foundry Heat treatment for metals, welding	2500 square feet
1-E	Advanced woodworking	2500 square feet
1-F	Aviation sheetmetal and engine	2500 square feet
1-G	Air conditioning and refrigeration	1500 square feet
1-H	House construction	2500 square feet
1-L	Heating and plumbing	1500 square feet
1-M	Graphic Arts, including printing, silk screen, photostat, photo offset, etc.	2500 square feet

Notes: The above list of shops is suggestive in nature and covers the basic shop fields. Modifications of the list will be made in line with local requirements. Consideration should be given to Junior College use of some of these facilities. Final determination of sizes and types of shops will be made after staff consideration.

All shops should have bilateral lighting, if possible. Sunglare should be avoided. Double doors to outside are needed in particular in aviation, automotive, advanced woodworking, and house construction shops. Each shop area includes storage. Care should be taken so that delivery of materials may be made easily from trucks to storage space. A large concrete apron outside of auto, aviation, house construction, and advanced woodworking shops is desirable.

2. *Auxiliary Spaces*

2-A	Planning and design room, also mechanical drawing	1500 square feet
2-B	Conference and class room	700 square feet
2-C	Office for instructors	400 square feet
2-D	Student lockers and washrooms	
2-E	Supply storage	500 square feet

Notes: North light for drafting room. Student lockers and washrooms should be easily accessible to all shops and easily supervised.

SECTION VIII: SCIENTIFIC BUILDING

1. *Laboratories*

Biology	1000 square feet
Botany	1000 square feet
Physics, 2 at 1000	2000 square feet
Chemistry, 2 at 1000	2000 square feet

2. *General Science Classrooms*, 3 at 800 sq. ft. ... 2400 square feet

3. *Auxiliary Spaces*

3-A	Preparation and storage rooms between each of 6 laboratories, 3 at 450 sq. ft.	1350 square feet
3-B	Dark room	400 square feet
3-C	Research and experimentation room	500 square feet
3-D	Green house	
3-E	Small animal room	200 square feet
3-F	Observatory	
3-G	Planetarium room	400 square feet
3-H	Departmental supply room	400 square feet
3-I	Department office	300 square feet
3-J	Conference room	300 square feet

Notes: Research room is for carrying on research by students and staff, requiring that apparatus be set up over period of time. Small

animal room is for caring for rats, rabbits, etc., used in demonstration and experimental work. The Planetarium room uses a hemisphere suspended from ceiling and a projector from floor. Complete darkening of the room is essential, with accompanying need for artificial ventilation when in use.

The greenhouse should be related to the Botany laboratory and also to outdoor growing areas.

SECTION IX: HOME ARTS BUILDING

1. *Nursery School* ..... 2500 square feet

Notes: Separate play area, developed for use by young children. This includes small building for outdoor blocks, toys, etc., sand box, tricycle track, slide, swing. Nursery unit may be a separate building or connected with the homemaking unit. Include in space, sleeping area, play area, laundry, one-way observation screen and space, bathing area, toilet and small kitchen.

2. *Clothing Laboratories*
   - 2-A Dressmaking, 2 at 1400 sq. ft. ..... 2800 square feet
   - 2-B Clothing design ..... 1400 square feet
   - 2-C Clothing care (including mending and laundry, etc.) ..... 1400 square feet
3. *Cooking*
   - 2-A Elementary cooking, 2 at 1400 sq. ft. ..... 2800 square feet
   - 2-B Advanced cooking, 2 at 1400 sq. ft. ..... 2800 square feet
4. *Department Office* ..... 300 square feet
5. *Home Arts Studio* ..... 1800 square feet

Notes: The Home Arts Studio should have 16' ceilings and large open floors area. This space should lend itself to the construction and erection of sets, similar to stage flats, reproducing various types and designs of rooms. These can be studied, decorated, designed, so that students have many experiences in this field of home arts. Eventually, it may be expected that a model house will be built by the House Construction classes for use by this area of the school.

SECTION X: ARTS STUDIO BUILDING

1. *Art Studio* ..... 2000 square feet
2. *Ceramics Studio* ..... 1400 square feet
3. *Crafts Studio* ..... 1400 square feet
4. *Commercial Art Studio* ..... 1400 square feet
5. *Display Area*
6. *Supply Room* ..... 500 square feet
7. *Department Office* ..... 300 square feet

Notes: Generally, the arts area should be provided with unobstructed north light. Careful attention should be given to storage needs for the various materials used. Display is important and there should be ample space for hanging of pictures, displaying ceramics and other craft products. The crafts studio will use media, such as textiles, art jewelry, plastics, art metalwork, wood, leather and the like.

SECTION XI: MUSIC STUDIO BUILDING

1. *Band and Orchestra Rehearsal Room* ..... 3000 square feet

Notes: 4' wide platforms rising from floor level, three tiers high will provide rehearsal space for the large instrument groups. Acoustical control of room is important.

2. *Choral Room* to seat 100
3. *Music Classroom* ..... 800 square feet
4. *Practice Rooms*, 3 at 100 sq. ft. ..... 300 square feet
5. *Listening Booths*, 3 at 50 sq. ft. ..... 150 square feet
6. *Instrument Storage Room* ..... 300 square feet
7. *Music Library Storage Room* ..... 200 square feet
8. *Band Uniform Storage* ..... 200 square feet
9. *Supply Room* ..... 200 square feet
10. *Department Offices* ..... 300 square feet

SECTION XII: MATHEMATICS CENTER

1. *Mathematics Laboratories*, 7 at 800 sq. ft. ..... 5600 square feet
2. *Mathematics Machine Room and Service Center* . 400 square feet

Notes: This space should service the entire school in mass computation through the operation of calculating machines. Primary requisite is electrical outlets with tables and chairs as equipment in addition to a variety of calculating machines.

3. *Exhibit Area*

Note: For mathematical models, displays and the like.

4. *Supply Room* ..... 300 square feet
5. *Department Office* ..... 300 square feet

SECTION XIII: LANGUAGE ARTS BUILDING

1. *English Classrooms*, 8 at 900 sq. ft. ..... 7200 square feet
2. *Speech Suite*
   - 2-A Main room ..... 900 square feet
   - 2-B Speech booths, 4 at 75 sq. ft. ..... 300 square feet
3. *Remedial Reading Clinic* ..... 450 square feet
4. *Little Theater* seating 150
5. *Foreign Language Classrooms*, 4 at 800 ..... 3200 square feet
6. *Supply Room* ..... 400 square feet
7. *Department Offices* ..... 300 square feet

SECTION XIV: BUSINESS PREPARATION CENTER

1. *Typing Room* ..... 950 square feet
2. *Stenography Room* ..... 800 square feet
3. *Business English Classroom* ..... 800 square feet
4. *Business Laboratory* ..... 1000 square feet

Notes: The business laboratory simulates office working conditions and should be designed as an office. Here bookkeeping, filing, stenography, duplicating, use of business machines, and similar office practices are carried on.

5. *Business Forum*—Conference room ..... 700 square feet

Notes: Promoting closer liaison with the business organization of Charlotte, this room would be the scene of frequent meetings between students and leaders in the City's business world.

6. *Commercial Display Laboratory* ..... 800 square feet

Notes: A large commercial storefront with appropriate shop counters and shelving are needed to simulate actual conditions in setting up commercial displays. A close relationship with the art unit is needed here. The space should provide for construction of displays.

7. *Supply Room* ..... 500 square feet
8. *Department Office* ..... 300 square feet

SECTION XV: SOCIAL SCIENCE BUILDING

1. *Social Studies Classrooms*, 7 at 900 sq. ft. ..... 6300 square feet
2. *Meeting Room* ..... 700 square feet
3. *Community Survey Room* ..... 900 square feet

Notes: The Community Survey Room requires display space for large maps, scale model of City and surrounding area, drafting space, work tables, and filing space.

SECTION XVI: CENTRAL SERVICE BUILDING

1. *Central Heating Plant*

Notes: Observation gallery should be provided so that the heating plant can serve an educational purpose as well. Space should be provided up to 30% beyond that needed to service the suggested plant.

2. *Coal Storage*—sufficient for at least one half year's supply.
3. *Incinerator*
4. *Meter Room* ..... 125 square feet
5. *Switchboard Room* ..... 320 square feet
6. *Furniture Storage Room* ..... 320 square feet

Notes: Readily accessible to receiving room.

7. *Janitor's Supply Store Room* ..... 320 square feet
8. *Garden Tool Storage* ..... 125 square feet
9. *Custodian's Work Shop* ..... 320 square feet
10. *Help's Locker Room* ..... 125 square feet
11. *Receiving and Shipping Room* ..... 320 square feet

Notes: The receiving and shipping room should be readily accessible from the service drive and should be the center of the major store

rooms. Storage in this room should include tools required to open cases and material used in prepared packages for shipment.

12. *Access Chambers*

Notes: These chambers will be made sufficiently large to permit men to work easily behind all plumbing installations.

13. *Eraser Room* ..... 40 square feet

Note: Vacuum cleaning device and storage for one complete set of erasers.

14. *Key Room* ..... 80 square feet

Illustration III

COMPREHENSIVE HIGH SCHOOL, LYNCHBURG, VIRGINIA

SCHEDULE OF SPACE REQUIREMENTS

Unit	Rooms Recommended	Rooms Planned	Room No.	Room Pupils	Size	Details
ADMINISTRATION						
Gen. Office	1	1			29′ x 17′	Counter, Supplies, Closet
Public	1	1			29′ x 11′	
Vault	1	1			11′ x 12′	
Records	1	1			11′ x 13′	Audio-Visual, Radio Control, Public Address, Program Clock
1 C. Room	1	1			10′ x 8′	
Principal	1	1			20′ x 17′	
Ass't. Prin.	1	1			14′ x 17′	
Sect.	1	1			17′ x 17′	
Girls Dean	1	1			10′ x 17′	Guidance
Boys Dean	1	1			10′ x 17′	Guidance
Waiting	1	1			11′ x 13′	
Files	3	3			13′ x 10′	
Book Shop	1	1			23′ x 30′	
Custodian Office	1	1			40′ x 23′	Work Shop Adjacent
Jan Locker Room	1	1			30′ x 23′	Locker Rooms & Toilet
Teachers Work Room	2	2			24′ x 25′	
HEALTH UNIT						
Waiting	1	1			12′ x 18′	
Nurse	1	1			10′ x 8′	
Dentist					9′ x 13′	
Boys Ward	1	1			12′ x 24′	4 bed
Girls Ward	1	1			16′ x 18′	9 bed
Examination	1	1			11′ x 22′	
HOME MAKING						
Living Room	1	1			30′ x 24′	To be used as Visitors' Room
Dining Room	1	1			11′ x 11′	Model Apartment
Bed Room	1	1			18′ x 13′	
Bath	1	1			6′ x 8′	
Kitchen	1	1			14′ x 11′	Demonstration Laundry Adjacent
Nursing Inst.	1	1			25′ x 23′	
Food Lab.	2	2	2	60	23′ x 35′	
COMMERCIAL						
Office		1			23′ x 12′	
Bookkeeping	3	3		105	2—23′ x 35′	1—23′ x 24′
Sewing	2	2	2	70	1—23′ x 35′	1—23′ x 30′
Shorthand	2	2	2	70	23′ x 28′	
Typing	3	3	3	110	1—23′ x 35′	1—23′ x 28′
Bus. Mach.	1	1			23′ x 28′	
Mimo.	1	1			23′ x 12′	
GENERAL						
Math	5	4	4	140	2—23′ x 30′	2—23′ x 28′. 20 S.F. per pupil at 35 to a room
Office	1	1			23′ x 10′	
English	7	7	7	245	2—23′ x 35′	1—23′ x 30′ 4—23′ x 28′ 3 with stages
Office	1	1			23′ x 13′	
History	6	5	5	175	2—23′ x 35′	2—23′ x 27′ 1—23′ x 40′
Office	1	1			23′ x 11′	
Latin	3	3	3	105	1—23′ x 35′	1—23′ x 30′ 1—23′ x 28
French	1	1	1	35	23′ x 28′	
Spanish	1	1	1	35	23′ x 28′	
Office	1	1			23′ x 10′	
Speech Corp.	1	1	1	35	23′ x 28′	
Journalism	1	1	1	35	25′ x 30′	
Diversified Occupation	1	1	1	35	23′ x 25′	

Unit	Rooms Recommended	Rooms Planned	Room No.	Room Pupils	Size	Details
SCIENCE						
Office	1	1			23′ x 13′	
Chemistry	2	2	2	60	23′ x 40′	Preparation Rooms
Biology	3	3	4	90	23′ x 40′	Preparation Rooms
Physics	1	1	1	30	23′ x 40′	Preparation Rooms
Office	1	1			23′ x 11′	
VOCATIONAL						
Shops	6	1			158′ x 80′	Sheet metal, Auto & Aeroplane, Mech., Machine, Carpentry, Plumbing & Welding, Radio & Refrigeration, Electric Shop, Lav., Locker Dress Room
Mech. Draw.	1	1			23′ x 54′	24 pupils
Print Shop		1	1	30	23′ x 46′	
Cosmetology	1	1	1	25	23′ x 59′	
Garment Mfg.		1	1	35	23′ x 39′	
MUSIC DEPT.						
Choral Room	1	1	1	35	23′ x 28′	
Band	1	1			½ cir. 58′ Dia.	Seats 100
Practice	3	3			13′ x 9′	
Music Lib.		1				24′ x 17′
Direct Off.	1	1				24′ x 10′
ART DEPT.						
Art	1	1	1	30	23′ x 50′	Exhibition space in corridor adjacent to Art Rms.
Ceramics	1	1	1	20	23′ x 28′	
Office	1	1			23′ x 11′	
LIBRARY						
Reading Room	1	1			90′ x 36′	Seats 130 @ 25 s.f. per pupil
Conference	2	2			16′ x 17′	Seats 20
Storage	1	1			8′ x 35′	
Librarian	1	1			24′ x 10′	
Work	1	1			9′ x 30′	6,000 Volumes
Audio-Visual Storage	1	1			16′ x 22′ 10′ x 15′	
SMALL AUD.						
Auditorium	1	1			67′ x 36′	Seats 225
Stage	1	1			15′ x 41′	Dress Rooms Adjacent
Dress Rooms	1	1			8′ x 15′	
Chair Storage	1	1			7′ x 35′	
Projection Booth	1	1			7′ x 11′	
CAFETERIA						
Main Floor	2	2			75′ x 52′	Seats 600 @ 14.2 sf per person total
Stage	2	2			22′ x 11′	
Dish Wash.	2	2			10′ x 14′	
Kitchen	1	1			44′ x 42′	1 sq. ft. 1 meal
Fac. Din. Room	1	1			31′ x 39′	Seats 50 @ 24 sf per person
Office	1	1			10′ x 12′	
Dressing Room	1	1			8′ x 12′	
Chair Storage	2	2			12′ x 20′	
AUDITORIUM						
1st Fl.	1,200 Seats School Board	1			118′ x 116′	1,800 seats Municipal requirement
Balcony requirement		1			36′ x 116′	600 seats Municipal requirement
Stage	1	1			116′ x 40′	
Scene Dock	1	1			23′ x 35′	
Dress Rooms	3	3			2—20′ x 30′	1—17′ x 18′ all with toilets
Check Rooms	4	4			14′ x 17′	
Offices	1	1			14′ x 19′	25′ x 110′ & 25′ x 22′
Lounges	2	2				
Rest Rooms	4	4			14′ x 19′	
Ticket Office	2	2			14′ x 19′	
Storage	1	1			73′ x 27′	
Conference Rooms.		5			20′ x 25′	

Illustration III—Continued

Unit	Rooms Recommended	Rooms Planned	Room No. Pupils	Size	Details
GYMNASIUM					
Floor	162′ x 115′	1		155′ x 106′	126 pupils 130 sf per pupil, bleachers seat 2,340. Basket Ball Courts 94′ x 50′
Corrective Ex.	25′ x 50′	2		20′ x 37′	
Equipment Room	2—20′ x 40′	3		14′ x 42′	
Coach		1		15′ x 18′	
Directors Off.	3	3		124′ x 16′ 1—15′ x 18′ 1—13′ x 15′	Closets and toilets connected
Ticket Off.	2	2		10′ x 10′	Connected to Directors Off.
Boxing Room	1	1		20′ x 20′	
Training Room	1	1		17′ x 20′	First Aid, Heat Lamps, Rub Down Tables
Girls Locker Room.		1		24′ x 113′	140 Lockers, 900 Baskets, 26 Showers
Boys Locker		1		24′ x 113′	140 Lockers, 900 Baskets, 26 Showers
Varsity Locker Room		1		100′ x 20′	Dress. Rm. Showers, Toilet
Visit Team		1		20′ x 30′	Dress. Rm. Showers, Toilet
Equip. Dry Room		1		30′ x 17′	
Men's Lounge		1		15′ x 21′	
Women's Lounge		1		18′ x 25′	
Swim. Pool		1		67′ x 113′	Pool 75′ x 45′. Seats 183
TOILETS					
Women Faculty	1	1		20′ x 24′	Lounge & Toilet
Men Faculty	1	1		23′ x 35′	Lounge & Toilet
Girls	5	5			As required by Va. State Board of Education
CENTRAL HEATING PLANT					
				Main Building Coal Bin	78′ x 44′ x 33′ high 78′ x 16′ x 10′ high

Illustration IV

JUNIOR HIGH SCHOOL 125, BOROUGH OF BRONX, BOARD OF EDUCATION, NEW YORK CITY

Program of Space Requirements

I. SITE DEFINED IN SEPARATE DOCUMENTS

II. UNDERLYING EDUCATIONAL PHILOSOPHY OF THE SCHOOL

Junior High School 125, Bronx, is planned as a school for boys and girls of the 7th, 8th, and 9th grades. The major portion of the children will come from Parkchester. The building will accommodate approximately 1800 pupils as follows: The present 7th and 8th year classes of P. S. 36, P. S. 47, and P. S. 106, Bronx.

The school will offer exploratory courses in various fields as well as the usual academic subjects.

In planning this school, the desire is to have as many features contributing to the educational program as possible. Corridors should be planned to make the greatest possible contribution to the educational program. Cafeteria and auditorium should be designed for varied use. Any multiple use that seems feasible should be tried out in the planning. Since cafeterias are only used approximately one third of a school day, arrangements for obtaining a wider use for this space should be attempted. The building should reflect the philosophy of junior high schools and their administration, as stated in Form No. 12, 9-43, Division of Housing and Business Administration, attached hereto.

In general, the architecture of this building should be adapted to or be an improvement upon the architecture of the neighborhood. The planning should result in a maximum use of space for educational purposes. It should be recognized that a beautifully designed school building may contribute significantly to the education of children. An attractive school building, adapted to educational needs is desired, with initial costs and subsequent maintenance costs kept at a minimum.

III. DETAILED SPACE REQUIREMENTS OF SCHOOL UNITS AS LISTED IN THE MANUAL OF SCHOOL PLANNING* FOR JUNIOR HIGH SCHOOLS

Section 1: Administrative Unit

Unit No. 1 — 1 General Office
2 — 1 Principal's Office
6 — 1 Medical and Future Dental Suite
7 — 1 Custodian's Office
8 — 1 Guidance Room
10 — 1 Mimeograph Room
11 — 1 Record Vault
13 — 2 Assistant to Principal Offices

Section 2: Auditorium

Unit No. 1 — Auditorium—seating capacity 600
2 — 1 Stage
3 — 2 Dressing Rooms (one for each sex)
4 — 1 Property Room
5 — Orchestra Space
6 — Motion picture machine alcove

Section 3: Cafeteria

Unit No. 4 — 1 Pupils' Cafeteria
5 — 1 Teachers' Cafeteria

* *Manual of School Planning*, Board of Education, 110 Livingston Street, Brooklyn, N. Y. 1947.

6 1 Cafeteria Kitchen
7 Service Counter
8 1 Store Room
10 1 Dietitian's Office
11 1 Dishwashing Room
12 1 Refuse Room
13 2 Help Locker Rooms (one for each sex) to be combined with custodial employees

Section 4: Gymnasium

Unit No. 5 1 Gymnasium with folding door for boys and girls
8 2 Instructors' Offices (one for each sex)
11 2 Store Rooms (one for each sex)
12 1 Community Store Room
13 2 Locker and Dressing Rooms (one for each sex)
14 2 Shower Rooms (one for each sex)
15 2 Gymnasium Toilets (one for each sex)
18 Bleachers—Folding type

Section 5: Library

Unit No. 2 1 Library Reading Room
5 1 Stack Room
6 1 Brief Case and Book Storage

Section 6: Shops

Unit No. 1 1 Art Crafts
6 1 Dressmaking
7 1 General Electrical
9 1 Graphic Arts (Printing)
10 1 General Metal
13 1 Millinery and Novelty
15 1 Woodworking

Section 8: Classrooms

Unit No. 2 32 7A-9B grade classrooms
5 1 Geography Room
6 5 Science Rooms equipped for visual aids
7 1 English Room
11 1 CRMD classroom

Section 9: Drawing Department

Unit No. 1 4 Art Rooms

Section 10: Homemaking Department

Unit No. 1 1 Model Apartment
3 2 Cooking Rooms

Section 11: Science Department

Unit No. 8 2 Science Preparation and Storage Rooms. One between each two Science Classrooms listed under Section 8 above

Section 12: Commercial Department

Unit No. 7 1 Typewriting Room

Section 13: Music Department

Unit No. 1 1 Music Room
2 1 Instrument Storage Room
3 1 Band Practice Room

Section 15: Exterior Playground

Provision for exterior playground, including school garden is to be made in accordance with the Manual

Section 16: Plant Operation and Custodial Spaces

Unit No. 1 Boiler Room
2 Fuel Storage Space
It is desirable to equip this school primarily with an oil burning heating plant. However, provision shall be made for economic conversion to coal with the necessary storage and handling facilities in case of an emergency.
3 Fan Rooms
6 Switchboard Room
8 Furniture Storeroom
9 Janitor's Supplies Store Room
11 Custodial Work Shop
12 Helpers' Locker Rooms to be used also for cafeteria workers
13 Janitor's Sink Closet
14 Dust Bin and chute

Section 17: Service Spaces

Unit No. A1a General Toilets
A2 Special Toilets
5 2 Dressing Room Toilets (one for each sex)
6 2 Custodial Employees' and Cafeteria Helps' Toilets (one for each sex)
7 1 Medical and Dental Suite Toilet
8 1 Principal's Toilet
9 Playground Toilets—Gymnasium Toilets accessible if possible
10 Teachers' Toilets (both sexes)
12 2 Public Toilets (one for each sex) near auditorium
13 2 Gymnasium Instructors' Toilets—one adjoining each office (only to be included if other facilities are not immediately accessible)
16 2 Gymnasium Toilets (both sexes)—accessible to playground desirable
A4 Washing Facilities
B Drinking Facilities
C Shower Facilities
1 2 Gymnasium Shower Rooms (one for each sex)
2 2 Gymnasium Instructors' Showers (both sexes) —only to be included if other facilities are not immediately accessible
3 1 Engineer's Shower
D Locker Facilities
1 Pupil Wardrobes
2 Gymnasium Lockers
3 Extra Pupils' Lockers
15 Provision for Public Telephone Booth
16 1 Receiving Room
17 1 General Supply Room
18 Local Shop Store Rooms
19 1 Eraser Cleaning Chamber
20 2 Teachers' Rest Rooms (one for each sex)

IV. ADDITIONAL SPACE REQUIREMENTS

Section 8: Classroom

No. Req.	Type	Size Sq. Ft. Each	Pupil Accom. Each	Dwg. and Equip. List. No.
2	Remedial Instruction Room	322	——	8014

After approval of the preliminary plans, the architect will be instructed as to the number and preferred location of various school grades. The grades will be indicated on a set of preliminary drawings. Working heights for chalk rails and built-in work counters for the rooms shall be in accordance with the following schedule:

Grade	Counter	Chalk Rail
7-9	33"	33"

V. GENERAL REQUIREMENTS

(a) Probably no part of this building need exceed three stories in height. It is desirable to keep educational space out of the basement. Some parts of this building may vary in height. Variations in height, however, are left to the architect.

(b) The proximity to the Parkchester Development will make desirable the use of this building for general community purposes. The planning should be in accord with this desire. Provision should be made for the segregation of large units so that these may be used by the community without opening the rest of the building. Heating, ventilation, and toilets must be provided so that sections cut off can be properly cared for.

(c) This building, no doubt, will at times be used for a program in adult education. It is suggested, therefore, that the architect give due consideration in planning to the location of the artcrafts shop and dressmaking shop, library and science room equipped for visual aids.

Illustration V

CO-EDUCATIONAL HIGH SCHOOL OF SCIENCE, BOROUGH OF BROOKLYN, BOARD OF EDUCATION, NEW YORK CITY

Program of Space Requirements

I. TECHNICAL DESCRIPTION OF THE SITE

Beginning at the corner formed by the intersection of the easterly side of Washington Street, and the southerly side of High Street; thence running easterly along the southerly side of High Street, 232' 2" to the westerly side of Adams Street; thence running southerly along the westerly side of Adams Street, 207' 9", to the northerly side of Nassau Street, and thence southerly along the prolongation of the westerly side of Adams Street, across Nassau Street to the southwest corner of Nassau Street and Adams Street; thence continuing southerly along the westerly side of Adams Street, 236' 6", to the northerly side of Concord Street; then westerly along the northerly side of Concord Street, 230' to the easterly side of Washington Street; thence northerly along the easterly side of Washington Street, 237' to the southerly side of Nassau Street thence northerly along the prolongation of the easterly side of Washington Street, across Nassau Street to the northeast corner of Nassau Street and Washington Street; thence continuing northerly along the easterly side of Washington Street, 207' 9" to the point or place of beginning, be the said several dimensions more or less, said premises being designated at Lot Nos. 1, 3, 4, 5, 8, 13, 15, 21, 22, 23, 24, and 26, in Block 95; and Lot Nos. 1, 8, 9, 10, 12, 13, 16, 20, 21, 23, 24, 25, 26 and 27, in Block 104, as shown on the Tax Maps of the Borough of Brooklyn, together with that portion of Nassau Street, described above, lying between Washington Street and Adams Street, and together with all right, title and interest, if any, in and to the streets and avenues in front thereof and to the center thereof.

All those certain plots, pieces and parcels of land with improvements thereon situate, lying and being in the Borough of Brooklyn, County of Kings, City and State of New York, bounded and described as follows:

Beginning at the intersection formed by the southerly side of High Street and the easterly side of Washington Street; thence running northerly in a straight line across High Street to the northeast corner of High Street and Washington Street; thence running northerly along the easterly side of Washington Street a distance of 65.07 feet; thence deflecting easterly 89 degrees 44 minutes and 56 seconds for a distance of 133.19 feet to a point of tangency (the westerly line of Lot No. 17); thence southeasterly along a curve with a radius of 97.63 feet to where it intersects the westerly line of Adams Street; thence southerly along the westerly line of Adams Street 14.16 feet to the southwest corner of High Street and Adams Street; thence westerly along the southerly line of High Street 231.03 feet to the point or place of beginning, be the said several dimensions more or less, said premises being designated as Lot Nos. 1 and 27 and part of Lot Nos. 2 and 17 in Block 85, as shown on the Tax Maps of the Borough of Brooklyn, together with that portion of High Street lying within the previously described boundaries and together with all right, title and interest, if any, in and to the street and avenues in front thereof and to the center thereof, subject to sub-surface easements necessary and to be reserved for the Rapid Transit Subway.

II. UNDERLYING EDUCATIONAL PHILOSOPHY OF THE SCHOOL

High schools of science are especially important at this time. If our country is to maintain its leadership in the world we must cultivate our science talent. Such talent is a national resource which has been considerably depleted during the war years. Only by broadening the base of effective science education in the schools can we insure that leadership. A high school of science selects its students by means of an examination designed to measure science interest and ability to pursue a curriculum leading to college and to professional careers in the sciences. The type of students will resemble those now in The Bronx High School of Science and in Stuyvesant High School. When about two thousand of the ablest boys and girls in the city are brought together, all of them interested in science and all of them headed for college, they create a teaching environment that is uniquely different from that of the general high school. The homogeneity of the student body with respect to level of ability and terminal aim brings certain advantages; it also brings added responsibilities. Ideas of citizenship and service are especially significant for potential leaders in an age of science.

A schoolhouse designed for the education of selected boys and girls of potential talent in the sciences cannot follow the standardized pattern for high school buildings. This is indicated by years of experience in schools throughout the country and especially in our own city. The physical plant which houses a high school of science must provide not only the facilities required by the modern neighborhood high school, but a number of special facilities as well. In general, these will make possible a large variety of individual and small group activities in all of the subjects. In the sciences, the special facilities will encourage laboratory and manipulative experiences of different kinds. The special rooms and arrangements outlined below are calculated to make effective and economical use of teacher personnel in accordance with the principles of organization and administration now in effect in the High School Division.

The curriculum capitalizes the students' interest in science for purposes of general education. The sciences are integrated with the social studies and the humanities. The required program of studies includes four-year sequences in the sciences, Social Studies, English, and Health Education, three-year sequences in Mathematics and a Foreign Language, courses in Shop and Mechanical Drafting, and the usual courses in Art and Music Appreciation. In addition, there is provision for a choice of several electives in the fields of Biology, Chemistry, Physics, Mathematics, Shop and Mechanical Drafting. Differentiated elective courses for girls are provided in the fields of Shop and the Sciences during the last three semesters.

The plant should be designed to accommodate 2500 boys and girls, admitted from 8B Elementary and 9B Junior High Schools.

In planning a school of this type, the desire is to have as many features contributing to the educational program as possible. Effort should be made to conceive of the heating plant, plumbing layout and heating layout as part of the teaching equipment in the school. Corridors should be planned to make the greatest possible contribution to the educational program. Cafeteria and auditoriums should not be designed for limited use. Any multiple use that seems feasible should be tried out in the planning. Since cafeterias are only used approximately 1/3 of a school day, arrangements for getting a wider use of this space should be attempted. One suggestion is that the cafeteria dining space may be divided rather than left as one large area. Folding partitions might be used.

Classrooms and laboratories should be designed so that there may be a library and conference corner. The shops are intended to develop fundamental skills in the use of basic tools and machines useful for teaching the application of science; and to give opportunity for learning how to construct and repair scientific equipment and apparatus.

This school will be part of the program for the rehabilitation of the Bridge Plaza section of Brooklyn. The architecture of this building should be adapted to the general scheme devised for the improvement of this area. The planning should result in a maximum use of space for educational purposes. It should be recognized that a beautifully designed school building may contribute significantly to the education of children. An attractive school building, adapted to educational needs is desired, with initial costs and subsequent maintenance costs kept at a minimum.

II. KINDS OF SPACE DESIRED

Details of spaces are listed in the Manual of School Planing, prepared for the Board of Education and can be referred to by Unit Number.

Section 1: Administrative Units

Unit No. 1 — 1 General Office
2 — 1 Principal's Office
3 — 1 Principal's Secretary's Office and Waiting Room
4 — 1 Administrative Assistant's Office
5 — 1 Record Files Room
6 — 1 Medical and Dental Suite (near Health Education)
7 — 1 Custodian's Office
9 — 1 Program Room
10 — 1 Mimeograph Room
11 — 1 Record Vault
12 — 1 Conference Room
13 — 9 Department Heads' Offices (to be located near activities)
14 — 1 Evening School Office
15 — 1 Radio Control Room
16 — 1 Teachers' Work Room

Section 2: Auditorium

Unit No. 1 — Auditorium Body—1250 capacity
2 — Stage
3 — 2 Dressing Rooms (one for each sex)
4 — 1 Property Room
5 — Orchestra Space
6 — 1 Motion Picture Booth
9 — Rest Room
10 — Coat Check Room
11 — Ticket Booth

Section 3: Cafeteria

Unit No. 4 — 1 Pupils' Cafeteria—900 capacity
5 — 1 Teachers' Cafeteria—60 capacity
6 — 1 Teachers' Cafeteria Serving Unit
7 — 1 Cafeteria Kitchen
8 — Service Counters
9 — Store Rooms
10 — 1 Dietitian's Office
11 — 1 Dishwashing Room
12 — 1 Refuse Room
13 — Interior Circulation
14 — 2 Help Locker Rooms (one for each sex)

Section 4: Gymnasium

Unit No. 5 — 1 Gymnasium co-educational (10,000 sq. ft.)
7 — 1 Administrative Office
8 — 2 Instructors' Offices (one for each sex)
9 — 2 Physical Examination Rooms (one for each sex)
10 — 2 Health Training (corrective) rooms (each sex)
11 — 2 Store Rooms (one at each end)
12 — 1 Community Store Room
13 — 2 Locker Rooms (one for each sex)
14 — 2 Gymnasium Shower Rooms (one for each sex)
15 — Gymnasium Toilets (one for each sex)
17 — Visiting Team Dressing Room
18 — Bleachers
1 Swimming Pool (75 feet long, 25 feet wide with 6 foot runways at two sides and one end and 15 feet at diving board end. Spectator space to be added)

Section 5: Library

Unit No. 2 — 1 Library Reading Room (200 pupils)
3 — 1 Stack Room
4 — 1 Librarian's Office
5 — 1 Work Room
6 — 1 Brief Case and Book Storage
Library Classroom

Section 8: Classrooms

Unit No. 3 — 14 Classrooms
7 — 8 English Classrooms
8 — 8 Social Studies

Section 9: Drawing Department

Unit No. 2 — 3 Trade Drawing
3 — 1 Blueprint and Storage

Section 11: Science Department

Unit No. 1 — 2 Elementary Biology Laboratories
2 — 2 Elementary Chemistry Laboratories
4 — 2 Elementary Physics Laboratories
7 — 14 Science Lecture Rooms
7 Physical Science and 7 Biological and General Science
8 — Science Preparation Rooms (adjoining 2 similar laboratories listed above)
9 — 1 Laboratory Storage and Acid Room

Section 13: Music Department

Unit No. 2 — 1 Instrument Storage
3 — 6 Band Instrument Practice

Section 14: Student Activities

Unit No. 1 — 1 Students' Activities Room
2 — 2 Dark Rooms (near Science)
3 — 1 G.O. and Sales Room
4 — 1 Students' Bank

Section 15: Exterior Playground

Provision for exterior playground excluding school garden is to be made in accordance with the Manual.

Section 16: Plant Operation and Custodial Spaces

Unit No. 1 — Boiler

Plant shall be designed for oil burning, with the setting for the boiler arranged to permit installation of grates or stokers should it be necessary to convert to coal at some future date.

The steam supply to the various parts of the building shall be arranged to provide for the heating of the sections of the building used for community or after school activities, independent of the rest of the building. It should be borne in mind that all parts of this building may be needed from time to time for community or after school activities. The number of heating sections to be provided will depend upon the building plan and will be determined previous to the approval of preliminary plans.

Unit No. 2 — Fuel Storage

Provide fuel oil storage tanks for a minimum of one (1) month's supply.

Sufficient space should be provided also for the future storage of coal, where economically possible, for one (1) season's heating requirements.

Unit No. 3 — Fan Rooms
4 — Incinerator
5 — Meter Room and/or
6 — Switchboard Room

Section 16: Plant Operation and Custodial Spaces

Unit No. 7 — Telephone Exchange Room
8 — Furniture Store Room
9 — 1 Janitor's Supplies Store Room
11 — 1 Custodial Work Shop
12 — Helpers' Locker Rooms (one for each sex)
13 — Janitor's Sink Closet
14 — Dust Bin and Chute
15 — Elevator
16 — Engineer's Closet

Section 17: Service Spaces

Unit No. A1a — General Toilets—both sexes
A2 — Special Toilets
5 — 2 Dressing Room Toilets (one for each sex)
6 — 2 Custodial Employees' Help Toilets (each sex)
7 — 1 Medical and Dental Suite Toilet
8 — 1 Principal's Toilet
9 — Playground Toilets
11 — Teachers' Toilets (both sexes)
12 — 2 Public Toilets (one for each sex)

13	Gymnasium Instructors' Toilets (one for each sex) adjoining the offices
14	Cafeteria Help Toilets (one for each sex)
16	Gymnasium Toilets—accessible to playground desirable
A4	Washing Facilities
B	Drinking Facilities
C	Shower Facilities
2	Gymnasium Shower Rooms (one for each sex)
2	Gymnasium Instructor's Shower included in Toilet Rooms
2	Swimming Pool and Shower Rooms (each sex)
3	1 Engineer's Shower
D	Locker Facilities
1	Pupil Wardrobes
2	Gymnasium Lockers
3	Extra Pupils' Lockers Swimming Pool Lockers
15	Provision for Public Telephone Booth
16	1 Receiving Room—with 100 sq. ft. for acid and chemicals storage
17	2 General Supply Rooms (one for Science)
18	Local Store Rooms, for shops and heads of departments. (English storeroom to be 50% larger than others)
19	1 Eraser Cleaning Closet
20	3 Teachers' Rest Rooms (one for each sex and one general)
21	1 Teachers' Work Room

IV. ADDITIONAL SPACE REQUIREMENTS

	Size Sq. Ft. Each	Pupil Accom. Each	Dwg. and Equip. List. No.
Section 1: Administration			
1 Guidance Suite (to contain waiting room, office and 8 interview rooms)	1288		
Section 6: Shops			
3 General Shops	1288	24	
1 Advanced General Shop	1288	24	
Section 8: Classrooms			
1 Visual Aids Room	1288	90	
Section 9: Drawing Department			
1 Art Appreciation	966	40	
Section 11: Science Department			
1 General Science Workshop Lab.	966	36	
1 Advanced Biology Laboratory	966	36	
1 Advanced Chemistry Laboratory (including adjoining clearview balance room, preparation room and store room)	1449	36	
1 Advanced Physics Laboratory (including adjoining preparation room and store room)	1288	36	
1 Earth Science Laboratory (including preparation room and store room)	1288	36	
1 Special (Girls') Laboratory (including preparation room and store room)	1288	36	
1 Biology Project Room	1288	36	
1 Physical Science Project Room	1288	36	
Section 12: Additional Space Requirements			
1 Roof Radio House, weather station and astronomy observatory tower	966	36	
1 Greenhouse	1288	36	
Section 13: Music Department			
1 Music Room (for choral work)	966	90	
1 Orchestra Room (to be planned with band practice rooms)	1680	90	
Section 14: Student Activities			
1 G. O. Office	322		
1 School Publication	322		
Section 16: Plant Operation and Custodial Spaces			
1 Room to house AC-DC Generator and air pressure vacuum pump	....	..	
Section 17: Service Spaces			
2 Pupils' Rest Rooms adjoining Medical Unit (one for each sex)	....	..	

V. GENERAL REQUIREMENTS

(a) Probably no part of this building need exceed three stories in height. It is desirable to keep educational spaces out of the basement. Some parts of this building may be one story in height. Variation in heights, however, are left to the architect.

(b) It may be desirable to use this building for general community purposes. The planning should be in accord with this desire. Provision should be made for the segregation of large units so that the community may use separate parts of the building, and provisions for heating, ventilation, and toilets must be planned so that each section may be used independently of the others.

(c) Without doubt, this building will at times be used for an extensive program in adult education.

(d) Height of chalk rails from the floor shall be 36". All plumbing fixtures are adult-size fixtures.

Illustration VI

THE SCHOOL OF INDUSTRIAL ART BOROUGH OF MANHATTAN BOARD OF EDUCATION, NEW YORK CITY

Program of Space Requirements for a Vocational High School

I. TECHNICAL DESCRIPTION OF THE SITE

The necessary data will be furnished when the Board of Estimate authorizes the site. The school will serve commerce and industry and should be located in central Manhattan near the clients who will make their facilities available for students and who will also provide part-time and on graduation full-time employment for the students.

II. UNDERLYING EDUCATIONAL PHILOSOPHY OF THE SCHOOL

The School of Industrial Art is a specialized vocational high school. Its courses now run through grades 9-12 inclusive and make provision for both boys and girls. The school provides special training in the fields of Commercial Art, Commercial Photography, Sculpture, Stone Carving and Modeling, Silk Screen Printing, Costume Design and Draping, Fashion Illustration, Jewelry Making and Theatre Design.

In planning, provision should also be made for the 13th and 14th years. These years would provide:

(a) opportunities for high school graduates
(b) extension courses for adult artists and craftsmen
(c) facilities, such as work rooms and studios, for general community use

The emphasis of the training is upon the art side, namely, design rather than upon the purely productive side.

New York City already has a high position in these fields. Europe, the former source of many of our skilled artisans and designers, is not able to serve as a reservoir. War suspended the great schools which formerly trained these designers and craftsmen. The opportunity is here for American born and American trained men and women. New York City has realized some of this opportunity by its plan for the Fashion Center.

In this building, the plan is to provide a school where every facility will contribute to the training of young men and women as competent workers in industrial and commercial design, to capture world leadership in this field. The interior and the exterior of the building should be a constant inspiration to the pupils and to the community in general, to the end that from this school will radiate an artistic influence that will be felt throughout the city. The building should be planned as a completed unit, but should allow for a maximum of flexibility in all spaces. The curriculum of the school makes desirable the use of the building itself as essential equipment for the pupils. Provision should be made whereby displays, murals, and wall decorations may be renewable and easily removable, thus increasing the working facilities at little expense.

The cafeteria and auditorium should be designed for multiple use. A wider use of the cafeteria can readily be planned with variations growing out of the very nature of the school. The dining space may be divided by folding partitions rather than left as one large area. It may be possible to develop museum and gallery features in the auditorium, with due consideration of safety rules and code restrictions. The auditorium may become a laboratory for the Theatre Design Shop.

The library should be planned for 150 pupils. It should be conceived to provide for more than books. It will contain samples of materials, textiles, wall papers, etc., as well as photographs or other pictorial representations of produced designs. This will require a library space at least 25% above the usual high school requirement. This school will have extensive adult use. Therefore, a size for classrooms is recommended which makes for ready conversion into laboratories and also for the integration of art teaching with the academic teaching. The size of such rooms should be 23′ x 35′. Such rooms will also provide for higher utilization because of the flexibility.

There should be ample provision for exhibition. The corridors should be used extensively for this purpose. Exhibition galleries will accommodate not only the products of the school, but will, no doubt, be used by industries to show contemporary designs and trends, to the advantage of the pupils as well as of the community.

Shops should reflect the character of the work for which they are designed. The massing of the shops as against the grouping of classrooms and other facilities may tend toward desirable economy.

In general, the architecture of this building should reflect the educational aims. It should be adapted to or be an improvement upon the architecture of the neighborhood. The design should contribute to the education of the pupils. An attractive school building, adapted to educational needs, is desired, with initial costs and subsequent maintenance costs kept at a minimum.

Stress in planning should be upon the elimination of waste space and upon securing a high percentage of habitable space.

The site may dictate a multi-story building for which passenger elevator service will be necessary.

III. DETAILED SPACE REQUIREMENTS OF SCHOOL UNITS LISTED IN THE MANUAL OF SCHOOL PLANNING FOR VOCATIONAL HIGH SCHOOLS

Section 1: Administrative Units

Unit No.	1	1 General Office
	2	1 Principal's Office
	3	1 Principal's Secretary's Office and Waiting Room
	4	1 Administrative Assistant's Office
	5	1 Record Files Room
	6	1 Medical and Dental Suite
	7	1 Custodian's Office
	8	1 Guidance Room
	9	1 Program Room
	10	1 Mimeograph Room
	11	1 Record Vault
	12	1 Conference Room
	13	4 Department Heads' Offices
	14	1 Evening School Office

Section 2: Auditorium

Unit No.	1	Auditorium Body
	2	Stage
	3	2 Dressing Rooms (one for each sex)
	4	1 Property Room
	5	Orchestra Space
	6	1 Motion Picture Booth

Section 3: Cafeteria

Unit No.	4	1 Pupils' Cafeteria
	5	1 Teachers' Cafeteria
	6	1 Cafeteria Kitchen
	7	Service Counters
	8	Store Rooms
	10	1 Dietitian's Office
	11	1 Dishwashing Room
	12	1 Refuse Room
	13	2 Help Locker Rooms (one for each sex. Combine with custodial employees, if possible)

Section 4: Gymnasium

Unit No.	3	1 Boys' Gymnasium—65′ x 95′
	4	1 Girls' Gymnasium—2596 sq. ft.
	7	1 Administrative Office
	8	2 Instructors' Offices
	9	1 Physical Examination Room
	10	1 Health Training (corrective) Room
	11	1 Store Room
	12	1 Community Store Room
	13	2 Locker Rooms (one for each sex)
	14	2 Gymnasium Shower Rooms (one for each sex)
	15	2 Gymnasium Toilets (one for each sex)
	18	Bleachers—in Unit No. 3

Section 5: Library

Unit No.	2	1 Library Reading Room—capacity 150
	3	1 Stack Room
	4	1 Librarian's Office
	5	1 Work Room
	6	1 Brief Case and Book Storage

Section 6: Shops

Unit No.	2	1 Art Metal
	8	1 General Mechanics
	9	1 Graphic Arts

Section 8: Classrooms

Unit No.	3	20 Classrooms

Section 11: Science Department

Unit No.	7	3 Science Lecture Rooms
	8	1 Science Preparation Room—adjoining 2 labs. See No. 1140.

Section 12: Commercial Department

Unit No.	3	1 Business Practice—clerical
	7	2 Typewriting Rooms

Section 13: Music Department

Unit No.	2	1 Instrument Storage
	3	1 Band Practice

Section 14: Student Activities

Unit No.	3	1 G. O. and Sales Room
	4	1 Students' Bank

Section 15: Exterior Playground

Provision for exterior playground excluding school garden is to be made in accordance with the Manual.

Section 16: Plant Operation and Custodial Spaces

Unit No. 1 Boiler Room
2 Fuel Storage Space
It is desirable to equip this school primarily with an oil burning heating plant. However, provision shall be made for economic conversion to coal with the necessary storage and handling facilities in case of an emergency.
3 Fan Rooms
4 Incinerator
5 Meter Room and/or
6 Switchboard Room
7 Telephone Exchange Room
8 Furniture Storeroom
9 Janitor's Supplies Store Room
11 Custodial Work Shop
12 Helpers' Locker Rooms (both sexes)
13 Janitor's Sink Closet
14 Dust Bin and Chute
15 Freight Elevator and
Passenger Elevators

Section 17: Service Spaces

Unit No. A1a General Toilets—both sexes
A2 Special Toilets
5 2 Dressing Room Toilets (one for each sex)
6 2 Custodial Employees' and Cafeteria Help Toilets (one for each sex)
7 1 Medical and Dental Suite Toilet
8 1 Principal's Toilet
9 Playground Toilets
11 Teachers' Toilets (both sexes)
12 2 Public Toilets (one for each sex)
13 Gymnasium Instructor's Toilet adjoining the office (only to be provided if other facilities are not available)
16 Gymnasium Toilets—accessible to playground desirable
A4 Washing Facilities
B Drinking Facilities
C Shower Facilities
1 Gymnasium Shower Room
2 Gymnasium Instructor's Shower (only to be provided if other facilities are not available)
3 1 Engineer's Shower
D Locker Facilities
1 Pupil Wardrobes
2 Gymnasium Lockers
3 Extra Pupils' Lockers
15 Provision for Public Telephone Booth
16 1 Receiving Room
17 2 General Supply Rooms
18 Local Shop Store Rooms
19 1 Eraser Cleaning Closet
20 2 Teachers' Rest Rooms (one for each sex) (include lockers and washing facilities)
21 1 Teachers' Work Room

IV. ADDITIONAL SPECIFIC SPACE REQUIREMENTS

No. Req.	Type	Size Sq. Ft. Each	Pupil Accom. Each	Dwg. & Equip. List No.
	Section 5: Library			
1	Museum	966	—	538
2	Exhibition Galleries on street level near main entrance	966	—	539
	Section 6: Special Shops			
1	Industrial Design	2,100	25	6389
1	Theatre Design attached to Auditorium Stage	2,100	25	6390
1	Leather Craft	1,288	25	6321
1	Cabinet Furniture & Wood-Carving	2,100	25	6391
1	Jewelry Design and Making	1,288	25	6392
1	Diamond Cutting and Setting	1,288	25	6393
1	Sculpture and Stone Carving	2,100	25	6394
1	Modeling	1,288	25	6395
1	Modeling (including kiln room)	2,100	25	6396
2	Interior Decorating	1,288	25	6360
1	Display Shop	1,680	25	6397
1	Glass	2,100	25	6398
1	Plastics	2,100	25	6399
3	Photography Studios (black and white)—including dark rooms approximately 650 sq. ft.	2,100	25	6400
1	Photography Studio (black and white)—including dark rooms approximately 650 sq. ft.	2,730	25	6401
1	Photography Studio (Color)—including dark room approximately 650 sq. ft.	2,730	25	6402
2	Silk Screen	1,288	25	6382
1	Graphic Arts	1,680	25	6383
	Section 9: Art Department			
4	Art Studios	1,288	25	936
5	Commercial Art	1,288	25	934
1	Sign Painting	1,288	25	937
2	Architectural Drafting	966	25	940
2	Fashion Illustration	1,288	25	938
2	Costume Design	1,288	25	939
	Section 11: Science Department			
2	Combination Physics and Chemistry Labs	1,288	36	1140S
1	Industrial Laboratory	1,288	36	1145
1	Photography Laboratory	1,288	36	1146
	Section 13: Music Department			
1	Music & Lecture Room	1,288	90	1331S
	Section 17: Service Spaces			
2	Pupil's rest rooms (each sex)	—	—	—

V. GENERAL REQUIREMENTS

(a) It is desirable to keep educational spaces out of the basement. Variations in height are left to the architect. The cost of shop construction will be considerably less than the cost of the remaining part of the building.

(b) This building will be used for general community purposes as well as adult classes. Provision should be made for segregation of large units so they may be used independently. Heating, ventilation and public toilets must be so planned that sections cut off may be properly cared for.

(c) The building is planned for the approved capacity for vocational schools and will house the normal register of 2,000.

(d) Planning for extensions should make two additional stories possible.

CHAPTER 7: secondary school classrooms

The vital changes in education at the secondary level will take place in the future in the classrooms of America. The evolution of the present day secondary school has, in general, been marked by a steady accretion of specialized activities represented in part by the addition of specialized facilities to secondary school buildings. Shops were added to care for vocational needs. Art and music studios were introduced as these fields attracted more attention in the program. Science, commercial subjects and homemaking all required greater and more specialized space as the high school program became richer and broader. Yet high school classrooms and the academic program of high schools have, with notable exceptions, remained fairly constant over a long period of time.

Probably there is no area in the school building that will have more new demands placed upon it in the next twenty years than the classroom and it is also probably true that no facility is generally so ill equipped to meet these demands. The school administrator and architect will want to study the classrooms in great detail as the point of greatest stress in the future use of the school building.

The comments on curriculum in a preceding chapter have indicated some of the major current developments in the professional thinking about secondary schools. Public discussion and writings have suggested some of the shortcomings of the program as generally offered and outlined, with varying degrees of usefulness, a profuseness of possible solutions.

Public education in America, drawing its strength and some of its weaknesses from its diversity, has a pattern of change which loosely governs the introduction of new educational practices into the curriculum. Change, in general, stems from the creative activities of skilled teachers who, when faced with problems in educating students properly, develop new methods, simple or complex, that enable them to do the job to their own greater professional satisfaction. As the body of new approaches begins to swell in volume, someone develops a theory that more or less satisfactorily generalizes upon what is already going on.

In the elementary school field, the past forty years has seen the discovery of children as a proper concern of the school as opposed to a rather exclusive concentration upon minds. To be sure, some schools, during the early period of discovery, became infatuated with the child to an embarrassing degree. On the whole, however, there seems to be developing a commendable balance between the respect of the school for the dignity of the growth and development of the individual child and the responsibilities of the school as an institution of society to provide intelligent adult guidance and direction for that growth.

As has been suggested in earlier chapters, the high school has not been untouched by the redirection going on in the elementary school. The problem has been made more difficult on the secondary level in view of the greater complexity of the student at the more mature age, and by the subject matter

way of looking at students. Numerous approaches toward integration of subject matter into broader courses or core curricula have had as one of the major objectives the provision of a longer space of time during the day in which one teacher may work with one group of students taking a major responsibility for the guidance of the students in her charge.

In general, the fusion of subject matter areas or the introduction of core curricula has so far been more common on the junior high school than on the senior high school level.

Regardless of the type of curriculum organization that has been adopted in a particular school, there have been certain changes in classroom procedure and resources that are wide spread and toward which secondary schools over the country have been moving. These changes are of fundamental importance in planning classrooms. Among them are:

1. A significantly wider variety of resources of far more penetrating nature are made avaliable to students.
2. Classroom procedures to a far greater extent involve the participation of the student in learning situations that have greater meaning to him.
3. The ways of expressing and utilizing what is learned have increased in variety and represent greater depth of understanding of problems studied.

Classroom Resources

BOOKS

Characteristic of the modern secondary school is the tremendous increase in the number of books used by students. Libraries must be larger and better supplied. In the classroom, instead of reliance upon a single text, are found wide research, extensive reading, and comparing of points of view found in a large number of books, pamphlets and documents having bearing on the subject under discussion. For example, a social studies class studying South America will want to use books dealing with political, cultural and social history of South America. Research studies in the relationship between North and South America, the Pan-American Congress and the relationship of the Western Hemisphere to the world society will be needed. Materials on geography and air geography of the region are indispensable. Some of the literature of South America will be read. Both English and foreign language newspapers will be used, documents and reports from government and other sources will be consulted. No meager provision for books and other printed material can be contemplated if the classrooms is to serve tomorrow's educational program.

The most common procedure is to obtain from the central school library a temporary collection of books and pamphlets dealing with the subject at hand. This collection will be housed in the classroom during the course of the study of a particular subject and replaced by another collection as the group moves on. While some of the research will be carried on in the library, the basic general materials will be housed in the classroom. The temporary classroom collection may range from fifty to one hundred books in a modern school with an ample library collection.

In addition to temporary collections, the room will have a more permanent collection of reference books, texts, and overall studies and writings dealing with the long-term interests of the class.

NEWSPAPERS AND MAGAZINES

The modern class will have its attention drawn to contemporary happenings frequently. In this connection newspapers and magazines will be widely utilized. Space provision for storage and display of current periodicals is important.

Comparatively recently, vast changes in means of communication have taken place. The near future holds certain promise of even greater change. Sound moving pictures, microfilm, radio and television open new horizons to each classroom in the country. There are few secondary schools now that are not provided with some type of sound motion picture projector. Radio is frequently available. Television is just beginning.

MOTION PICTURES

We may expect in the future development of simpler, lighter, easier to operate motion picture projectors. The time can be anticipated when it will be possible for each teacher to have the use of a projector and have available suitable film to provide pointed and profitable visual education at all stages of the school program. This suggests that consideration in planning be given to darkening of

rooms or use of projectors by proper modification and equipment for daylight projection. As a matter of course, all rooms should be wired and provided with outlets so that the sound system can be plugged in without necessity for long cables to be placed on the floor of the room. Suitable storage facilities, in a central location, for equipment and film are an essential for every school building. Electric outlets should be provided for each of the four walls of a classroom.

RADIO AND RECORDINGS

Radio has allowed students to listen in on history in the making over the world. Addresses by the President of the United States to the Congress, meetings of the United Nations General Assembly, and other happenings are shared by students through this medium. Educational broadcasts, music and drama are available and, to a surprisingly large degree, used in classrooms. Recordings, having the advantage of use in the program at a time best suited to the class group, are widely used. The architect and school administrator will wish to devise together arrangements in the school plant so that radio and recordings can be most efficiently utilized. In general, these devices are most profitably used when under the direct control of the teacher.

MICROFILM

Greater utilization of microfilm with the accompanying projection device will allow wide circulation of facsimiles of documents, old newspapers, and may in time be used widely instead of books. Savings in space, particularly for seldom used materials, are important.

OTHER PROJECTORS

Each school will use other types of projectors including opaque, slide, and 35 mm. still film projectors. These machines, together with storage space for films, slides and the like, are valuable means of providing information for students. Realism and effectiveness are given to the school program that is not possible when printed materials alone are used.

TELEVISION

Television is in its infancy. It is apparent, however, that used wisely as an educational device, it can revolutionize a significant segment of the educational process. New schools should include suitable conduits for ultimate installation of television. Eventually each classroom may require its own television outlet. Its eventual effectiveness will depend upon the ability of television production to provide programs that will enlarge the boundaries of the school. There can be no doubt that the possibilities here of taking students into the shops and market places, theaters and concert halls, philosophers' offices and government council chambers, if realized, may reshape our people and our schools. Judging from educational experience with radio, it may be decades before the potentialities of television are put to work for education. School personnel, however, must experiment with and try out techniques that will develop for the use of television in the day to day task of education. Provision must be made in school buildings to care for future needs in this field.

RESOURCES OF THE COMMUNITY

Of great significance has been an increasing tendency on the part of teachers to look beyond the classroom and the various types of vicarious experience that can be brought into the classroom to the school site and the school community as resources of unmatched importance for the high school program. Slowly the boundary that divides the school from the community is dissolving.

The resources of the school site are of immediate and direct importance to the classroom. Here on the site of the modern secondary school students develop aspects of community life for study and analysis. For example, groups of students may have worked over a period of years in the school forest, developing and carrying out a program of tree conservation, watershed protection and the like. A social studies class, as a result, has at hand a laboratory demonstration of forestry and conservation. From such a point, the social studies class may analyze the social implications of a large scale conservation effort in the community and nation. The problem has been made real as the students learn by seeing, by sharing in the work, by quizzing their fellow students engaged in the project.

The full exploitation of the educational advantages of school sites, in turn selected in terms of educational usefulness, will produce marked change in the number and nature of classrooms as we now know them. Proper school sites, of ample size and

character are an inexhaustible investment in educational resources.

The community is a laboratory to the modern school. Here man does the things that are studied about in the school. Mathematics are vital in business, government actually is carried on, speech and language have immense implications in all aspects of community life. The modern high school increasingly taps this rich source of material and experience. Persons from the community whose business experience has been rich place their knowledge and background at the disposal of the students. In every community there are all kinds of artists who willingly come to the school to work along side of students and stimulate them by their skill and accomplishments. Collectors, also, can be found. Some person with a rich and detailed knowledge of ancient writings and clay tablets; a collector of Indian lore; a resident learned in colonial crafts; all these are rare finds for the alert school. These resources are brought into the orbit of the class where they become priceless materials for young minds.

Out into the community go the students, too. Into the council chamber and court of justice they go, eager to learn how man governs himself and administers his laws. They study the religions, the industries, the ways of life of their community and return to the school to digest and analyze what they have seen and heard. Community surveys, studies of housing needs, analyses of the pattern of recreation are carried on. Now the students are getting their teeth into aspects of community life, learning to evaluate data, use mathematics, apply general principles to specific and real problems and by discussion arrive at a majority decision as to course of action that should be taken.

Increasingly, students will participate in the adult life of the town or city. Their opinions will be heard; their willingness to work harnessed for the good of all. As significance and importance are attached, both by the school and the community, to such participation, the effectiveness of education of the students will grow.

The line between community and school slowly dissolves. Vocational preparation blends into cooperative education and apprenticeship training which in turn blends into upgrading training on the job. As we have learned in part to do this in the vocational sphere, the same will be done in training for citizenship and in the cultural fields.

Classroom Procedures

In the recitation type school the activities of students were relatively circumscribed. They read the prescribed pages in a textbook and, either orally or in writing, answered the teacher's questions to prove that the passages had been read. In general, the teacher did most of the talking. Below, an incomplete list of the kinds of activities that go on in a modern classroom has been made to suggest the diversity of activities that such a room must be designed to house.

KINDS OF ACTIVITIES CARRIED ON IN CLASSROOM:

A. BY THE STUDENTS

1. PLANNING—Deciding upon the work to be done for a day or longer period. Analyzing and discussing the approach to this problem. Introducing the problems through discussion by the teacher or a student, showing of a motion picture, or displaying materials and clippings.
2. MAKING ARRANGEMENTS—Selection and scheduling of motion pictures, radio programs or transcriptions that have a bearing on the problem. Scheduling and inviting staff members or persons in the community who can contribute. Scheduling and making arrangements for trips to pertinent places in the city or surrounding area. Selection of committees. Sending of requests to business or government sources for information. Making of assignments. This phase of classroom work is done largely if not entirely by students.
3. COMMITTEE WORK—Definition of the work and organization of the committee. Deciding on work to be done by members of the committee. Selection of a chairman. Gathering of information. Obtaining judgment of the group. Organizing information and judgment into a report. Preparing a presentation of the report using a variety of techniques, such as models, charts, displays, dramatic presentation, written reports, oral reports, panel report with students who have become expert in various aspects of the problem sharing in the reporting.
4. INDIVIDUAL RESEARCH—Using library resources, materials gathered in community, inquiries addressed to business and government sources, other resources of schools, such as scien-

tific laboratories, art and music studios, shop and the like. Sifting evidence, arriving at facts, making judgments and preparing results.

5. READING—Acquiring information through reading textbooks, supplementary textbooks, library books, reports, magazines, government documents, newspapers. Among newspapers used may be old and present day papers, microfilmed newspapers, foreign papers, other national newspapers. Learning better reading techniques and improving reading speed.
6. LISTENING—Listening to the teacher, other students, other staff members, persons from the community, the radio or transcriptions.
7. WATCHING—Watching demonstrations, moving pictures, slides, displays, drawing of diagrams and the like.
8. DISCUSSING—On the basis of facts known and reported, discussing and arriving at conclusion with the teacher, other students, other staff members or persons invited from the community.
9. CONSTRUCTING, DRAWING, DESIGNING AND SEWING—Models, demonstration apparatus, costumes, displays, scenery, reproductions and the like.
10. PRACTICING—Becoming skilled and accustomed to the practical application of rules of grammar, mathematical processes, foreign languages, vocabulary, etc.
11. DISPLAYING—Displaying charts, models, clippings, reports, graphs, posters, demonstration equipment. Displaying this material for the purposes of reports to the class, other classes, entire school or community; on the stage, in the classroom, in the corridors or in stores, halls, etc., in the community.
12. SUMMARIZING AND REPORTING—Giving the results of committee or class work to the class, other classes or the school through written reports, in class or school newspapers, oral reports, panel discussions, dramatic presentations, through radio broadcasts, transcriptions, moving pictures produced by students, displays and other similar techniques.
13. STORING—Storing written materials, reports, committee projects, books, library collections in specialized fields, models, charts, posters, construction projects, newspapers, etc., in finished or incomplete state.

B. BY THE TEACHER

1. PLANNING—Planning teacher's work. Planning with students.
2. EXPLAINING—To the entire group, to committees, to individuals.
3. EVALUATING—Testing comprehension, grasp of material, orally and in written form.
4. GUIDING—Observing actions of individual and counselling students, keeping anecdotal and other records for each student.
5. RECORD KEEPING—Keeping records of attendance, filling out forms for supplies, etc. Keeping account of books, recording measures of student progress.
6. DISCUSSING—Participation in small or large group discussion of topics under consideration.

C. BY ADULTS

The work of adults in the classroom parallels that of high school students in the type of activities that go on. Possibly, more emphasis may be placed upon discussion and less on presentation, art and construction work and the like.

The above listing suggests that of great importance is the participation by the students in the activities that are going on. Skills in the use of speech are gained when the students use speech under conditions of importance to them. There is no transfer of training when the teacher exercises the speech skills to the exclusion of the students.

Planning the Classroom

PAST UNIFORMITY IN CLASSROOM PLANNING

The tendency toward uniformity in planning classrooms, regardless of the subject matter taught, ignored the educational possibilities of a proper environment. The school became institutionalized and the work of the school formalized. In future schools each educational space should be given its distinctive design.

THE GROWING TENDENCY IN CLASSROOM DESIGN

The fundamental principle in classroom design is that the space should be planned to support and promote the instructional program to be offered in

any particular room. The size of the room, its general layout, the furniture, and other facilities must all be related to the functional demands of the curriculum itself. Standardized classroom design tends to minimize the importance of the curriculum. It suggests an emphasis upon tradition and artificiality rather than upon reality and actual needs.

Modern education does not expect all children to move forward at the same pace and to achieve the same results. In some schools individuals are given contracts, or programs, which they carry on by themselves with the proper checking by the teacher at opportune times. All individuals may not be using the same curriculum materials at the same time. The tendency is to utilize in the classroom to a maximum degree the new devices produced by industry. New types of materials are being brought into the classroom to give greater reality to teaching itself. The emphasis is no longer upon seats and desks as the major equipment. Work tables, supply cabinets, easels, display devices, and reading alcoves have found their place in the modern classroom. Variations in the specific equipment and spaces occur with the different types of programs followed or educational work to be done.

There will be an ever-increasing stress upon the desirability of placing students in rooms which are comfortable, informal, flexible, and inspirational—rooms which reflect the atmosphere of the subject to be taught, rooms which invite purposeful activity and creativeness, and rooms that inspire student interest and promote the natural desire to enter into the great adventure of searching for information, mastering certain vital segments of learning, thinking through genuine problems, and imparting new-found information to others.

RELATION OF CLASS SIZE TO ROOM SIZE

In the past it has been subjectively determined that high school classes of more than 35 pupils were unsatisfactory. It was also felt that the space required per pupil should not be less than 18 square feet. Many state departments have specified that the width of the room shall not be more than twice the height for lighting purposes. The result of combining these "standards" was a typical classroom approximately 22′ x 29′ with variations of one, two, or three feet in either dimension. Obviously, mere dimensional requirements are not satisfactory bases for planning.

A standard class size has been a major determinant of the spaces provided in many schoolhouses. Class size may vary more in the future than it has in the past. The emphasis upon individual activity and expression, the possibility of teaching some phases of the curriculum with larger groups of students, the proven success of the talking picture for instructional purposes with large groups, and the wider freedom of the classroom should be given greater consideration in the planning of room sizes than the more dimensional requirements which unwisely have been incorporated in law.

Tests in illumination have proven that the natural light entering through the classroom windows is seldom sufficient over more than half the room and artificial supplementary lighting must be used on the corridor side. Thus, the traditional standard of twice the height equals the width of the room also is being affected by experience and scientific tests.

Financial economy will play an important part in all high school planning. As the high school building changes its nature, only the satisfactory features of traditional classroom planning should be conserved. The modern program requires more of elasticity in a building than the educational program of fifteen or twenty years ago. Pupil stations, which means the places where students work at any of the many activities in which they engage, should become the unit of planning for educational space rather than the student's chair and desk. The activities which are carried on in the modern classroom must be known to the architect before he can plan. Room size cannot be arbitrarily fixed. It must be the resultant of many discussions.

The Engelhardt-Leps Check List for Secondary School Classrooms*

No classroom can have all, or perhaps even a majority, of the features listed in the following check-list. There must be a happy selection from this list to meet the special needs of a particular subject or a specialized area of instruction. Above all, planning should produce a livable setting which will have the power of attracting individuals and putting them at ease. Mankind has learned to build

* Prepared by N. L. Engelhardt and Joseph M. Leps. Originally reproduced in The American School and University, Fourteenth Annual Edition, pp. 252-253. American School Publishing Corporation, 470 Fourth Avenue, New York City, 1942.

homes that are more attractive than they were twenty and thirty years ago. Man's offices are less fearsome and more homelike and comfortable, and improvements beyond those accomplished in the school have penetrated into shop and commercial center. This check list by no means represents a finality in planning. These items may best suggest to architects and superintendents points of departure. The aim of all planning of secondary classrooms should be to make them places which pupils occupy with joy from which they depart with great reluctance, as central and favored parts of their environment.

CHECK LIST FOR SECONDARY SCHOOL CLASSROOMS

PART I

Human Values—The design, construction, decoration, and equipment of the classroom should conform to the highest standards in the recognition of human values.

A. Recognition of the Esthetic in the General Design

1. Harmony in proportion and shape of room
2. Color combination — pleasing and varied
3. Decorative hangings
4. Design and finish of furniture
5. Design and finish of built-in features
6. Equipment whose design is in harmony with room
7. Floor treatment—hardwood, inlaid linoleum, mastic tile
8. Lighting—maximum of natural light
9. Lighting—fixtures for artificial attractive as well as functional
10. Pictures
11. Removable panels for murals
12. Suitable materials for interior finish
13. Rugs
14. Vases for flowers
15. Venetian blinds, curtains, or translucent shades
16. Window boxes for flowers

B. Application of the Findings of Psychology

1. Art objects and materials
2. Awareness of reaction of the individual as an organic whole
3. Control of concomitant and attendant learnings
4. Design for happy, democratic living
5. Environment planned as element of learning situation
6. Interest centers
7. Models and display — pupils' work display cabinet, and bulletin boards
8. Opportunity for individual expression
9. Opportunity for creative activity
10. Opportunity for group action
11. Opportunity for relation of experience
12. Opportunity for work and thinking

C. Contribution to Community and National Spirit

1. Appropriate books and publications
2. Community maps and surveys
3. Display cabinet and bulletin boards
4. Display of flag
5. File of local historical data
6. Multiple display board racks
7. Pictures and murals
8. Rooms finished in conformity to idealized local style
9. Room furnished to represent regional or historical period style
10. Statuary

D. Contribution to Comfort and Happiness

1. Scientific design of chairs and furniture
2. Air conditioning
3. Acoustical treatment
4. Abundance of light and sun
5. Adjustment of furniture to size of occupant
6. Easy chairs and reading lamps
7. Fireplace
8. Kitchenette
9. Flowers
10. Plenty of space for movement
11. Music instruments
12. Phonograph and radio
13. Reading tables—proper angle of surface
14. Social room or classrooms' adaptability to social affairs

E. Regard for Physically Handicapped

1. Audiophones
2. Adjustable desks and furniture
3. Special lighting for eye defectives
4. Restrooms for individual use, conveniently distributed

F. Recognition of Pupils' Individual and Personal Rights

1. Cafeteria service
2. Drinking fountains
3. Individual storage space for lockers
4. Place to work comfortably
5. Provision for freedom of movement
6. Opportunity for "boy to meet girl"
7. Recognition of social impulse
8. Social room—alcoves

G. Convenience and Conservation of Energy

1. Built-in filing space
2. Built-in shelving
3. Drinking fountains at sink or in corridor
4. Fully equipped workroom adjacent to classroom
5. Lockers in passageway
6. Location and integration with rest of facilities
7. Museum space and pupil showcases in room or corridor
8. One or two stories only

H. Rooms Constructed on Basis of Living

1. Aquarium
2. Adequate storage space of all types
3. Bulletin boards
4. Chalboards of harmonious color and size planned for program
5. Chalkboard display rail
6. Doors—attractive appearance —out of way in operation— automatic locking and control
7. Easy chairs
8. Hardwood floors
9. Linoleum on mastic tile
10. Provision for related hobbies
11. Provision for appeal to individual interests
12. Rugs and drapery—curtains
13. Radio
14. Reading lamps
15. Scientific lighting — reflection and diffusion
16. Walls and ceilings harmoniously decorated
17. Window and wall seats with cabinets beneath
18. Window boxes for flowers
19. Vases and pottery
20. Venetian blinds

PART II

Function—The classrooms and facilities for the academic department should be planned to conform to the most enlightening ideas of the intended use. That is, the design, construction, decoration, and equipment should further the school program for the community.

A. Use of Modern Techniques and Equipment

1. Audio-visual aids (built in or designed ab initio)
   a. Camera—motion picture
   b. Files for illustrations, photographs and portraits
   c. Globes (electric)
   d. Maps
   e. Models
   f. Museum exhibits
   g. Pictographs
   h. Pictorial charts
   i. Phonograph
   j. Projector for sound motion pictures
   k. Projector for slides and film strips
   l. Opaque projector
   m. Radio
   n. Radio — two-way communication system
   o. Screen—rolled into wall or ceiling electrically
   p. Sound recording machine
   q. Stereopticon
   r. Stereoscope
   s. Television
   t. Microphone
   u. Language instruction records
2. Air conditioning
3. Barometer
4. Calculators — all types for mathematics room
5. Chalkboard — colored — white — slate
6. Chalkrail
7. Clock and signal for period change
8. Dictating equipment
9. Duplicator
10. Electric outlets
11. Glass building blocks
12. Hygrometer
13. Outlets for vacuum cleaner
14. Pencil sharpener
15. Photo-electric control for lighting, exits, etc.
16. Sliding wall panels—doors—electrically operated
17. Sound controlling treatment of ceiling, walls, floors
18. Telephone

19. Thermostat
20. Typewriters
21. Ultra-violet ray glass
22. Refrigerator
23. Recessed museum, display cabinets, and other features with individual lighting equipment
24. Stage—professionally equipped —shop, storage, dressing rooms, curtain and scenery, and lighting
25. Lighting — indirect, concealed source, fluorescent
26. Spotlighting for maps, pictures, etc.

B. Abundant Storage Space

1. Closets
2. Bookcases—built in
3. Cabinets—built in
4. Files—built in
5. Lockers
6. Cabinets for flat material beneath chalkboard
7. Shelving and bins in work room
8. First-aid cabinet over sink
9. Recesses under movable panels for maps, pictures, chalkboards, screens, and bulletin boards
10. Window and wall seats with storage space beneath them
11. Scientific scheme for utilization of space

C. Provision for Flexibility

1. Chalkboards, screens, bulletin boards which are reversible, slide into wall, or swing out of way
2. Curtains for darkening room
3. Movable furniture
4. Sections of pupil storage space which can be locked or unlocked in blocks for various groups
5. Movable walls and partitions to vary size of room

D. Adequate Instructional Material

1. Atlas
2. Audio-visual equipment
3. Bulletin boards
4. Chalkboard
5. Display cabinet
6. Drawing board and drafting tools
7. Dictionary and stand
8. Encyclopedia
9. Exhibits
10. Easels
11. Globe
12. Hot plate
13. Language instruction records
14. Magazine rack
15. Models
16. Newspaper rack
17. Pictures
18. Maps and charts
19. Duplicating equipment
20. Illuminated drawing board
21. Printing press
22. Phonograph
23. Recording machine
24. Room library and reference books
25. Reading table
26. Stage—make-up and dressing room
27. Stage—out-of-doors
28. Slide rule
29. Sink and running water
30. Teacher's desk
31. Teacher's chair
32. Teacher's cabinet
33. Teacher's locker
34. Teacher's filing cases
35. Transit and tools for mathematics
36. Typewriter
37. Workbench and tools
38. Workroom

E. Recognition of Social Aspect

1. Alcoves
2. Comfortable chairs
3. Conference and workroom
4. Chess and game boards in mathematics room
5. Curtains
6. Dancing in social room or adapted classroom
7. Davenport or settee
8. Musical instruments
9. Opportunity for privacy
10. Opportunity for youth-adult contacts
11. Piano
12. Provision for refreshments to be served
13. Provision for clubs and organizations
14. Reading lamps
15. Tables for games and refreshments
16. Social room or adaptation of classroom for social affairs
17. Space for freedom of movement
18. Socialized recitation facilities
19. Radio
20. Window seats
21. Fireplace

PART III

Mechanistic Aspects—The mechanistic aspects of the classroom should conform to the highest standards of – –

a. Acoustics
b. Automatic control
c. Aesthetic appeal
d. Adaptability to group
e. Comfort and convenience
f. Flexibility
g. Functional efficiency
h. Heating
i. Humidity control
j. Interior finish
k. Lighting
l. Orientation
m. Safety
n. Sanitation
o. Ventilation

General Classroom Details

CHALKBOARDS

The highest grade slate or glass has generally been found to be satisfactory. Boards should not be placed on walls opposite windows unless absolutely necessary. They should never be placed between windows. If not more than 12 feet of board is needed, the best location is on the right side of the center of the front wall. Chalkboards should not be less than 28 inches off the floor. For senior high schools they may be 32 to 36 inches high. The width of the board should not be less than 36 inches.

CHALK AND ERASER TROUGH

The most satisfactory chalk trough has an open wire screen, with ¼″ to 38″ mesh, above the trough. This arrangement permits use of a vacuum cleaner in the trough without removing chalk and erasers. The inside of the trough should be 2¾″ with a 2″ space between screen and trough.

CHART CASES

The space below blackboards may be used most advantageously by installing chart cases. These cases may be 2 ft. to 3 ft. wide and the depth need not exceed 6″ to 8″. They should be as high as possible. The doors should be hinged on the bottom and equipped with a heavy wire spring bumper to hold charts tight against the door. It is advisable to install air vents in the cases to prevent the air pressure caused by closing one door from opening an adjacent door.

SUNBOARD

It is desirable to equip every room with a sunboard under all windows for growing plants. This shelf should be at least 12″ wide and may be 18″ to 24″. Cabinets and radiator enclosures should extend from floor to sunboard to prevent dirt and dust from gathering under the shelf.

SHADES AND CURTAINS

Every room should be equipped with opaque shades operating on tracks or in grooves and fitting tightly at top and bottom to prevent light leaks. The advent of motion pictures in the classroom has emphasized the importance of good shade construction. The use of heavy drapes or curtains operating on a track may satisfy the need but prevents control of horizontal light. A combination of translucent shades and curtains provides the most satisfactory arrangement. In this case the shades should operate up and down from the center of the window.

DISPLAY BOARDS

A maximum amount of display space is usually advantageous. Cork is usually the preferred material as it does not show tack holes and may be painted in any color. After painting, holes caused by tacks will show, but annual painting will prevent any unsightly conditions. Corkboard walls or panels above blackboards are very desirable. A combination cork and hook rail above blackboards constitute an essential part of classroom equipment.

USE OF PROJECTORS

In each classroom, a number of electrical outlets are required. There should be one so located as to provide conveniently for power for projectors. Each classroom is best served if a cable is installed with suitable outlets so that the sound system of the projector can be plugged in at the rear of the room and the regular classroom amplifier used as an outlet.

In many schools, projectors are mounted on rolling tables for easy and quick use in the classroom. Door widths and ease of movement to the rear of a classroom should be assured.

STORAGE

Each classroom will be used probably by six to eight classes a day. In addition, adult groups may use these spaces as well. Separate storage for each group is desirable. Space for project storage is needed. Instructional supplies including paper, wood, clay, wire, poster size cardboard, large paper, mural paper, and paints must be stored. Liberal allowances of shelving for textbooks, supplementary texts and loan collections from the library are needed, considering also that each group using the classroom will not be studying in the same area. The teacher will require separate storage space for materials, records, and the like. Built-in legal size file drawers will be helpful, with at least one drawer provided for each teacher who will use the room.

DISPLAY

In the process of introducing a subject, discussion and reporting, display is important. A large amount of bulletin board space is vital. Places to display murals, made on long sheets of paper, should be provided. A stand for models to be displayed with opportunity for lighting is important. Posters, charts, maps, survey results are used and should be easily viewed by the group. A glassed cabinet for permanent display is needed.

EQUIPMENT

Tables seating two to four students with chairs are most desirable for the type of activities suggested. Several comfortable lounge type chairs may be located in a library corner.

Audio-visual equipment will include the availability of sound motion picture projectors, slide and slide film projectors. Electrical outlets are needed. Radio and transcriptions may be heard either through a central sound system or by individual units. Consideration should be given to equipping one social studies room and one English room with a television set for experimental and demonstration purposes.

Instructional material, varying of course in terms of the specific use to which the room will be put, includes:

Atlas, bulletin board, chalkboard, display cabinet, drawing board and drafting tools, dictionary and stand, encyclopedia, exhibits, easels, globe, hot plate, language instruction records, magazine rack, models, newspaper rack, pictures, maps, charts, duplicating equipment, illuminated drawing board, printing press, phonograph, visual education equipment, recording machine, room library and reference books, reading table, stage, stage out-of-doors, sink and running water, teacher's desk or table, chair, teacher's filing cabinet, transit and tools for mathematics, typewriter, workbench and tools, modeling table with impervious top.

ACOUSTICAL TREATMENT

It should become standard practice to provide each classroom with an acoustically treated ceiling.

For this purpose, acoustical tile is most desirable. In addition, wall and floor finshes should be considered from the point of view of acoustic properties. As classrooms become larger and more generally include stages or platforms, the acoustics of the room become increasingly important. Every effort should be made to reduce reverberation of sound without producing an acoustically "dead" room. When a stage or platform is used, the opposite wall may well be amply provided with bulletin board to reduce reverberation from that wall.

TEACHER REQUIREMENTS

If maximum utilization is to be gained from every classroom, more than one teacher will use each room each day. Problems, such as record storage, work space, and conference space are raised by this move.

There are two methods of meeting such a problem. One is to assign the room to a teacher who will have the preponderant use of such space. She will use the classroom as her work area before and after school hours. All other teachers using the space will not have any classroom assigned them but will occupy teacher's work space at some point set aside for this either on each floor or near each department office. A second method provides work space for each teacher in appropriate spaces located as suggested and assigns classrooms to no one teacher. Regardless of method used, early consideration should be given in planning to provide work space for teachers. A work area may include a general space where desks and files are located and several partitioned-off conference rooms or separate cubicles for each teacher to be assigned to the unit.

The Junior High School Classroom

In the seventh to ninth grades, a significant number of schools provide a program, variously named, in which students remain for a considerable part of the school day in one classroom with one teacher. Such a teacher will instruct the students in two or more subjects or will be in charge of the "core" program for the students. In this fashion, the teacher through her greater knowledge of the students will be better able to serve as guide and counselor. The junior high school classroom reflects the less specialized program of these years in school and the attempt to have one teacher direct the learnings over a wider area of the curriculum.

Figure 1 suggests a layout of a junior high school classroom with areas of the room developed for library, work, conference, and teacher. The room for the junior high school student must have a wide variety of resources available and allow for maximum of flexibility in meeting the needs of students.

Heavy emphasis should be placed on the use of moving pictures and other audio-visual aids in the program. Ample display area is necessary. Storage for projects and supplies should receive close attention. File cabinets of legal size are important for clippings, pamphlets, projects developed by students, and similar material.

The classroom atmosphere should suggest a work space. Emphasis should be on usability of the area. The room should be able to stand rough usage, spilled paints and other unavoidable accidents that seem to happen when groups of students are working in many media.

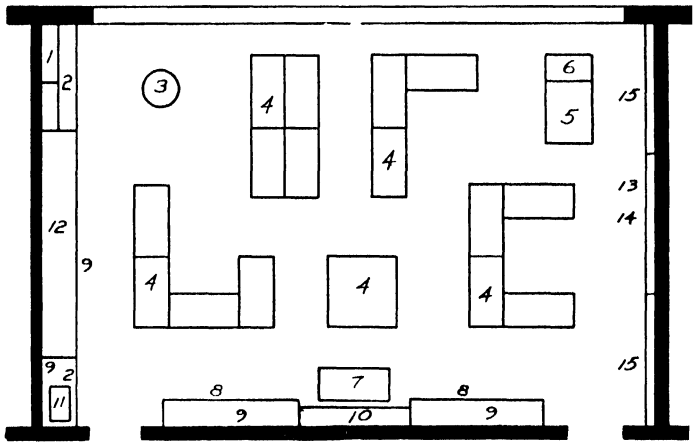


Fig. 1. Classroom, San Francisco Public Schools: 1. Bookshelves and magazine rack. 2. Concealed overhead lighting. 3. Round table, 4 ft. diameter. 4. Pupils' tables and chairs. 5. Teacher's desk. 6. Two drawer file cabinet. 7. Conference table. 8. Supply cabinet and shelf. 9. Display board. 10. Built-in seat, storage under. 11. Sink with work counter, storage under. 12. Pupils' wardrobe. 13. Projection screen. 14. Sliding chalk boards. 15. Display, chart and map storage under.

Special Classroom Planning

The first educational spaces planned for a high school were classrooms. With the introduction of the physical and biological sciences, laboratories were introduced. A laboratory is a work room, a place devoted to experimental study or to the carrying on of an operation or activity. With the introduction of household arts and the mechanic arts, special labora-

tories or work shops, were provided. As the more comprehensive social science supplants history and geography, laboratories will be as necessary for this area of teaching as for the physical sciences. The teaching of English is rapidly changing in the high school to include more of production and participation on the part of the students as well as individual guidance. The English work room, or laboratory, might well be a place in which music, art, and language are closely associated in the teaching process. In fact, it may be expected that each area of subject matter will sooner or later find its space needs satisfactorily met only when a laboratory has been provided for it in which the materials for instruction are readily available, curriculum reconstruction is constantly going on, and theory and reality are intimately associated in the teaching process. For example, even in the area of mathematics, the schools of the future may require a work shop in which the diagrams, models, and theories may be worked out in material form for the better comprehension of students.

SOCIAL SCIENCE COMBINATION CLASSROOM UNITS

The growing complexity of social forces, the increasing interdependence of communities and nations, and the vital economic problems of this age have placed new demands for more adequate training in the field of the social sciences.

The social science instructional program, which directs effort toward an understanding of these problems, has been somewhat retarded by the vast amount of curricular material and by the lack of proper materials and equipment for carrying on. Probably more than any other one division of curriculum, the social sciences need the careful attention of both educator and architect to assure adequate plant facilities.

The Commission on Social Sciences has divided the program of study according to (a) physical and cultural geography, (b) economics, (c) cultural sociology, (d) political science and (e) history. Quoting from their report:

> "In the secondary school the central theme would be the development of mankind and the evolution of human culture with constant reference to the present and to American civilization. This program might culminate in the study through concrete and living materials of regional geography, of comparative economics, government and cultural sociology, of the major movements in social thought and action in the workers' world, of the most recent developments on the international stage—a study in which the experience, the knowledge and the thought of all the preceding years would be brought to bear, by means of comparison and contrast, upon the emerging problems, tensions, and aspirations, the evolving social programs and philosophies of mankind and the American people in their regional and world setting. Also special attention would be given in the secondary school to the reading of historical and social literature including newspapers and magazines, great historic documents, classics of social thought and the achievement of familiarity with the methods and instruments of inquiry in the social sciences, with historical criticism, analyses, verification and authentication." [1]

Such a program requires far more in the way of physical facilities than four bare walls, desks and chairs. Figure 2 shows a social science laboratory developed for the San Francisco Public Schools. The laboratory includes a general area; one slightly elevated to be used as a stage, group meeting place and study area; a group conference room; and a preparation and work space. The unit, as envisaged, allows for a significant amount of committee work, individualization of program and diversification of the resources and media used. A significant program in the class room aspect of the social studies can move forward in such a space.

[1] Report of the Commission on the Social Studies, American Historical Association, *Investigation on the Social Studies in the Schools*, "Conclusions and Recommendation," pp. 60-61. Chas. Scribner's Sons, 1934.

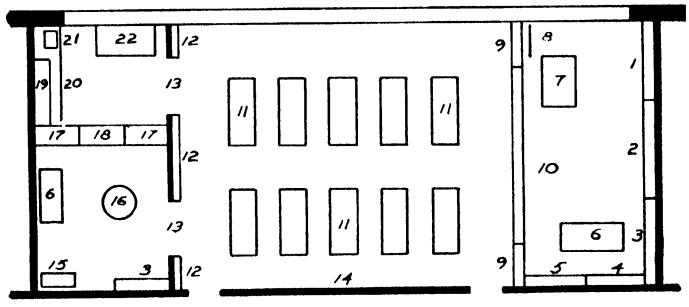


Fig. 2. San Francisco Public Schools: Right, Raised Platform; Center, Recitation and Work Space; Lower left, Group Conference Room; Upper left, Small Group Preparation and Work Space. 1. Storage. 2. Local history and museum case. 3. Bookcase. 4. Magazine rack. 5. Newspaper rack. 6. Exhibit table. 7. Teacher's desk. 8. Movable blackboard. 9. Display case. 10. Raised platform. 11. Pupils' desks and chairs. 12. Storage. 13. Folding door. 14. Blackboard and display board, map rack over. 15. Table. 16. Conference table and chairs. 17. Map and chart storage. 18. Tool storage. 19. Open shelves. 20. Work bench. 21. Sink. 22. Work table.

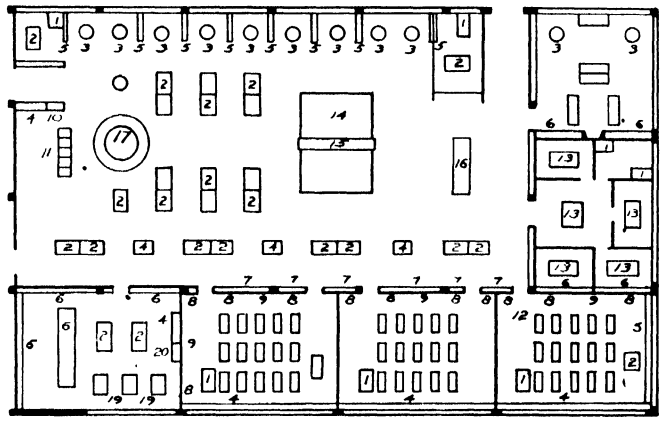


Fig. 3. Social Science Laboratory: Lower tier, left to right: Teacher-Student Curriculum Laboratory and Supply Room, Transportation Emphasis, Communications Emphasis, Industry Emphasis. Top tier, left to right: large Work Area with Teacher's Office at right near door; Reading Room and adjacent to it, Teachers' Offices and Conference Rooms. 1. Teacher's desk. 2. Work table. 3. Reading table. 4. File cabinet. 5. Bookcase. 6. Storage cabinet. 7. Display case. 8. Bulletin board. 9. Blackboard. 10. Visual study. 11. Tablet arm chairs. 12. Student tables. 13. Conference. 14. Project pit. 15. Rolling platform. 16. Project table. 17. Large globe. 18. Leaf display rack. 19. Typewriter desk. 20. Mimeograph.

A more elaborate layout for the social sciences is shown in Figure 3. In this case, areas have been set aside for transportation, communications and industry emphasis. The main work area capable of accommodating several class groups, a reading room conference or committee rooms, and a curriculum laboratory and supply room make up the building unit. In a smaller school, the emphasis would be placed on providing such adaptations in areas of rooms rather than setting aside entire spaces for a single use.

In some schools, community survey laboratories, air age laboratories, world industry exhibits and study spaces and the like have been developed out of specific needs of the school. The architect will wish to think of classrooms in some such fashion rather than as an arbitrary number of interchangeable rooms. The social studies laboratory is derived from the particular needs and requirements of this very significant area of study.

Language Arts

In general, the language arts program of a senior high school when expressed in terms of courses offered includes English, speech, foreign languages, classical languages, journalism, business English, dramatics, and a wide variety of specialized courses involving local needs. To an increasing degree, reading clinics have been provided in high schools to aid individual students to meet the reading problems encountered on the high school level.

Two major trends stand out in this field. The first is that speech, of greatest utility, has been given little consideration. Modern programs have shown almost a reversal of procedures by giving a great deal more emphasis to the general speech program. The second trend is that reading cannot be taught in elementary school and then forgotten. Reading skills necessary for high school must be taught there. Remedial reading must be provided for those in need of such.

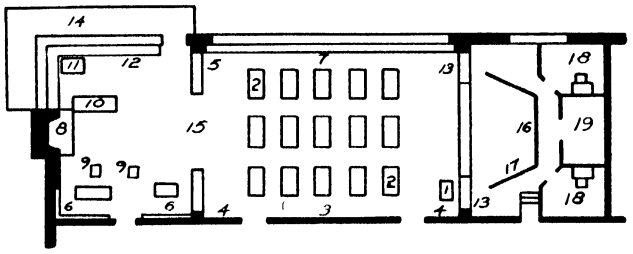


Fig. 4. English Instruction Spaces, San Francisco Public Schools: Left to right: Library, Reading and Social Room; Recitation and Audience Room; Stage. 1. Teacher's desk. 2. Student tables. 3. Blackboard. 4. Tackboard. 5. Cabinet. 6. Bookshelves, cabinets below. 7. Open shelves, flower box above. 8. Fireplace. 9. Armchair. 10. Lounge. 11. Reading and conference table. 12. Window seat. 13. Open shelves. 14. Terrace. 15. Folding door. 16. Stage. 17. Cyclorama. 18. Dressing, conference, reading or listening room. 19. Storeroom.

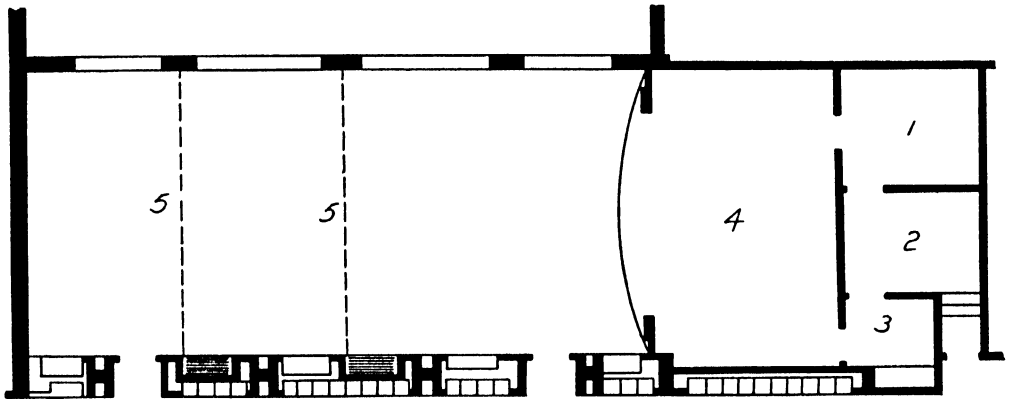


Fig. 5. Dramatics Room, J. W. Sexton High School, Lansing, Mich. Warren S. Holmes Co., Architects. 1. Recording Room. 2. Office. 3. Storage. 4. Stage. 5. Folding Partitions.

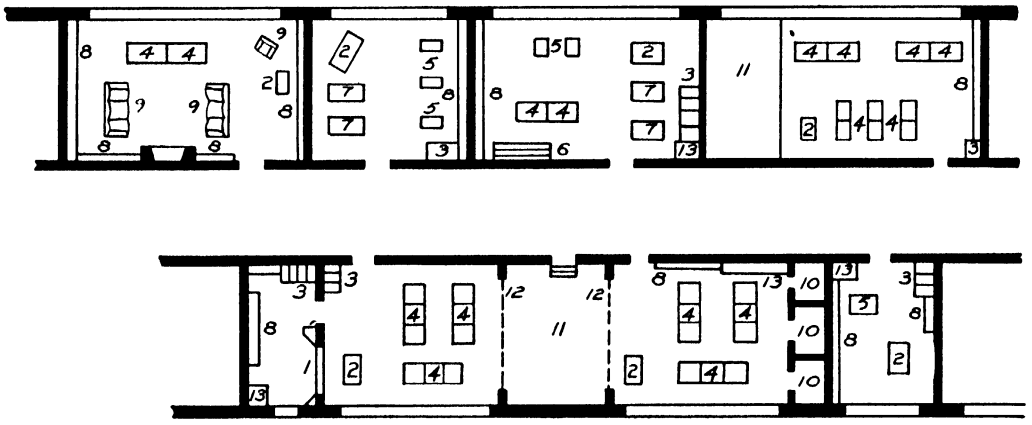


Fig. 6. Language Arts Suite. Top tier, left to right: Reading and Seminar Room, Publications Office, Journalism, Foreign Language. Lower tier, left to right: Language Arts and Radio Studio, Speech, Department Office. 1. Control Console. 2. Teacher's desk. 3. Files. 4. Tables and chairs. 5. Typewriting desk. 6. Newspaper files. 7. Desk. 8. Bookcase. 9. Lounge chair. 10. Recording and listening booth. 11. Platform stage. 12. Folding partition. 13. Cabinet.

Figure 4 shows a suggested English instruction space for the San Francisco schools. Noteworthy are the stage and the library, reading and social area. Such a room serves well as a dramatics classroom, English classroom and also in the club activities of the school as a center for such groups as creative writing, literary and dramatic clubs. For many students, the greatest educational outcomes derive from the informal, interest-centered club program. Classroom modifications to serve these groups are most desirable.

A dramatics classroom is shown in Figure 5. A suggested layout for a language arts area is contained in Figure 6. Of particular interest is the use of one of the speech areas as a broadcasting studio. The tie between speech in the classroom and use over either the school broadcasting or school radio station is most important and should be strengthened.

Classrooms for journalism will be practical laboratories. Conference space, work areas, typing section and filing area will be among the major components of such a room. Ample provision of bulletin board space for display, newspaper files and magazine racks will show the special use of such a room. A separate office for student publications is often desired. In some cases, the journalism room is also the headquarters for school publications.

Instruction in the art of speech has been largely submerged in the traditional compartmentalized subject matter of English. In some schools it has been separated from English for two reasons. First, speech is related to all other fields of education not just English alone. Second, the units and facilities required for instruction in speech are distinct from those specified for the teaching of English.

Speech arts include fundamentals and two areas called creative and interpretive speech. Creative speech embraces conversation, discussion, speechmaking, and debate. Interpretive speech starts with

oral reading and continues into the field of choral speaking and the drama. The correction of speech defects should be one of the prerequisites of any program looking toward speech refinement. It may be anticipated that a well-rounded speech arts curriculum will embrace the following activities: social conversation, business interview, oral reading and interpretation, debate, dramatics, students' forums and practice in parliamentary law, verse speaking choir, and corrective and remedial work.

In order to make possible the carrying out of this comprehensive program, provision should be made for the following spaces and facilities:

1. Studio theater
2. Informal reading room
3. Dramatics classroom with make-up booths
4. Voice and diction room with two soundproof booths for voice recording
5. Speech clinic with two soundproof booths and containing equipment for corrective and remedial work
6. Debate and conference room
7. Rehearsal rooms
8. Teachers' offices and public address control room

Soundproof booths are indispensable requirements of speech units. The equipment available in the speech clinic includes electric phonographs, audiometer, recording machines, mirrors, microphones, and loud speaker. Display cases and wall boards, blackboards, supply cabinets, and chart cases are essential equipment for both rooms. The whole unit should be decorated with murals and pictures in harmony with the background of the speech arts. Wall cases containing exhibits and articles of historical interest in speech development might well serve as an incentive for better speech.

FOREIGN LANGUAGE CLASSROOM UNIT

The National Survey of Secondary Education found that in 1931 foreign languages ranked second in importance among all high school subjects. In spite of this important position, most schools have provided few, if any, laboratories or class units especially equipped for the language work. The general practice of assigning any available room, or only standard classrooms, to the department may be discouraging to both teachers and pupils and a handicap to successful teaching. Regardless of the types of curriculum or methods of teaching which may eventually be developed, languages will play a significant part in the program and will need more adequate housing.

A modern language unit should contain a platform stage. This space may also serve as a reading, conference or work area. In the larger school, by use of two folding partitions, the platform may be made available to two classrooms. Booths similar to those provided in the speech unit should be included in the foreign language rooms. Speech improvement and learning through recordings will be the activities carried on in the booths.

Book cases should be prominent in the plan. Magazine and newspaper racks for foreign language periodicals will be needed. The platform stage may be set off by placing cabinets for student materials or teacher's supplies on either side of the risers to the platform.

MATHEMATICS CLASSROOMS

Much of the practical day to day work in the field of mathematics is related by the teachers to problems arising in the social studies and in the sciences. Although a considerable portion of time is devoted to learning the techniques of mathematics and the logic of mathematical approaches to problem solving, realism and meaning is injected into the program by utilizing the mathematical approaches and skills by application to actual problems found largely in the social sciences and the natural sciences.

Point has been given mathematics in the classroom by additional emphasis upon pictorial statistics, the making of graphs, and interpretation of similar data. Of importance in the planning of mathematics classrooms has been the importance attached to the making of models from wood, paper, and wire to illustrate mathematical concepts.

> "Educators are gradually becoming aware of the growing importance of quantitative thinking in the interpretation of the world of today, and the leaders of the present time are conscious of a need for a greater degree of precision in dealing with the affairs of daily life. Recent technological advancement has brought about social and economic changes which can be best comprehended and appreciated if studied quantitatively. School administrators and mathematics teachers are planning a type of mathematics for the American child that will mean more than

the studying of factoring in algebra, proving useless identities in trigonometry, or memorizing the statement that 'a straight line is the shortest distance between two points' in geometry. This mathematics will serve him as a means of a more exact regulation of the affairs of his daily life and a more precise interpretation of the facts of his experience." [2]

Instruction in the kind of mathematics that will accomplish these important purposes can be greatly facilitated, if classrooms are adapted to meet the needs. Many mathematics rooms consist chiefly of walls covered with blackboards. The inspirational features of these rooms have frequently been omitted. Mathematics rooms may be designed to inspire students to secure mathematical concepts and to explore the whole realm of the history and science of mathematics. The effort should be made to give the student an appreciation of man's eternal need for quantitative thinking and symbols, and of the place of mathematics in man's building, his engineering, his music, and even his fine arts.

The primary motive in the design of the mathematics classroom proposed is to provide a setting in which the pupil will catch the spirit of this subject which is essential to every science known to man. If this broad concept of the place of mathematics in modern life can be brought into the student's thinking, it will greatly alleviate the tendency on the part of large numbers of students to consider mathematics as a mere hurdle which they must somehow get over. Obviously, the most effectively designed and equipped room conceivable will not perform this task of itself. What it will do is to facilitate the teaching that goes on within the room and help tremendously in the development of student receptivity.

Figure 7 shows a mathematics classroom planned as definitely for the teaching of mathematics as the laboratory is for the teaching of the science. Such a room is literally a mathematics laboratory. Here the student can be shown relationships and can demonstrate dependence and functionality. Here he can test for formulas and learn how they are derived.

Suitable pictures and murals are suggested for the walls, models are placed where they can be seen and studied, magazines are provided, reference books and all the necessary working tools are made available with the thought of giving the student

[2] Bedford, Fred L., "Planning the Mathematics Classroom," *School Executive Magazine*, pp. 290-292, April, 1936.

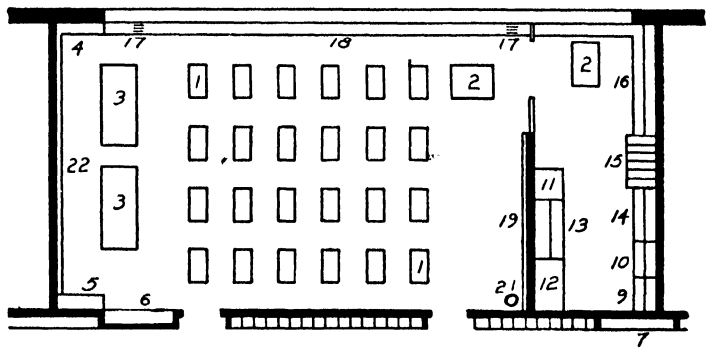


Fig. 7. Mathematics Laboratory, San Francisco Public Schools: Left, Recitation and Reading Room; Right, Workroom and Model Room. 1. Student's desk. 2. Teacher's desk. 3. Conference table. 4. Newspaper rack. 5. Bookcase. 6. Museum case. 7. Display case. 8. Lockers. 9. Tool case. 10. Model case. 11. Teacher's locker. 12. Chart file. 13. Cabinets. 14. Instrument case. 15. Vertical file. 16. Bookcase. 17. Heating unit. 18. Storage. 19. Blackboard, cases under. 20. Blackboard. 21. Spherical blackboard. 22. Display board.

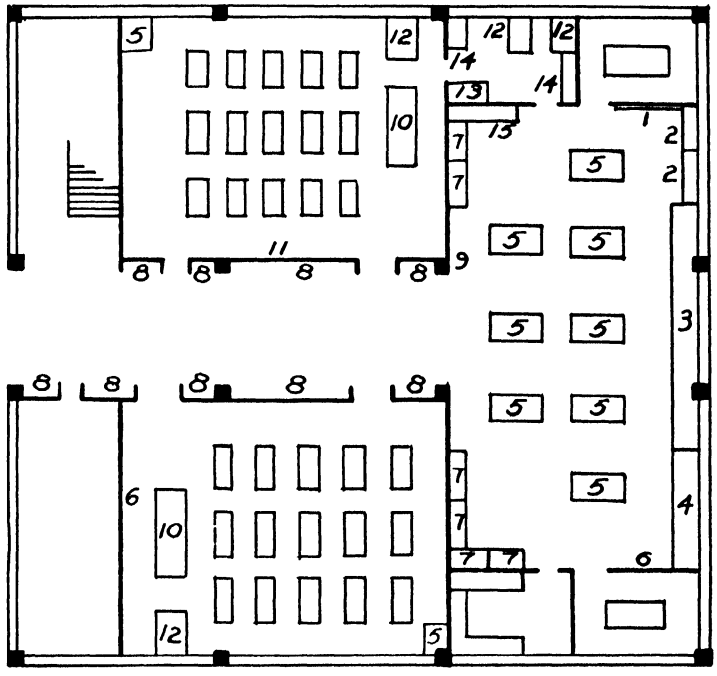


Fig. 8. Mathematics Unit, W. K. Harrison and J. A. Fouilhoux, Architects. N. L. Engelhardt, Educational Consultant. Top, Classroom, Teacher's Office, Conference Room; Center, Corridor, Workshop; Bottom, Classroom; far right, Conference Room. 1. Tool rack. 2. Lathes. 3. Workbench. 4. Solder and glue bench. 5. Work table. 6. Blackboard. 7. Storage cabinet. 8. Showcase. 9. Bulletin. 10. Demonstration. 11. Display. 12. Teacher's Desk. 13. Files. 14. Bookcases. 15. Mimeograph. 16. Tables and chairs.

maximum contact with mathematics.

Figure 8 carries this new conception of mathematics units one step further and provides a combination laboratory and workshop in connection with two classrooms. The workshop is equipped with work tables and benches where projects may be carried out, models built, and demonstration held. Provision is made for working in wood, metal, and clay. The corridor serving the unit is lined with museum cases for displaying the models and drawings of the students. Two conference rooms have

been provided for the use of small student groups working on special projects.

Bedford states:

> "The primary purpose of high school mathematics is to teach pupils to learn and to understand functional relationships and methods of problem solving. It is important not to obscure these by overemphasis on long arithmetical computations." [3]

In the business world today, calculating machines have replaced tedious computations. Pupils most certainly should be given every advantage to utilize those machines speedily and accurately. The slide rule is used extensively in all phases of engineering and scientific investigation and is especially helpful for approximating and checking results. The large demonstration slide rule is very helpful in explaining the use of the individual rules and should be incorporated as a fixed unit in the classroom.

Sound motion pictures and radio are both of considerable value in bringing to the class a realization of those mathematical problems which are world-wide and so large in scope as to preclude the possibility of illustrating them by classroom materials.

Open display cabinets should be provided for housing such instruments as sextants, transits, levels, hyposometers, angle mirrors, incline planes, drawing boards, T-squares, triangles, planimeter, pantograph, compasses, pulleys, gears, etc. Storage space must be made available for paper, graphs, charts, tests, teacher records, and student work.

Blackboards should include a spherical board mounted on a tripod cross-section chart, circular section for angular work which rotates in the plane of the stationary blackboard. Reversible sections of blackboard may be found desirable in many cases.

Display space should include bulletin boards, museum cases, and multiple exhibit rack. The upper part of the walls may be divided into removable display panels for hanging posters, murals, graphs, and pictures.

Ample bookshelf space should be provided preferably at the rear of the room. A magazine rack is necessary for displaying current periodicals and magazines of mathematical interest.

[3] Bedford, Fred L., "Planning the Mathematics Classroom," p. 290, *The School Executive*, April, 1936.

CHAPTER 8: the auditorium and its stage

The theater, through the long centuries since its inception, has been a potent factor in education. Not in education taken in its formal sense, perhaps, yet assuredly drama has always been of profound interest to its audience, no matter from what community it has been drawn, and has had its roots, by and large, deep in the universal matter that makes up life itself.

The theater early drew its topics from the very fundamentals of community living. Victory over the enemy, spring with its promise of new life, water to break the long drought; all were celebrated. In the primitive tribes this rejoicing took the form of the dance. As the simple dance evolved into a pantomime that attempted to tell a story or recreate the past, the theater as we know it was born. It had meaning to the community it served; the community itself created, improved upon, or acted out the pageantry that was so much a part of the common heritage.

Tragedy and comedy, the sophistication of the plot, the conflict of persons and forces had all been assimilated into the drama by the time of the high tide of the Greek theater. Evolving as it did from religious ceremonial, the theater of Aeschylus, Sophocles, and Euripides had great lessons to teach the multitudes that thronged to witness these contests of drama and idea. To the 15,000 persons crowded into the huge stone amphitheater that converged upon the circular stage, the proceedings had overtones of awe and majesty.

The popular appeal of the Greek theater was a reflection of its community value. A heterogeneous audience was assured by the state which subsidized the attendance of those unable to pay admittance. Sun and sky were no illusory reference to those who sat in the open on the vast expanse of stone steps. Aristophanes' barbed jests in referring to political figures then current were not lost on his audience. The breadth of passion and the healthiness of atmosphere of the theater of those days brought the drama into an intimacy with the community that served to increase the vitality of both.

THE INFLUENCE OF ROME

With Rome drama had given way to spectacle, vigor to sophistication, the theater to amusement. On the great stages, across which huge pageants passed, or gigantic figures of padded actors strutted, the glories of Greece were diluted beyond recognition. With the advent of the barbarians the spectacle turned into buffoonery and farce until finally the dramatic tradition was carried on only by minstrels, acrobats, and jongleurs wandering from castle to castle, from village green to village green.

The Middle Ages saw the return of the theater to the people. Miracle plays or mysteries grew out of the attempt on the part of the Church to dramatize the stories of the Bible; to bring to the illiterate man the lessons that were hidden in Latin.

The transition from religious to secular auspices

paralleled the early history of the Greek theater. The miracle plays moved from the Church to the market place, from the sponsorship of the clergy to that of the trade guild.

THE DRAMA OF THE PEOPLE

Thus arose a potent indigenous drama, crude and untutored, yet possessing the vigor that closeness to community life brings. For the production was in the hands of amateurs; of tradesmen and artisans, farmers and peasants. The plays themselves were anonymous, of composite authorship, and subject to constant change and revision under the impact of generations of individuals as authors and actors. The vitality of the market place and the inn yard, the trades and the farms permeated the theater. The guild of Mariners presented the *Flood,* the Bakers the *Last Supper.* Cain became a greedy grasping English peasant, Noah's wife a "cursed shrew" of a sleepy English town.

The miracle play, as it was rolled from section to section of the English town, was fresh and simple, a product of the common people complete with the virtues and defects of such an origin.

The morality play was the prelude to the professional theater of our day. From this point the theater went its way toward a more or less complete professionalization. Interludes, court plays, inn-yard plays were all successive steps that, combined with the heritage of the past, culminated in the excellence of the Elizabethan theater.

ENCOURAGEMENT OF DRAMATIC ARTS

Today the balance between professional and amateur is being restored. The recognition of the theater as an important educational force has returned. The importance of creative activity in the lives of all people has led to the encouragement of the use of the theater as one facet of the creative arts in school and community. Facing problems and having goals different from those of the professional theater the school of today, in its physical features devoted to the encouragement of the dramatic and allied arts, must be carefully planned for the fullest participation in these activities by the common people, either students or members of the community that the school is truly serving.

FUNCTIONAL PLANNING OF THE AUDITORIUM

The design of the secondary school auditorium should reflect the trend toward increased participation in theatrical productions by amateurs. The design must recognize the function of the auditorium as a center of creative expression for the members of the community, both of school age and adults, rather than as a technically equipped space in which a few specialists perform and the remainder act as passive observers. As a consequence of the shift in use, the shift in emphasis in design must be from the audience areas to the stagecraft laboratories and workshops of which the stage itself is the fulcrum.

Objectives to Be Sought

Cochran [1] has listed certain objectives to be sought in the use of the auditorium which should be helpful to the architect in conceiving of the place of this large unit in the entire school setting. He believes that these things should happen in the school auditorium.

1. LARGE GROUP THINKING

The word "large" is used in order to exclude those groups which function better in smaller spaces. As the movement for public forums and discussion groups grows in this country we may find that the school auditorium is one of democracy's best workshops.

2. EXPRESSION OF THOSE CREATIVE ARTS WHICH MAKE USE OF THE AUDITORIUM

Certain creative arts have traditionally been associated with the theater. Music, drama, and the dance come first to our minds, but we must add to these stage-craft which includes form, color, and lighting.

3. APPRECIATION OF THE ARTS WHICH MAKE USE OF THE AUDITORIUM

We are entering into a period of greater emphasis on audience participation. Devices for registering critical judgment offer opportunities to develop appreciation. In order to establish a more appreciative attitude it may be necessary for us to select with greater care those who are to participate in any given auditorium activity.

[1] Cochran, Blake, "The School Auditorium: A Culture Center," pp. 469-71, *School Executive,* June, 1938.

4. EXPERIENCES WITH MATERIALS USED IN THE TECHNICAL EXECUTION OF AUDITORIUM ACTIVITIES

The stage workshop has become an important part of the modern auditorium. The effective combination of wood, cloth, color, and light offers a magnificent opportunity for purposeful activity.

5. BROADENING AND DEEPENING OF SYMPATHIES AND UNDERSTANDING

While these qualities may rest on an intellectual foundation, they are primarily emotional in operation. Where is there a more subtle yet powerful force for touching the human heart than can be found in drama and music?

6. DEVELOPMENT OF SKILLS IN GROUP LIVING

Here are to be found the qualities of poise, confidence, and self-reliance which are so highly valued by the principals of elementary schools. This offers experiences in group living, in sharing decisions, delegating responsibilities, and working together for a common purpose.

7. PRACTICE IN ORAL AND VISUAL COMMUNICATION OF IDEAS AND IMPRESSIONS

This is concerned with the problem of transmitting ideas and impressions in a vivid and undistorted manner. All of the speech arts come into play here.

8. THE STIMULATION OF CREATIVE THINKING

In a stimulating setting who is to say what each listener shall think as he listens to a Beethoven symphony? It becomes the function of those who design auditoriums and plan programs to minimize distraction and focus the forces so that they will liberate the imagination.

9. EVOCATION OF GRACIOUS LIVING AND MOULDING OF MANNERS

When a young man observes, perhaps for the first time, the courtesies that become a gentleman at the theater or concerts, he acquires a value of gracious living. Good manners and standards of conduct are working principles here and not abstractions.

10. ENJOYMENT OF LEISURE IN AN EFFECTIVE ENVIRONMENT

The auditorium may sometimes furnish an environment in which the individual may retreat from work-a-day cares, and refresh his attitude. Some may call this "escapism," but even that may have a place in a world of conflicting forces.

11. THE EVOLUTION OF LEADERSHIP

Here is meant leadership in its best sense; not the rise of little Caesars, but the proper evaluation of the ideas of those who seem to think and act most effectively.

12. STIMULATION OF DESIRABLE GROUP ATTITUDES

The development of school morale may be furthered in the school auditorium. Religion and patriotism have a place in auditorium activities, but we must beware of those propogandists who take advantage of the malleable quality of a group to further selfish and unworthy ends.

VARIETY OF ACTIVITIES

The auditorium unit, to meet the needs of school and community, must be flexible enough to meet the needs of a variety of activities of equal importance as dramatics. Music plays to a wide audience and is a fruitful means of expression and source of enjoyment. Forum discussions, lectures, demonstrations, and assemblies will take place in the auditorium and provisions must be made for them. Moving pictures and the radio and phonograph are mechanical aids to the educational process and, as such, on occasion are accommodated in the school auditorium.

These activities, on the whole, originate on the stage and the expression is toward the audience. Music, of course, originates in the rehearsal room and the tieup with the stage is not as striking as in the case of dramatics. The theater is bound up with the stage and requires extensive preparation in the stagecraft areas in conjunction with the stage itself before the production is ready. This discussion, for convenience, follows the preparation of the play to the stage itself and then indicates the modifications from that point on which fit the auditorium for its multiple use as a dramatic-musical-discussion center.

THE STAGE IS THE FOCUS OF ALL SUBJECTS

The trend toward amateurization of dramatics has been reflected throughout the modern school curriculum. In the subject areas of English, mathematics, science and social studies it has been found that the theater offers an excellent medium for the

expression of ideas and a means of communicating such ideas to fellow students and members of the community. In addition, a dramatic project offers the opportunity for integration of experiences gained in many areas. The art rooms contribute to the design and painting of scenery, decoration of the stage, and design of costumes. The shops are important in the acquisition of techniques necessary for the construction of the scenery and other items of stage furniture and properties. The home economics area provides skilled hands for cutting and sewing of costumes. Science contributes the knowledge and skill in handling electricity. The library contains stores of information that the research of students will make available to bolster the authenticity of the play or pageant.

CREATIVE DRAMATICS IN THE CLASSROOM

The classroom is the starting point in creative dramatics in the secondary school. Recognition of the value of the dramatic form as a teaching aid, as a medium of creative expression, together with an increase in the use of the techniques of the theater to give point to the problems of the classroom, have led to the inclusion in many modern type rooms of a simple stage. Thus in the classroom will be taken the preliminary steps in the production of the plays upon the specialized stage of the school. In the classroom the play may be written, the cast picked, and rehearsals held. The resources of a stagecraft laboratory and the services of a teacher skilled in the ways of the theater will probably be at the disposal of the students and faculty in solving many of the technical problems that will be encountered in the classroom.

Thus, it is in individual classes that the initial impetus is given to productions in the auditorium center. From the classroom the production can move to an area in which experimentation and planning can correlate the stagecraft aspects of dramatic production with the play itself; a place where costume and scenery, lighting, and direction, under conditions that prevail on the stage, can be integrated with the production.

PLANNING CENTER FOR STAGECRAFT

The coordination of the various activities that comprise a dramatic production requires the provision of suitable spaces designed about the preliminary or back-stage work necessary before the play may be presented before an audience.

Of primary importance in the designing of such supplementary areas is that they be flexible enough to meet a variety of needs and that they have sufficient use to justify the cost of the specialized installation. In a school where a well developed program of dramatics is carried on, and where community use of the auditorium unit is extensive, a separate and specialized planning area for stagecraft may be warranted. Where use is such as to preclude separate installation of a planning center, some appropriate combination of spaces may be developed. The planning and construction area for stagecraft may be combined, or the planning area may be incorporated into a classroom unit, for example, an English laboratory located close to the auditorium unit.

A REHEARSAL STAGE

A simple rehearsal stage is a primary requisite. The provision of such a stage in the stagecraft planning center will allow the use of the room as a little theater for presentation of plays to small groups, for small musical ensembles, or for talks and discussions. Movable seating arrangements should be made and suitable storing space provided for the chairs when they are not in use.

Increased activity of schools in the making of amateur moving pictures and the closeness of this activity to the dramatic field should lead to the inclusion of such activities in the auditorium unit. For this purpose, adaptations may well be made in the planning unit. For the making of motion pictures, a large open floor space and facilities for the control of light are important. The facilities of the auditorium unit, such as the construction area, dressing rooms, and make-up rooms will contribute to the effectiveness of the planning area for such use.

EXPERIMENTATION IN THE PLANNING CENTER

For fundamental instruction and experimental work in the use of light in dramatics, the planning center should provide a small amount of simple equipment and installations. The space should be wired to allow the use of baby spotlights on the stage. Several miniature theaters, preferably constructed by the students in stagecraft, offer an excellent opportunity for trying out, on a small scale, stage designs and lighting effects.

The equipment for the planning center will include conference tables and chairs, work tables for preliminary stage scenery and costume designing, and a library corner for reference books on the practical arts of the theater.

STAGECRAFT WORKSHOP

The extent of the dramatics and moving picture production program will again condition the degree of specialization of the stagecraft workshop. The function of this space is the provision of proper facilities for the construction and painting of stage scenery, and the construction of stage properties. In addition, it may be desirable to make costumes in this area.

If the dramatic program warrants such specialization of space, a stagecraft workshop should be located within the auditorium unit. Ease of access from the stage proper to the scenery construction unit is important. Large doors and corridors of equal size between these two spaces will aid in the movement of scenery and properties. Direct access to the out-of-doors from the workshop and a loading platform bordering on a service driveway are important.

The height of the workshop should be such as to allow for construction and moving about of large scenery flats. Fifteen-foot ceiling heights should be a minimum for at least one section of the shop. Equipment may be simple. Large open floor areas, work benches with suitable small tool equipment, and painting facilities are required. Tool and material storage should be included in the installation. Storage of stage scenery should be possible in the construction area, utilizing an inside wall space or in a nearby space especially designated for this purpose.

Light requirements are similar to those of other shop areas. Because of the nature of the scenery painting, northern orientation is preferred. Artificial light should provide an intensity of illumination at working levels comparable to that required in other shop areas. An exhaust system may be required to remove paint fumes if the natural ventilation is not sufficient for that purpose. An ample number of electrical outlets should be provided.

COSTUME DESIGN AND EXECUTION

The making of costumes may be carried on in the stagecraft workshop or may be included in the function of the homemaking area. If the workshop is used, work tables and chairs should be provided for the cutting and sewing of costumes. Electrical outlets for portable sewing machines will allow installation of simple and inexpensive equipment and, at the same time will provide for greater freedom in the use of equipment.

When the school program does not justify specialization of space to the extent of the provision of a stagecraft workshop, a school general shop can be so designed as to provide many of the facilities of the stagecraft shop, provided that the school shop is located within or adjacent to the auditorium unit. A clear space for scenery construction and added ceiling height in such an open area are the principal adaptations required. Costume design and the making of costumes may then be carried out in the art and home-making units.

With the introduction of construction activities into the auditorium unit, the control of noise emanating from the shop unit becomes of vital importance to the proper functioning of the entire area. The application of sound control materials to the walls and ceilings of the shop unit will be helpful. The placement of a corridor for cross-stage travel, between the rear wall of the stage and the workshop will help to cushion the noise.

PROPERTY ROOM

The inclusion of a storage room designed for the hanging of costumes and the storage of other personal equipment of performers will help in encouraging care of valuable materials. Clothes racks and cabinets with movable shelving are equipment. Stage property as well as stage scenery may be housed here. If this is done the space must be of considerable proportions, located with easy access to the stage, but may be housed in an area that cannot be used for any other purpose.

DRESSING ROOMS, MAKE-UP ROOMS, AND THE GREEN ROOM

Attention must be paid to the provision of dressing-room facilities in connection with the auditorium unit. There is little doubt but that group dressing rooms are superior for amateur use rather than individual dressing rooms. Separate dressing rooms for boys and girls should be provided, and each room should be equipped with suitable toilet and shower facilities. Clothes lockers, chairs, benches, tables, and mirrors should be provided as equipment.

A common make-up room located between the two group dressing rooms is desirable. Benches, a long make-up table against the wall, mirrors, and excellent, shadowless, artificial illumination are necessary. A storage cabinet for make-up materials is helpful. Ease of access from these rooms to the stage must be planned with well-lighted corridors or stairs.

A green room, following the time-honored tradition of the theater, may be found advisable for relaxation between appearances on the stage, for social purposes, and entertainment after performances. Comfortable lounging chairs and tasteful decoration will contribute greatly to its usefulness. Such a room will serve to accommodate speakers or other performers using the stage.

Care should be taken that these spaces be located so that they are easily available for use in connection with similar activities carried on in areas other than the stage. Classroom stages with the accompanying dramatics, the little theater of the planning center, amateur moving picture production in the planning center and elsewhere, plays in the outdoor theater, and outdoor pageants are some of the activities that require the use of dressing room and make-up facilities.

Stage

FUNCTION

The school stage is the projection point for a wide variety of activities that includes many of those most popular with community and school groups. The stage must aid amateurs and, on occasion, professionals to project to an audience the ideas and emotions contained in the play that they are performing and that they may have written. The stage must provide a location on which can be heard and viewed all manner of speakers, members of forum discussions, debaters, visiting lecturers, student speakers, and the like. The stage must, in addition, be so equipped and constructed that a large school or community orchestra, band, or choral group can be comfortably accommodated on it, and so that the music can be carried to every member of the audience clearly and without distortion.

The stage must be flexible enough to accommodate with equal ease and effectiveness a performance, for example, of an operetta with a cast of 100 and a supporting orchestra or the performance of a solo dance with one individual holding the attention of the audience. Similarly, musical groups will vary from an orchestra to an ensemble or a soloist; speakers from a large discussion group with frequent give and take with the audience to a single lecturer. Groups of varying sizes must be planned for and arrangements made to assure the effectiveness of presentation.

The mechanical devices that have been adopted by the schools as teaching aids are often used in the auditorium area. These devices are accepted as permanent equipment and careful attention should be paid to their installations. Radio, silent and sound moving pictures, phonographs, and the school public address system are all an integral part of stage equipment and should be considered in the planning of the stage.

PLANNING

The stage must be planned about the functions that it is being designed to serve. For discussions and lectures, the forestage space is important. Visibility must be good. The carrying of the voices from the stage to the audience area and from all points in the audience area to the stage is important. Provision should be made for the easy installation of portable microphones at this point if the audience area is large enough to warrant it. In large auditoriums it may be advisable to install a movable microphone unit that is designed to pick up voices in the audience and amplify the voice so that the entire audience will be able to hear better the contributions from its own members. Permanent wiring for amplification microphones and the school public address system should be installed at the time the stage is constructed. Outlets of a permanent nature should be flush with the floor and provided with suitable protection for the times that they are not in use.

Large musical groups require, for effective presentation, a large open floor area, suitable movable platforms to provide levels of varying height for different instrument sections, a wide proscenium opening, and good sound reflecting materials to the rear, sides, and possibly above the performers. A stage set may be constructed for use at musicales and concerts to provide the reflecting quality. Often, however, a cyclorama or the permanent draperies are used as a backdrop for performers. For solo and small group work the forestage may be used or the

proscenium narrowed by the use of the stage draperies, teasers, and tormenters. Availability of microphones will add to the effectiveness of small groups if the audience area is large.

When the orchestra is used in conjunction with dramatic presentations, space should be allowed in the audience area before the stage. The orchestra members should not interfere with the sight lines. A slight depression may be necessary to prevent any obstruction to vision. Less desirable, an orchestra pit may be provided. Care should be taken that railings are provided for safety.

Organ chambers are frequently included in high school auditoriums and the planning should be such as not to prevent the subsequent installation of organs if not included in the original equipment. Electrical organs are increasingly in favor because of economy of installation and maintenance.

The close relation of music to the stage indicates the desirability of locating the music unit near or within the auditorium unit. Noise control is essential if this arrangement is to be practicable. Instrument storage should be provided near to the stage. Easy access between the rehearsal room or the instrument room and the stage is important.

Amateur dramatics requires a stage carefully planned for both actors and stagehands in order that the utmost participation can be obtained.

The following indicate some of the points at which attention should be focused: Off-stage space is necessary to the proper functioning of the stage. Recognition of the value of backstage work and the interest it evokes in the school and community population this area serves will result in planning more carefully for the work. The stage has been overemphasized and the backstage given too little recognition in the past. The rear wall of the stage should be unbroken by doors or windows within the sight lines of the audience. The wall may well be used as a cyclorama or as a background for dramatic presentations. The stage box should be free of all dressing and make-up rooms. For circulation purposes some means of back-stage crossover should be provided. If the stage is not deep enough for this purpose when the scenery is set, a circulation corridor behind the rear wall of the stage should be provided. This space also serves to deaden sound coming from adjacent workshops or music rooms. The stage loft is of importance for the hoisting of scenery flats above the sight line of the audience.

One design provides for a stage 25 feet deep and 50 feet wide. It is free from all obstructions, especially small dressing rooms. The proscenium width in this case is 30 feet and its height 20 feet. The height to the gridiron is 49 feet and to the ceiling 56 feet.[2]

The stage should be a self-enclosed unit fully fire-resistive, with kalamein doors. An automatic sprinkler system is desired for the stage and its property rooms. All doors leading into the stage should be down stage. There should be doors on both sides of the stage. Doors should be provided which will make possible the easy transfer of large scenery for off-stage storage.

The floor of the stage is preferably built of soft wood laid on a concrete base. A stage trap door may be arranged which will permit the transfer of property as well as scenery to a storage room below. This frequently may be the only satisfactory method of transfer from stage to store room and vice versa.

Frequently, for the reduction of insurance costs, it will be found that a skylight above the stage will help materially. This tends to keep any fire enclosed within a limited area.

THE GRIDIRON

The upright gridiron type makes for greater safety and for greater accessibility. With heavy installations of curtains, borderlight units, and other scenery a counter-weight system for raising and lowering of scenery may be necessary.

STAGE LIGHTING EQUIPMENT

Lighting equipment is most important in the modern theater. This does not mean that it should be expensive or complicated. For the amateur stage, simplicity and flexibility of installation are the primary criteria in planning for lighting equipment. Baby spotlights, several floodlights, and a switchboard equipped with dimmers are other essentials. All such equipment should be movable and simple in operation. The more experimental theater has dispensed with borders and footlights and substituted baby spotlights supplemented by light from ports in the ceiling of the audience area. Access to lighting ports is gained by means of catwalks over the ceiling of the audience area. Elimination of borders and footlights is recommended for school stages.

[2] Smith, Milton, *The Equipment of the School Theater*, p. 52, New York, Bureau of Publications, Teachers College, Columbia University, 1930.

PINRAIL AND SWITCHBOARD

The stage switchboard and pinrail are preferably elevated and fenced in with locked gates at the approaches. This makes for better control of lighting effects, greater freedom on the stage itself, and safeguarding against injury to valuable equipment.

The switchboard should be planned so that every individual light or series is wired with its own light switch and dimmer. Master switches and dimmers are necessary to black out or dim the entire stage at once. Provision should be made for the curtain control at the switchboard. Telephone and electric buzzer connections with the orchestra, dressing rooms, and moving picture operator are desirable. An adequate number of stage floor plugs should be installed to provide for stage as well as property lighting.

Audience Area

The audience area of the auditorium serves to seat comfortably the audience that has assembled from the school or the community. All too often in the past, this has meant that the area must seat the entire student body of the school or some set portion of the school population, in order that formal assemblies need be duplicated as little as possible. Another determining condition has been the necessity for accommodating large crowds at graduations. Factors relating to relationship between stage and audience and degree of utilization of seating capacity have, infrequently, been considered in determining the number of occupants to be cared for.

The size of the seating area must be determined after careful consideration of the kind of use program it must serve, as well as community facilities already available. In a school system with a large number of schools, an auditorium serving particular areas may be increased in size over what is normally considered desirable if community conditions warrant. In some communities a secondary school may need two or three small audience areas and stages within the auditorium unit. In others the availability of community facilities outside the school will restrict the facilities incorporated in the school plant.

In general, small auditoriums are most desirable and effective. Audience areas capable of seating from 600 to 800 persons are increasingly favored, inasmuch as they are better suited to control by student performers. Such an area may well be supplemented by small theaters seating 200 or 300 persons and served by the same areas that the larger unit draws upon. Careful utilization of space will justify the cost of such installation. Fundamentally, the needs of the community and the school taken in conjunction with the extent and the nature of the program contemplated are the criterion upon which to base the estimate of need for audience areas and stages.

SEATING

The determination of the number of auditorium seats should be on the basis of 7½ to 8 square feet per seat if seats are arranged in straight rows. If arranged in curved rows, an additional square foot per seat is required. In the development of the seating plan the comfort of the audience in hearing and seeing should be the basis of all planning. This means that all posts and pillars are eliminated. The seating, as far as possible, should serve the needs of the patrons. Book racks and hat racks are desirable, and quiet, positive seat action should be sought. All seats should be numbered according to a fixed plan.

A second emphasis has been upon the spectator nature of the audience. With the rise in tide of forum discussions and the increased interest in participation in adult education has come a need for variation in audience seating arrangement to provide greater ease of movement and more opportunity for audience participation in the activities of the unit.[3]

The comfort of the members of the audience is important if the desired effect of a production is to be assured. Comfortable chairs should be provided. Sufficient room between rows of chairs will allow travel to and from seats without requiring those already seated to arise and, at the same time, will make for greater comfort.

Aisles should be wide, free from obstructions or steps, and dimly lighted by permanent aisle fixtures. Travel lines should lead up aisles of the audience area, straight through doors placed directly in line of travel, through intervening lobbies or other space directly to the outside. The audience

[3] Engelhardt, N. L., and Engelhardt, Jr., N. L., *Planning the Community School*, pp. 25-31, New York, American Book Co., 1940.

area should be at ground level and no stairs should intervene between the audience area and the out-of-doors.

The audience area should slope from the rear toward the stage. Balconies are preferably eliminated. Whereas balconies are acceptable for dramatic purposes, for discussions and for similar purposes the isolation of the balcony tends to defeat the purposes of the meeting. The last rows of the audience area may be elevated at a more rapid rate than the slope of the audience area floor. Exit from these seats will be down ramps to the corridor or travel lines and hence out. If a balcony is required no more than 20 percent of the entire auditorium capacity should be seated here. The balcony should be planned with the avoidance of irregularities in risers and treads which may tend to cause accidents. Ample protection should be provided against falling at the front of the balcony without, at the same time, obstructing the view. The best planning does not provide for complete separation of the audience by an ill-conceived balcony.

The plan of exit from the audience area, to be used in case of danger, should be carefully worked out. It should be borne in mind that the auditorium will bring together the largest group housed in the school. The ideal for exits should be that every patron will instinctively find the exit intended for him in case of an emergency because of the frequency of exits and the ease with which they may be approached.

ILLUMINATION OF AUDIENCE ROOM

Some school administrators have expressed a preference for auditoriums with no natural lighting. This desire is furthered because of the increased use of the auditorium for motion pictures, as well as day-time productions, and the difficulty of excluding natural light in the day-time. Where air-conditioning is provided, there can be no objection to this plan of auditorium construction. Most schools, however, will not have air-conditioning and, therefore, will have the advantage of both natural and artificial lighting. Automatic controls for darkening windows, operable from a central point, are desirable. The utmost of care must be taken with every minor detail in the exclusion of daylight because there is no greater annoyance than to have the lack of planning interfere with proper daylight production.

Skylighting of the auditorium can and should usually be avoided in order to control light.

In the artificial lighting of the audience room an indirect lighting plan is preferred. The reading of programs or notices should be made possible for every patron at his seat. Thus, 8 to 12 foot candles will be desirable at the reading plane. Provision must be made for dimming out all artificial lights in the auditorium while maintaining full lighting facilities in the auxiliary rooms, foyer, corridors, and stairways. The penetration of light from these areas into the audience room must be guarded against. House lights should be controlled from the stage, from the motion picture booth, or from a point near the main exit.

Special exit lighting must be provided at all points of exit and provision should be made for lighting the instrument stations for the orchestra, as well as the station of the moving picture operator.

MATERIALS OF CONSTRUCTION

The primary requisite in all construction is fire-resistiveness of all materials. The planning should follow local building codes and fire laws. All exit doors should be provided with easily operable panic bolts and fire exit signs should be discernible from any and all parts of the audience chamber.

The aisle coverings should prevent noise in travel, and the walls and ceilings should be treated acoustically. It should be recognized that the complete absorption of sound may destroy auditorium effects as well as result in the failure to control sound.

LOBBY AND RELATED AREAS

The lobby is the center of a group of audience service activities. The lobby serves as the "living room" or special area of the more formal audience space. It is a place for relaxation, social intercourse, and furtherance of pleasant school and community relationships. Comfortable furnishings and tasteful decoration of the space are important in setting the atmosphere for its activities. Exhibition space adjacent to the lobby or integrated with the lobby will serve as an outlet for expression in other arts and will aid in developing school and community relations.

Rest rooms for men and women should be available from the lobby. A drinking fountain should be located in the lobby. A box office and a cloak room are other necessary spaces if this unit is to serve adequately the needs of its users. The box office is

preferably located in the lobby where there is a minimum of interference with the passage of groups. The standards followed should be those of the regular theater box office, with spaces for cash register, ticket rolls, and racks. Classrooms, if in close proximity, may frequently be used as cloakrooms, but care should be taken to provide storage place for the coat racks.

A foyer bulletin board for the announcement of events should be a part of the original planning. An illuminated bulletin board out near the public entrance may also be considered a desirable phase of planning.

Close integration of design with the out-of-doors will allow for outdoor gardens as annexes to the main lobby and use of the service facilities in connection with the outdoor theater.

Audio-Visual Equipment

The planning should provide for the use of 16mm. sound motion picture equipment. The machine in such a case is frequently placed in the center of the audience chamber. Electrical connections are needed. The use of a booth is required for 35 mm. equipment. Emphasis today is upon the use of the 16 mm. film and, hence, many schools may not need an operator's booth. If such a booth is to be planned, the following standards will be helpful.

OPERATORS' ROOMS

Moving picture booths should be constructed of fireproof materials and should be well ventilated. Concrete, brick, or wood sheathing, covered with No. 26 gauge galvanized iron, lock-seamed for wall, floor, and ceiling, may be used. All doors, door frames, and shutters should be of metal, or metal covered. Shutters for the rays should be suspended by cotton strings attached to counterweights, so that a flash of fire would burn the strings, thus allowing the shutters to close tightly. All doors to the booth should close automatically and should be kept closed during a performance. A metal film box, which can be tightly closed, should be provided to store films. The booth should have a fireproof vent flue with a cross-section area of at least 50 square inches. This would be located directly above the machine and should lead directly to the outside. A fireproof inlet which will allow for 30 cubic feet of air per minute should also be provided for ventilation. A signal button and buzzer in the booth and on the stage should be provided for signaling purposes. An intercommunication telephone between stage and booth is desirable.

The following dimensions give working limits, but local city or state ordinances may require greater limits:

For two projectors only, a booth 10 feet long parallel to the screen, 10 feet deep and 7½ feet high; or 12 feet long, 7 feet deep, and 7½ feet high is required. If a spotlight, rewind bench, motor-generator set, or any additional equipment is required in the booth, sufficient space over the dimensions noted should be provided.

Projection portholes should be provided as follows:

Projection Angle	Height to Center of Portholes from Booth Floor
0°	47⅝ inches
5° below horizontal	45½ inches
10° below horizontal	42¾ inches
15° below horizontal	41½ inches
20° below horizontal	38⅞ inches

It is recommended that the projectors be spaced 54 inches apart. The minimum allowable distance is 51 inches. A distance of 30 inches is desirable between the center of the left projector and the nearest obstruction on the left. The minimum allowable distance is 24 inches. A distance of 36 inches is desirable from the center of the right-hand projector to the nearest obstruction on the right. The minimum allowable distance is 30 inches.

The floor of the booth should be of rigid construction, so that there will be no appreciable vibration. Projection machines equipped for sound reproduction may weigh approximately 1,500 pounds.

A space 3 feet wide should be available on the rear wall if the booth is 10 feet deep, or on the side wall (preferably left side) if the booth is 7 feet deep, for mounting the amplifier equipment.

Sound Generator Room

A space 6′ x 4′ x 7⅓′ high, or 5′ x 5′ x 7½′ high, is required adjacent to, or within a distance not exceeding 30 feet from, the booth for the low voltage sound generator set. Suitable ventilation should be provided in this space.

Rewind Room

If local ordinances require the film rewinding to be done outside the booth, a space 6′ x 4′ x 6′ high, minimum, should be provided adjacent to the booth.

STEREOPTICON EQUIPMENT

This should be a separate unit from picture machines.

TALKING AND SILENT PICTURE PROJECTION APPARATUS

(1) A perforated fireproof screen that will give the maximum of light reflection and sound transmission should be provided. This type of screen can be used also for the projection of stereopticon slides and silent pictures.
(2) Provision for darkening the windows.
(3) Acoustics

The auditorium should be satisfactory as to size, shape, and finishing surfaces, so as to insure ideal acoustic conditions for reproducing speech and music.

Instruction in the high school in the operating of moving picture machines and in the repair of films and equipment, as well as in the management of the visualization equipment, constitute a desirable part of the teaching process. If an operator's room is planned it should be thought of as a learning laboratory for students as well as an operating room for the films themselves.

Relation of the Auditorium Unit to the Secondary School Plant

The auditorium unit is a center for expression in various media. It draws upon the resources of the entire school. Its work is allied closely with that of the classrooms and areas throughout the building. At the same time, it is a center requiring a degree of isolation for concentrated work and effect. It serves a community and is one of the most popular and best utilized areas in this respect.

As a result, the auditorium unit should have its individuality as a section of the school building's contribution to education, at the same time serving the entire building in many ways. About the unit should be grouped those spaces devoted to drama, speech arts, music, the fine arts, and the dance. Direct access should be provided from the school to the various areas of the auditorium unit without disturbing any other area of the unit. With the increase in importance and utilization of the back stage areas will come an increase in traffic to those spaces. In addition, the school must have easy access to the audience area. The community must have easy access to the audience area and to the shop areas at the same time. This requires that the auditorium be located on the ground level and perhaps at the point of greatest community focus.

Provision must be made for the functioning of the auditorium separately from the remainder of the building. Collapsible iron gates reaching from floor to ceiling, recessed in the wall when folded, should be planned across corridors at strategic points. All service facilities, such as lighting, heating, and ventilating, should be planned to operate separately from the auditorium unit. The personal service facilities, such as toilets, wash rooms, and cloakrooms, should be planned for the dual use of the entire school as well as the auditorium, but should be so located that they may be segregated from the rest of the school.

The facilities of the auditorium unit, if properly planned, will prove an endless resource of community and school education and a tremendous stimulation to the development of a program vital and pulsating in the life of young and old. The educational and cultural load placed upon the auditorium precludes its being used also as a gymnasium. No planning has been successful to date in housing the needs of the physical education program and of the auditorium program in the same place. A school can adequately advance the interests of both of these programs only as separate units are provided.

General Characteristics of Auditorium Location and Planning

LOCATION AND ACCESSIBILITY

Typed diagrams represent some of the possible relationships of the auditorium space to the main block of the school building. Type *A* shows the location on a wing with direct accessibility of the auditorium from the out-of-doors and with easy approach to the stage and of planning the auxiliary rooms essential for proper stage development. This is one of the most satisfactory locations of the auditorium from all points of view.

Type *B* presents a very satisfactory location. A corridor running alongside of the auditorium makes

for accessibility to stage and any large spaces that may be planned thereabouts.

Type *C* is a variation of *B*. Type *D* presents distinct advantages in auditorium use although accessibility to the stage may be closed off in subsequent planning and the auditorium is not readily segregated from the remainder of the building for distinctive community use.

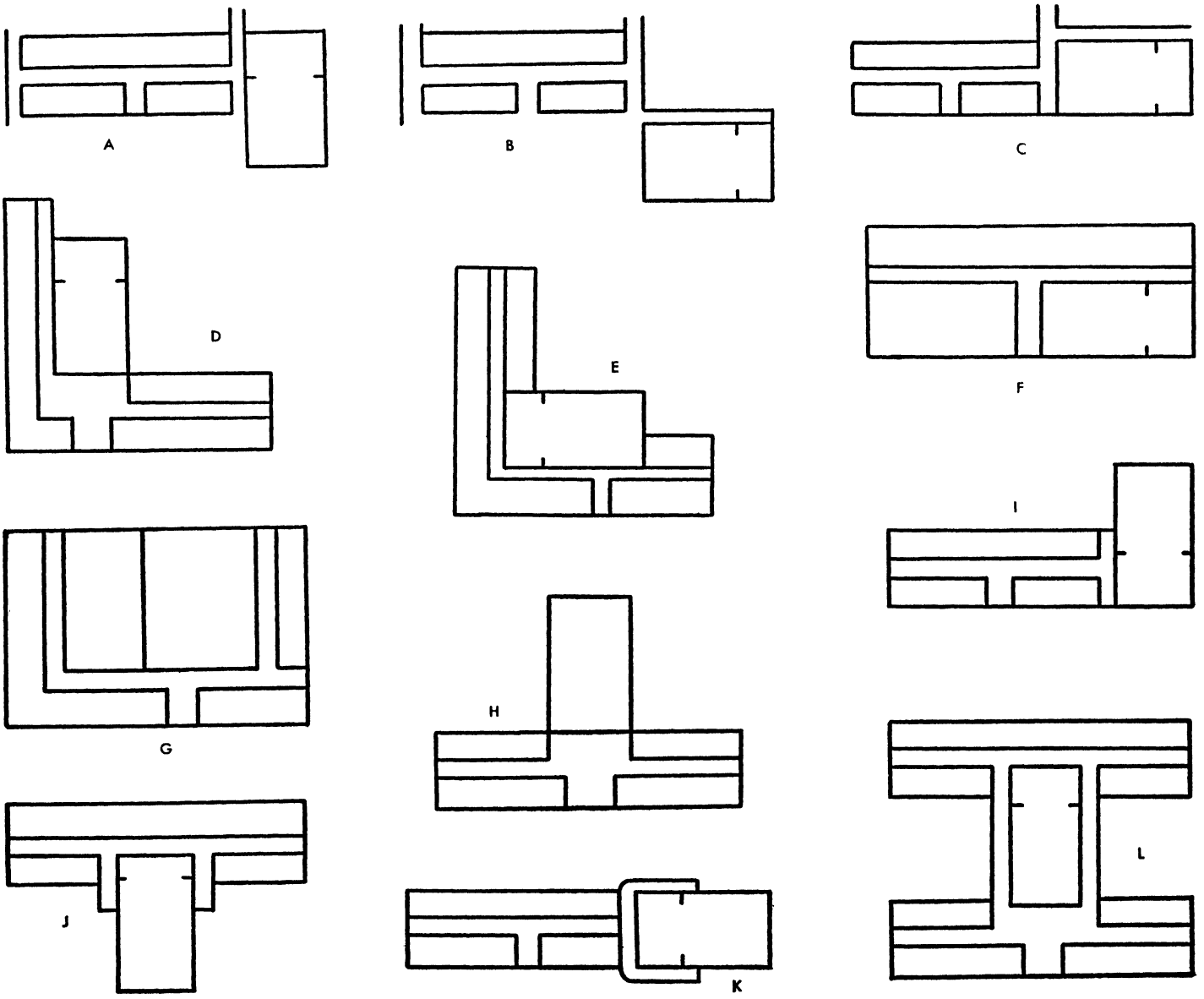
Type *E* is a less satisfactory development of *D*. Type *F* has a corridor between the gymnasium and auditorium that may act as a buffer for sound. Type *F* can be made into a very satisfactory plan.

Type *G*, with auditorium and gymnasium adjoining in the heart of the building, has little to commend it. Type *H*, with the stage remote from the main structure, makes for an unsatisfactory unit. Type *I*, with a stage to the front of the building, is usually not satisfactory.

Types *J* and *K*, with a stage in the heart of the building, present some difficulties in the transfer of the audience group from the building proper to the audience chamber and in the handling of stage equipment.

Type *L* is located on the criterion that the auditorium must be equally accessible from all parts of the building. This may aid in the dispersal of groups that use the auditorium, but this location has none of the advantages of an auditorium located on the wing of the building and offers, on the other hand, many disadvantages as it determines to too large a degree the very character of the building.

Type *M* is a campus type, with the auditorium a separate unit as in the case of college plans. This type will prove very satisfactory for a community secondary school offering all of the advantages of a regional educational center.



CHAPTER 9: the school library

The scope of library service has been rapidly expanded for secondary schools in recent years. Library comes from the Latin word "liber"—meaning "book." But the modern secondary school library deals with more than books. It makes provision for using all of the media of learning and administers the program by which such media become readily accessible when the demand is made.

Under instructional programs where a textbook in a subject satisfied in large measure the reading requirements of a student, the librarian's role was limited. In modern schools, where frequent reference to many books is encouraged and the class textbook plays a limited part in promoting the learning process, the library itself becomes a very pronounced focus of school service. It may be the center around which a large part of the school is planned.

INTEGRATION WITH COMMUNITY LIFE

The program of the school library may also be well integrated with many community activities. These may be forums, reading clubs, individual and group research interests, and activities centering around motion pictures, hobby clubs, public relations, or other group interests. The school library may be intimately associated with the museum interests of the community. Display cases and bulletin boards may frequently serve for all types of exhibits representing skills or historical interests of the community.

The library provides for adult needs. With the extension of adult education programs and the community emphasis upon rehabilitation and vocational readjustment, there is need for an adult center for browsing and the maintenance of contact with the most recently published books in various fields. The public library may provide the facilities for these purposes. Very frequently, however, the high school will supplement the public library, or the public library and the high school library may be planned jointly at the school community center. The library should then be arranged so as to be readily accessible to adults as well as students of the school. Provision should be made for small informal discussion groups without interfering with library study, and the facilities should be planned to invite browsing and other extensive use of the library.

THE LIBRARY AS A TRAINING CENTER

The library should not only be a place where books and other materials are made available to students, but it should be thought of as one of the guidance agencies and training agencies of the school. In every school there are individuals who would profit from instruction in the care of books, cataloging, indexing, as well as in their repair. Students are also interested in learning the technique of bibliography making and the classification and arrangement of books, and of learning the history of book-making and the place of books in industry, government, research, and in the other activities of man. Certain general training covering these problems is usually given by the librarian to all students in the school. The planning of the library spaces should be such that consideration is given to the service that the library may render as a training center. For instance, the librarian's work

room should be suffciently large so that a number of assistants may be housed there. The library classroom can also be planned to contribute to the training and guiding facilities.

SUPPLEMENTARY LIBRARY FACILITIES

In addition to the central library provisions various departments or activities in the school will desire library facilities in close juxtaposition to the work being carried on. The books and materials used in this way will be changed frequently but will be under the control of the library itself. Bookmobiles, carrying displays of recent books and other educational materials, may also be used in taking library facilities to other parts of the school and in encouraging extensive use of books and other educational literature. The spirit of library work and service must be present throughout the secondary school plant. Any planning which can contribute to that end will enhance the educational advantages of the building.

VARIED SCHOOL USE OF THE LIBRARY

In some particulars the library differs from all the other rooms used in the secondary school. The individual who comes to the library at the beginning of a period may not stay through the entire period. Groups, either under teacher guidance or selected representatives from classes, may meet in the library for conference or research. An entire class may be brought to the library to be shown the location and sources of references. Individuals, as well as groups, may be given instruction in the use of the library. Some groups may be developing a program for class instruction and may wish to have access to the museum specimens, mounted pictures, musical records, slides, or other visual aids. A committee of parents may desire to use professional books on topics relating to home and school. Debating clubs and hobby clubs may seek guidance and advice at the library.

The list of services is constantly being supplemented. The planning must be truly functional so as to meet the demands of a reference study hall, a general reading room, an art center, a research unit, and a creative laboratory.

ARCHITECT'S UNDERSTANDING OF LIBRARY FUNCTIONS

Every school has its own particular idea about the library and the work it does. The architect must not attempt to plan the library without getting firsthand and intimate contact with the library service in the old school that is to be replaced, or having a full discussion with the librarian and principal of the school that is being planned. Library service is designed to aid teachers to teach as well as students to learn. It must provide for frequent teacher conferences. There must be simplification of library use and the equipment and planning must assist to that end. Displays within and adjacent to the library may call attention to new books and reviews. A regular plan of library display throughout all corridors may be a desirable element in planning. Arrangements within the library should promote ease of access to materials, the segregation of materials centering about a common interest, and ready attraction to displays and exhibits.

The architect, before initiating library planning, will find it advantageous to read *The Library in the School* [1] and *School Libraries for Today and Tomorrow.*[2]

ARCHITECTS SHOULD STUDY CHARACTER OF SCHOOL LIBRARY MATERIALS

The library is designed to house various types of materials and the individuals and groups who are desirous of using these materials. If the library is planned so that difficulty is encountered in its use, it will serve less adequately than if it is so planned that satisfaction is universally expressed in the use of materials.

Library materials include books on many different subjects, dictionaries and encyclopedias; standard catalogs, directories and, "Who's Who's" of various kinds; newspapers, periodical magazines, and trade journals, perhaps 100 to 150 in number; collections of pamphlets, bulletins, clippings, and pictures, files of slides, films, models, maps, and charts, many of which are provided for in vertical files and have substantial indexes; paintings and other art specimens for the adornment of walls, cabinets, or mantels; and museum materials associated with the science or some other department of the school.

CAPACITY OF LIBRARY

Many factors determine the required capacity of a school library. If study halls are being planned

[1] Fargo, Lucile F., *The Library in the School,* Chicago, American Library Association, 1939.

[2] American Library Association, *School Libraries for Today and Tomorrow,* Chicago, The Association, 1945.

to care for large groups of students each period, the library capacity can be reduced. Such a study hall practically requires greater reliance upon a single textbook since in the study hall most of the reference materials cannot be provided. The library capacity also depends upon the length of the school day, the number of class periods, and the number of classes assigned to each student. If there are seven or eight class periods per day, and each student is in class but four periods a day, the load on the library will be much heavier than would be true in schools with a lesser number of class periods per day. If teachers are not encouraged to take their students, or to send committees from their classes to the library, the load upon the library will not be as heavy as would otherwise result. If all library responsibilities are lodged in a librarian, without any provision for assistance, it is clear that the library size must be less, for then the school will not be able to carry out all of the desired library functions.

No high school should be planned with such a small enrollment that it will not need a library for at least a capacity of 50, and no library capacity should be less than 10 percent of the total enrollment. Percentage figures of this kind are, however, deceptive because the library is constantly taking on new functions and should not be planned in such a restricted manner as to prevent the fulfillment of all desirable functions. In a school of 1,250 pupils it ought not to be unreasonable to have a library that will house 250 students. Study halls would be eliminated in the planning and true learning functions would be stressed.

Library planning can be such that extensions are readily made into adjoining rooms. In past planning it is clear that of all the rooms that have needed extension, the library ranks foremonst.

MAIN LIBRARY ROOM AND AUXILIARY SPACES

The main reading room forms the center of library planning. Auxiliary rooms include a librarian's work room, conference rooms for pupils and teachers, library classroom, stack room and film library storage, and storage room. The number and size of these rooms will vary with the size of the school. It is also clear that in some schools more spaces than those listed here will be needed. The library may desire to have associated with it the community historical museum. Art display centers may be wanted because of the instructional emphasis in the school and community upon arts or crafts. Inasmuch as the library is one of the most important rooms in the building, the emphasis upon community achievement should be encouraged in spaces which are associated with this center of learning.

Table 1 lists the minimum space needs for libraries of schools of various sizes.

TABLE 1. Minimum Rooms Needed for a Library

Maximum Building Capacity	Reading Room	Work Room	Conference Room	Library Classroom
300– 500	1	(1 combined)		
500– 700	1	1	1	
700–1,000	1	1	2	1
1,000–2,000	1–2	1	3	1

LOCATION OF THE LIBRARY

The first consideration in the location must be given community use. It is far more preferable to have the students walk to the first floor than to have members of the community hesitate in the use of the library because it happens to be upon an upper floor. Centrality of location, remoteness from noise sources, and orientation which add to the attractiveness and usefulness of the library are criteria to be borne in mind.

The library should not be remotely located. There are advantages in having it so located that people who use it may also have ready access to the administrative suites. There is also gain if student activities, such as the school newspaper or magazine, dramatic club, and similar organizations, can be located so that ready access is afforded to library facilities.

GENERAL READING ROOM

Because of the size of this room it may need more than classroom height. Opportunity is thus frequently afforded for creating a room atmosphere which is definitely outstanding among the rooms of the building. The height may also make possible mezzanine planning of alcoves, conference spaces, and reading spaces. Entrances should be so planned that there is a minimum of confusion at these points. In schools having enrollments in the neighborhood of 1500 to 2000 students it may prove desirable to provide more than one reading room in order to preserve the informality of the spaces and to reduce the number of students to be served in one room. Such increase in number of reading rooms will reduce the possibility of producing monumental

rooms in place of work spaces. The large number of occupants of the rooms requires special attention to exits. It adds to the attractiveness of the library if partition walls between corridor and library, especially at entrances, permit a view through the library.

Sound absorbing materials should be used on walls and floors as it is desirable that the library be quiet at all times. The floor may be covered with battleship linoleum, cork carpet, cork tile, asphalt tile, or rubber tile. The ceiling should be made thoroughly sound absorbent.

The high school library should be one of the most attractive rooms in the community which the high school serves. Its decorations should be in keeping with the service to be rendered. The general library effect secured in the planning may well be reflected subsequently in the planning of homes in the community. The color scheme followed through the library decorations should make for a light, cheerful, pleasant room. The character of the murals, friezes, and appropriate paintings should be given consideration in the original planning.

BOOK-CENTERED PLANNING

Since books form the large part of the library content, planning should center around the number of books that are desired. A minimum of five books per pupil is essential in any school library. The average school library, however, provides in the neighborhood of ten books per student while in the exceptional school this figure runs as high as twenty. Thus the book capacity of a school for 2,000 may run considerably over the minimum of 10,000 volumes. Original planning will make actual provision for the books in such terms that they are readily accessible to readers as well as to groups interested in particular areas of study.

The minimum requirements for books and shelving are shown in Table 2. Careful planning will require in many cases that minimum standards be exceeded in order that future needs for seating spaces and shelving may be met.

Shelving should not be in excess of 7 feet in height. Most shelves are preferably 8 inches deep. A limited proportion of shelving will be 12 inches deep to care for the larger books and magazines. Librarians prefer shelving without projections so that ready access is had to books themselves. Where thousands of books are being handled each day, the architect will make the library more useful if he will adhere distinctly to the experience of librarians in the details of shelving and equipment.

TABLE 2. School Library Planning Chart[1]

Size of School	Minimum Seating Capacity	Minimum Floor Area at 25 sq. ft. per Reader	Minimum Volume Capacity	Minimum Shelving Footage
200	Largest class group plus 20	1,375	2,000	250
500	75	1,875	5,000	625
1,000	100	2,500	7,000	875
2,000	200	5,000[2]	10,000	1,250

[1] Adapted from American Library Association *School Libraries for Today and Tomorrow*, Chicago, The Association, 1945.
[2] More than one general reading room may be desired.

ESSENTIAL EQUIPMENT

The main equipment of the library consists of charging desk, tables and chairs for library patrons, librarian's work desk, catalog cases, book trucks, stands for dictionary, atlas and large reference books, bulletin boards, newspaper and magazine racks and filing cases. Other equipment should include display cases, wastebaskets, globes, pictures, files for lantern slides, and illustrative materials. The library is essentially a workshop and provision must be made for this equipment if adequate service is to result. The library which also has provision for an appreciation corner where there may be displayed the unusual or the latest in textiles or pictures, in books, photography, posters, or decorative art, is incidentally contributing to desirable learning.

DETAILS OF EQUIPMENT

Student tables are preferably 29 to 30 inches high, 34 to 36 inches wide, and 5 to 7 feet 6 inches long. The five-foot tables seat 6 people with two on each side and one at each end. Round tables preferably have a diameter of 4 feet. The high school chairs are 18 inches high and carry substantially built-in metal lead gliders. The charging desk will vary with the size of the school and the number of librarian workers. It is preferably "U" shaped, with provisions for charging trays, cash drawer, slots for the receipt of book cards, and storage spaces for

returned books located on the inner or working side of the desk. Sectional charging desks are commercially available. Reference stands for dictionary and other large books have a sloping top and, for high schools, are 41 inches high at the front and 44 inches at the back. The width will depend upon the number of patrons to be served at one time. The magazine racks may be built in alongside of the walls, or may stand free. A three-foot width is standard. The catalog cabinet can come in any size desired.

In planning a large school, the details of the number of cards needed, and the size of file necessary, should be carefully studied before final decisions on library dimensions are made. Book trucks may be used within the library and also throughout the school. The storage of these trucks when not in use should be within the library work room. Such trucks may be approximately 43 inches high, 40 inches long, and 15 inches wide.

LIBRARIAN'S OFFICE AND WORK ROOM

In the very large school there may be two rooms for this purpose, a small office room with a desk, studio couch, typewriter, telephone, filing cabinet, and chairs. In the smaller school these provisions will be included either in the library itself or in the librarian's work room. The central piece of equipment in the work room should be a work table around which several individuals may be employed in the mending of books. A sink with hot and cold water is essential equipment. The walls should be lined with shelving, preferably with covered space below. Doors should connect the work room with the library as well as the corridor. The work room should be the place to which all mail and express are delivered. This will include large packages. A special mail box should be provided with direct connections with the corridor. It may also be desirous to use the work room as a try-out for certain kinds of films and, therefore, electrical connections are necessary.

CONFERENCE ROOMS

Conference rooms designed for teachers, students, and adult groups should adjoin the main library. Some of them may be merely alcoves; others may be separate rooms cut off entirely from the main reading room but with glass partitions. The equipment of these rooms should consist of a large table and chairs to accommodate at least 15. Only a limited amount of shelving is necessary. A small blackboard section, as well as a bulletin board, will be helpful.

LIBRARY CLASSROOM

Such a classroom may directly adjoin the library and may, in fact, be an enlarged conference room. It should be planned with work tables and chairs and should care for from 30 to 50 workers. It should be equipped for motion pictures, slides, and other mechanical means of reproduction. A blackboard across the front of the room, with bulletin board predominating on the other walls, will make this room one used for special displays.

STACK ROOM AND FILM LIBRARY

A stack room is necessary if the library is responsible for the distribution of free textbooks throughout the school. Its size will depend upon the numbers and kinds of textbooks which are distributed. The planning for such a stack room must be an individual matter for each school. If the school holds the library responsible for all instructional materials, this stack room will take on the dimensions of considerable proportions. Sometimes a small stack room is needed in connection with the library which does not handle free textbooks. This can be a room in which metal shelving is used and in which there is a concentration of materials infrequently used.

A desirable film storage has become essential in every modern school. Today 16 mm. non-inflammable films predominate. Their storage should be provided for in a room where machines also may be stored and repaired. Schools with limited film storage space will find that the increasing use of films will create the need for an expansion of this space. In some cases a work room at basement level may be available for this film storage. This room may also serve as a supplementary repair and general storage room. It should have a lift or dumbwaiter connection with the librarian's work room. In special cases this room may also serve as a general receiving room for books and may house the mimeographing unit which takes care of the library's needs.

MUSEUM ROOM

This room may be in close proximity to the

library, or may directly adjoin it. It may take on the characteristics of a corridor alcove. It is used for the systematic display of historical articles, relics, maps, exhibits, charts, pictures, posters, scientific materials, and other collections of value to the community and school. The room may be developed both for display as well as for conference purposes. It may be the center of a student community historical society, or similar organization.

CHECK ROOM AND TELEPHONE BOOTH

If the library is planned for extensive adult and community use, certain service facilities such as public telephones and checking space may be required. Toilet provisions may also have to be made. It is preferred that all of these facilities be planned jointly with other rooms which serve similar community purpose. Library use should, however, not be curtailed because of failure to make provisions for these needs in the school.

NATURAL AND ARTIFICIAL LIGHTING

The general reading room should be one of the best lighted rooms in the building. Architecturally the general character of the library usually lends itself to good natural lighting. Care should be taken in the installation of windows so that wall space essential for book storage is not used up. The ratio of 20 to 25 percent of window area to floor area should be followed for the most effective and beneficial lighting. The artificial lighting of the general room should be from the ceiling. The entire room should be flooded with light so that shadows are reduced to a minimum. Table lights are desirable only at special points where nooks or special seating provisions make for coziness and comfort.

CHAPTER 10: indoor physical education and recreation spaces

Increasingly, modern American secondary schools are conscious of sports for all. Vigorous exercise, the joy of team play, and comfortable relaxation with fellow students after tiring play are aspects of a good physical program for adolescents that all who are physically able should and do enjoy. Modern living for many young people, particularly in urban areas, does not offer too many opportunities to get really tired as a result of physical exercise. At the same time that the school offers a balanced program of sports for all, attention is given to increasing sharply the number and variety of games for which students in the course of their education will acquire necessary skills and a reasonable degree of competence. It is hoped, of course, that a good recreation program will have to carry over into adult life and that by acquiring skills in school in games that are suitable for adults, additional impetus will have been given to greater individual interest in worthwhile and health-giving recreational activities.

Along with the large muscle exercise and skills in games, physical education has major contributions to make the growth of students in the areas of character development, sportsmanship, ability to work together, and ability to get along with one another.

Most secondary schools carry on extensive programs of interschool athletic contests. In many cases several varsity teams are maintained in each sport. The number of sports in which interschool competitions are held is increasing. Lacrosse, soccer, six-man football, swimming, golf, archery, tennis, badminton, and handball have important places in the sports schedules as well as football, baseball, basketball, and track.

A thriving intramural sports program is a sign of a vigorous physical education program that is reaching a significant portion of the student body. For girls, the intramural program is particularly significant since interschool contests for girls are rather generally limited. In addition, social dancing and the other more specialized forms of the dance add another facet to the all round program.

To adults of the community, the indoor recreation spaces have great appeal. For the younger adult, those who recently were full time secondary school students, no great changes from the high school program will be noted in the types of activities in which they want to engage. Older adults will generally avoid the more strenuous games yet for them a wide and varied indoor recreation program can be offered.

The architect in planning indoor game spaces will give recognition in his sketches and drawings to:

1. A far larger proportion of the student body participating actively in a games program.
2. A wider diversification of offering of games.
3. The teaching of game skills having recreational value in adult life.
4. The varied interest of the adults of the community in the school's facilities available for recreational purposes.

The indoor physical education and recreational

facilities will vary widely in accordance with the school and community program. In this area, planning for facilities should proceed on a highly individualized basis. The pooling of thinking of staff, community representatives, administrative personnel and architect is a procedure that will best assure spaces and equipment that will contribute most effectively to the efficient performance of the task set for the modern secondary school.

Bookwalter [1] has listed the following principles in connection with planning facilities for the health and physical education program.

1. Facilities should be conveniently located.
2. Facilities should be attractive and inspire appreciative treatment.
3. Related areas and groups should be in a functionally related unit or department.
4. Expenditure of money, time, and energy for the construction, use, and maintenance of health and physical education plant should be kept as low as is compatible with effective instruction and with maximum wholesome participation.
5. Increase or change in the activities offered should be readily and economically feasible.
6. The elimination of odors, noises, and moisture; the segregation of activity groups; and the exclusion of undesirable persons should be automatic and effective.
7. Consideration must be given to safety, hygiene, and sanitation in the provision, arrangement, and maintenance of facilities.
8. The oversight, control, and management of activities and groups will be facilitated by visability.
9. Adaptability of areas to multiple use enhances their utility.
10. Facilities must be in accord with curricular needs, scientific facts, legal requirements, and interscholastic sports rules.

GAME REQUIREMENTS

The following sports and accompanying playing court dimensions [2] are listed as an indication of the functional bases for the planning of physical education facilities. Proper planning will proceed on the basis of sports program, total number of participants in relation to the participants at one time multiplied by the number of play periods planned in arriving at needed floor areas and play facilities.

Archery Range—minimum length is 30 yards, regulation range 150 yards.

Badminton—28 feet by 56 feet by 25 feet.

Basketball—Men—35 feet by 60 feet to 50 feet by 94 feet.

Women—maximum size 45 feet by 90 feet. 10 feet clearance on all sides of playing court.

Bowling—8 feet, 3 inches by 88 feet for each alley. 7½ feet minimum ceiling height.

Billiards and Pool—5′6″ by 10′2″ with 6′ clearance on all sides.

Golf driving—20 feet square by 15 feet high, enclosed in net.

Croquet—30 feet by 60 feet with dirt or turf playing surface.

Deck Tennis—Doubles court is 18 feet by 40 feet.

Handball—20 feet wide by 34 feet long by 16 feet high.

Shuffleboard—6 feet wide by 52 feet long.

Softball— 60 feet between bases; 250 sq. ft. for outfield is desirable. Largest available space may be used.

Squash Racquets—Doubles, 25 feet by 45 feet by 22 feet.

Volleyball—30 feet by 60 feet.

Table Tennis—2 tables need space 13 feet by 42 feet or 23 feet by 24 feet.

SPACE REQUIREMENTS

A well balanced physical education program will require ample clear floor area. This may be either of field house or gymnasium type. In schools of from 500 to 1000 students, two separate play areas, one for boys and one for girls will be desirable. These may be provided in a field house or a large gymnasium, either of which may be separated by folding or sliding partitions or in separate gymnasiums. In larger schools a field house supplemented by two or more gymnasiums may be needed. Variations from these suggestions may be in the direction of providing banks of handball or other courts, and game rooms for ping pong, billiards, and pool. Swimming pools, although expensive, are extremely popular both with school and community groups and should be included where possible.

[1] Bookwalter, Karl W., "Planning Health, Physical Education and Recreation Facilities for Public Schools and Colleges," *American School and University*, 1946, pp. 177-183.

[2] Adapted from Engelhardt, N. L., and Engelhardt, N. L., Jr., *"Planning the Community School,"* New York, American Book Company, 1940, pp. 51-53.

PLANNING THE FIELD HOUSE

Relatively few secondary schools have as yet taken advantage of the low cost per cubic foot usually characteristic of field house construction with the resulting opportunity of greatly increasing the indoor area available for recreation as well as a variety of other uses.

Field house construction provides large unobstructed floor area. Such spaces are easily adaptable to a variety of uses, particularly if a stage is located at one end of the structure. Floors are often a mixture of clay, sand, and sawdust. Softball, archery, croquet, indoor tennis, horseshoe pitching, quoits, and golf practice are particularly well served in such a space. For tennis and basketball, portable wooden floors are needed. If sufficient space is available a permanent wooden flooring for those two sports may be installed.

The field house is particularly adaptable to large audience situations, community fairs and exhibits, and other functions requiring a large area. The availability of a field house in the school plant may be particularly desirable if no large assembly area exists in the community.

THE COMBINATION AUDITORIUM-GYMNASIUM

For reasons of economy, combination auditorium-gymnasiums have frequently been planned as a part of high school buildings. Superintendents and principals quite generally are agreed that such combinations can be justified neither from the functional nor the administrative point of view. It is a physical impossibility to combine the characteristics of a good auditorium and a good gymnasium into a successful hybrid. Typically, a gymnasium is a large oblong room with a level floor, high windows covered with wire screening, glazed wainscoting, no stage or chairs, and basketball goals protruding prominently from each end. These characteristics cannot be made to harmonize with the needs of an auditorium which require a high degree of acoustical treatment, a stage, a sloping floor, opaque window shades, comfortable non-portable chairs, and space for an orchestra.

It may be pointed out further that the transportation, care, and storage of portable chairs present architectural and administrative difficulties which have never been solved, and that portable chairs in a room of auditorium proportions constitute a definite fire and panic hazard. In terms of pupil use, educational values, and finally, in terms of financial economy, combined auditorium-gymnasiums cannot be justified. In most communities, a careful study of needed building cubage, of audience capacity, and available funds, will show that a better distribution of all three factors is possible through the planning of single and separate gymnasiums and auditoriums.

Clapp and Perkins [3] in commenting on the combination auditorium and gymnasium point out that in some cases the compromise is necessary and write that:

> "In all cases, if a combination gymnasium-auditorium is going to be used, it becomes practically imperative to provide a small auditorium elsewhere in the building."

ADAPTATIONS FOR MORE EFFECTIVE COMMUNITY USE

Several factors if given consideration in planning will promote community use of facilities and often promote usability by the school population. These factors are

1. Ease of accessibility.
2. Provision of all necessary services in a unit that can be heated and supervised independently of the remainder of the building.
3. Provision of space for games most popular with adults, such as bridge, table games, dancing, shuffleboard, deck tennis, croquet and golf.
4. Provision of locker facilities and storage of clothing for the adult users of the community facilities.
5. Parking space near facilities to be used.

Reference to Engelhardt and Engelhardt, Jr., on *Planning the Community School*, pp. 47-56, will provide much useful information with respect to this important aspect of planning recreation facilities for adults.

Game rooms near gymnasiums or in student and community social units will contribute greatly to use by adults. Such rooms of pleasant aspect, comfortably furnished, will have wide use day and night.

THE GYMNASIUM — LOCATION

Frequently the gymnasium or field house is con-

[3] Clapp, Wilfred F., and Perkins, Lawrence B., "Designing the School Plant for Multiple Use," *American School and University*, 1946, p. 71.

structed as a separate unit of the school campus. Chief advantages of such a location are that ease of community access can be achieved, good planning will relate the structure closely to outdoor physical education facilities for dual use of service facilities, ability to utilize simpler and cheaper construction, and noise from the area will be of less disturbance to the remainder of the buildings. In the northern section of the country, passageways to other sections of the plant may be necessary. In all events, careful circulation studies will have an important bearing on location.

The main indoor play areas may be incorporated into the body of the school building or serve as a wing. Ease of student and community access both as spectators and participants should be assured. The problem of noise should receive consideration and planning should eliminate as far as possible interference from this course.

No play areas should be located in the basement. Location should be such as to assure good circulation of fresh air. Corridors and interior locations in which all fenestration is on the second floor level leaving the playing area in a well of walls should be avoided. Window area should be at a maximum with good natural ventilation at the playing level provided.

The service rooms should be conveniently located with respect to the indoor play area and should also have easy access to the outdoor play fields. Locker and shower rooms should not be located in basements. Good ventilation is a prime requisite.

THE GYMNASIUM — PLANNING DETAILS

The floor area is determined by the activities that are represented in the physical program for students and adults. If a large baskeball court is planned, 48 feet by 75 feet, for example, an additional 20 feet length and width should be provided in order that 10 feet clearance between the court and wall be allowed on all sides. Additional space may be necessary on the sides to accommodate bleachers for spectators.

Floors should be constructed of hard maple, 7/8 to 1 1/8 inches thick or of wood blocks on end. Lower walls of the gymnasium should be smooth to avoid injury to users. Smooth brick, wood, or wooden bands may be used. Upper walls are best constructed of simple materials such as cinder blocks which have been painted. Ceilings should be acoustically treated.

Maximum window area should be provided in order to obtain good natural lighting and circulation of air. All circulation at play level is desirable but caution should be exercised against drafts. Window material and design should be such as to reduce distracting glare to a minimum. Windows should be protected by wire from breakage. Consideration should be given at the same time to ease of opening windows.

Artificial light should be even and glareless, providing 15 foot candles of illumination at floor level.

All heating and lighting fixtures should be recessed and protected against damage by flying balls and the like. Similarly clocks, drinking fountains, pianos, and other equipment should be recessed and protected.

GYMNASIUM EQUIPMENT

Most of games played in the gymnasium require an entirely clear floor space, and all apparatus should therefore be of a character which permits easy removal. Rollers and hoisting ropes are essential. Mat trucks are convenient for the removal of large unwieldy mats to places of storage. Mat racks along the walls are also used successfully for the storage of mats.

In this connection, it is highly desirable that storage rooms be provided which open directly from the main gymnasium. The doors to these rooms need be of no more than average height, but they should be of double width and without door sills. Sills interfere with the movement of essential equipment in and out of the room. Storage rooms should be sufficiently large to accommodate all of the standard portable gymnasium equipment, including such items as piano and phonograph. For the storage of smaller items of equipment, such as, ball, bats, and hand apparatus, specially provided rooms are not necessary. Lockers, boxes, racks, or closets may serve this purpose to good advantage. Where portable bleachers are used, storage space is necessary. Such storage should be at least 18 feet long.

A well planned gymnasium is equipped with offices for departmental instructors. The exact size and number of these offices should be determined by the size of the school and the nature of the proposed program of physical education, but two rooms should be considered necessary for each gymnasium. A general office and an adjoining private office may thus be set up. These offices should be easily acces-

sible to the gymnasium, locker rooms, special auxiliary rooms, and athletic fields. Private dressing room, showers, toilet, and wash basin are other essentials. Lockers, files, bookcases, first aid cabinets, storage space, and cots are additional facilities which should be provided as needs indicate.

The departmental offices should also be planned in direct relation to examination rooms in order to coordinate the physical education program with general health objectives. These latter rooms are necessary for frequent physical examinations needed in the individualization of physical education. Equipment for examination rooms should be selected by parties responsible for the examinations, but weighing scales, lounge rest chairs, and first aid cabinet may be secured as standard.

SPECIAL GYMNASIUM ROOMS

Corrective gymnasium is recognized as an essential part of a well balanced program of physical education. The effectiveness of this type of work is conditioned by the facilities available for the purpose. A room should be provided in the physical education unit of the building, which is adapted to the needs of both individual and group instruction. Dimensions which approximate 25′ by 50′ are desirable. The extent of the apparatus needed will be limited by the extent of the service provided for pupils, but many high schools provide stall bars, triplex pulley weights, quarter-circle pulley weights, wrist machines, leg machines, neck machines, chest bars, and lesser items of equipment such as marbles for use in arch strengthening exercises. Separate corrective gymnasiums for boys and girls are highly desirable. Service facilities for these rooms should meet the same high standards maintained in other parts of the unit, and where possible, should be designed to accommodate the particular handicaps of pupils enrolled in corrective gymnasium classes.

DRESSING ROOMS AND SHOWERS

Dressing rooms and showers should be of such size and number that the maximum size of class can bathe and dress in the relatively short period of time allowed for this purpose. This usually requires a floor area about equal to that of the gymnasium. Such an area has been found ample for the needs of visiting athletic teams as well as for regular classes, although the lockers provided for team use should be in a room separate from the regular class lockers. With the exception of team facilities, the lockers needed for the service of girls need not be different from those of boys. Basket service for the safekeeping of gymnasium clothing has been proven to be highly satisfactory. Full length lockers are preferred for the storage of street clothing while classes are in progress.

For the use of boys, gang showers may be used satisfactorily, while individual showers and dressing booths should be provided for girls. The number of these facilities should be sufficient to accommodate the largest enrolled class in physical education. Immediately adjoining toilet facilities should be provided for all dressing rooms and showers. Built-in hair drying machines with foot pedal control and adjustable nozzles are necessary for use of girls and desirable for boys' dressing rooms. Electrical drying equipment for face and hands has much to be said for it from the standpoint of sanitation. From a specially planned towel depository, towels should be provided each pupil for each bathing period.

THE SWIMMING POOL

The last two decades have witnessed a tremendous increase in the use of swimming as a part of the physical education and recreation program. Few physical activities involve as much of big-muscle exercise as does swimming. For general purposes of physical condition, few activities are as valuable. In the therapeutic treatment of physical handicaps, swimming has demonstrated outstanding possibilities. Improved construction of pools and increased confidence in protective sanitation have also been factors in the growing popularity of swimming. The modern high school does well to provide pool facilities in a balanced program of physical education.

In planning the swimming pool, every effort should be made to maintain the highest standards with regard to location, size and shape, construction, and sanitation.

Unless carefully considered reasons indicate otherwise, the high school swimming pool should be located in the physical education unit. An abundance of fresh air and sunlight is essential, although the proper temperature of the room must be maintained by means of a planned heating system. The temperature of the room should be somewhat above the average classroom temperature. The location of a swimming pool below grade level should be scrupulously avoided.

For purposes of inside construction, rectangular shaped swimming pools are recommended. Minimum dimensions should be 20′ by 60′, but widths of 28′ to 30′ are preferable. Ample widths tend to eliminate collision and injury to swimmers. The bottom of a swimming pool should slope gradually from the shallow end, in not more than the proportion of 1′ to 15′, until the water depth reaches approximately 6′. Beyond this point, the slope may be more rapid in order to provide a depth of 8′ to 10′ at the end of the pool planned for diving purposes. In the inside rectangular pool, all walls should be vertical.

In construction, the swimming pool should be lined with light colored, smooth finished materials without cracks or joints of any kind. Corners should be symmetrically rounded. All parts of the pool used for foot contact in taking off should be slip-proof. Swimming lanes should be marked in colors contrasting with the color of the pool bottom. According to rule, swimming lanes should be 7′ wide. The pool deck and walkways should be of ample width, slip-proof, and completely surrounding the pool. Ladders, stairways, and diving boards should be located at the deep end of the pool or on both sides of the deep end. Ladders should be recessed in the walls. Under no circumstances should any part of the pool or its facilities be permitted to protrude out into the water.

PLANNING POOL SANITATION

Nothing should be left undone in planning the sanitation of a swimming pool. An abundance of natural sun light, as previously indicated, is a prime requisite for this purpose. Filtration and chemical treatment of the water are most effective when used in combination. Such cleansing agents as ozone, ultra violet ray, and chlorine have proven to be satisfactory if used systematically and scientifically. The pool should be drained and cleansed as frequently as its use demands. For this purpose drainage valves should be provided in the deep end of the pool which will permit the escape of all water in not more than three or four hours. The inlets for fresh or purified water should be located to produce a uniform circulation. Most frequently these inlets are located at the shallow end of the pool at a depth of about 12″ below the surface of the water. Scum gutters should extend completely around the pool. They should be recessed and so designed that all scum will be washed down drains provided at 10 foot intervals in the gutters. Gutters should be of a type which eliminates the possibility of swimmers becoming trapped by arms or legs. For cleaning the pool when drained, suction apparatus is preferable, although vigorous scrubbing procedures should be used on occasion. The cleansing operation should not be confined to the pool proper. Runways, walk ways, diving board, ladders, and all other related facilities should receive the same minute and careful attention. Dressing rooms, shower rooms, toilets, and lavatories should receive the same scrutiny and attention. Recirculation pumps, hair catchers, filters, water heaters, chlorinators, pole hooks, buoys, diving towers, and all other equipment should be inspected frequently for purposes of repair and maintenance, as well as for cleanliness.

It is obvious that all routine and mechanical precautions taken for purposes of sanitation will come to naught if the pupils using the pool are not properly instructed in personal cleanliness and sanitary restrictions for the protection of large groups of people. Shower baths should be provided adjoining the pool, and a thorough cleansing of the entire body should be required of all swimmers before entering the pool room. Spitting in or about the pool should be forbidden. Toilet facilities should be provided near the dressing rooms and showers, and adjoining the pool. Return to the pool should be possible only through the shower room.

CHAPTER 11: the school cafeteria

The philosophy of secondary school cafeteria service has been passing through many changes. The kind of cafeteria planned in a schoolhouse is intimately connected with the philosophy of service to be rendered. The emphasis in early American education was upon instruction, with little attention being paid to problems of nutrition and health. In the modern school the diet and nutritional programs of children receive fully as much emphasis as the instructional program. In the old school the cafeteria was simply a place into which children could be corralled for a short period of time so that they might hurriedly eat their lunch. In the modern school the cafeteria is not a non-instructional service but the cafeteria period offers opportunity for many types of educational gains.

If a school is planned as a place in which youth and adults live and work together harmoniously, then the cafeteria should be planned so as to make its greatest contribution to this program of harmonious living. A school teaches good manners and permits the opportunity for the exercise of good manners. Cafeteria service so operated that good manners can be exercised only with difficulty does not contribute its maximum to the success of the school. The place to which youth, as well as its teachers, come at lunch time for some release from the arduous tasks of the morning ought to be so conceived that personal comfort and relaxation are made possible. Freedom from tension, from unnecessary noises, from crowding, pushing, and disagreeable methods of handling food should be sought in cafeteria management. Planning will help much in the elimination of many of the unsatisfactory features that characterize cafeterias conceived only as places in which the "animals are to be fed."

THE LUNCHEON PERIOD IN ADULT LIFE

Adults enjoy eating lunch with one another. They seek quiet places. The luncheon period brings with it many advantages. There is afforded opportunity for the discussion of problems of common interest. The eating of food and the development of ideas frequently go hand-in-hand. Courtesies may be extended to one another and likes and dislikes of people can be intimately understood. The civic luncheon clubs of America have capitalized upon these luncheon advantages. Groups have united for comradeship, for the development of community programs, for the brief mid-day interlude of song and instrumental music, for the satisfaction of the gregariousness of the individual. These luncheon organizations of both men and women have become agencies of great importance in American community life. Some of the most constructive community growth has first been discussed at such luncheon meetings.

The philosophy of school cafeteria service will recognize the values that will come to students in following the better features of these adult luncheon programs. Activities promoting school and community interests can be launched at the school

cafeteria. Musical performances can be given and forum discussions can be held. In fact, the effort should be made to provide opportunities for certain kinds of social learning and participation that may not be characteristic of other types of school work. To this end a small stage is needed in the cafeteria, with adequate storage space for instruments and materials commonly used.

TEACHING TABLE MANNERS

High school enrollments come from all types of homes. In some of these homes good table manners are taught; in others, the teaching is neglected. The high school student who has not been taught good table manners may find himself considerably embarrassed on occasions and perhaps given a low rating not in conformity with his general abilities. Man succeeds in this world to the degree that he learns the amenities of social intercourse. The school cafeteria can provide the opportunity for training in table manners. Moving pictures which subtly demonstrate proper techniques should be made available. The display of the proper kind of pictures on the walls may go far toward helping in this instruction. Murals can contribute to this end. Other display devices of various kinds should be planned so that no opportunity for educational gains in the cafeteria will be lost.

SEATING PLANS

Informal seating arrangements in a cafeteria are superior to formal regularized seating schemes through which large numbers are cared for but many social advantages are lost. In some cafeterias plans are made whereby students have opportunity at some time during the year to act as waiters. Seating is prearranged so that faculty members and students may sit together and discuss problems of common interest. In other cases faculty spaces are definitely assigned but provision is made so that faculty members may invite different students from time to time to join the faculty groups. In large as well as small cafeterias the planning should be such that none of these advantages of mingling and learning is ignored.

FOODS AND THEIR VALUES

In various high school classrooms, phases of the nutritional and dietary programs of mankind are studied. The cafeteria service must not conflict with such teaching. The food served and the combinations of food needed by the individual should help to make strong, healthy individuals. Any contribution that the design and architecture of the cafeteria can make to the proper selection of food and an adequate balance of diet will make for additional gains in the educational process. Clever designs and displays are some of the means of achieving this end.

MULTIPLE USE OF THE CAFETERIA

Space utilization studies of existing secondary schools show a small percentage of use being made of most cafeterias. Where cafeterias are planned so that food service counters are part of the main dining room, it becomes difficult to use the dining room for general educational purposes. The separation of the service counters from the dining space can be effectively planned. With the dining space cut off from the noises of the kitchen or of the work going on in the service area, the seating space of the cafeteria can be used for many types of educational activities.

It has been the custom to plan the cafeteria as one large room. The one advantage that accrues from such planning is that the large space becomes available for a community dinner or banquet. Frequently the cafeteria serves the school better if it is broken into two, three, or more rooms. Assignment to these rooms can be made by class or interest groups, and faculty and students may join in using the cafeteria hour for participation in a program of common interest.

ILLUSTRATIONS OF MULTIPLE USE

With the expansion of instrumental as well as vocal music in schools, adequate space is not found in many buildings to care for these classes. The cafeteria may serve well in this respect, providing the sound factor is cared for. Groups may use the cafeteria as a talking picture studio. Forum discussions are readily held here and class groups, or other activity period groups, find the spaces of the cafeteria very advantageous for their use. The cafeteria may be a study hall. It is rarely satisfactory as a library and as a meeting place for small groups. It, however, serves well certain social functions of the school, as well as adult activities which are held concurrently with the regular day school program. These are some of the reasons why the cafeteria

should be one of the most attractive rooms in the secondary school center.

LOCATION OF THE CAFETERIA

Sunlight and fresh air should be drawing features of a cafeteria. In many climates this room can be placed so that easy access is afforded diners to the out-of-doors where a terrace has been planned to provide for extension of facilities. Dark basement cafeterias should be avoided. The location underneath auditoriums has little to commend it. Some administrative officers prefer the cafeteria on a ground level so that students may go directly out-of-doors. Others prefer the location on an upper floor where sunlight, the community view, and the assurance of quiet become assets.

COMMUNITY USE OF CAFETERIA

The word "cafeteria" has a limited connotation. A better name for a high school cafeteria is "Social Hall." The spaces provided should be in frequent use by the community. Luncheons, teas, dinners, and banquets should be encouraged, in which fathers and mothers participate with their children, or meet for their own adult purposes. This suggests that the cafeteria should be readily accessible from the out-of-doors and that perhaps it should be easily cut off from the rest of the school facilities to make for use if and when the other parts of the building lie idle. This community use of the cafeteria also requires that attention be paid to checking spaces for coats and hats, lavatory facilities for men and for women, and storage spaces for the equipment and materials which adults may desire to use.

THE CAFETERIA AS A TRAINING CENTER

The public schools may be erroneously thought of as places in which there are students who are taught and adults who simply render service of one kind or another. These adults may be teachers, custodians, workers in the cafeteria, or clerical assistants. The program of secondary education is definitely undergoing change. To the end that all activity within the school shall have its educational implications and advantages, the cafeteria workers should not be thought of solely as servants to those who are learning, but should be given every advantage for learning all that is to be known about cafeteria management, dietary programs, and associated activities.

The cafeteria should be a training center so that food service throughout the community may be improved. It is conceivable that in the future many communities will not countenance food service in restaurants and other eating places unless it is maintained at the very high standard set by school cafeterias. The workers in the cafeteria should be encouraged to look forward to participation in local commercial enterprises for the purpose of selling food and food service with the high standards in mind maintained in the school cafeteria. Thus, the cafeteria becomes one of the learning and training laboratories of the school. Architects who think of it in these terms will, without doubt, alter the character of cafeteria planning. Such planning may result in the incorporation of a classroom where service workers may be instructed and in a cafeteria library containing the important books produced by man covering his food needs.

The high school itself should plan to use the cafeteria as one of its laboratories for the training in food service of part of its regular day school enrollments. The utilization of a cafeteria can be considerably enhanced and great benefits can accrue to a school body, as well as to the community itself, if such a teaching program is advanced.

PROVISION FOR STUDENT SERVICE

Altogether too frequently features of school buildings are planned without due reference to the problems that students encounter in the use of facilities. In a high school students carry many books while traveling from one class center to another. It is difficult to serve oneself at a cafeteria counter while at the same time holding an armful of books. In fact, in many schools where no provision is made for books students seek the easy way out by trying to store books on window ledges, in corners of the floor, or in some spot where they will not be damaged or destroyed. Good planning will meet the service needs of the student. He is being taught by the school to care for his books. He must have the place to store them. This provision either is in his own locker which is nearby, or through a system of checking on ledges or counters especially designed for this purpose. It may be a box system of checking or some other ingenious device for assuring rapid handling of materials.

In the health classes of the school, the student is taught to wash his hands before entering the cafeteria. Washing facilities should be provided just as

is done in the clubs of adults so that students may wash their hands, clean their fingernails, and dry their hands before selecting their food. Good administration will encourage hand washing before eating by providing readily accessible facilities. These facilities should be so planned that rapidity of movement of large groups is possible.

MANAGEMENT OF CAFETERIA

In the ideal situation the cafeteria director is a member of the faculty. She is not only trained in providing food service but also in relating the cafeteria program to the student and faculty needs of the school. This director is directly responsible to the principal of the school. The school cafeteria should not be planned as a private concession, nor should the management be left to amateur or untrained groups either of parents or of other adults. The office facilities for the manager should be in keeping with the size of the cafeteria, and the equipment should be such as to assist in carrying out the responsibilities of the service.

CAFETERIA CAPACITY

Good school administration makes possible having at least two and probably three periods for cafeteria service. This means that the cafeteria should never be required to seat more than one-half, and preferably not more than one-third, of the student enrollment at one time.

If the initial cafeteria provision is for a school unit which may ultimately be only a fraction of the total school plant planned for on a site, the cafeteria should be planned for easy extension at a minimum of cost. Frequently the service sections are made sufficiently large in the first instance to provide for the ultimate capacity desired. The future extension that will be needed will only then be for seating capacity. Skillful planning will assure future extension to the cafeteria wherever future extension to the building as a whole is contemplated.

THE MATERIALS OF CONSTRUCTION AND FINISH

The cafeteria presents problems associated with the materials of construction that are unusual in the planning of a secondary school center. The dining spaces themselves witness foods of all kinds being brought in, both liquid and solid. Shortly after a dining period, groups may wish to use the spaces for group work on educational problems. Food odors, stains, and other vestigia should have disappeared. This requires good ventilation, easily cleansed floors and walls, and materials which do not permanently retain the effects of grease or other food spots. As the dining spaces take on this new function, there must be no interference from the rooms in which meals are being prepared, service counters are being arranged, or foods and other materials are being brought in. Effective acoustical treatment of the ceiling, the floor properly protected against noises, and furniture planned with the idea of keeping noise to a minimum, are features which must be given full consideration in all planning.

The decoration of the cafeteria should create a cheerful and attractive atmosphere. The color scheme should be pleasant and non-irritating. The equipment and materials of construction should harmonize with the color scheme throughout. Window draperies can be planned to take away the institutional effect of this room.

All doors, windows, and other openings of the cafeteria should be well screened. The screens should be so arranged that windows may be opened without removal of the screens. Screen doors should be rendered noiseless.

Fixed equipment in the dining room, such as drinking fountains, should be planned with the proper equipment so that the diners in the cafeteria may easily get water while holding trays. Containers for used cups should be provided and all planning should be such that waste water is not in evidence. The fountains can be arranged so that one fountain is available for every 150 patrons and is so located that it may form an attractive part of the dining room when it is used for other purposes.

EXITS FROM THE CAFETERIA

The cafeteria, like the auditorium and gymnasium, is one of the large units in the secondary school plant where people assemble in large numbers. Every exit from the cafeteria should be planned so that in case of danger the dining room can be very rapidly cleared. The kitchen is a source of fire danger and although it will be protected from the dining room by fire-resistive walls, nevertheless, there will be openings through which smoke and flame may come. The dining room should be in close proximity to fireproof stairwells and every means should be employed to guard against any congestion in passage either to or from the cafeteria.

THE LIGHTING OF THE CAFETERIA

Restful natural and artificial illumination should be planned for. Sunlight will add to the attractiveness of the spaces. Artificial lighting should be maintained at a uniform standard throughout the spaces. Inasmuch as this room is used for educational purposes as well as for food services, the highest standards for the illumination of educational spaces should be observed here. Evening use of the cafeteria will require particular attention to the illumination of exits and the control of lighting fixtures for exits.

AUXILIARY CAFETERIA ROOMS AND SPACES

The cafeteria differs from most of the facilities planned in a secondary school in the number and character of the auxiliary rooms and areas that are required for complete and effective service. Among these are the kitchen, a dish-washing unit, a store room, refrigeration space, dressing, locker and lavatory facilities for employees, a cafeteria office, the service space with counters, faculty or special lunchroom, a cafeteria classroom, elevator or dumbwaiter service, and a custodian's closet and service room. The stage, which may form a part of the dining space, may also have its toilet and rest room facilities for general community accommodation. Frequently equipment storage will be needed for the cafeteria in case it is to be used.

Detailed Characteristics of the Auxiliary Spaces

KITCHEN

The kitchen should be planned with proper reference to adequate natural as well as artificial lighting. It should be sufficiently spacious so that workers may operate without interference and with the possibility of maintaining the highest degree of sanitation. It should be located where delivery and refuse service is readily made but in no sense is the kitchen to be put in the category of spaces located in undesirable parts of a building. Modern planning makes the kitchen as attractive and inviting a place as any other room in the school.

The planning should be so developed that service from the kitchen through the service counters can be made with a maximum of ease. The service counters are preferably cut off by complete partitions both from the kitchen and from the dining spaces themselves. The kitchen should be arranged so that at least two, and preferably more, lines may be effectively served simultaneously in the service area.

In small schools the kitchen is frequently made too limited. The standard of one square foot of kitchen space per dining seat may be followed for cafeterias with a 500 capacity or more. Small kitchens will find it necessary to exceed this minimum. The kitchen requires as much specialized planning as any laboratory in the entire school. If it is not properly arranged continued conflict results.

The system of routing the food preparation serice through the kitchen should be completely developed before a layout is accepted. Bryan, in her text, *The School Cafeteria,*[1] suggests the following criteria in planning:

1. Process of receiving and preparing food must move in orderly sequence around or through the room, either from left to right or from right to left.
2. The direction of the routing is in turn determined by the location of the cafeteria exits and the point nearest the exit which is most convenient for the collection of dishes. The line bringing its trays to a dish window or truck must not cross the service line. If this point locates the dishwashing section of the cafeteria on the righthand side of the kitchen, preparation should move toward the left. Routing in the opposite direction is usually most convenient, if dishwashing is done on the left.
3. The sink and peeler for vegetable preparation should be located near the delivery entrance.
4. Salad, fruit, dessert, and sandwich preparation should adjoin the vegetable preparation. Utility table or tables, the small mixer (if required), toaster, and refrigerator are usually placed between the vegetable unit and the entrance to the lunch room.
5. Cooking equipment should be convenient to the vegetable preparation unit. Ranges, bake oven, steam kettle and steamer should be grouped under the same hood. The baker's and cook's tables will adjoin the cooking unit.
6. In small kitchens the cooking unit is usu-

[1] Bryan, Mary de Garmo, *The School Cafeteria,* pp. 273-274, New York, F. S. Crofts & Co., 1936.

ally placed against the wall opposite the entrance to the service counter. In large ones, it is frequently preferable to place this unit in the center of the room, grouping other preparation units around it. Hot food may be carried quickly to the service counter from this location.

7. The mixer should be placed so as to be used by both cook and baker.

8. If the pot sink is placed near the vegetable sink the cost of plumbing is lessened.

9. The dish storage cabinet should be accessible to salad, baking, and cooking units. If there is no dish storage in the cafeteria service counter, this dish cabinet must be near the entrance to the dining room.

10. Space must be allowed between pieces of stationary equipment for the passage of dish or service trucks, if these are used, and for employees to stand or sit while working, or to pass each other.

11. Food preparation and service are frequently carried out in the same room. An effect of partitioning off the preparation is gained by placing dish storage fixtures and refrigerators back of the counter and in front of the preparation equipment.

In the layout of the kitchen, the following work units must be considered: baker's unit, cook's unit, vegetable preparation unit, salad and sandwich unit, soup unit, and dish-washing unit. These units will require the following equipment: range, vegetable steamer, hood covering the cooking and baking units, a pan rack, sink, slicer, bake oven, mixers, tables, gas plate, storage cabinet, pan and cooling rack, vegetable peeler, vegetable sink, soup kettle, refrigerator, compressor, toaster, slop sink, and hand basin. For dimensions and sizes, consult *The School Cafeteria*.[2]

The storage cabinets for dishes should be planned of sizes to provide for the number and variety of dishes needed for cafeteria capacity. The location of these dish cabinets should make possible a minimum of transfer from the dish-washing unit to the service counters for next usage.

The materials of construction of the kitchen should be such as to provide for a maximum of sanitation and freedom from noise. Walls and floors should be readily cleansed and the floor covering should be of non-slip material not readily destroyed by grease.

Mechanical ventilation is essential for the removal of odors and the maintenance of a comfortable temperature. Every effort should be made to plan so that odors will not be carried into other parts of the building through vent ducts or other wall openings.

[2] *Ibid.*, pp. 274-277.

DISH-WASHING PANTRY

The location of the dish-washing unit is important in the reduction of labor and in the transfer of equipment. It is most desirable to have this unit self-contained with ready access from the dining room so that students may bring their trays to this point of service. Where dish trucks are employed for conveying trays of used dishes from tables to the dish-washing unit, it is necessary to plan the exits and the sizes of this dish-washing unit in conformity with this need. In this unit there will be a dish-washing machine with its accessories, dish tables, dish trucks, and storage cabinets.

The dish-washing unit should be planned so that there will be a minimum of interference between its work and that of food preparation. Mechanical ventilation in this unit is essential, as well as planning for noise reduction to a minimum.

GENERAL STORE ROOM

The general store room must be vermin- and burglar-proof. It may be divided into two sections, one for surplus foods and one for surplus equipment. Frequently it is advantageous to plan this store room in available space that is not in close proximity to the kitchen. In such case, the store room of the kitchen will be limited in size to take care of the transfer of materials needed for a short period, while the larger store room cares for the bulk of goods that may have been purchased a month or two in advance.

Concrete floors, smooth plaster or concrete walls, metal bins and shelves, and adequate artificial lighting are desirable characteristics of the food storage spaces. The equipment storage spaces may have wooden shelves. Provision should be made so that easy access is had to high shelving.

REFRIGERATION PROVISIONS

Refrigeration must be planned as part of the kitchen equipment as well as part of the serving provisions. The amount of refrigeration necessary will depend upon the size of the school, the character of the food program, and the methods of buying

that are employed locally. Careful attention should be given to the refrigeration of milk between the time of delivery and that of sale at the service counter. No refrigeration should be planned without full consideration of these factors. No phase of the refrigeration planning should be left to chance but should be handled by a refrigeration expert.

DRESSING, LOCKER, AND LAVATORY FACILITIES FOR KITCHEN WORKERS

The personal service facilities provided the cafeteria workers will include provision for changing from street to work clothes, locker accommodations, washing facilities, and a rest room. In this latter room should be shelves for books and magazines on food service, a couch, and comfortable chairs. Where provision is made for a special dining room for the kitchen workers, this should adjoin these service facilities. Care should be taken to provide for both sexes in case future service might necessitate the employment of both men and women.

CAFETERIA OFFICE

Providing food service for an enrollment of 1,000 and more individuals is a big enterprise. Many records are needed, detailed planning of menus is required, funds must be safeguarded, conferences with salesmen, patrons, and workers must be held, group instruction for workers and others must be planned, and many emergencies must be met. A well-planned office, through which cares and conflicts can be reduced, will pay for itself in a short time in superior cafeteria service. Regular office equipment, including a desk, chairs, filing cases, and a typewriter are necessary. If funds are to be kept in the school for any length of time, an adequate safe is required. This will also provide a place for the protection of accounting and purchasing records.

A small waiting room off of the office should be provided in the larger cafeterias. The location of this office may be such that, through glass partitions, a certain amount of supervision can be provided food preparation even though the director is working in the office itself.

SERVICE SPACE WITH COUNTERS

The service counters are usually provided between the kitchen and dining spaces. In planning the space to be devoted to these counters, consideration should be given to the kinds of foods which are served and the number of different kinds of foods which the students take. The arrangement of counters so that several groups may be served rapidly is far superior to having long counters past which every patron must move. The counters should be cut off entirely from the dining spaces. This may be done through slip sash, or through fixed partitions with doors regulating the entrance to and exit from counters. Provision should be made so that there is a minimum of conflict among lines moving either before or after food service. The placement of the cash register must be such as to control all exit from counter service.

In providing the equipment to be included in the counter, space should be set aside for hot foods, bread and sandwiches, salads and desserts, including ice creams, hot and cold beverages, individual equipment such as trays, silver, napkins, and glasses, shelves and warmers for dishes, cash registers and other methods of payment. Drinking water provisions are usually made within the dining space remote from the center, and soiled dish delivery is preferably made to openings beyond the service counter. Guide rails for tray support and pipe partitions for directing traffic are incorporated in this equipment.

The materials of construction of the service equipment should be such as to make possible the maintenance of the highest degree of sanitation at all times. Ease of cleanliness and imperviousness to food stains are essential characteristics.

FACULTY OR SPECIAL LUNCH ROOM

It has been suggested that as far as possible one large dining space be avoided in planning for any school. Rooms which can be set apart either through moving or folding partitions or through completely separate planning, offer many advantages. Particularly is it desirable that a small dining space be provided for a group of 10 to 25 persons. Such a dining room can be used by teachers who wish to be relieved of the group pressure of the hour, or by small conference units seeking the opportunity for discussion without interference. This small lunch room may be provided with a limited amount of equipment, especially for the preparation of hot drinks for which adequate provision may not be made in the cafeteria itself. This room should be planned attractively and should be arranged so that it may be one of the food service laboratories for student instruction.

CAFETERIA CLASSROOM

This room may serve the double purpose of instruction of cafeteria workers, as well as of students who are planning to enter food preparation or food service vocations. It should be planned for 30 to 35 occupants, with blackboard, bulletin board, and other display provisions. Opportunity for teaching through motion pictures should be planned for. The room should have a library on food service throughout the world, as well as on changes in equipment and in the methods of service.

ELEVATOR OR DUMBWAITER SERVICE

Provision for the moving of equipment or foods in bulk should be made through elevator or dumbwaiter service wherever cafeteria spaces are planned on various levels, or in case the cafeteria is planned on an uppper level of the school building. Automatic self-locking elevator service can be employed.

GARBAGE AND REFUSE ALCOVE

Good cafeteria management will provide for the removal of garbage and refuse at such intervals that there will be no unnecessary accumulation. These discarded materials should, however, be placed in containers and made readily available to collectors in an alcove on a platform, or in a covered passage where they are adequately protected from dogs or from being turned over. Hot and cold water should be provided in these storage spaces so that the containers may be cleansed after every use. Complete screening of this storage space is essential.

CUSTODIAN'S CLOSET AND SERVICE ROOM

A general custodian's service room should be provided in close conjunction with the cafeteria. Here will be stored equipment used, especially for cleaning the cafeteria spaces, as well as mops, brooms, and brushes needed for any special emergencies. A slop sink with hot and cold water should be a part of this equipment. Shelves should be provided for the storage of custodian's cleansing material as well as arrangements for the hanging or placement of equipment.

STAGE

The stage of a cafeteria may be a platform without any partitions about it, or it may have its own proscenium arch or partition walls. It should be sufficiently large so that small groups can perform. A storeroom for musical instruments and limited musical equipment should be provided. Public retiring rooms for men and for women may be planned in connection with the stage, or in conjunction with the public coat-checking service. A screen for motion pictures, as well as outlets for motion picture machines, should be included in the planning.

CHAPTER 12: planning physical science facilities

In this age of scientific revolution, secondary schools have particular responsibilities in developing programs of education in science capable of maintaining scientific literacy on the part of all youth and, at the same time, assist in locating and training students whose careers should be in this area. Concurrently, as the scientists who worked for the use of atomic fission in wartime came out of their laboratories to raise public issue concerning control of atomic energy, so must science education be vitally concerned with the social implications of the laboratory and the test-tube. The scientific method, as a discipline of thinking and a way of problem solving, is an outgrowth of science education as well as other areas of knowledge that the good teacher plans for in shaping a program for students.

Advances in scientific knowledge have resulted in a dissolution of the lines of demarkation separating biology, for example, from chemistry. While specialization seems likely to remain by reason of the tremendous store of knowledge available and flooding forth in the broad science field, the science program is planned in full knowledge that biology, chemistry and physics are only devices to reduce arbitrarily fields to a size that makes for convenience of approach. The spread of general science in the secondary schools and the emergence of science survey courses on the college level bear testimony to the attempt to obtain broad overviews of science prior to more detailed examination of specific areas of science.

In science, as in social studies, individual research has assumed larger proportions in the educational program. In some communities, high school students as part of their program are required to carry on original research projects at a level commensurate with their maturity and background. The Bloomfield, N. J., High School and the Bronx High School of Science, New York City, are two from among many that could be cited in which such a practice exists. For such projects, laboratory procedures will be changed and the library, shops, and other facilities of the school will contribute to the successful outcome.

The science laboratories serve also as tools for other subject areas. The study of conservation by social studies classes will involve generous reliance upon the science fields for facts and scientific conclusions to be applied to large social problems. Consumer education, too, will draw upon scientific resources in the testing of products and guidance in purchasing. Science as a servant to mankind means that the school laboratories must be provided with the space and resources adequate to meet the demands made upon them by other aspects of the educational programs.

Typically, science education will have been centered largely on a nature study program in the elementary school. To some extent, the science program has been derived from the major fields of science and organized into a series of learning experiences, extending from grade to grade, which will have developed in the pupils some of the larger concepts and generalizations of science. In a rudimentary way, some of the pupils coming from the elementary school will have learned how to use the generalizations of science in interpreting natural and social phenomena.

The particular responsibility of the junior high school in the field of science education is to continue the development of understandings with regard to the principles and generalizations of science which are helpful to pupils in interpreting their natural and social environment. Problems of present-day civilization, developed with due regard for the maturity levels of the pupils, receive increasing emphasis. Because of the need for continuity of learning experience between the elementary school and the junior high school, as well as within the latter, it is generally recognized that science education at the junior high school level should be planned for all pupils. Elective science in the junior high school is not recognized as desirable practice.

The senior high school, in its science curriculum, continues to provide science experiences which are directed toward an understanding of those principles and generalizations which function in helping pupils to make intelligent adjustments to the natural and social environment. However, because of the relatively greater maturity of the pupils and because of the correlation which exists between science and other courses of study, practice indicates that science at this level is generally elective. The needs of some students must be met through somewhat technical and specialized courses. Most preprofessional pupils will come in this classification. Other pupils will need related science in connection with vocational preparation. Thus, the science curriculum at the senior high school level will be a composite of courses and activities indicated by the special needs of individual pupils and general courses which are directed toward an understanding of those principles necessary for effective everyday living.

The secondary school science program is generally composed of four types of activities. These are the lecture-demonstration in which the instructor demonstrates and the class watches, the class or group discussion, the experimental work in which the student manipulates apparatus, learns to use the microscope, works chemical experiments, and carries out research projects. These are supplemented by individual conferences, research in the literature of the field and the like.

Provision for all types of these activities will be made in the science facilities of all secondary schools, large or small. In the small high school, one general science laboratory may be required to serve all the specialized science functions of the school. Such a laboratory and supplementary rooms must provide for demonstration, discussion, experimentation, and individual counseling and study. Larger schools will provide more than one laboratory. For efficient utilization and flexibility of program, general laboratories again may be provided, differentiation flowing out of the moveable equipment provided and the storage of supplies. It is only as the school increases in size to 1500 or 2000 students, if at all, that specialized laboratories for chemistry and physics, for example, should be introduced. Even in schools of this size, the utilization of such spaces, expensive as they are, is low. Careful planning of facilities calls for potential utilization studies to determine whether or not a high degree of specialization is economically feasible.

General Considerations in Planning Physical Science Laboratories

LABORATORY TABLES

Movable laboratory tables will generally be acceptable equipment for most science courses. Such tables, approximately 5 feet long by 28 inches wide by 30 inches high, should be equipped with acid resisting tops. Stools are preferably supplied as seating equipment. Tables should be equipped with drawers for storage, during class periods, of books and other materials. Sinks, installed along walls of room and suitably dispersed as to be convenient to all tables, should be provided at the rate of one sink to every four students. If movable tables are used floor or wall outlets for utilities should be planned.

Combination desk-tables are also used, particularly in the chemistry laboratory. Such desks are fixed to the floor. Each two units share a sink and gas and electrical outlets located between the units. Storage for chemical supplies and items of small equipment is provided below the table top. Ease of access to plumbing fixtures is necessary.

The long, fixed laboratory tables are more elaborate. Sinks and outlets for gas and electricity are placed at intervals along the length of the tables. Racks are often provided in the center for storage of chemical supplies.

INDIVIDUAL STORAGE

Each student should be provided with a small storage space suitable for holding laboratory pro-

tective wear, goggles, and some small equipment or supplies. Storage lockers or locking drawers built into equipment will serve this purpose.

SINKS

Sinks should be of chemical stoneware or of alberene. Acid proof glazed earthenware drains should be used from all sinks in the science units where acids are used.

FUME HOODS

For use in experiments in which noxious gases are given off, fume hoods should be provided equipped with a mechanical exhaust system. The exhaust fans should be manually controlled for operation when hoods are in use. Exhaust ducts should be coated with acid resisting paint.

STORAGE

Storage facilities for chemical and other supplies will be needed. Such space is best provided in a separate room, equipped with metal shelving. Provision should be made for sharing storage space with adjoining laboratories or science unit. Locked cupboards will be needed for storage of delicate instruments and dangerous chemicals. Ease of supervision of storage by the instructor will add to the effectiveness of the laboratory.

DEMONSTRATION TABLE

A completely equipped demonstration table will be required in each laboratory. These tables will have acid resisting tops, and be provided with a sink, gas, several electrical outlets. Control of lights might well be provided from the demonstration table.

VISUAL EDUCATION

Each laboratory should be provided with dark shades, either over-lapped or with built-in channels. Locations for projectors should be provided and suitable electrical outlets given.

GROWING BEDS AND ANIMAL SPACE

Growing beds are valuable assets in most science courses. In many cases small greenhouses may be desired. Care should be taken so that the beds may be drained. Of particular importance is the necessity that these spaces as well as those for small animals be kept at fairly constant temperature even during hours that schools are closed down and heat drops such as overnight, over weekends, and during holidays. Growing beds should be located so as to receive suitable sunlight. Growing beds may be placed on wheeled tables for convenient moving.

The small animal is important in science programs and provision must be made for their care. An animal room is a desirable procedure. Such a room should be well ventilated and with floor that can be hosed down. Racks or cages will be needed. Small animals may also be housed in separate sheds on the school grounds. If this is done, protection from tampering, overfeeding, or burglary should be provided. A similar heating problem exists as that described for the growing beds.

Provision for Specialized Science Fields

GENERAL SCIENCE

The equipment for this laboratory will depend in large part upon the fields of science that will be surveyed and upon the amount of time devoted to the subject.

Movable tables and demonstration table are required. Other equipment will be portable and may be moved in from a central storage point or other laboratories as needed. Growing beds, aquaria, and animal cages or rooms will be valuable in the program.

DISCUSSION SPACE

Where fixed laboratory tables are provided, the portion of the room near the demonstration desk may be fitted with movable tablet arm chairs or fixed chairs sometimes mounted on platforms rising at the most three levels. Care should be taken in the event of a tiered area to guard against accident hazards.

In some larger schools, separate demonstration-lecture rooms are provided. This practice seems less desirable in view of the inflexibility of use of the space and the usual low utilization that accompanies such arrangement.

SUPPLEMENTARY EQUIPMENT

Book cases for classroom library collections are

generally desirable in laboratories for reference and research work. Key cabinets and filing cabinets are desirable. A teacher's desk or table will be advisable.

SAFETY

All precautions should be taken to render this type of space as nearly accident proof as possible. Fire extinguishers and emergency first aid kits should be installed and plainly marked. All state and local codes governing laboratories and use of poisonous and inflammable materials should be observed.

BIOLOGY AND BOTANY

The general science type of laboratory can easily be used for this field of study.

Specialized facilities will include aquaria, growing beds, and small animal housing. Storage for microscopes and other instruments is needed. Display cases and specimen storage are important.

A greenhouse will contribute much to the study of plant life. Sunlight glass expanse, hose connections, separately regulated temperature control of the automatic type, floors which can be hosed down, and suitable growing beds are required.

CHEMISTRY

Facilities for chemistry have been incorporated in the general discussion.

PHYSICS

Control of light is important for the study of optics. A photographic dark room is often provided in conjunction with this type of space.

Movable type laboratory tables of the general science variety are appropriate for the physics laboratory. Electric control boards and transformers are desired to provide both AC and DC current. Provision should be made for experiments requiring pulleys and the like. This may best be accomplished through demountable vertical and crossrods that screw into brass plates set flush in the tables. Provision should be made over the demonstration tables for suspension of apparatus.

ASTRONOMY AND WEATHER STUDY

These fields have particular interest as club activities in connection with science survey work, in adult education, and for hobby groups on the adult level.

Astronomy can best be served by providing a rooftop space for observation or some point on the school site, either of which commands an unobstructed view of the heavens. If a rooftop location is provided, easy, well lighted access to the roof is required. A section of the roof that is flat and protected by coping walls should be strengthened to provide for the necessary load and covered with roofing material or tiling that will not suffer from considerable walking over it by groups of people. Electrical outlets should be provided for illumination of the observing space and to eliminate accidents. Such fixtures should be suitably protected and care taken that short circuits will not be caused by water seepage into the wiring.

A permanent mount for the telescope should be installed for the placement of a portable telescope.

In addition, in some schools a small planetarium may be desirable. These require the permanent installation of a hemisphere from the ceiling of the room. The stars are projected on the hemisphere from a machine located below it. Provision for complete darkening of the room and its mechanical ventilation should be made.

A weather station with wind velocity measuring instrument, wind direction indicator, and other instruments may well be located at the observatory location. A cupboard at this point protected against the elements and locked will facilitate the work.

Auxiliary Spaces

STORAGE ROOMS

Storage spaces are generally inadequate when it is considered that each science laboratory, in physics, for example, really teaches a variety of specialized fields, each with its own equipment and apparatus. Storage rooms should adjoin each laboratory or be shared by two laboratories.

OFFICE SPACE

A central headquarters for the science unit is desirable. Individual counseling and conferences will be carried on here. A table, chairs, desk or desks, filing cabinets, and several comfortable chairs will be the essential equipment.

PREPARATION ROOM

In the larger science unit, a preparation room is sometimes provided. A laboratory bench, with sink and utilities should be provided. Ample storage space for equipment is needed. At times such a space is combined with the instructor's office.

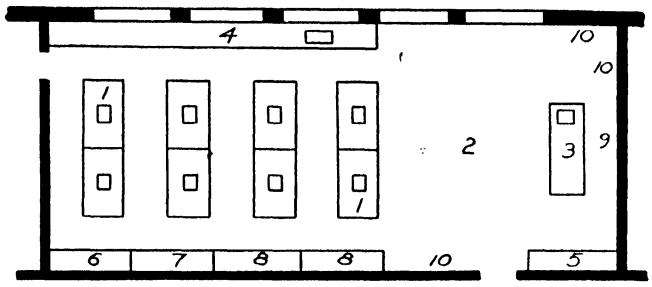
PHOTOGRAPHIC DARK ROOM

A windowless room equipped with efficient mechanical ventilation is needed. Where frequent use is involved, a vestibule and two-door entrance will serve to allow egress and at the same time prevent light from entering. An alberene bench and sink and alberene shelving will serve as principal equipment.

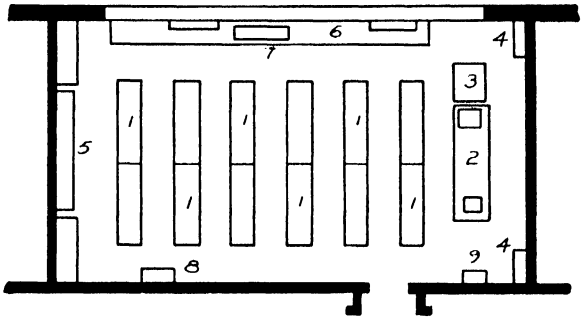
EXAMPLES OF EXISTING PLANS

Many of the larger school systems of the country have developed plans for the various kinds of science rooms. Although it is true that these plans will not necessarily meet the needs of individual science programs, they may prove suggestive.

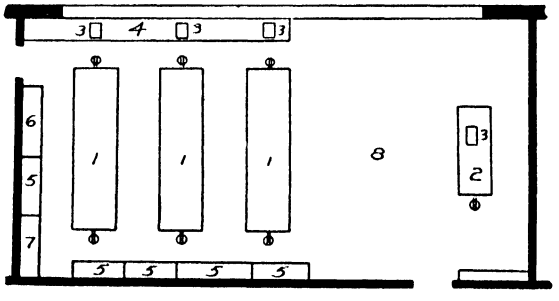
Plan 1 is the Oakland, California plan for General Science Rooms. It lists built-in equipment and furniture. Plan 3 also presents the scheme for a Physics laboratory for that city. It should be noted that these plans provide for such economies as joint use of storage rooms, and that science correlation may be stimulated by placing the several science rooms in close proximity to each other in the total building structure.



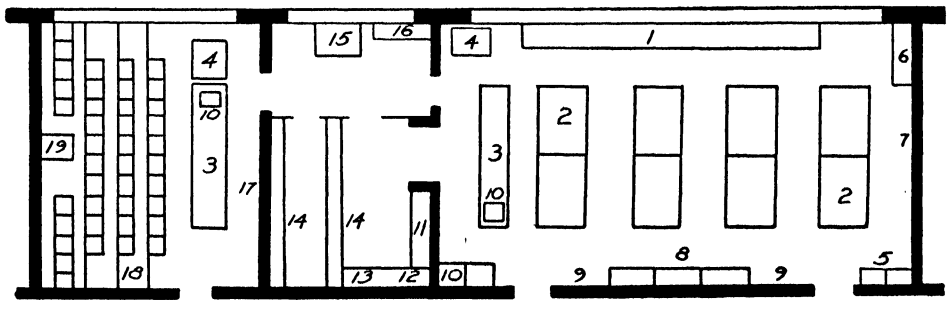
Plan 1: General Science Room. Oakland, California, Public Schools. 1. Work tables with sink. 2. Space for movable chairs. 3. Demonstration table. 4. Work bench with sink. 5. Apparatus case. 6. Supply cabinet. 7. Material and bookcase. 8. Storage. 9. Sliding blackboard. 10. Bulletin board.



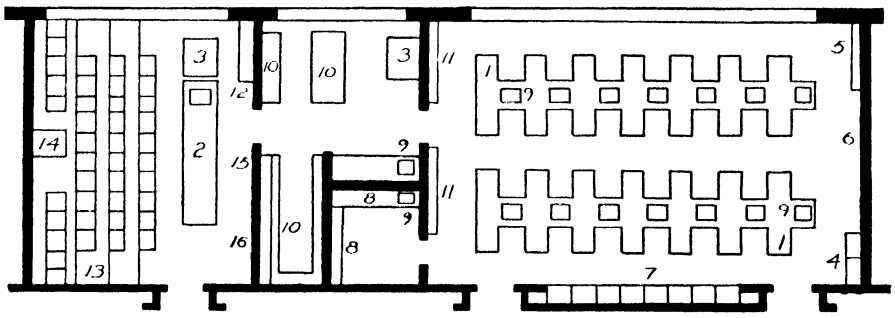
Plan 2: Biology Classroom. Board of Public Education, Pittsburgh, Pa. 1. Student table. 2. Demonstration table. 3. Teacher's desk. 4. Bookcase. 5. Storage case. 6. Shelf. 7. Aquarium. 8. Sink. 9. Notebook case.



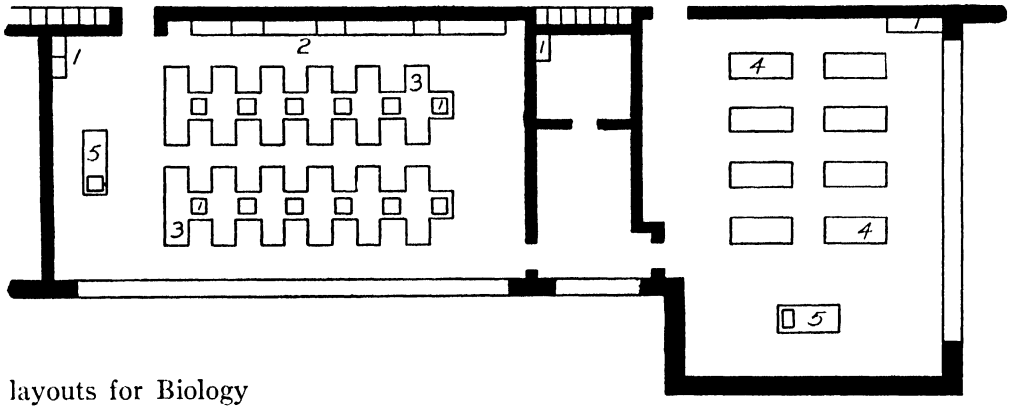
Plan 3: Physics Laboratory, Oakland, California, Public Schools. 1. Student tables, storage under. 2. Demonstration table. 3. Sink. 4. Work table, storage under. 5. Apparatus case. 6. Bookcase. 7. Supply cabinet. 8. Space for movable chairs.



Plan 4: Physics Suite, Board of Public Education, Pittsburgh, Pa. Room at left, Demonstration room; upper center, Work room; center, lower left, Storeroom; center, lower right, Apparatus; room at right is Laboratory. 1. Acid Proof work bench. 2. Students' tables. 3. Demonstration table. 4. Teacher's desk. 5. Bookcase. 6. Balance case. 7. Projection screen. 8. Apparatus case. 9. Bulletin board. 10. Sink. 11. Motor generators and transformers. 12. Batteries. 13. Air compressor. 14. Shelving. 15. Bench. 16. Lathe. 17. Projection screen and sliding blackboard. 18. Stepped platform. 19. Projector.



Plan 5: Chemistry Suite, Board of Public Education, Pittsburgh, Pa. Reading from left to right the rooms are: Demonstration Room; upper center, Work Room and Office; center, lower left, Store Room; center, lower right, Darkroom; right, Laboratory. 1. Students' Laboratory tables. 2. Instructor's table. 3. Teacher's desk. 4. Notebook case. 5. Balance case. 6. Blackboard and projection screen. 7. Fume hoods. 8. Alberenc bench. 9. Sink. 10. Steel shelving. 11. Shelving. 12. Bookcase. 13. Stepped platform. 14. Projector. 15. Projection screen. 16. Blackboard.

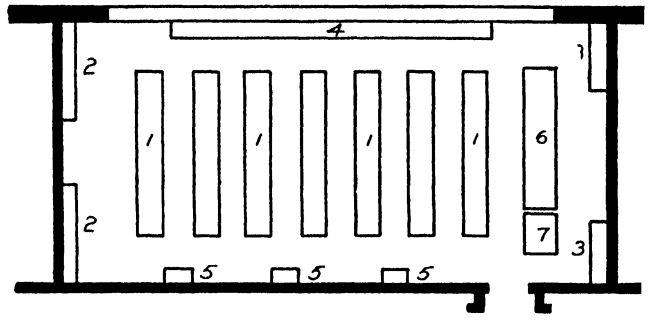


Plan 6: Science Laboratories, Henderson High School, Vance County, N. C. Eric G. Flannogan, Architect. Left to right the rooms are: Chemistry and Physics Laboratory; Dark Room; Office and Storage; General Science. 1. Sink and work shelf, storage under. 2. Storage and fume hoods. 3. Students' laboratory tables, storage under. 4. Students' tables. 5. Demonstration table.

Plans 2 and 7 show typical layouts for Biology and General Science facilities in use at Pittsburgh, Pennsylvania. These floor plans are such that each room may be placed separately in a building, or the two rooms may be placed adjacent to each other, using a common store room and conservatory. This is a commendable arrangement in that it makes for correlation within the science curriculum.

The Pittsburgh Schools have also adopted the practical suites for Chemistry and Physics as shown in Plans 4 and 5. The availability of demonstration rooms, apparatus rooms, storage space, and teachers' offices are notable features of these layouts. The plans are also sufficiently flexible to permit close correlation within the science program. By placing the suites end to end in a building, it would be possible to use a single demonstration room. The two suites might also be placed across a corridor from each other to good advantage. The physical appointments set forth in these layouts are also highly suggestive.

In planning service facilities for the various types of science units, check lists have definite value. This is especially true if the check lists are prepared as a direct expression of the identified needs of the local situation. An inspection of science rooms, plans, and specifications currently available reveals the following facilities commonly provided in General Science rooms:



Plan 7: General Science Room, Board of Public Education, Pittsburgh, Pa. 1. Student table with gas and electric service. 2. Bookcase. 3. Case. 4. Bench. 5. Sink. 6. Demonstration table. 7. Teacher's desk.

- Demonstration table
- Instructor's desk
- Student laboratory tables
- Student tablet arm chairs
- Store room
- Preparation room
- Teacher's office room
- Museum or display cases
- Side work bench
- Library or book cases
- Aquarium
- Live animal cages
- Plant room, conservatory, or growing trays
- Apparatus case
- Key cabinet
- Lockers for students and teachers
- Bulletin boards
- Clock synchronized with school time system
- Fire extinguishers
- Large acid proof stone jars
- Waste paper baskets or hampers
- Sinks and other means for drainage
- Gas and gas burners
- Electricity and numerous outlets
- Water and various water faucets
- Room control switchboard
- Steel filing cases
- Projection screen
- First aid kit or cabinet

A similar list of facilities for Biology and Physics rooms is available from the same sources:

- Demonstration table
- Instructor's desk
- Student laboratory tables
- Student tablet arm chairs
- Store room
- Preparation room
- Teacher's office room
- Museum or display cases
- Side work bench
- Library or book cases
- Aquarium
- Live animal cages
- Plant room, conservatory, or growing trays
- Apparatus case
- Key cabinet
- Lockers for pupils and teachers
- Bulletin boards
- Clock synchronized with school time system
- Fire extinguishers
- Large acid proof stone jars
- Waste paper baskets or hampers
- Sinks and other means for drainage
- Gas and gas burners
- Electricity and numerous outlets
- Water and various water faucets
- Room control switch board
- Steel filing cabinets
- Projection screen
- First aid kit or cabinet

Suggestive list of facilities for Physics rooms

- Instructor's desk
- Instructor's office
- Demonstration table
- Student laboratory tables
- Student tablet arm chairs
- Store room
- Preparation room
- Dark room
- Motor room
- Direct current motor generator equipment
- Storage batteries
- Museum or display cases
- Apparatus room or cases
- Clock synchronized with school time system
- Waste baskets
- Gas and gas burners
- Water and various water faucets
- Electricity and numerous outlets
- Room control switch board
- Sinks and other means of drainage
- Large acid proof stone jars
- Fire extinguishers
- Side work bench
- Lockers for teachers and pupils
- Key cabinet
- Steel filing equipment
- Projection screen
- First aid kit or cabinet

Suggestive list of service facilities for Chemistry rooms:

- Instructor's desk
- Instructor's office
- Demonstration table
- Student laboratory tables
- Student tablet arm chairs
- Storeroom
- Preparation room
- Dark room
- Large hood with fan outlet
- Two or three smaller individual hoods
- Balance room or cases
- Apparatus room or cases
- Side work bench
- Museum or display cases
- Clock synchronized with school time system
- Waste baskets or hampers
- Large acid proof stone jars
- Lockers for teachers and pupils
- Key cabinet
- Fire extinguishers
- First aid kit or cabinet
- Gas and gas burners
- Electricity and numerous outlets
- Water and various water faucets
- Sinks and other means of drainage
- Room control switch board
- Steel filing equipment
- Projection screen

RECENT PLANNING

Much of the more recent planning of facilities for science in the high school has been mindful of two major needs. First, an attempt has been made to provide for a more direct contribution to the objectives of secondary education. Second, facilities are planned for integration within the field of science. In planning such a science unit, Franklin, McGuinness, Poehler, and Slonecker took their departure from these major considerations, and then conceived of a curriculum in terms of six major generalizations as follows:

1. Organization of the physical universe and its changes through time.
   - Atomic and molecular structure
   - Structure of the earth
   - The solar system and the universe
   - Sources of energy in the above; energy transformation
   - Changes in the earth and the universe through the ages
2. Organization of the living world and changes through time.
   - Metabolism; exchange of materials and energy
   - Reproduction
   - Behavior in response to environmental factors and as affected by physiological conditions
   - Genetics
   - Evolution
3. Interrelation of living things.
   - Plant and animal ecology
   - Economic and health relationships of plants and animals to man
   - Human ecology; social psychology and social anthropology and much now loosely termed social problems
4. Man's use of energy and of materials from the earth's crust.
5. Man's control and use of living things.
   - Agriculture
   - Animal husbandry
   - Plant and animal breeding
   - Use of plant and animal products
6. Man's thought of himself and the universe.
   - Reflective thinking
   - Logic
   - Psychology
   - History of science and technology
   - Development of a world-model
   - Philosophy of science.[1]

Although it was agreed that the detailed plan

[1] Franklin, G. C., McGuinness, J. A., Poehler, P. F. Jr., and Slonecker, L. N., *A Proposed Natural Science Unit in a Modern School*, Form 59, Educational Administration, Teachers College, Columbia University, 1936 (mimeographed) 4 pp.

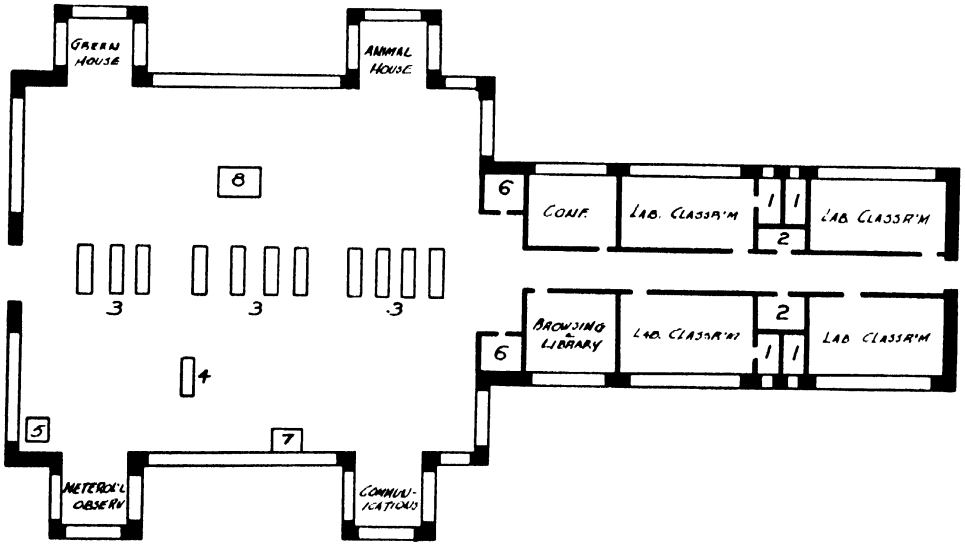
and the equipment for a science unit should evolve from the needs of the locality, this committee of students set up the suggestive arrangement shown in Drawing 8. This science unit is unique in that it proposed one large room devoted to the six major areas of science previously listed. Adjoining laboratory classrooms, conference room, library, and teachers' rooms also involve noteworthy ideas in relation to the central unit. This plan also makes specific provisions for the use of object materials, animal and plant life, and the out-of-doors.

Beidel, McKelvey, and Williams, in their planning of a science unit, shown in Drawing 9, also emphasize the need for greater unity among the sciences and the role of science in accomplishing the purposes of general education. They set forth the particular respects in which the science program may contribute to human living as follows:

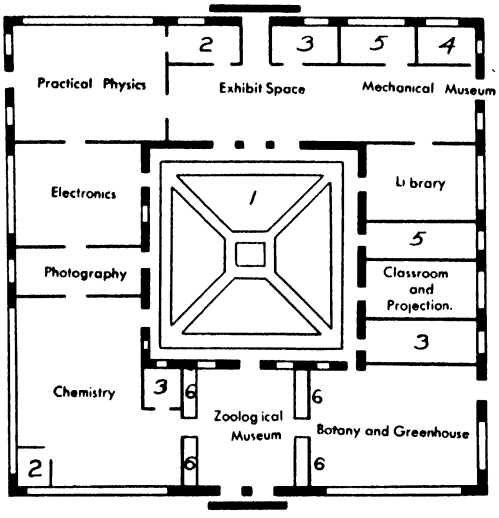
1. Promote the understanding of the major generalizations of science and the development of associated scientific attitudes.
2. Provide learning activities which meet the fundamental needs of adolescents in personal, social, civic and economic relationships.
3. Develop the characteristics of personality essential to effective living in a democratic society through the development of individual potentialities, effective participation in group activities, and reflective thinking.[2]

In this example, special attention was also centered on an attempt to relate science education to community problems. The use of movable partitions is intended to increase the utility of the unit

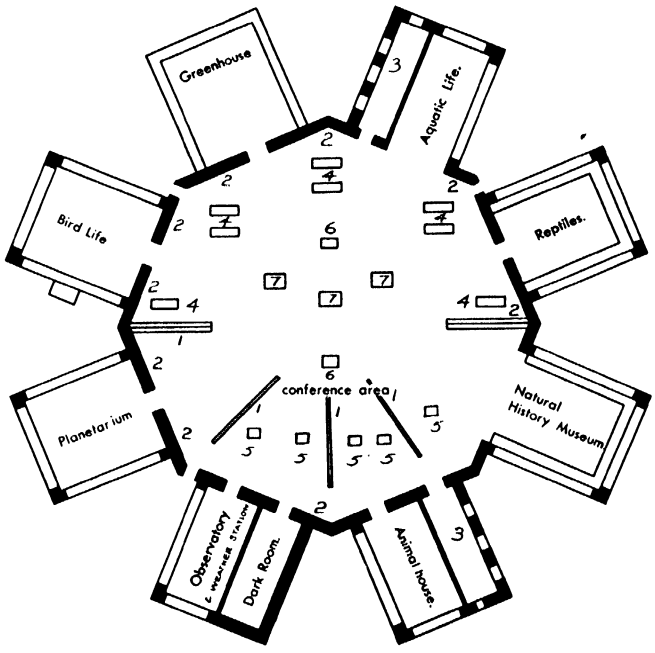
[2] Beidel, F. D., McKelvey, F. H., and Williams, H. J., *A Science Unit for the Secondary School*, Form 161, Educational Administration, Teachers College, Columbia University, 1937, (mimeographed), 3 pp.



Plan 8: Proposed Natural Science Unit, prepared by G. Challis Franklin, John A. McGuinness, Paul F. Poehler, Lyle N. Stonecker, and advised by Prof. S. R. Powers. Physical Universe and changes through time. Man's use of Energy and Material from the earth's crest. Man's thought of himself and the Universe. Man's control and use of living things. Organization of living world and changes through time. Inter-relation of living things. Work benches and sinks along walls. 1. Offices. 2. Storage. 3. Museum cases. 4. Work bench. 5. Lodel Solar System. 6. Dark room. 7. Forge. 8. Aquarium.



Plan 9: Design for Science Unit. Prepared by: F. H. McKelvey, H. J. Williams and D. J. Beidel. 1. Sun dial. 2. Office. 3. Storage. 4. Workshop. 5. Washroom and toilet. 6. Aquaria, small animal cages, exhibit cases.



Plan 10: A Unit for the Natural Sciences. Prepared by: Martha E. Buttenheim, Earl Hall and Carleton M. Saunders. The unit is designed to obtain natural light from above. 1. Bookcases. 2. Storage and exhibit cases. 3. Toilet and washroom. 4. Locations for student tables. 5. Library and conference tables. 6. Teacher center. 7. Work tables.

and to make for closer integration of the science program.

Buttenheim, Hall, and Saunders have planned the science unit shown in Drawing 10. The design of this unit has been guided by a philosophy which emphasizes the importance of the sciences in the total curriculum and which recognizes the major objective of education, which is to shape educated laymen. The more specific criteria set up for planning the unit are as follows:

A. To provide a setting in which the goals of Natural Science can be attained.
B. To provide for the perpetuation of materials assembled by students during their course of study.
C. To provide the utmost in flexibility so that the unit will be useful in many ways now and adaptable to the as yet unknown requirements of the future.
D. To provide supplementary experiences for other units in the school.[3]

In this plan, the use of selected items of expensive equipment has been justified in terms of a larger contribution to pupil experience and a proper conservation of teacher energies. Emphasis has been placed on indigenous object materials, but trips to museums, zoos, aquaria, and other points of interest are urged to extend horizons beyond the local community. Problem solving, as opposed to research, is given preferred emphasis in designing the unit as a workshop. Special facilities have been provided for the use of other units in the school insofar as their programs may be enriched by going to the natural science unit or by borrowing illustrative materials for outside use on a temporary basis.

[3] Buttenheim, Martha E., Hall, Earl, and Saunders, Carleton M., *A Natural Science Unit for a Modern School,* Form 162, Educational Administration, Teachers College, Columbia University, 1937 (mimeographed), 3 pp.

CHAPTER 13: arts and crafts studios

THE CHANGING FUNCTIONS OF ART IN THE MODERN SECONDARY SCHOOL

Art in the modern secondary school has come out of the art studio and permeated all phases of living in the school. Where in former years the art room was one to which students went for a period or so a week to learn how to draw along conventional patterns, the art studio with its affiliated craft areas has become a fulcrum of creative activities in a variety of media and concerning matters closely linked with the interests of young men and women as these interests emerge from the classroom experiences, school or community life, and the impact of a dynamic society upon them.

It was a great revolution when educators, accustomed to verbalization, recognized at least in part the role of art in the broadest sense as a powerful means of expression and a medium that other than especially talented children could use with effectiveness. Since the understanding and appreciation of art flows naturally from an intimate acquaintance with its media and processes, the full acceptance of this point of view augurs well for the art consciousness of the youth of this country.

Art, in emerging from the studio, has broadened its horizon. Following a similar trend apparent in society where beauty is recognized in industrial design and in packaging, art has a positive function in the making of dress, the study of interior decoration and homemaking, and in the popular appeal of school dances and newspapers.

With its broader base and more direct appeal has come a call for more facilities for the acquisition and development of the necessary aptitudes, techniques, and skills. The potentialities of art as a means of expression are seen by more students, and the desire for the attainment of advanced skills is aroused in more of the students.

ARTS AND CRAFTS IMPORTANT IN THE COMMUNITY EDUCATIONAL PROGRAM

For the community as a whole, the area of the arts and crafts is one in which adults are probably most interested in using the facilities of the school. Informal programs for adults including art work, appreciation of art and hobby activities in connection with a wide variety of media must be anticipated and provided for in designing the secondary school building.

The opportunity to work with one's hands will, in an urban area, have great appeal to workers who toil daily with words and paper. In agricultural regions, the farmer's wife will welcome the opportunity for creative work in an art studio as relaxation and recreation after a strenuous day. The school should be planned to meet the needs of the model railroad or airplane enthusiast, the clerk who wishes to bind a book with his own hand, and the myriads of people who wish to learn how to repair an electrical appliance, how better to decorate one's home, and how to be less helpless in an age of mechanical gadgets.

SOME ACTIVITIES OF THE ARTS AND CRAFTS STUDIES

Art has widened its media as it has widened its outlook and function. The allied craft areas are grouped with the fine arts because of the recognition of the importance of craftsmanship in the production of useful items in which beauty of design and workmanship have a major role.

The fine arts utilize various media such as oils, water colors, charcoal, pastel crayons, and the like. Allied closely to the art group are such activities as home decorating, design applied to all the crafts, stage scenery designing, and construction, costume design, and fashion design.

The metals through art metal craft and jewelry design and making are increasingly of importance in the school and community crafts program. Leather and glass working along with the art of metal crafts, ceramics, involving pottery making, clay modeling, and sculpturing, and textiles with weaving, rug making, and other uses of materials and fabrics where the creative design elements are important have come into prominence in the crafts program.

The graphic arts, now far beyond in scope the old time print shop, are vitally concerned with the factors of design. Bookbinding, reproduction by means of etchings, engraving, lithography, and linoleum block printing are major new areas incorporated with the art of the printing trades in the graphic arts. Photography is an extremely popular activity that should be provided for in this area.

As the school contributes to the vocational abilities of its students, young and old, it also is serving a function of art. The woodworking and sheet metal shops can learn from the art studio as well as the reverse. Science laboratories, school cafeteria, and mathematics classroom are all areas in which an interrelationship with the arts and crafts studios will be mutually stimulating and beneficial.

FACILITIES FOR ART

The art studio area should contain the following elements: work space for creative expression, storage space for materials, washing and sink space, exhibit and display area, discussion and study space with library and print storage facilities. Depending upon the size of the student and community group to be served, these facilities will be grouped in one room or spread through a suite of related spaces.

THE ART STUDIO

The art studio should be so located as to have unobstructed north light. It is particularly desirable to augment the natural lighting through the use, whenever possible, of skylighting. If skylights are provided, suitable means for the control of this source of natural light should be provided.

The studio should be large enough to provide from 25 to 35 sq. ft. of space per pupil. With more informal use of such special facilities, allowance should be made for the use of art studio by small numbers of students not regularly scheduled for art but who may use the space at the same time as a scheduled group in connection with work, for example, in the social studies or language arts.

The major equipment of an art studio is working surfaces. Movable easels and stools are the most flexible type. Tables are relatively difficult to move about. The increasing tendency toward large productions such as murals calls for large unobstructed floor area which can best be achieved through the use of easels that can be stored in a small space when not in use.

Several long tables, model stands, and shadow boxes are essential. Small tables should be provided for the placement of shadow boxes in drawing from still life. Several full length mirrors should be included.

Storage space should be worked out carefully in order to attain a simple, flexible and yet adequate installation of cupboards, closets and drawers. Vertical cabinets for housing of large uncompleted pictures are of great assistance.

Sinks with drainboards and with splash-protected shelving above them should be located about the art room. Space near windows should not be used for this purpose. Facilities for washing should be included in the installation.

Electric outlets should be distributed about the space. Provision should be made for the use of small portable spotlights to flood the model stands for special lighting effects. Semi-indirect type lighting fixtures should be equipped with daylight bulbs. Fluorescent or ordinary electric light bulbs are not acceptable in this space. Indirect lighting should be provided for the inner wall where work of the students may be displayed unless the inside wall is used as a working surface in the production of murals.

THE CRAFT STUDIO

The size of the student population and the extent to which the crafts program has been developed will determine the size of the room or rooms to be devoted to this function. In general, the facilities described below will indicate the equipment needed.

Art Metal work and jewelry making are activities requiring only simple equipment yet providing rich opportunities for the display of creative design and craftsmanship. Work benches should be of solid construction as they will be used for the hammering of metals. Metal vises should be installed. Desks should be provided with electric and gas outlets. Bunsen burners are used for heat treatments of the metals.

Storage facilities will include an outside ventilated space for acids used in etching. Storage closets for tools and metal supplies, sinks with hot and cold water connections and drainboards are all essential. First aid equipment that will deal speedily with acid burns is necessary. Locker space for storage of students' work aprons or smocks should be at hand.

Facilities for etching, engraving, and wood block or linoleum block carving are related and may be provided for in this area. Simple work benches and one or two roller presses or printer's proof presses will constitute the major portions of equipment.

Ceramics or modeling and pottery making, have great value both in student and adult creative expression. Student work benches must be of solid construction with raised backs.

Benches, because of the great amount of moisture involved in modeling with clay, are preferable constructed of wood without a paint or varnish finish. Stone or composition laboratory type tops are also suitable but more expensive. From two to four potters wheels should be provided for a class group in ceramics. Other desirable equipment includes a clay bin, drip pan, casting table, a marble or stone slab, and a storage cabinet especially designed to avoid drying of clay products.

The kiln for firing of pottery should be located in a separate room adjacent to the ceramics area. The kiln room should be highly fire resistive, insulated for heat and equipped for special ventilation. Shelving should be installed on the free walls of the kiln room.

The kiln is preferably gas fired. Electrically heated kilns are made in smaller units and require no flue for exhaust of vapors yet require too frequent replacement of heating elements. The gas fired kiln must be equipped with an exhaust flue. Kilns are more useful if they are large. A good working size is a kiln with a muffle approximately 18″ wide x 22″ high x 24″ deep.

Plastics have had some use in school craft work largely from the point of view of cutting and shaping items from bars or sheets of the material. Schools will soon make the step to the actual production of the plastic from the raw materials of a binder, a filler, and a coloring agent, and casting the molten plastic into molds, working and shaping articles from the bars or forms produced. With the growth of the importance of plastics in industry, the understanding and experience in the process of making plastics from raw materials will be of vital interest and importance to students in the modern school.

Essential equipment will include a small injector press in order to produce the pressure necessary: a gas or electric stove for heating of the materials to about 500° Fahrenheit, and molds for casting that can be made for school purposes out of plaster of paris.

Textiles are included in the arts and crafts area in the design and hobby aspect of that field. Homemaking has a close relationship, of course, and reasons of curriculum practice and emphasis of the individual school will determine the area in which facilities for weaving, design of textile patterns, art weaving, dyeing, and the like will best fit.

Equipment for the textile crafts area will include looms of various sizes, with one or two large looms, and the remainder of the smaller variety, spinning equipment, rug frame, sinks and dye storage cabinets. Tables and chairs should be provided. Storage and washing facilities are necessary.

PHOTOGRAPHY

Interest in the field of photography has grown tremendously in recent years. In the schools this trend has been reflected in the increase in the number of camera clubs, the inclusion of the study of photography in the school curriculum, and the large number of adult education programs in which photography is a vital and popular element.

The motion picture has begun to come into its own as an aid to teaching and still more recently as a means of creative expression. Students, through this device, can permanently record their artistic creations or the result of their analyses of community or school problems. The potential significance of this aspect of the use of the motion picture lends added importance to the adoption by the school of techniques and practices designed to use the medium to its fullest advantage.

Spaces needed for the artistic production of still pictures will include a studio and a developing and printing room. Additional spaces that will add to the effectiveness of the area are a property storage space and dressing rooms.

Moving picture production may well be carried on in the same spaces. Adaptations for this purpose could be made with the provision of substantially larger working studio space than would be necessary for still pictures alone. Necessary are the inclusion of dressing rooms, and location of the photography unit in close relationship with the stagecraft areas, in-

cluding scenery shop, costume and property preparation spaces, and dressing and makeup rooms. Cutting, reviewing, and editing facilities will be needed.

The studio space should be provided with tables and chairs for class or group discussion and planning and the space should be designed for easy darkening in order that films may be shown frequently with a minimum of disturbance.

STUDIO SPACE

A large, high ceilinged, open floor space will serve best the function of housing the photographic activities. A space 25′-30′ wide by 40′-60′ long should be sufficient to house both still and motion picture production, varying, of course, with the extent of the program in this field. Sixteen foot ceilings will provide necessary space for construction of sets and for camera elevations to obtain angled shots from above, although normal classroom heights can be used.

Floors may best be installed of soft wood, similar to those recommended for stages, to facilitate erection of sets. Large doors providing access to stagecraft shops should be provided. Electric wiring arrangements should be made to serve portable lighting units of high intensity.

DEVELOPING AND PRINTING AREA

A dark room is necessary if students are to carry out developing and printing of still pictures. Motion pictures ordinarily must be treated by professional concerns. The room required should be light proof and provided with good mechanical ventilation.

Equipment will include tables, a sink or sinks with drainboards, washer, dryer, and considerable wooden shelving.

CUTTING, REVIEWING, AND EDITING SPACE

Space for cutting, reviewing, and editing motion pictures produced in the school may be provided in the photographic studio. If used for such a purpose, opaque shades, screen, and convenient outlets should be installed. A work table with appropriate equipment is necessary for effectively carrying out this work.

RELATION OF ARTS AND CRAFTS UNIT TO REMAINDER OF SCHOOL

The arts and crafts are integrally related to the auditorium, stage, and stagecraft unit, the shops, and the homemaking center. In addition, this unit is used widely and often in an adult education program.

Provision should be made for the separate lighting and heating of the space without interference with the remainder of the building. A separate direct community entrance may be desirable with the ability to block this section off from the remainder of building an important consideration.

Display is a common consideration that applies with great force to the arts and crafts area. Consideration should be given to the use, whenever possible, of spaces for the purposes of displaying or showing to the school and to the community the products of the arts studios.

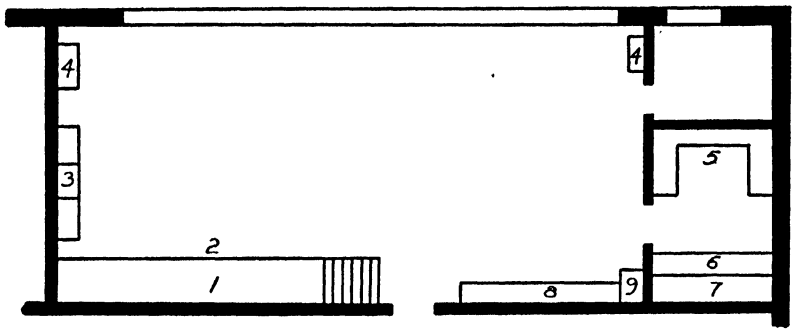
The ingenuity of the designer is the only limit to the effective display areas. The inner wall of the arts and crafts studios should be designed to be of use for this purpose. Moldings for the hanging of pictures, shelving, and cupboard space should be provided. Effective lighting, preferably of the indirect variety will assist in display.

Corridors are, of course, obvious spaces for this purpose. Display cases, set in corridor walls and equipped with lighting and electric outlets for use of spotlighting are desirable.

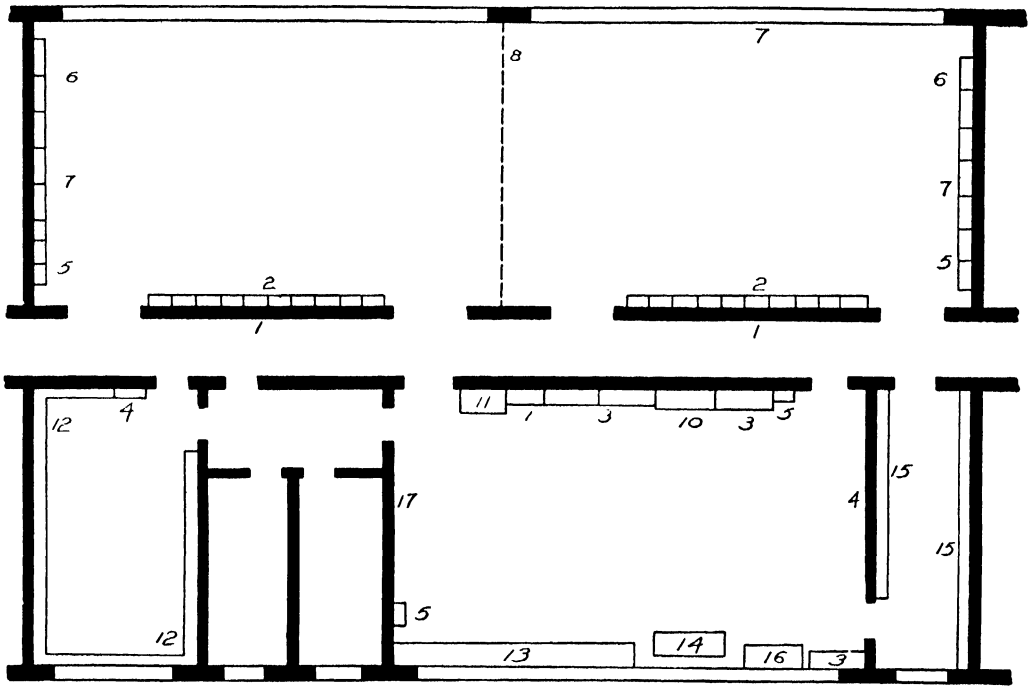
The cafeteria walls, the lobby and adjoining corridors of the auditorium or various corridors of the building may be used as art galleries if attention is given to effective exhibition of pictures and other products and to lighting of the material displayed. Showcases on the outer periphery of the school offer real means of communication with the public if the school is located near a route well traveled by adults.

ART ROOMS FOR THE SMALL OR MEDIUM-SIZED HIGH SCHOOL

Because of the individual type of instruction required, art classes should not exceed 30 to 35 students. Crowded art rooms, or rooms with equipment fixed to the floors, hamper the instructional program. A room 50′ x 23′ will provide for many activities, such as dyeing, block printing, batik work, and modeling. The room should reflect the character of the program that is being planned for. The entire wall space, outside of that taken up by blackboard



Plan 1: Art Room, Ramapo Junior-Senior High School. Tooker and Marsh, Architects, N. L. Engelhardt, Educational Consultant. Office. Storage. Art Room at left. Top right, Office; lower right, supplies. 1. Platform, linoleum top. 2. Cupboards and shelves under. 3. Storage cabinets. 4. Sink. 5. Shelves, cupboard under. 6. Drawers and drawing board storage. 7. Shelving. 8. Art library. 9. Clay bin.



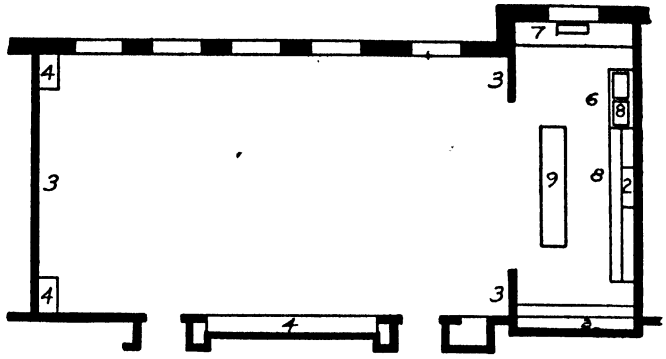
Plan 3: Art Unit, W. K. Harrison and J. A. Fouilhoux, Architects, N. L. Engelhardt, Educational Consultant. Top tier: Activity Room. Lower tier, left to right: Reading Room, two Offices opening into Waiting Room, Work Area, Textile Supply Room. 1. Display case. 2. Bulletin Board, cabinet below. 3. Cabinets. 4. Bulletin Board. 5. Sinks. 6. High cabinets. 7. Low cabinets. 8. Folding doors. 9. Clay bin. 10. Zinc lined cabinet. 11. Dumbwaiter to kiln below. 12. Bookcases. 13. Work benches. 14. Lathe. 15. Open shelves at top, cabinets below. 16. Bench for metal work. 17. Blackboard—projection screen.

and cupboards, should be planned for display. Wood paneling has frequently been used. A minimum of blackboard, with a sliding section located in the front of the room, suffices. Special artificial lighting for this blackboard is helpful. A work sink and a lavatory should be installed. Cupboard and drawer space should be amply wide to take drawing paper of large dimensions, and drawing boards. Fire-resistive storage cabinets for art materials and tools and ample bookshelving should be made available.

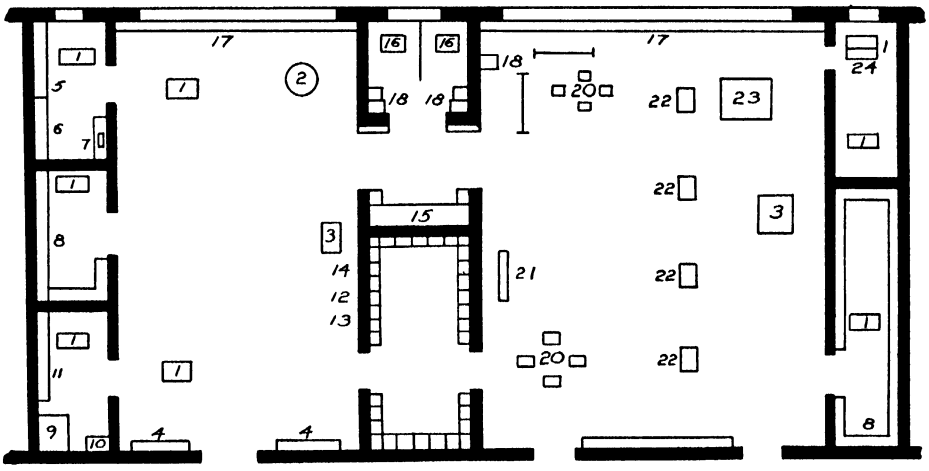
A separate supply room, approximately 12′ x 15′ should adjoin the main art room, and a small instructor's room should also open off of the art room. Separate studios for clay work, metal work, block printing, and other specialized art activities are helpful adjuncts. Each requires equipment and storage facilities especially adapted to its purposes. Exhibit cases may be built in as part of the classroom, or placed in the adjoining corridor.

Much art can be taught through the agency of the stereopticon or talking picture and provision for the use of the machines, as well as for the screen, should be made. Students working in the art room require smocks or coverings for their regular day clothes, and locker provisions must frequently be made within the art area for taking care of these garments.

Plan 1 represents the art room included in the Suffern, N. Y. High School, and Plan 2 the art room of the Scarsdale, N. Y. High School.



Plan 2: Art Classroom, San Francisco Public Schools. 1. Work counter with sink, zinc top. 2. Supply cabinet over. 3. Display board. 4. Display and supply cabinet. 5. Clay box. 6. Work table. 7. Work table. 8. Cabinet for moist storage trays. 9. Work table, drawing board rack under.



Plan 4: High School Art Unit, Prepared by J. A. McGinness, N. D. Polliam, P. F. Poehler, Jr., with the advice of Prof. Belle Boas. Left to right: Modeling Room bordered on left by Clay Room, Supply Room and Kiln, reading top to bottom; Top center, offices; lower center, lockers. Drawing Room with Press Room and Storage on right, top to bottom. 1. Work tables. 2. Potters wheel. 3. Modeling stand. 4. Display cabinets. 5. Clay bin. 6. Damp box. 7. Sink. 8. Shelving and cabinets. 9. Kiln. 10. Hot plate. 11. Work shelf. 12. Projection screen. 13. Paper roller. 14. Reversible blackboard. 15. Library shelving. 16. Teacher's desk. 17. Window shelf—lockers under. 18. Filing cabinets. 19. Movable screen. 20. Easels. 21. Adjustable stand. 22. Drawing tables. 23. Loom. 24. Press.

ART ROOMS FOR HIGH SCHOOLS OF 1,200 TO 1,500 ENROLLMENT

Plan 3 shows desirable relationships and provisions for a large unit in a high school. The proposed height of the roof is 15 feet. Plan 4 illustrates other types of special relationships and provisions that can be made for a school of this size.

ART DISPLAY ROOM

A special display room with museum lighting for the display of the work of the community and school art clubs, or of temporary exhibits, contributes significantly to the development of art appreciation and the integration of school and community.

STUDENT ART CLUBS

The high school art club should be provided with space meeting its requirements. This club may have charge of the art services of a school. These may include the planning of school decorations, the development of murals in corridors, cafeterias and other spaces, the layout of school year books, manuals and menus, the decorations for school purposes, the advertising material for school activities, and the design of stage scenery and costumes. There are many other fruitful art activities in which the club may engage which are part of the educative process. The art club's facilities should be planned in terms of the managerial, productive, and social work that is involved.

CHAPTER 14: industrial and practical arts and vocational education in the secondary school

Confusion often arises in planning a comprehensive high school between the functions of industrial and practical arts and the objectives of vocational education. Both of these broad fields of instruction are served through shops planned to meet specific needs. The kind and amount of equipment and machinery to be installed vary with these needs.

A PHILOSOPHY OF INDUSTRIAL AND PRACTICAL ARTS

In the secondary school, the individual student is given opportunity for growth and understanding in all phases of human interests and activities. He is provided with a background of general education and is also given insight and opportunity for participation in or even the development of skills in specialized fields of endeavor.

MANIPULATIVE EXPERIENCES A PART OF GENERAL EDUCATION

"Provision should be made for experiences in the manipulation of materials and for the development of those discovered special abilities, talents, and interests of the individual which may be a means of increasing his happiness and social value. It is equally necessary to discover the personal needs of the individual and to make proper provision for their utilization." [1]

The 1945 Harvard Report, in discussing the objectives of general education makes this comment: "Most students who intend to go to college are now offered an almost wholly verbal type of preparatory training, while hand training and the direct manipulation of objects are usually reserved for the vocational fields. This is a serious mistake. The bookish student needs to know how to do things and make things as much as do those students who do not plan to take further intellectual training. The direct contact with materials, the manipulation of simple tools, the capacity to create by hand from a concept in the mind—all these are indispensable aspects of the general education of everyone. In some schools pupils receive such training in the elementary grades, other students gain such experience outside of school; but for those who have had no experience in the use of tools, a high school course may offer the only possibility." [2]

COMPARISON OF INDUSTRIAL ARTS, PRACTICAL ARTS, AND VOCATIONAL EDUCATION

Manipulative experiences may be offered in the secondary schools from the seventh year through the twelfth year, in some cases on an optional basis and in others on a required basis. In grades seven through nine these experiences are generally given on an industrial arts basis, while from grades ten through twelve they are given either on a practical arts or vocational education basis. This means that junior high school pupils are given the opportunity for exploration in an area and for the discovery of special interests or aptitudes. The actual acquisition of marketable skills is not sought in grades seven through nine.

On the other hand, the term vocational education, as generally defined, includes training of less than college grade in the fields of agriculture, commerce, homemaking, trades and industries. In public school systems, vocational education operates within the framework of the National Vocational Educational Act and its subsequent revisions. One of the requirements that must be met is that the shop or

[1] Connecticut State Department of Education, *The Job of the Secondary School*, Bulletin XVI, Hartford, Conn., 1941.

[2] Report of the Harvard Committee, *General Education in a Free Society*, Harvard University Press, Cambridge, Mass., 1945.

manipulative experiences must occupy half the daily program, or three hours. Another is that the pupil shall receive training for one specific trade or occupation. The third is that the mathematics, science, and drawing that are taught must be directly related to the trade which the pupil is learning. These requirements will no doubt undergo modification from time to time. On completion of a full vocational education course, the assumption is that the student will find an opportunity to practice this vocation for his livelihood.

"The term 'practical arts' as used in education is the broad inclusive term that embraces as subjects of instruction: manual training, mechanic arts, industrial arts, domestic science, household arts, domestic arts, general agriculture and general commercial education." [3]

Thus a practical arts curriculum may be offered in a general or technical high school, where it may include any type of shop or manipulative experiences for boys or girls above the ninth year. The opportunity is provided these students to broaden their contacts with the materials and industrial processes, but again as an extension of general education rather than a direct preparation for a vocation.

INDUSTRIAL ARTS IN THE SECONDARY SCHOOL

"Industrial arts education . . . is essentially a part of general education that forms a necessary general foundation and background upon which specialized vocational education may be built. It is the connecting link between the broad, general education on the one hand, and narrower specialized education on the other." [4]

"Industrial arts education is a phase of general education that concerns itself with the materials, processes and products of manufacture, and with the contribution of those engaged in industry. The learnings come through the pupil's experiences with tools and materials and through his study of the resultant conditions of life. It is a curriculum area rather than a course, being comparable in this respect to the language arts.

"Industrial arts, therefore, has general values that apply to all levels, and in a continous program these values are progressively intensive and are cumulative in their effect as the pupil advances in maturity. Through such a program the pupil:

1. *Gains knowledge* of the changes made in materials to meet the needs of society, of tools and industrial processes used to effect the changes, of the constant adaptation of materials, tools and processes to meet changing needs and conditions, and of industrial workers and working conditions.
2. *Grows in appreciation* of the value of information regarding occupations as a background for a wise choice of a career, of the importance in modern life of tools and industrial processes, of the industrial processes, of the artistry of the designer and skill of the artisan, and of the dignity of productive labor.
3. *Increases in ability* to plan constructive projects, to select and use sources of industrial and related information, to handle tools and materials, to express with material things his individual interests, to use effectively his recreational time and to evaluate work and its products.
4. *Develops attitudes* of concern for safety practices, of considerations for workers in all fields, of regard for cooperation among the members of a group and of respect for property.

"Largely manipulative in character, yet affording content of an informational, technical, and social kind, industrial arts contributes to complete living because it meets needs that are real and satisfies impulses that are inherent . . . reading, discussion, observation, and experiment are combined with participation in activities which permit discovery and development of creative and artistic abilities." [5]

PRACTICAL ARTS IN THE SENIOR HIGH SCHOOL

Pupils enter the ninth or tenth grade with varied backgrounds of manipulative experiences depending on the schools from which they come. Boys who come from eighth grade schools usually have worked only in one area, wood; the girls have had some practical arts cooking or homemaking instruction. Junior high school boys usually have had manipulative experiences on an industrial arts basis in as many as four general area shops, wood, metal, graphic arts and electricity; while the girls may have had an opportunity to work at the practical arts of cooking, dressmaking, homemaking, and perhaps novelty and millinery. Both boys and girls

[3] Struck, F. Theodore, *Foundations of Industrial Education*, John Wiley and Sons, Inc., New York, 1930, pp. 36-7.
[4] *Ibid.*, p. 40.
[5] Proffitt, Maris M., *Industrial Arts. Its Interpretation in American Schools*, Bulletin 1937, No. 34, Washington, D. C., U.S. Office of Education, pp. 1-2.

may also have had experience in ceramics, crafts, or typing.

In New York City the many high schools have no common pattern of curriculum organization. They may vary from the college preparatory curriculum in a school having only one shop; through the general curriculum in which pupils are offered practical arts for exploratory or tryout experiences as well as for general education, to those technical high schools in which the shops are greater in number than the general classrooms, and where all the boys are programmed for the same practical arts work in the first two years of shops, and for the last two years with a choice. Many types and kinds of practical arts programs are offered which may be partly or wholly elective or prescribed, and may vary in length from one to four years. The pupil may engage in these activities anywhere from two to twenty periods per week. Such variations in offerings, of necessity, do not lend themselves to any single fixed pattern of planning the physical facilities.

MANY KINDS OF INDUSTRIAL AND PRACTICAL ART SHOPS

Practical arts and industrial arts shops may be divided into three main categories: (a) the comprehensive or multiple activity shops usually found in schools equipped with only one or two shops; (b) the *general* commercial, graphic arts, homemaking, metal, wood or other *area* activity shops; and (c) *the single unit* art metal, cooking, drafting, foundry, machine, millinery, sewing, sheet metal, typing, or other specific practical arts shops.

Practical arts and industrial arts shops may be grouped by areas of instruction as follows:

1. *Craftwork*
   1. Art Weaving
   2. Ceramics
   3. General Craft Shop
   4. Modeling and Carving
   5. Pottery
   6. Stonecarving
   7. Woodcarving
2. *Drafting*
   1. Aeronautical Drafting
   2. Architectural Drafting
   3. Electrical Drafting
   4. General Drafting
   5. Machine Design
   6. Machine Drafting
   7. Mechanical Drafting
   8. Shop Drafting (Freehand)
   9. Structural Drafting
3. *Electricity*
   1. Electrical Construction
   2. Electrical Installation
   3. General Electrical Shop
   4. Radio Shop
4. *Graphic Arts*
   1. Graphic Arts Shop
   2. Photography
   3. Printing
5. *General Shopwork*
   1. General Shop
   2. Home Mechanics
   3. Science Shop
6. *Home Economics*
   1. Clothing
   2. Foods and Nutrition
   3. Home Furnishing
   4. Home Management
   5. Millinery
7. *Metalwork*
   1. Art Metalwork
   2. Foundry
   3. General Metalworking
   4. Instrument Making
   5. Jewelry Making
   6. Machine Shop
   7. Sheet Metalwork
   8. Structural Shop
8. *Miscellaneous*
   1. Agriculture
   2. Air Conditioning
   3. Horticulture
   4. Stagecraft
9. *Textiles*
   1. Dressmaking
   2. Textile Printing
   3. Weaving (Power)
10. *Transportation*
    1. Automotive Shop (engine, body, ignition)
    2. Aviation Shop (engine, fuselage, instrument)
    3. General Transportation Shop (combined aviation and auto shop)
11. *Woodwork*
    1. Building Construction
    2. General Woodworking
    3. Joinery
    4. Woodturning and Patternmaking

PLANNING THE INDUSTRIAL ARTS SHOP

The planning of an industrial arts or practical arts shop takes on a particularization associated with the objectives set forth and the degree of individualization sought. Uniformity in these shop layouts does not produce the best results. Recognition of the skills and interests of the instructional staff brings the most satisfactory layouts.

The Definition and Aims of Vocational Education

DEFINITION OF VOCATIONAL EDUCATION

"As used with reference to federally aided instruction that meets the requirements of the Smith-Hughes Act of 1917 and the George-Dean Act, which became effective July 1, 1937, and is carried on cooperatively by local and state authorities with the United States Office of Education, vocational education has reference to training for useful employment in trade and industrial, agricultural, business, homemaking, vocation-technical, and other pursuits of less than college grade." [6]

Training for useful employment concerns itself to a large degree with the development of skills and knowledge required for quality and quantity production in some form. All vocational training is specific and unique as it pertains to a particular area, and must be given under physical conditions which simulate actual, real-life situations. Therefore, each school shop or laboratory must be planned individually in terms of the specific requirements of the subject area. In many instances the requirements of various shops in the same subject area are so different as to necessitate individual planning.

[6] Struck, F. Theodore. *Vocational Education for a Changing World,* John Wiley and Sons, Inc., New York, 1945, pp. 6-7.

GENERAL THEORIES IN VOCATIONAL EDUCATION

"1. Vocational education will be efficient in proportion as the environment in which the learner is trained is a replica of the environment in which he must subsequently work.

"2. Effective vocational training can only be given where the training jobs are carried on in the same way with the same operation, the same tools and the same machines as in the occupation itself.

"3. Vocational education will be effective in proportion as it trains the individual directly and specifically in the thinking habits and the manipulative habits required in the occupation itself." [7]

4. Vocational training, beyond the exploratory phases, may well be deferred until the student has acquired the maximum of general education background. In most high schools, the vocational courses, as such, are preferably started at the 10th year or beyond. Without doubt, the best preparation for most vocational students is a liberal training up to the 12th or 13th year and then a high degree of specialization in his vocational choice.

MANY TYPES OF VOCATIONAL SHOPS

In New York City's schools, which offer the most extensive program of vocational education to be found anywhere in the world, as many as three hundred different kinds of shops have been planned. A portfolio [8] of shop layouts shows the special nature of all this planning.

The shops fall into three categories:

1. Exploratory shops in various subject areas, called General Shops, i.e., General Electric, General Building or General Metal Shops.
2. Highly specialized industrial shops such as Airplane Engine, Electric Motor, or Gas Welding.
3. Shops on different levels such as Automotive; Elementary, Intermediate and Advanced.

The complexity of the program of vocational education is best illustrated by the following list of shops to be found in the New York City school system. Any community planning a secondary school will, of necessity, plan those shops which can be best related to local economic and industrial needs. The opportunity for exploration beyond present requirements must however be satisfied in the planning.

[7] Prosser and Allen, *Vocational Education in Democracy*, The Century Co., New York, 1925.

[8] Engelhardt, N. L., Associate Supt., Portfolio of School Shop Layouts, Division of Housing and Business Administration, Board of Education, New York City, 1947.

Vocational Subjects Requiring Special Shop Facilities, New York City, 1947

Art, Commercial
- Art, Commercial
- Decorating, Interior
- Design, Costume and Illustration
- Design, Industrial
- Design, Jewelry
- Design, Ladies Garment
- Design, Shoe
- Design, Textile
- Fashion Illustration
- Layout and Design, Advertising
- Studio, Art
- Studio, Photo

Art, Industrial
- Ceramics
- Glass
- Jewelry Making and Design
- Leathercraft
- Novelty
- Painting, Sign
- Plastics
- Sculpture and Stone Carving
- Stage Design

Automotive
- Body and Chassis
- Body Repair and Painting
- Body and Fender
- Chassis
- Display
- Electric
- Engine
- Maintenance and Servicing
- Mechanics, Advanced
- Mechanics, Elementary
- Mechanics, Intermediate
- Mechanics, Gas Engine, Elementary
- Mechanics, Gas Engine, Intermediate
- Repair and Testing

Aviation
- Accessories
- Assembly, Sub
- Covering and Fuselage
- Dope Shop
- Electricity
- Elementary
- Engine
- Engine, Dis-Assembly and Installation
- Engine, Final Assembly and Testing
- Engine, Testing
- Engine, Overhaul
- Fabric
- Fuselage and Rigging
- Fuselage and Wing Assembly
- Hydraulics, Brakes and Wheels
- Instruments
- Laboratory, Testing
- Lofting, Layout and Photo
- Machine Tool Operating
- Maintenance
- Mechanics
- Metal Work
- Observation Control
- Observation Room
- Propeller
- Sheet Metal
- Spray
- Tail Surface and Control
- Template and Fitting
- Wing Construction and Repair
- Wing Construction and Repair, Metal
- Wing and Fuselage, Metal
- Wing and Fuselage, Wood
- Wing and Fuselage, Wood and Fabric
- Woodwork

Building Trades
- Air Conditioning
- Construction, General Advanced
- Construction, General Elementary
- Glass and Plastics
- Heating, Advanced
- Heating, Automatic
- Heating and Ventilating
- Heating and Ventilating, Automatic
- Heating and Refrigeration, Automatic
- Maintenance
- Masonry, Advanced
- Masonry, Elementary
- Painting and Decorating, Advanced
- Painting and Decorating, Elementary
- Painting, Decorating and Finishing
- Plastering
- Plumbing, Advanced
- Plumbing and Heating, Elementary
- Plumbing and Sanitation
- Refrigeration and Air Conditioning
- Sanitation and Ventilation
- Sheet Metal and Roofing, Advanced
- Sheet Metal and Roofing, Elementary
- Struct. Steel and Orn. Iron (Erection Shop)
- Structural Steel and Ornamental Iron
- Surveying
- Tile Work
- Trowel Trades

Commercial
- Accounting and Business Practice
- Library Practice
- Operating, Office Machine
- Merchandising and Sales

Drafting
- Architectural
- Aviation
- Mechanical
- Production Planning

Electric
- Appliance

- Appliance and Radio
- Armature Winding
- Cable and Pipe
- Contracting and Servicing
- Elementary
- Illumination
- Installation and Practice, Advanced
- Installation and Practice, Intermediate
- Instrument Repair
- Laboratory
- Marine
- Marine Engines
- Motors
- Operating, Motion Picture and Sound
- Plating
- Power
- Refrigeration
- Telephone
- Wiring
- Wiring and Motors

Food Trades—Production
- Analysis and Sampling
- Baking, Bread Retail
- Baking, Bread Wholesale
- Baking, Cake
- Baking, Hotel
- Candy, Manufacturing
- Canning and Bottling
- Cooking, Caf. and Catering, Advanced
- Cooking, Cafeteria and Tea Room
- Cooking, Elementary Caf. and Tea Room
- Cooking, Hotel
- Dairy Products
- Food Packing, Cheese Manufacturing
- Laboratory, Nutrition
- Maintenance and Repair
- Meat Curing and Packing
- Meat Cutting

Food Trades—Merchandising
- Bakery, Retail
- Butcher
- Cafeteria and Tea Room
- Cafeteria and Tea Room (Girls)
- Cafeteria, Public
- Dairy
- Delicatessen
- Display, Window
- Fish Store
- Foodstuffs, Merchandising
- Food Trades
- Fruit and Vegetable
- Grocery
- Grocery, Fruit and Vegetable
- Luncheonette, Public
- Meat and Fish
- Meat Merchandising

Food Trades—Service
- Cafeteria and Catering Service
- Housekeeping, Hotel
- Stewarding

Graphic Arts
- Bookbinding
- Engraving, Block
- Engraving, Photo
- Estimating, Printing
- Gravure and Photo-gravure
- Layout and Design in Printing
- Linotype Repair
- Lithographing
- Maintenance, Machine Typesetting
- Makeup, Book and Job
- Monotype Casting
- Multilith
- Offset, Photo and Platemaking
- Photostat and Blue Printing
- Photography
- Platemaking
- Platemaking, Offset
- Presswork
- Presswork, Cylinder
- Presswork, Offset
- Presswork, Newspaper
- Presswork, Proof
- Printing, General
- Printing and Presswork
- Sign and Showcard
- Silk Screen
- Steorotyping
- Stonework and Imposition
- Typecasting, machine
- Typesetting, hand
- Typesetting, machine
- Typesetting Machines, Maintenance and Repair

Horticulture
- Floristry
- Garden Workshop
- Greenhouse
- Laboratory, Agricultural
- Landscape Construction
- Nature

Industrial Arts
- Art Crafts
- Auto and Aviation
- Cafeteria and Tea Room
- Cooking
- Cooking, Advanced
- Domestic Science
- Dressmaking
- Dressmaking and Sewing
- Electric, General
- General Crafts
- Graphic Arts
- Homemaking and Model Apartment
- Jewelry Making
- Kitchen Unit
- Mechanics, General
- Mechanics, General Household
- Metal Art
- Metal General
- Needle Trades, General
- Sewing
- Shop, General
- Weaving, Art
- Wood and Metal
- Woodworking, Elementary
- Woodwork, General

Lapidary
- Diamond Cutting and Setting

Maritime Trades
- Bake Shop, Galley
- Boat Building
- Boats, Maintenance
- Boiler Room
- Deck Shop
- Engine, Auxiliary
- Engine, Diesel
- Engine, Gas
- Engine, Steam
- Engine, Turbo Electric
- Galley and Mess (crew) and staterooms
- Galley and Mess (passenger) and staterooms
- Lofting
- Machine Shop
- Metal
- Pipefitting
- Rigging in Hold
- Sail Loft
- Ship Fitting

Metal
- Forge
- Foundry
- Heat Treatment of Metals
- Laboratory, Applied Mechanics
- Laboratory, Materials Testing
- Machine Shop, Advanced
- Machine Shop, Elementary
- Machine Shop, Intermediate
- Sheet Metal, Advanced
- Sheet Metal, Elementary
- Sheet Metal, Intermediate
- Welding, Electric
- Welding, Electric and Gas
- Welding, Oxy-Acetylene

Music
- Music, Instrumental
- Music, Vocal

Navigation
- Aviation
- Celestial Planetarium
- Laboratory

Needle Trades—Manufacturing
- Blocking and Cutting, Hats
- Clothing, Men's Mfg.
- Cutting, Women's and Children's Garments
- Cutting, Garment, and Operating
- Cutting, Fur, and Operating
- Cutting (for girls)
- Cutting and Fitting (shoes)
- Draping
- Dressmaking, Trade
- Flower and Feather Making
- Fur, Manufacturing
- Leather Goods
- Millinery, Trade
- Millinery, and Novelty
- Novelty
- Operating, Garment Machine
- Operating, Power Machine
- Operating, Special Garments
- Patternmaking, Garment
- Shoe Manufacturing and Repair
- Tailoring
- Undergarment Manufacturing
- Upholstery

Needle Trades—Merchandising
- Modeling
- Retail Store
- Store (Sales, office and classroom)

Optical
- Mechanics, Optical

Radio
- Air and Airways
- Broadcasting
- Code, Practice
- Mechanics
- Radio and Household Appliances
- Ship Operating
- Station Operating

Service
- Barbering
- Beauty Culture, Advanced
- Beauty Culture, Elementary
- Cleaning, Pressing and Repair
- Clock and Optical Work
- Dental Assistant
- Dental Mechanics
- Doctor's Assistant
- First Aid Instruction
- Hygiene, Health Nursing
- Laundry
- Management, Hotel Front Office
- Marcelling Room
- Mechanics, Clock and Watch
- Nursing Home
- Nursing (practice)
- Nursery (unit)
- Repairing, Shoes
- Service, Hotel
- Shampoo
- Repair, Watch and Clock

Textiles
- Dyeing
- Picking Room
- Spinning Room
- Weaving, Power

Wood Trades
- Cabinet Making
- Carpentry
- Carving
- Furniture Making
- Joinery
- Joinery, Ship and Patternmaking
- Millwork
- Patternmaking
- Turning
- Woodworking (hand)
- Woodworking and Patternmaking

Unclassified
- Occupational Therapy
- Laboratory Technician
- Shop Demonstration Room

CHAPTER 15: facilities for the teaching of music

Enrollments in courses in music increased greatly in high schools during the period 1920-1940. The impetus came in part from the wider contacts made by the American people with the radio, the educational talking picture, and other agencies of the technological age. During this period many people for the first time were able to listen to symphonies produced by the best musicians in the nation. The radio disseminated band, chorus, and solo music throughout every hour of the day. The educational talking picture presented some of the foremost musical stars and band music became associated with individual band leaders.

During this period national stress was laid upon the proper use of leisure time and music in all of its phases played a significant part in the development of this program. The vocational aspect of music has also been stressed with greater vigor during recent years. The net result of these and other forces has been to give music its rightful place among the offerings of the high schools of the country. The limited amount of space provided for music in many of the older high schools must now be augmented considerably in order to meet the needs of bands, orchestras, glee clubs, and choruses.

THE OBJECTIVES OF MUSIC

Dykema [1] has set up the general objectives of music as follows:

a. To increase and refine pleasure in tone or rhythm or both.
b. To develop taste and pleasure in music as an art.
c. To clarify and expand music as a means of self-expression both directly and indirectly (i.e., directly when the individual himself produces the music; indirectly when he listens to others).
d. To develop the power of sensitive, intelligent, aural attention.
e. To develop correct use of the singing voice (both individually and in ensemble).
f. To acquire control of the mechanics of reading and interpreting music.
g. To develop and apply instrumental skill (e.g., solo, band, orchestra, and chamber music).
h. To build up a permanent interest in music through a broad and deep experience in studying, performing, and listening to music.
i. To discover and encourage musical aptitudes and talent and to indicate their avocational and vocational possibilities.
j. Through any or all of these aims to aid in producing a sane, joyous, balanced outlook upon life and the ability to fit oneself effectively into the community.

These aims are both broad and specific. School planning must be such as to provide for music in the lives of all of the students in the school and to make for the greatest possible contribution to the music understanding and appreciation opportunities of the adults of the community. People should be taught to sing, to play, and to listen. Their association with good music should produce a lasting desire for it, and there should be no break between the enthusiasms of the student group and those of the community in the utilization of music for deep, human satisfactions. It should be recognized that not only does music have intellectual

[1] Dykema, Peter W., *Music for Public School Administrators*, pp. 141-142, New York, Bureau of Publications, Teachers College, Columbia University, 1931.

and social value, but it should be used in school to draw upon the creative abilities of the young and old of the community. Its recreational possibilities should not be ignored, nor its power to control the emotions and ideals of people and to stimulate them to constructive action. Music may become the life work of many students either for teaching or for performing, and the school facilities should be planned with this vocational objective, as well as the other purposes, in mind.

MUSIC AND THE OTHER SUBJECTS

Music does not stand alone by itself among the courses of the curriculum but it may be constructively related to almost every other aspect of the curriculum. The rhythms of physical education, the reproduction of sound through science, the association of music with history, and the interpretation of literature through music represent only a few of the many inter-relationships between music and the other subjects of the school. Rarely is an auditorium program carried out without its musical part; in fact, the needs of the musical program should constitute one of the major considerations in auditorium planning. This refers not only to the development of the facilities for the orchestra, but also to the provisions for rehearsal, the storage for instruments, the lighting for proper dramatic effects, and the acoustical design to provide against harmful sound effects.

CLASSIFICATION OF MUSIC GROUPS

Music is taught and practiced in school with groups of varying sizes. Frequently large sections of the student body may assemble in the auditorium and engage in mass singing. In vocational instruction, individuals may be taught singly, or there may be ensembles and choruses. In the program of instrumental instruction, orchestras and bands are taught in groups which have taken on large proportions and naturally vary from school to school. Some schools have also taken over the individual instruction of the piano and other instruments which traditionally have been taught through private practice. Other groups, like the glee clubs, a Cappela choir, madrigal choir, and instrumental quartets have become definite features of many high school programs. Listening and discussion groups, community glee clubs, quartets, and orchestras are other types of organizations for which a modern school will find it desirable to make provision.

ROOM PROVISIONS FOR MUSIC

All of these school requirements suggest rooms as follows: choral room, band and orchestra room, theory room, classrooms, library, listening rooms, practice rooms, work room, storage rooms, and an office.

GENERAL CHARACTERISTICS OF MUSIC ROOMS

Proximity to the auditorium, in fact direct connection with the auditorium, is desirable for some of these music rooms. It is also helpful if music rooms can be so planned that the sounds of music practicing do not permeate classrooms and other rooms where quiet is desired. Inasmuch as auditoriums should be planned on ground level, there is difficulty in meeting both of these objectives of music room planning. Coordination of the music with the art associated with the stage is helpful.

The music rooms present a special acoustical problem because sufficient reverberation is needed to prevent deadening effects. The distribution of acoustic materials in the music rooms should be distinctly the task of an acoustical expert. Straight-line and right angle surfaces are to be avoided, with preference for the irregular and non-parallel surfaces. The esthetic nature of music should be reflected in the decoration and design of the spaces.

CHORAL ROOM

This room should provide for a chorus of 75 to 100 voices and it should be sufficiently wide for the group of singers and the separation of voice parts. The banking of seats has been a preferred characteristic of these rooms. The level space in front of the seats should be designed to provide adequately for desk, music stand, grand piano, and radio-phonograph. Sometimes it will be found advantageous to plan this front space as a small stage which can be enclosed by curtains. The room becomes the most satisfactory when neither the audience nor the instructor will have to face the glare from windows. A room 52′ x 23′ will house approximately 125. Wherever possible, a more generous allotment of space should be provided.

The essential equipment of this room are a piano, either grand or upright, radio-phonograph, teacher's desk, student armchairs with drop-desk arms, bul-

letin board, lantern screen, storage spaces, music cabinet, conductor's stand and dais, and wall chart of music paper. A blackboard with permanent staves should be in the front of the room. The room should be provided with soundproof doors.

Special equipment may include an electric outlet for 16mm. portable sound picture equipment, an electric outlet for radio-phonograph, opaque window shades for use during picture projection, a switch for light and picture machine control at the rear of the room, and soundproof window construction. Chalkboard provision to show black notes on a white background is sometimes desired.

BAND AND ORCHESTRA ROOM

High school bands and orchestras have attained considerable size, frequently totaling 75 to 100 or more participants. The rooms that are provided for this number should be arranged for rehearsals. Frequently a community symphony orchestra of 78 players may wish to use this space, with minimum dimensions of 26′ x 46′. The room should lend itself to proper grouping for this purpose. The furniture should include individual chairs without arms for players, music racks, piano, music cabinet, radio-phonograph, bulletin board, wall chart of music paper or small portable blackboard, conductor's stand and dais, and cabinets or lockers for instruments and uniforms.

Instruments may be owned by the school, or by the individual student, and separate lockers should be provided to meet both needs. Bands are frequently provided with uniforms owned by the school. Therefore, lockers are necessary, as well as adequate spaces for dressing purposes. If the room is used for other purposes, storage space should be provided for the chairs and music stands. In providing storage for instruments, care should be taken that the storage spaces can be adequately locked. There should also be room for the larger instruments of the orchestra and band, such as the drums, bass viols, melophones, tuba and other large horns, harp, and violoncello. Lockers may be arranged according to type of instruments.

CLASSROOMS

The music department will need classrooms for the study of theory, including musical backgrounds, rudiments of music, harmony, and history of music. These subjects afford a splendid basis for determining the design and decoration of these rooms. The rooms should accommodate classes of regular class size, preferably 30, and not more than 35. They should be adapted to the use of the lantern projector and screen. Tablet armchairs, teacher's desk, a radio-phonograph, and a grand piano are needed features of the equipment. A movable blackboard with permanent staves or a blackboard across the front of the room should be provided. The number of classrooms will vary with the size of school and the local emphasis placed upon music.

Such additional equipment as an electric radio-victrola, and a recording instrument are types for which splendid use can be made.

MUSIC LIBRARY

Where the music department is sufficiently large, a splendid music library may be necessary. Otherwise, provision for the music library should be made in conjunction with one of the main rooms planned for music purposes. In the library music materials in both printed and recorded form will be stored. This requires special storage cases for sheet music and cases for records. Open shelving should be provided for books, with an 8 inch depth for half of the shelves and 12 inches for the remainder. A librarian's desk and tables for six students, with chairs, constitute part of the minimum equipment.

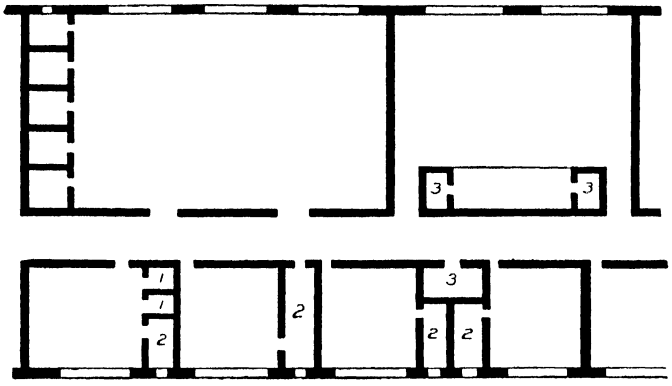
LISTENING ROOMS

Small rooms, in which the only equipment need be an electric-radio-phonograph and two comfortable chairs, are desirable parts of a music suite. They may be associated with the library or with any of the other music instruction room provisions.

PRACTICE ROOMS

Practice rooms designed for individual practice on instruments, including a piano, will need only simple equipment. Two chairs, a piano bench, music rack, and a small table will suffice. The rooms planned for vocal practice should be twice as large as those for instrumental practice because this alone will provide for differentiation between voice and instrument sounds. The classrooms may be used for rehearsal and practice purposes of small groups, such as ensembles and quartets.

The location of the practice rooms should be such that there is the least sound interference with the other work of the school. Frequently they



Plan 1: Music Unit. W. K. Harrison and T. A. Fouilhoux, Architects. Top tier: Left, Band and Orchestra Room with two levels of practice rooms opening at left; Right, Choral Room with Stage at bottom. Lower tier: Library and three classrooms. 1. Listening booth. 2. Office. 3. Storage.

are skylighted or provided with dormer windows. The doors should be soundproof.

WORK ROOM

Music instruction may proceed to the point where instruments are made and repaired. A small laboratory set aside for this purpose may encourage the development of individual talents. The main equipment of such a room would be woodworking table equipped with wood and metal vises, and a wash sink. Provision for the storage of instruments and tools should be planned.

STORAGE ROOMS

With a music department of considerable size, large storage space is essential. Costumes, equipment, and instruments not in use should be placed under the control of the music department. For the small school storage facilities may be developed in conjunction with the instructional space provisions.

MUSIC OFFICE

The music office may serve many purposes. It may be a conference room, a guidance room, a teachers' work room, and may take on the characteristics of a music museum. Provision should be made for supply cabinets, lockers for teachers and the director, and conference equipment. The size of the room will vary with the importance of music in the curriculum. Frequently the music department is required to carry on considerable business, such as the handling of entertainments and other performances. In such cases a clerk may be needed and provision should be made for clerical help and for the safeguarding of cash which may be handled through this department.

SCHOOL MUSIC AND THE RADIO

The day is not remote when many schools will have radio broadcasting stations and will broadcast

part of their school programs both in music and other fields during the day and evening. Some schools have already initiated such a program. If this is contemplated, or if the administration desires to plan for it, provision should be made in one of the rooms so that such transmission of school programs into the community and surrounding area may be accomplished without difficulty.

A PROPOSED MUSIC SUITE

Plan 1 shows a proposed music suite with the relationship of spaces to one another and to the auditorium. Listening rooms have been placed adjoining the library. Practice rooms have been located on two levels adjoining the band and orchestra room in which the height is above regular classroom levels. Offices have been associated with each classroom with the plan that they be used partially as offices and partially as storage if so desired. A small group conference room has also been included in this layout. Insufficient storage space represents a major defect of this unit.

MUSIC PROVISIONS IN THE SMALL HIGH SCHOOL

Each school will be required to select from the above lists the provisions that it desires to have incorporated within its own building. The consolidation of many of the features listed above around one classroom space has been worked out satisfactorily. Where only one room can be provided, a space 52′ x 23′ may be used, with a small office adjoining. Such a room should have sections set aside for storage. Provision should be made for the radio, for library, motion pictures and slides, and for the use of electrical equipment. There should be a music cabinet which will contain at least 750 pieces of music, a piano, chairs with silenced tips, and music racks. The major storage for the music department in such case may be associated with the stage, or with the regular school storage facilities.

CHAPTER 16: housing the business education curricula

The business education programs of most high schools are of a two-fold nature. They serve students who are looking toward vocational training in the business field, as well as students who wish to acquire skills or knowledge in specific business areas. The percentage of students in the total high school enrollments who have been taking one or more subjects in the business fields has increased greatly within past decades. It is not unusual to find as many as 50 percent of a high school enrollment who, in large degree, are following a business curriculum of one kind or another.

In the planning of school facilities it is essential that local trends in business education be discovered so that ample provision is made for the large groups who are seeking vocational competence in the business fields.

TYPES OF SUBJECTS TAUGHT

Business curricula looking toward training in bookkeeping, secretarial work, or general clerical work include a wide range of courses designed for teaching skills or for giving broad business understanding. Such courses include:

Advertising
Bookkeeping
Business Economic Problems
Business English
Business Mathematics
Business Organization
Clerical Practice
Commercial Law
Cooperative Work Experience
Economic Geography
Elementary Accounting
History of Commerce
Junior Business Training
Machine Operation
Merchandising
Office Practice
Penmanship
Personal-Business Problems
Record-keeping
Salesmanship
Secretarial Practice
Shorthand
Store Arithmetic
Store Organization and Planning
Textiles and Non-Textiles
Transcription
Typewriting

These courses may be used on the "social-appreciation level," "personal-use-level," or the "vocational-use-level." The variation in aims should play an important part in the nature of the physical environment provided.

CRITERIA FOR PLANNING THE BUSINESS FACILITIES

Some of the above courses may be taught in regular types of classrooms but many of the courses require special room sizes and special facilities. The planning should be in accordance with the best modern practices in the business world. Much of the teaching can be made realistic by giving students responsibilities in the business work of the school itself. This suggests proximity of the business department to the central administration. The following administrative problems of the school may be related to the work of the business curricula:

1. Accounting for the funds of the various student organizations.
2. Taking charge of the financial details of entertainments and all public programs involving fees.
3. Managing the school bank.
4. Handling the school store.
5. Assisting in the filing of school records.
6. Aiding in the creation of permanent school records, such as making scrap books and binding mimeographed and printed material.
7. Coordinating with the art department or advertising work of the school.
8. Training students in the salesmanship of school programs or projects.
9. Managing the telephone switchboard of the school.
10. Acting as receptionists wherever such need is felt in the program or activities of the school.

This list may readily be supplemented by the activities in a particular school. These are types of school interests which cannot be overlooked in the planning of the facilities.

BUSINESS EDUCATION AND COMMUNITY ACTIVITIES

The business education programs in schools should be intimately related to community life. Opportunity should be afforded the student for making contacts and getting understanding of actual work in the business world, and the business interests of the community should be encouraged to bring their problems, as well as their suggestions, to the school so that there may develop a better understanding of the business needs of the community as well as a training which is definitely associated with those needs. An advisory committee of business men has been set up in some localities which works with the faculty and students of the school in planning for mutual interests.

This has resulted in bringing into the school goods from local stores which have been displayed and sold in the school on a prearranged basis. Window display and commercial art have been carried on through the courtesy of merchants who have sent the display material and the provision in the school of proper display spaces. Advertising has been developed by student groups for the small business man.

Students have formed companies, such as woodworking companies, an egg candlery, or a commercial farm, for the transaction of business and have been given the experience of organizing, producing materials, and selling.

Junior chambers of commerce and boards of trade have played important roles in community life. Their membership has frequently come from the student body and their activities require special attention in housing. These, and many other types of interacting relationships between the business department and the community, require consideration in planning the modern high school.

INTEGRATION OF BUSINESS EDUCATION WITH OTHER EDUCATIONAL OFFERINGS

There is no course in the business curriculum which is not intimately associated with some other branch of school work. There has been a rightful emphasis upon the acquisition of skills in bookkeeping, typewriting, shorthand, and business arithmetic, but success and leadership in the business world depend upon broad knowledge and intimate understanding of science, art, and world problems. Business education must be well integrated with the speech arts, the fine arts, the social studies, the sciences, the home economics, and the consumer education courses of the school curriculum. Good planning of facilities is reflected in the degree to which the influences in these areas can be associated with the development of the business education areas.

THE INFLUENCE OF THE TECHNOLOGICAL AGE

Great advances are being made constantly in the application of machines to routine business practices. Bookkeeping, once done laboriously by hand, is now completely accomplished by machine. The typewriter has been moving through various stages of development until now electric and electronic controls obviate the necessity of application of human hands. Selling was once purely a personal task but now is performed, in many instances, by machines. Analysis of business accounts is now expedited by electrically-operated devices. Calculations of all kinds are made today in the business office by fingers rapidly manipulating keys and machines rather than by mental processes. The wax cylinder takes the dictation of the business official who wishes to use every spare minute of his secretary's time. In the business department provision must be made for these machines, as well as for those that will be planned tomorrow. A course on existing machines and what they accomplish, as well as on the kinds of machines that are necessary to expedite business, might well be a part of the training in the high schools.

CLASS SIZE

Many types of classes in the business area should be limited to 30 or 35 students. Courses which are purely drill courses and involve much individual practice, like bookkeeping and typewriting, may be taught in larger groups of 45 students.

PROVISIONS IN THE SMALL HIGH SCHOOL

The small high school will be required to make a choice among the kinds of courses given and the kinds of rooms to be provided. In no other department of school is it so essential that rooms be planned for multiple use wherever possible. Typewriting rooms are so planned with difficulty unless a substantial typewriting desk with disappearing top is used. This, however, takes up more space than other types of equipment. It is true, nevertheless, that with the need for giving every high school

student training in typewriting, any facilities planned ought to be used to the maximum. Other rooms, such as the bookkeeping and shorthand rooms, can, of course, be adapted to many purposes.

As far as possible the characteristics of planning outlined here for larger schools should be condensed in the smaller school so that a maximum of opportunity for student experience in desirable activities is maintained.

PLANNING FOR ADULT USE

The business education facilities can play a significant part in adult education programs of communities. This is especially true of rooms set up for the teaching of special skills as well as of spaces designed for business forms or for specialized interests, such as window display, salesmanship, and other distributive activities. Any contribution to the plan that can add to the interest and comfort of adults will add to the total use of the investment made in the building.

BOOKKEEPING ROOM

Where enrollments warrant, bookkeeping rooms can provide for 45 students with a minimum of 18 square feet of floor space per student. A room 23′ x 40′ is satisfactory for many schools. A blackboard across the front of the room, with a double-sliding central section, is desirable. Ample cork board space should be installed. The corridor wall should be divided between blackboard and cork board. Some blackboard sections may be ruled for ledger sheets, balance sheets, or other accounting forms.

The equipment consists of bookkeeping tables which may be of the individual type 24″ x 34″ in dimension, or may be large enough to accommodate two students. An ample storage room should be provided directly adjacent to the bookkeeping room. If a space is not provided in the tables for student materials, a large cabinet should be planned with individual drawers to care for the maximum number of pupils using this room for bookkeeping purposes. A drawer interchangeable between the file and the desk makes for easy filing and ready use.

Provision should be made for a small library and for a magazine cabinet, if not provided for elsewhere in the department. The student chair used should be in keeping with high-grade commercial office practices and will be of the movable, adjustable type. Other equipment will include instructor's desk and chair, clock, standard key cabinet, chart cases under the blackboard, and a four-drawer curriculum metal file for legal-size papers, preferably inset in the walls.

TYPEWRITING ROOM

In the small school the "dropped-type" desk may be used where typewriting enrollments are limited. This will make possible the use of the room for other instructional purposes. Such a room may be of regular class size. If this practice is followed, a small room nearby with a few typewriters may constitute the practice room when typewriting classes are not in session.

In the small school both the advanced and elementary typewriting will be taught in the same room. This requires that other office equipment. such as mimeographs, calculating machines, and other typical devices and filing equipment, must be included in the typewriting room.

In the large high school two kinds of typewriting rooms will be necessary for elementary and for advanced instruction. The equipment used is preferably a substantial individual desk for each typewriter. The desks may be set up in pairs, but space should be provided between pairs so that the teacher may move about for individual instruction. Pupils' chairs should not interfere with typewriter desks in back of them. The desks may be arranged so that the daylight for the student may come from the left, right, or rear.

In the elementary classes 40 desks should be the maximum with 45 to 50 desks in the advanced classes. Typewriting desks should vary in height from 26″ to 30″, depending upon student heights, and student chairs must be adjustable. In planning 20 to 22 square feet should be allowed per student. Blackboards should be installed across the front of the room, with the teacher's desk and the teacher's typing demonstration desk as the sole equipment between blackboards and the student typewriting desks. The demonstration desk is sufficiently large to take a typewriter and has long legs to make it visible from all parts of the room. The side walls should be equipped with display spaces for large charts used in the teaching process. Space under the blackboard may be utilized by chart cases. A large cabinet equipped with drawers interchangeable with those of the students' desks may be needed.

The number of drawers in the cabinet should correspond to the maximum number of students using the room.

Other essential equipment of the elementary typewriting room includes bookshelves, magazine rack, and a phonograph or other device for setting typing pace. A built-in cabinet for the storage of supplies is essential. A four-drawer curriculum filing cabinet for legal size paper should be provided, preferably inset in the wall.

In the advanced typewriting classes other types of equipment, such as filing cabinets, mimeographs, mimeoscopes and electric typewriters, may be installed in the rear of the regular student desks. There should also be a table with a 36″ x 26″ top for a paper cutter. This equipment may require a 10 to 15 foot space in addition to that set apart for the regular class group.

Two essentials in the typewriting room are the provision for soundproofing and the installation of a lavatory for washing hands after using typewriter ribbons and carbon sheets.

SHORTHAND CLASSROOM

This instruction requires a minimum of special equipment and can be carried on in a regular classroom equipped with tables and chairs. In smaller schools a small room, separated from the typewriting room by an office partition with glass offering no obstruction to vision, is frequently used. For a 40-student room 23′ x 30′ is a desirable size.

Blackboards should be provided on three sides of the room, a portion of which should be permanently ruled, similar to a stenographer's notebook. The student tables should be simple with ample writing surface and a minimum of drawer space. They should be of standard height, with smooth centers. The seats should reproduce high grade commercial office conditions. Other equipment should include a bulletin board, chart case, display case, book and supply case, teacher's desk and chair, visitor's chair, and a clock.

BUSINESS ENGLISH CLASSROOM

This classroom should be designed to provide for 30 to 35 students, with 20 square feet per student. The equipment should be flexible and should consist partially of tablet armchairs and tables and chairs. The tables should be designed for conferences of 6 to 10 students. The room should also be planned so that it may be used for visual education. Provision should be made for a screen attached to the front wall. Blackboards should extend across the front of the room. Cork boards should extend across the corridor wall and the rear wall. A special section of the cork board near the door should be set aside for the class bulletin.

The room may also be used for speech instruction purposes and telephone instruction. The use of dictating machines may be taught here. Types of teaching mechanisms which may be used include speech-recording devices, disconnected telephone instruments, and dictating machines. Special listening booths adjoining the room for the use of individual students in hearing their own speech-recordings are desirable. Other desirable equipment includes teacher's desk and chair, bookcase, magazine rack, storage cabinets, and a four drawer legal size curriculum filing cabinet. Cabinets, wherever possible, should be inset in the walls. Electrical connections for the use of machines should be installed in the listening booths as well as in the main room.

VARIOUS COMBINATIONS OF SPACES

In addition to the facilities listed above, schools vary greatly with regard to their other special needs for business education. Many combinations of rooms have been used, such as: *(1) a general office practice room,* where typewriters, calculating machines, duplicating devices, and files are used, with about 50 percent emphasis upon typing, and 50 percent on the rest of the activities; *(2) a bookkeeping and billing machine room,* where stress is placed upon bookkeeping machines and other mechanical devices for carrying on the bookkeeping program of a business; and *(3) a duplicating and filing room,* where typing may or may not be taught, and where each student is provided with a table and chair. The remainder takes on the characteristics of a business, filing, mailing, auditing, and duplicating office. Duplicating devices and addressing machines form a major part of the room's equipment.

GENERAL BUSINESS LABORATORY

The general business laboratory may be adjusted to many of the instructional needs for which separate spaces cannot be provided. In small schools it will be a limited area, but in the large schools it may take on dimensions of a room 23′ x 40′. In the larger room a separate section may be set

aside for clerical practice. Another section may be devoted to machine operation, and other sections may meet the specialized needs of the local school. Selections for equipment for this laboratory may be made from the following: commercial bank, cashier's desk, bank safe, wide-carriage typewriter, typewriter machines, calculating machines, duplicating machines, bookkeeping and listing machines, addressographs, protectograph, dictating machines, checkwriters, paper-fastening machines, stamp-affixing, sealing, and weighing machines, paper-cutting devices, telephone switchboard, directories, railway guides, postal-information guides, credit retailing books, trade journals, trade and industrial maps, correspondence files, and display cases. The student equipment will be chairs and desks. One section of the room may be set aside for a large conference table.

In this room a limited amount of blackboard space will be needed at the front. Cork board spaces should be provided wherever possible. Special attention should be paid to the electrical connections needed for the various types of machines. The room should duplicate, as nearly as possible, modern commercial conditions, with special attention paid to sections set aside for the instructional office, and for curriculum files.

OTHER CLASSROOMS FOR BUSINESS EDUCATION

Classes in business economic problems, business arithmetic, commercial law, economic geography, history of commerce, penmanship, and spelling are types of classes for which no special planning is required. The space set aside for these purposes may be determined on the basis of 18 square feet per pupil of maximum class size. Each of these subjects presents, however, a special need and may require space above and beyond the minimum in cases where the instruction is proceeding on an activity basis, namely, through the development of student projects involving displays or exhibits, or extensive planning which can only be done on large tables around which groups can gather. In such cases extensive provisions should be made for storage and filing, as well as for display. The room should take on the characteristics inherent in the subject being taught.

Business arithmetic classrooms may need provision for calculating machines with proper electrical connections. In economic geography classrooms there will be a maximum display of maps for which special provision can be made with the utilization of a maximum of all available wall space. Provision for visual education is also desirable in these rooms.

PROVISIONS FOR DISTRIBUTIVE EDUCATION

The distributive occupations are those associated with merchandising activities. They include the distribution of man's products in industry and agriculture to the ultimate consumer, or to others like retailers, jobbers, and wholesalers, who have a part in moving the goods from their original source to their ultimate consumption. The managerial and selling services are included in this instruction. Schools have varied widely in the amount of instruction which they have given in this field. The future may be expected to witness a steady increase in this area both in the cosmopolitan high school as well as in the vocational schools.

Provisions made for instruction will vary greatly. They may begin with a room space of 23′ x 50′ dimensions which is subsequently planned by the students, in all of its detail, for a commercial enterprise. Thus, the students would have the opportunity of studying costs associated with the planning and equipping of a store. Other provisions may extend to the full equipment of a store and the planning of the building with the subsequent instructional emphasis upon retail selling practices.

In planning for the distributive occupations in any school, it is well to follow the most modern practices, the most modern designs in fixtures and displays, and to adhere to changes which are taking place in the increasing of sales as well as in the display of goods. There is no special educational equipment needed here beyond the regular fixtures, furniture, supplies, machines, and references of the business world.

COMMERCIAL DISPLAY ROOM

A room 23′ x 36′ may be used for the teaching of commercial display. In one end of the room may be built the show windows of a local store. The course is designed to give the student practice in the preparation and the making of displays. The work may be intimately associated with the art department. Many posters and designs of legends and price cards are used in addition to the display of goods of various kinds borrowed from the local stores. Large drawing tables around which groups

may work, adequate storage for display materials, limited blackboard space, and extensive wall display space are essentials. A wash sink should be provided and adequate electrical connections to promote experimentation in artificial lighting. This room may also be used for commercial poster designing and for sign-painting.

Display windows of commercial store size in corridors of the building will provide an opportunity for the students in these classes to exhibit the productions of the school to the public. Provisions should be made for electrical outlets in all display areas.

BUSINESS FORUM ROOM

A room 23′ x 26′ planned with a large director's table in the center to care for 15 to 20 people, and directors' chairs round about, will meet the needs of a Junior Board of Trade, or other similar student business organization. The walls of this room should reflect the commercial and industrial activities of the community. Desks should be provided for the secretaries' organizations which use the room. Adult advisory committees of the community, as well as other adult organizations, would find this room helpful in their deliberations. It is a room around which many of the student activities of the commercial department should center. It is also a room which the faculty could use for their consultations with student groups or with one another.

REPAIR ROOM

The repair of the mechanical devices used in business education frequently cannot be done in the instruction rooms, thus necessitating a small repair room with a work bench and tool cabinet. The need is especially felt in the larger schools where many machines are used. This room may also be used for instructional purposes in giving some individual students who are especially mechanically inclined an opportunity for participating in the repair work and learning about the involved mechanisms.

THE OFFICE OF THE DIRECTOR OF BUSINESS EDUCATION

The departmental office may be of simple character and should be equipped to provide for small group and individual conferences as well as for the work of the director and his secretary. The files of the department are preferably kept in a small but separate filing room. These files may include the placement records of students and alumni, in case placement in business positions is made largely through this department. The filing equipment needed for these records will vary with the size of school and will, in large measure, determine the size of the required filing room.

CHAPTER 17: spaces for homemaking

From cooking and sewing for girls to preparation for successful home living for both boys and girls has been the trend of development in homemaking in the secondary schools of this country. The minimum program of biscuit baking and hemming a skirt has broadened to include a host of direct and indirect offerings designed to produce more competent household managers and general handymen around the house as well as to help establish firmer foundations for more successful family relationships.

For example, the shop offers the future head of the household experiences in repairing domestic equipment, the music program adds richness to the resources of the home. Recreation that the whole family can participate in together is a result, in part, of skills and interests developed in the game rooms, swimming pool, picnic grounds, or playing field of the modern secondary school. Throughout the program, practice and experience in the social arts involved in learning to get along with others add to the happy and stable home.

This realization by schools of the contribution that can be made to home living has been reflected in the steadily broadening program that has been developing in the areas in which homemaking may be considered as being taught directly. A partial listing of courses in this field discloses such varied offerings as:

Family Financial Planning
Housing
Consumer Education
Good "Buymanship"
Social Welfare
Family Relationships
Marital Psychology
Mental Hygiene
Family Recreation
Public Health
Maintenance of Family Health
Home Nursing
Selection and Care of Clothing
Care of Synthetic Fabrics
Nutrition
Conservation
Heating the House Efficiently
Child Care and Development
General Problems of Home Life
Home Management

These courses represent an effort to apply the scientific knowledge available from many fields to the issues that must probably be met if successful home living is to be achieved.

Spaces for homemaking education are provided in various fashions in modern secondary school buildings. Laboratories for food and for clothing are usually found often supplemented by "apartments" or other more or less typical home accommodations. Sometimes the home environment is simulated in a cottage for home arts located on the school site. At times, instruction in the various fields of homemaking is carried on in the homes of the students, often by means of projects supervised by a teacher who travels from home to home.

The expanding scope of home economics education requires that some new spaces be added, as the local program dictates, to the more conventional facilities. For example, instruction in child care and development is increasingly being carried on in nursery schools located in or near secondary school buildings. The introduction of consumer education courses has meant that space for simple experimentation and testing of household purchases be available near the home economics unit. Stress given to ability of students to live together and the accent upon the building of pleasant personalities has given new meaning to the living room area of the typical home economics "apartments" or has called for the inclusion of student social rooms in newer plants.

The home arts program has its vocational as well as general educational value. The home arts spaces, together with the cafeteria, and in some schools student shops, tea room, soda fountain and the like, provide facilities for the transfer of vocational learnings from theory to practice. In this fashion, students learn the science of nutrition, aspects of quantity cooking and phases of institutional management in the laboratories of the home arts suite. These theoretical or laboratory approaches are put into practice when students take responsibility for purchase of foods, planning of menus and the like in the school cafeteria. The vocational aspect of the program has grown in importance and many facilities within the school can provide significant ex-

periences of real vocational value if properly planned for this additional function.

The decisions as to the extent of the home arts program and the spaces needed will necessarily be arrived at in terms of local needs. Consideration should be given to the probability that adult use of such facilities will be extensive. Community canning programs have often been located in food laboratories. Millinery classes and schools for brides are popular offerings in most adult education programs.

The home arts unit should be located where a maximum of sunlight is received together with a minimum amount of dust. Often, particularly in the small school where the teacher of home economics is also in charge of the school cafeteria, the unit should be located near the business and kitchen section of the cafeteria. Both units are best placed on upper floors providing careful consideration has been given to student circulation problems. Care should be taken, if considerable adult use is anticipated, that not too much stair-climbing is involved. It is important that the unit be available for use without heating or opening the remainder of the building when desired.

If a nursery school unit is contemplated for experiences in child care and study of child growth and development, it must be located on the ground floor with direct access to the outdoors. In this case the home arts spaces should be located near the nursery, preferably closely integrated with it. Again, a practice house or separate home arts cottage should be located with easy access to the cafeteria and particularly to the nursery unit.

THE FOODS LABORATORY

A number of separate functions are carried on in the large foods laboratory. Among these are the actual preparation of foods. At times these are served and eaten in this space. In addition, class demonstrations and discussions are carried on. Often reading takes the spotlight. Group work on such items as preparation of vegetables for community canning may also be anticipated. The emergence of deep freezing as a popular food preservation technique requires allotment of space to this function. Finally, storage is a too often neglected function of the unit.

Adequate space for these functions requires approximately 1200 to 1500 sq. ft. of floor space. Foods laboratories may be up to 30 or more feet in width if bilateral lighting is possible.

The provision of a number of unit kitchens is generally accepted as good practice in the foods laboratory. Such units have a minimum size of 9′ x 7′. These are U shaped, each containing built-in cabinets, work table, sink, range, a table and two to four chairs.

Blazier [1] recommends that the work counters have a minimum width of 24″ and that, if two girls are to work side by side, 60″ be a minimum length. The counters should be 31″ high. Refrigerators should be located near each group of two to four units. A table and chairs should be provided for every student group near each unit kitchen. Table heights are 25″ and chair heights 16″.

In the planning of home arts laboratories students can obtain significant educational experiences if the adults are willing to take the time necessary. Time and motion studies, appraisal of efficiency of unit kitchen arrangement, study of work conditions, light, and economy in equipping the space are all practical home arts problems that will provide unusual challenges for students if they are given a chance to participate in the planning of the units.

In addition, a discussion demonstration area should be provided. Informal furniture will be advantageous since adults as well as students will use it. A library corner in this section is desirable, together with built-in files and work tables for the teacher.

A deep freezing unit of size large enough to meet the needs of the students desiring experience in its use should be provided in or near the foods laboratory. The provision of a proper storage room with space for storage of frozen products may be a desirable combination. Instruction in freezing would appear to be particularly desirable in rural areas where its use is increasing rapidly. A towel drying closet with good ventilation, possibly forced, is a great asset to the teacher in aiding in the solving of a troublesome minor problem. Floors of the foods laboratory are preferably of grease resistant asphalt tile or linoleum.

The equipment purchased for the laboratory should reflect the best thinking of staff, students, and architect in the planning of a kitchen for the community. Equipment, however, should approximate average conditions in the homes with emphasis upon efficient arrangement. A variety of types of

[1] Blazier, Florence E., *"Planning a Combination Homemaking Room," American School Board Journal,* February, 1944, pp. 33-38.

ranges, for example, ordinarily found in the community will be of more value than provision of only one type.

CLOTHING LABORATORY

In the clothing laboratory, space should be available for the designing and making of clothes, planning of clothing expenditures, selection of materials, care and repair of clothing, and, in some cases, weaving of cloth eventually to be made into clothing. Particular care should be exercised in planning this unit in order that adequate light at working surfaces is obtained.

The clothing laboratory will provide from 1200 to 1500 sq. ft. in most cases. Sewing machines, each with a separate supplementary light source, together with cutting tables and sewing tables are the main equipment. Cutting tables, when large bolts of cloth are used, are 6′ x 32′ x 3′ in dimensions. Smaller tables are satisfactory when large scale cutting is not used. Sewing tables should be 30″ high with ample knee space.

A discussion and design area will be equipped with drawing tables, informal chairs, table for the teacher, and ample filing space. Files should hold patterns efficiently.

Equipment for visual education is desirable. Display space, bulletin boards and blackboard should be installed.

Storage for work in process is necessary. Tote trays and supply storage should also be planned for.

A laundry should be located adjacent to the clothing laboratory. From 200 to 250 sq. ft. of floor space is desirable for this purpose. Several built-in tubs, one or more washing machines, a drier, an ironing machine, and service table are needed. Ironing boards, either built-in or in cabinets, are essential. Consideration should be given to electric outlets suspended from the ceiling to avoid trailing electric cords. Space for storage of irons should be of asbestos and metal construction to reduce fire hazards. A clothes drying rack is desirable. Consideration should be given to the flooring so that it will not become slippery if water is spilled.

OFFICE

In the larger unit, a teacher's office with an adjacent conference room may be desirable. Pleasant surroundings, preferably planned and carried out by students, will contribute. Desk, chairs, filing cabinets, duplicating machine and typewriter are essential equipment.

HOME ARTS APARTMENT OR COTTAGE

The home arts apartment or cottage is designed, where used, to simulate actual home conditions in providing practical experience for students. Apartments, when provided, have not always been used sufficiently to justify the expensive space. In a few schools, apartments of varying sizes ranging from a one room apartment with kitchenette to a full sized four or five room apartment have been included in one large home arts unit. With intelligent use, many valuable outcomes could be expected, including experience in planning and preparing meals under various conditions, decorating the apartments of various sizes and the like. In the main, however, the apartment should be planned carefully for multiple usage if it is to be provided at all.

A kitchen and living room are the main spaces. Both should be larger than ordinary home facilities of the same type. The living room would serve as well for classes in home decorating. Space for storage of additional furniture of different periods and design should be readily available. The living room should also be used for social activities. The adjacent kitchen will be of service at such times. Storage for china, silver, and tea service are needed. The living room should have direct access to a main travel corridor of the school to allow for more convenient use for school social purposes. A wood burning fireplace will add to its usability.

A bedroom and bathroom may also be provided, particularly if home nursing is to be taught. Again ample storage space is desirable.

The home arts cottage or "practice house" located on the school grounds is probably superior in value to the apartment. In any new construction, such a house should usually fit in the average range of costs of homes in the community to be served, aside from the additional costs dictated by educational purposes to be served. The home arts cottage should make a significant contribution to the thinking of the community in the field of family housing. Again, the school students can obtain rich experience if they are invited to participate generously in the planning of the unit.

The home arts cottage serves as a practical laboratory for electrical wiring, operation of heating unit, house construction, repair and the like. Panels should be movable to expose plumbing, electrical

wires, and structural members. The cottage should be heated by the central heating plant. In addition, a typical family heating installation should be provided that will operate independently. Many opportunities exist here for teaching the application of scientific principles if the building and equipment are carefully designed.

A cottage of this type, if properly designed, can have many contributions to make to a vital community education program. Rooms should be planned carefully for multiple use.

CHILD CARE UNIT

The practice of giving secondary school students intimate contact with young children has been growing in acceptance. In many cases, a complete nursery unit has been incorporated into the planning of new school buildings. In these spaces students, under the supervision of trained teachers, learn about the development of young children, the games they play, how to care for them, proper feeding, and acquire some insights into child psychology that for many will have practical use not many years after leaving secondary school. The nursery school can become a center for child study on the part of young parents of the community to help them in their new role.

Spaces required include a play room, a rest space, nurse's office, teacher's office, kitchen, laundry, and storage for cots, supplies and play equipment. An enclosed outdoor play yard will also be necessary. The bibliography contains references to materials concerning the planning of nursery school units.

CONSUMER EDUCATION

Consumer education can either be developed as a point of emphasis in a variety of courses usually offered in secondary schools or as a separate course. The home arts and science laboratories, industrial arts, library, and other specialized spaces can all contribute to this program.

A consumer education laboratory is equipped with simple laboratory tables with sinks, hot and cold water, and gas. Built-in drawers for tools and ordinary kitchen equipment should be provided in the tables.

Storage space is needed. A scale, mixer, drawing table, filing cabinets, display space, bulletin boards. tables, filing cabinets, radio, moving picture projector, and recorder are requisites.

CHAPTER 18: facilities for administration

I. The Changing Role of Administration

The quality of leadership of a school determines to a great degree the effectiveness of the program of education. Too much importance cannot be given to the role of the principal in developing in a school the sense of importance of education and a resolve to make that education meaningful in the life of each person with whom that school comes into contact.

Administration has made great strides in recent years. The professional preparation of personnel has improved; the techniques of organization and administration have been developed and refined; and most important, the scope of leadership has broadened and the value of cooperative planning and direction by staff, students, and adult participants has been recognized.

The headmaster of yesterday's high school was concerned, in large part, with the problems incident to the efficient organization of a schedule of classes, with the disposition of the time of the teachers, and with the proper routing of papers, supplies, and reports. Supervision was largely the insistence by the principal that proper discipline be maintained and that the teachers conform rigidly to such prescribed curricula as may have been laid down.

Today's administrator is responsible for developing and maintaining a positive program of education vital in the life of the community. New functions and responsibilities of the school to the people in the area surrounding the school building require men and women of broad vision and dynamic leadership if education is to maintain and improve its position in relation to other public services. The importance of education notwithstanding, the effectiveness of the school may suffer if the larger responsibilities of the institution to society remain unmet.

RESPONSIBILITIES OF THE SECONDARY SCHOOL FOR THE GENERAL EDUCATION OF BOYS AND GIRLS

The secondary school is concerned primarily with the provision of a stimulating and coordinated program of activities for adolescent boys and girls that may be expected to result in significant growth on the part of each youth who may experience it.

It is the responsibility of the principal that such a program meet the needs of the students it is intended to benefit. This is not a static relationship. The study, revision, and implementation of new curricula is a fundamental function of teachers and principal, working together and pooling resources and points of view. The stimulation of staff to the peak of its abilities to meet the challenge of the role of education together with the enrollment of teachers in the task of curriculum reconsideration is a mark of real leadership and supervision.

From staff participation in the planning of curriculum to the assistance and encouragement of individual teachers is a logical step. Supervision of teachers by the principal changes to understanding and help; the principal moves from the status of overlord to that of colleague. Teachers need expert help, advice, and stimulation if they are to

continue as effective and resourceful leaders of children. A good principal will provide this encouragement and assistance through his own efforts and through the organization of his staff for the support of teachers.

VOCATIONAL ADJUSTMENT OF SECONDARY SCHOOL PUPILS

Part of the education of all children in the latter part of their secondary school career should be preparation for work, whether this be by means of pre-professional preparation, actual training for the skilled and semi-skilled trades, or through the acquisition of information regarding work opportunities and requirements. Experts from industry and labor should cooperate closely with school officials in planning and developing courses of study leading to employment in the industries of the community. Apprenticeship should be fostered and reciprocal training arrangements made with industry. Academic tradition cannot be allowed to be a barrier to this preparation of students for economic independence. The school program should be adjusted in accordance with the employment policies of the community or the regional area the school serves. Such cooperation requires great effort on the part of the school if a realistic introduction is to be provided into the world of work and if industry is to be able to profit from the skills that the schools have trained for. The test of the school's training will be on the production line.

RECREATIONAL AND INFORMAL EDUCATIVE ACTIVITIES

As the scope of the school program widens, the responsibilities of the school principal grow. Organized recreational programs for afternoons and evenings have a place in every secondary school curriculum. Clubs and other student activities can no longer be classified as "extra-curricular." Rather they have become curricular in nature and can be differentiated from the more standard educational program only by the degree of informality of the activity, the increased student control, and the greater degree to which these more informal activities reflect the interests and hobbies of the participants.

The school day is no longer abruptly terminated in the early afternoon. The principal and his staff of teachers have a responsibility for the direction and encouragement of this equally educative, recreational and informal educational program of the afternoon and evenings for proper use of leisure hours.

By extension, the summer program of education cannot be neglected by professional teachers. The school functions continue, although in a changed form, through the summer recreation program carried on in the school building and grounds. The relationship of the school and its staff to summer camps and play schools should be close, whether these be public in nature and supervised by educational authorities, or whether they be privately owned and operated in cooperation with the public school system.

RESPONSIBILITIES FOR A PROGRAM OF ADULT EDUCATION

The school as a community center must provide a program of education for the adults of its influence area. This program, to be meaningful should, of necessity, reflect the needs and wishes of mature people of the community. Of great importance in the success of any such program, is the participation of the adult group in the determination of the program that is to be offered. The relative emphasis that is to be placed upon Americanization courses, vocational preparation or retraining, upon recreational (in the narrow sense), avocational, or cultural pursuits is a matter that cannot be determined except by the community itself. The principal must provide means whereby the community may effectively register its wishes in the matter. He must also be responsible for providing teachers capable of carrying on such a program for adults, whether his staff is recruited from the regular teachers of the school or in part drawn from the community itself. Intelligent leadership and encouragement are necessary if his staff is to meet the challenge of education for adults.

COMMUNITY-SCHOOL RELATIONSHIPS

The importance of the relationship of the school to the community it serves cannot be overstated. The school program and school building must be developed in terms of a concept of responsibility that will include the larger function of the school as an active agent in community life.

The Benjamin Franklin High School in New York City represents in many respects an advanced form of cooperation among the principal, staff and students of the school; the public at large, through interested individuals; and various civic agencies both public and private.

The school building reflects this program. It is located in an area of East Harlem and serves a population of heterogeneous nationalities and races. The building is located adjacent to a city park and, through cooperative arrangements, the facilities of the park are available for school purposes. Nearby is a new housing development, which the school as a unit was of importance in bringing into the neighborhood. The building itself has been planned to meet the needs of high school and adult populations and has particular facilities that are adapted for community center use.

The principal has been instrumental in the establishment of the East Harlem Research Bureau currently housed near the school building. Through this bureau a continuing survey of the school community is carried on. The necessity for improved hospital facilities has been shown and the school is one of the agencies of the area which are cooperating in a drive to obtain this service. A community newspaper has been established with the principal as the editor, and it is important in unifying community morale.

The activities of the school in the community are many. For example, in vacant stores in the neighborhood, community libraries, various language clubs, and social clubs have been organized under school auspices. Because of the density of the population in that slum area, block units have been organized along each street in the vicinity of the building. The dwellings on each side of the street for one block length provide a homogeneous unit within which activities are organized. On occasion, the block is roped off, programs arranged followed by entertainment and social dancing. This school cannot adequately be described in terms of what goes on in the building alone. It is a community school.

The principal's relations with the community go far beyond that of placating ruffled parents. The school must have a positive role in the community and must serve as a center of growth or rehabilitation of the areas within its influence. Community planning, community growth, and morale are proper objects of the principal's attention.

DEMOCRATIC ADMINISTRATION

The expanding role of the school, the recognition of the value of staff participation in administrative decision, the necessity for the utilization of staff resources and areas of expertness in approaching problems of great variety, the recognition of the need for actual participation of students in determining for themselves procedures to be followed, and the need for understanding, advice, and help from lay members of the community are factors which have profoundly altered the relationship of the principal to this staff, to his students, and to the public he serves, and with whom he works.

The good principal, in order to take advantage of expertness on the part of his teachers in the various fields, will consult frequently with his staff. Problems of curriculum cannot successfully be met by administrative pronouncement. The degree to which teachers who are to carry out a program understand and are ready, in a psychological sense, to put into operation proposed changes will determine the effectiveness of the teaching and of the curricula. Consequently, curriculum revision on a continuing basis will be a major faculty activity with the flow of ideas between leader and staff carrying on without interruption in both directions.

The relationship of the administration to the student body of a school has changed as a result of better understanding of the problems and the significance of student self-government. Clubs and publication are being emancipated from strict faculty control. The responsibilities of making decisions, of controlling finances, and of executing policies either for clubs, class groups, or for the students as a whole are being vested squarely with the students as a phase of training for citizenship. Principals are recognizing the worth of student participation to an increased degree in the working of the school organization.

The principal is moving into closer contact with the parents and lay members of the community. The adult education programs, reflecting closely the needs and interests of the population they serve, are often devised or outlined by interested members of the community. Volunteers aid in the administration of this program. Competent persons from the community may be enlisted as teachers. Vocational education cannot operate effectively without constant reference to employers and representatives of labor. With the increased emphasis on the relation of the schools to civilian defense in safeguarding children, in conveying information to the public, and in preserving morale, the schools must place great reliance on parents. Close and harmonious working arrangements must be perfected under the pressure of emergency conditions. In area after area, the

schools and their public are becoming more closely integrated. Participation of teacher, of student, and of lay persons in a genuinely democratic organization will produce teamwork that will accomplish results.

II. Expanding Services to Children

HEALTH

The principal is vitally concerned with the health and safety of the pupils in his charge and of his community in general. In cooperation with a general education program that is concerned with providing children with scientific knowledge relating to good bodily habits, nutrition, and home making, together with a program of health education providing wholesome recreation and hygiene, during and after school hours, a school health service is a prime requisite for the determination of the state of health of children. The school has a definite responsibility to see that some treatment is given for known physical defects. This may be carried out through doctors, clinics, public health service or through the school health service. A careful follow-up is necessary to make sure that treatment followed the diagnosis and that every effort is being made to clear up the defect. A careful system of individual health records as a part of the cumulative record of each child is required.

CHILD WELFARE, ATTENDANCE, AND VISITING TEACHER SERVICES

The role of proper home environment, parent attitude, clothing, and nutrition in the development of children have long been recognized as matters of fundamental importance. In recent years, economic conditions have so drastically affected these basic necessities that the schools, through sheer impact of these conditions have been forced into the field of child welfare or social work. Where other public and private agencies could be found capable of absorbing the load of this work, the schools were required to coordinate the services. In other instances, no such agency could assume the burden and the schools were required to take more direct action.

Distribution of clothing and the provision of free lunches and meals, and, more recently, the distribution of inexpensive milk and lunches have been types of services that the schools have been called upon to render.

Increased knowledge as to conditions in the home and the attitude of parents toward their children has been sought as a result of clearer insight into the nature and causes of maladjustment. The adjustment of problem cases has been made more effective by the use of the services of visiting teachers, social workers, and psychiatric case workers in educating parents, in seeking to aid home conditions and, on the other hand, causing modifications in the school program of these children, on the basis of more complete knowledge of children gained through this close contact with the home. Truancy has been met by careful search for the causes, whether they lie in the attitude of parents or teachers or in the environment at home or at school.

THE CARE AND EDUCATION OF PHYSICALLY HANDICAPPED CHILDREN

Changing concepts of care of physically handicapped children calls for greater effort on the part of principal and staff. Seeking normal living for all children, current criteria for the education of this group of children call for avoidance where possible of segregation, and the provision within the regular school program of modified programs with suitable rest periods based on known medical needs. No longer can the crippled or cardiac child be sequestered and ignored. Individual handicapped children must be provided for along with normal students. Post-operative and convalescent children must similarly be provided for by suitable modifications of school schedule, but for a shorter period of time.

THE EDUCATION OF GIFTED AND SLOW LEARNING CHILDREN

The principal is responsible for modifications of the curriculum to accommodate slow learning and gifted children. Again the trend, generally, is away from the segregation of this group. Rather, modifications for individuals should be made within learning situation provided for more normal children.

GUIDANCE

Guidance, from being merely a specialized service, has become an attitude toward children and curricula. The principal, to meet ever changing conditions of modern life, is compelled to develop means for the permeation of the guidance attitude in his staff. The coordination of the work of specialists, the education of teachers in the technique of guidance, and the arranging of scheduling in order that needed

changes in the educational program may be affected following lines suggested by the guidance effort are all aspects of the relationship of the principal to this service fundamental to the education of individuals.

III. Functional Relationships Involved in an Administrative Unit

The administrative unit is made up of on one hand, the services that are rendered to teachers as aids and stimuli in order that children may receive a more effective education. On the other hand, the administrative area is the fulcrum of those activities that are directed toward the participation of the school in the life of the community. In addition, within the unit are housed the services involved with the keeping of records or the preservation of the experiences of the school in a permanent and orderly fashion.

Of fundamental importance in administration is the availability of pupil records. From curriculum revision, to health, guidance, placement on the job, as well as a host of other activities, cumulative and complete records of individual students are of great importance. The centralization of cumulative pupil records is a major function of the administrative suite. Those services which employ these case histories of students must, for economy of time, and efficiency of service, be grouped together. Similarly, curriculum workrooms and spaces for the guidance services should be located in close proximity. Placement, guidance, and vocational advisory service have a close functional relationship. The administration of adult education or recreation requires the use of much of the equipment and specialized spaces of the administrative unit. The community survey area is fundamental to much of the work that is done here for children and adults.

As the influence of the principal is a determining factor in the aliveness of a school, so should the principal's office be located in the thick of the activity. The stimulation of teachers to maximum effectiveness, creative supervision, and inspiring community-school relationships are not accomplished through withdrawal within a sanctum. The principal's office should be a center of creative activity and kindly personal relations.

The administrative services may be grouped within a unit or distributed throughout the building. Local conditions will dictate what combination of offices will best meet the needs of the individual school. However, in most instances, an analysis of the functions of the administrative services will indicate a need for the grouping of many if not all of these spaces.

The administrative unit should be located centrally in relation to the remainder of the school plant. The services should be easily available to the public and to the students and teachers. It should be located on the ground floor and near to a central entrance. Provision should be made for direct entrance into some of the areas from the outside in order that a minimum of disturbance will be created by the use of the school facilities by the community during school hours.

IV. The Provision of Spaces for Administrative Services

THE GENERAL OFFICE

The general office has the following functions to perform; the reception of students and adults; clerical, typing, and stenographic services to the entire staff; the handling of communications whether by mail, telephone, radio, or bulletin board; duplication of administrative and instructional materials; the keeping of records; the storage of materials for work and the orderly accounting for and disbursement of the supplies; and the provision of personal conveniences for the staff of that office. In addition to the regular staff, space must be provided for such students who may be assigned to that office for some form of work experience.

GENERAL PERFORMANCE STANDARDS

The general office must meet the standards required of work-space in commercial offices. Attention to lighting, sound control, ventilation, comfort of workers, and efficiency in the arrangement of equipment and facilities will pay dividends in terms of better morale and lessening of waste caused by fatigue of workers or inefficient work space.

The requirement of good lighting and ventilation generally preclude any arrangement whereby the general office is entirely without windows to the outdoors. In most cases, the separation of work space for stenographers or clerks from natural ventilation and light has proven unsatisfactory. Only in

those cases where a maximum amount of natural light is allowed through the office partitions by the use of glass brick or some similar material and supplementary lighting has been carefully installed and, in addition, where relatively expensive air conditioning of the atmosphere in the inner office space has been introduced will this space be usable in an efficient and comfortable fashion.

Sound control, usually achieved by the installation of some sound deadening material on the ceiling and walls of the office space will cut fatigue and increase the efficiency of the workers. In addition it will increase the attractiveness of the space if it is used as a reception center as well.

Space should be provided for typewriter chairs and desks, as well as for work tables, files, and other equipment as indicated by the functions the office is to serve.

KEEPING OF RECORDS

A main function of the general office is the keeping and systematic handling of the great majority of the school records. These may be roughly classified into the records of individuals served by the school, whether young or adult, and records of administration or generalized records.

Designing the school plant facilities for the handling of individual student records must take into account the fact that these records are of importance in a number of areas of the school program. Data must be entered on record cards from a number of sources and the materials on the cards will be used by a variety of services within the school organization. Individual student records are of importance in the area of guidance. Teachers must be able to consult frequently pupils' cumulative record cards and are required to add to these documents at fairly frequent intervals. The health service will have significant additions to make to the records. Placement workers, psychologist and psychiatrist, visiting teacher and social case worker, all or any of these specialized services have a contribution to make to the records or a demand to make upon the reports. In a more general way, the curriculum revision work is dependent upon access to these materials and data.

Thus, ease of access to these files of student records together with the fact that these reports are of a confidential nature require that the files be centrally located in the administrative unit and that they be carefully supervised. Careful planning will make easier the problem of supervising the records.

In large schools a separate pupil record room may be desirable supervised by a clerk in charge of the files. This unit would be more closely integrated with the curriculum-pupil aspects of the unit. In a smaller school, the files would be an area of the general office work space. At the same time, close working relationships with the other areas of the unit should be preserved.

RECEPTION OF STUDENTS AND ADULTS

The reception of persons entering the administrative suite is of importance in determining their attitude toward the persons with whom they must deal. Every effort should be made to have the reception pleasant and the area inviting. A separate central waiting room that will serve the entire administrative area, if well planned, may be feasible. If the general office must also serve the public directly, some pleasant waiting space should be provided. Comfortable chairs and a table may be provided. Exhibits of school work may be used to heighten the interest of visitors.

A flat topped counter will prove useful to facilitate handling of routine matters, if the general office serves this dual purpose. Careful planning of the working drawers and files of the counter will increase the efficiency of the clerical staff in dealing with routine needs.

HANDLING COMMUNICATIONS

The general office is the center of communications for the school. Forethought in planning will result in more efficient distribution of letters, bulletins, telephone messages, radio programs, and public address broadcasts.

A central mail box containing space assigned to individual teachers should be provided. This may be placed in the general office or in the teachers' workrooms. An official bulletin board is usually provided where it is easily accessible to teachers. This may be located near to the teachers' mail boxes.

The telephone switchboard of appropriate size should be installed in the general office. If, as is usually the case, the work attendant to operating the switchboard is not sufficient to require the full time service of an operator, the board should be so located that a clerk in the office can operate the board and carry on other work without inconvenience. Telephone extensions should be provided within the general office for groups of desks. Outlets

in other offices should be wired to have all calls go through the central switchboard for control purposes. Pay telephone booths should be provided in the reception area of the administrative unit and in other convenient locations throughout the school building.

The radio and public address system should be installed in the general office and should be controlled by a clerk in that office. The routine work of the management of this instructional aid should be centralized in the general office.

DUPLICATION OF MATERIALS

The duplication of instructional materials, administrative bulletins and forms may well be centralized in the general office except as this work may be done in the commercial course work. As the noise of operation of the mimeograph or other duplicating machines is distracting, a separate space may well be provided for this purpose. Good lighting, noise control, and adequate electrical outlets are imperative for this space.

STORAGE

The administration unit must be provided with space for the storage of office supplies and forms used in the course of its business. In the general office provision must be made for the distribution and control of the supplies for the school. Although the general supply storage will not usually be located in this unit, care should be taken so that a clerk may easily supervise and account for supplies in the most efficient manner.

A vault is provided in many schools for the storage of important records and to protect small amounts of money. The installation of a vault or a safe will depend upon the necessity for the protection of such items. In most cases, a small safe will provide sufficient protection as a good administrator will not allow money in any quantity to remain in a school building over night.

The Principals' Office

FUNCTION AND LOCATION

The principal's office should be at the center of the activity of the school. The principal is the liaison agent acting between the school and the community. He is the officer of the school responsible for the educational program in its many phases; adult education, school program for youth, informal education after school hours, and community center program. The school principal is of strategic importance in the functioning of the school.

The office of the principal will be used for the reception of visitors to the school, for conferences with students, parents, teachers, and lay persons from the community. The room must be large enough to accommodate groups of from fifteen to twenty people at a time. It must also be a convenient efficient work space for a busy executive. The office must be easily accessible to the public, students, and faculty, and at the same time have the requisite privacy and freedom from disturbing noise or traffic.

Entrance to the principal's office should be controlled by the general office. A separate direct entrance to the private office from a corridor without going through the general office should be provided.

EQUIPMENT

The principal's office should be provided with a large desk and swivel chair. A conference table with chairs should be provided. Book cases, a closet or wardrobe, and a closet for storage are necessary and may be built into the walls of this space if it is found desirable to do so. One or more comfortable chairs and a settee will add to the informality and the charm of the room. Lamps, curtains or drapes, a rug, pictures, smoking stands, and other articles will contribute to the atmosphere of comfort.

Telephone and intercommunicating phone service should be available. An outlet of the public address system may be provided as well as a microphone extension. The buzzer call system should be installed in order to summon a secretary located in the general office space.

OTHER OFFICES

Offices for such administrative personnel as dean of boys or of girls, and administrative assistants should be located near to the general office. Secretarial service should be provided by the general office.

Furnishings will include desk and chair, work table, chairs for visitors, bookcases, wardrobe closet and other articles. File drawers are desirable. Every effort should be made to provide cheerful looking, comfortable, and efficient work spaces.

FACILITIES FOR GUIDANCE

Guidance is largely the responsibility of teachers. To augment the activities of individual teachers, many schools relieve members of the faculty from teaching duty in order that they may concentrate on the guidance program. Still other schools provide full-time trained guidance people who carry on personnel work with children and also train teachers in the guidance and personnel techniques.

Guidance requires the services of several specialists. Psychologists and psychiatrists are provided for testing and for diagnosis and treatment of emotionally maladjusted children. These services are often provided on a school system basis rather than on that of an individual school. Placement workers are an integral part of a guidance program. Social case workers or visiting teachers provide professional contact with the home in order that a coordinated program for dealing with children can be effected between home and school.

ROLE OF INDIVIDUAL RECORDS IN GUIDANCE WORK

It is of paramount importance that adequate, complete, and comprehensive records of each pupil be stored in a location of easy access from the guidance area of the administrative unit. All guidance services to children are based and must be based, if it is to be effective, upon complete knowledge of the child which is possible only if carefully prepared and up-to-date cumulative records are available. The doctor or nurse of the health service must make entries on the cards or record forms. Psychologists, social worker, placement worker, guidance counselor, and particularly the teacher must add to the file and use the information collected there from many sources.

As described above, the individual records should be filed under the general supervision of the general office. The guidance services must be located adjacent to the records.

FACILITIES FOR GUIDANCE

A Reception Area should be provided. This may be developed as a section of the general reception area for the entire administrative unit. Comfortable furnishings and attractive decoration will have positive values in the guidance effort. It may be advantageous to include in the reception area a library corner the shelving of which will hold books on vocations, a collection of junior college and college catalogs, and other information pertinent to the after school aspects of guidance work.

Counseling Rooms are desirable for individual conferences between teachers or guidance counselors and pupils and, in some cases, parents. It is important that complete privacy is assured in these rooms. They should be furnished with comfortable chairs and a table with appropriate chairs. Every effort should be made to put students at their ease and the charm of the furnishings and decorations can contribute to this end.

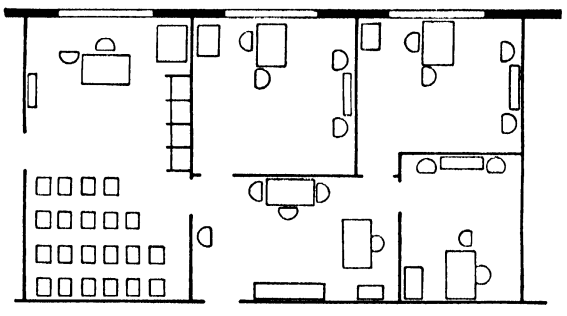
A Case Conference Room is necessary in which a student's teacher, the guidance counselor, health expert, social worker, and psychologist or psychiatrist, can come together, explore the problems of a particular individual, take into consideration the contributions of the various points of view of the specialists involved, and plan a program of action complete in scope to meet the child's needs.

Necessary equipment will include a conference table with chairs.

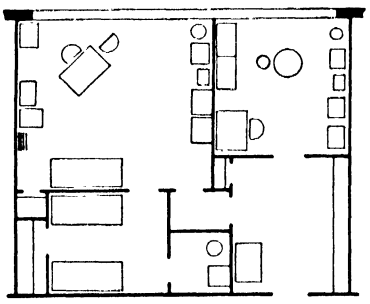
The placement worker will need office space with interview rooms in which employers may interview students.

The social case workers will need office space with suitable desks, chairs, and filing equipment.

Rooms should be provided for psychological and psychiatric services. The usual office furniture will be needed.



Guidance Room, High School. Psychologist and Group Testing, left; Counsel, upper right; Placement, upper center; Certification, lower right; Waiting Room, bottom center.



Medical and Dental Suite, Small High School. Medical and Examination Room, upper left; Dental Room, upper right; Waiting Room, lower right; Closet, lower left corner; Rest Room, lower left; Toilet, lower center.

HEALTH SERVICES

The facilities for health services are described in Chapter 20. However, the design of the administrative unit should indicate the close relationship between health work and guidance. Particular care should be taken in order that appropriate modifications in pupils' schedules may be made because of health conditions requiring such attention. Care should be taken that health information is recorded on pupil record cards. Ease of referral to individual records being of such importance, the health unit must be located within the administrative unit.

THE ADMINISTRATION OF COMMUNITY SERVICES

The school building must house the services and the administrative facilities for the program that the school carries on in the community. Again, it may well house services and agencies that, not necessarily educational in character, are functioning in the community. In the latter group are community health agencies, welfare groups, social service groups and councils, in times of war, civilian defense units, and the like. These agencies will use general school facilities largely, but in some cases it may be wise to provide such groups with office space.

The community services of the school require specific rooms and offices and provision for these functions should be included in the planning of the building.

ADULT EDUCATION

The administration of a program of formal and informal adult education is a major function of the school principal and his associates. In New York City this assumption was given impetus when the Board of Education adopted a resolution giving the principal of the school full control over the educational program of his school, day, afternoon, and evening. Of most importance in this resolution is a clause granting the principal the privilege of so arranging his program as to allow him to supervise personally that portion of the total program that in his judgment most needed that care. Thus a principal desiring to develop the afternoon recreation and evening adult education program could arrange to be present at his school only during those hours and in this fashion give full-time leadership to a phase of the school program usually regarded as an "extra-curricular" activity of the principal.

An office should be provided for the person usually charged with the administrative responsibility for the adult education program. The general office space, of course, should house clerical workers that may be necessary. Provision should be made for the collection of fees and the registration of students in the adult program.

COMMUNITY PARTICIPATION IN THE ADMINISTRATION OF THE ADULT EDUCATION PROGRAM

The heart of the administrative unit as it pertains to adult education is a large conference room. An educational program and a community center program for adults cannot be alive unless it reflects directly the needs and interests of its voluntary participants. The planning and development of an adult program must proceed from its participants with the assistance and stimulation that the adult education experts on the school staff can offer.

For this reason the adults, through a council, or in some other fashion, have a direct responsibility for the formulation of a program for their school. A conference room equipped with conference table and chairs is essential.

UTILIZATION OF COMMUNITY RESOURCES

Community research is a basic element of educational planning. Space will be provided in the building for this research in the laboratory units. Utilization of this space by adults should be considered in the planning.

The vocational program of the school requires constant contact with representatives of labor and industry. Many vocational schools have developed advisory commissions in the trades taught in the school. Such assistance should be sought by secondary school administrators when vocational preparation is included in the school program. A regularly established advisory group will probably meet in such conference spaces as may be available.

CHAPTER 19: service facilities for teachers

To the degree that teacher needs are satisfied in planning building facilities the greater will be the returns to be expected from their services. In planning, teacher service facilities should not be an afterthought. It is not good planning to assign to teachers' use space which apparently can serve no other purpose. In planning teacher facilities it is necessary to become familiar with the degree to which teachers would be involved in the administrative process of the school and the kinds of responsibilities that would be placed upon them.

TEACHER PARTICIPATION IN ADMINISTRATION

Few trends in school administrative practice are as significant as the current emphasis on democratic procedures. Teacher participation in the formulation of school policies is widely recognized as a device for in-service training and as a means for the development of sounder school policies. Faculty morale is another stated objective commonly assigned to teacher participation. In encouraging participation, and in developing morale, teachers should be asked to analyze carefully their individual and group needs when a building planning is undertaken. They should be encouraged to suggest those developments in the building plan which will reduce routine and formal service and those which will make possible the fullest educational and professional returns for the services which they render.

Teacher contributions to building planning may become very significant if it gives the opportunity for complete teacher analysis of service rendered and makes possible a cooperative attack upon the common problems of the faculty.

CHECKING LIST FOR TEACHERS' SERVICE FACILITIES

In recognition of the distinctive character of the educational problem in each community, it may be assumed that teachers' service facilities cannot be standardized. Planning should proceed, however, from certain broad criteria of teacher service. A checking list of these criteria and their subheadings will assist any faculty which is participating in planning, as well as the architect of the school. The following checking list is comprehensive. There is no suggestion that every item in this list must be provided for in every school. An analysis of this checking list may, however, bring to the fore facilities which otherwise would be forgotten.

1. Teachers' service facilities should be adapted to the need for effective democratic pupil-teacher relationships. To such ends teachers should be provided with—
   a. Secretarial service
   b. Teaching library service
   c. Teaching supply service
   d. The machines and other mechanical devices which add to the effectiveness of the teaching-learning process
   e. Facilities for individual conferences with pupils
   f. Facilities for group conferences with pupils
   g. Facilities for effective pupil-teacher social relationships
   h. Facilities that assure conservation of energy in the teaching process
   i. Conditions that contribute to the esthetic in the teaching process.

2. Teachers' services should be adapted to the personal needs of teachers. They should be provided with—
   a. Facilities for the safekeeping of clothes, books, keys, records, and all other personal and official effects needing such care
   b. Facilities for receiving and distributing mail and official communications
   c. Facilities for dressing
   d. Facilities for rest
   e. Facilities for human service
   f. Health service at school
   g. Opportunity for exercise and recreation
   h. Facilities for reading and study
   i. Essential communication service
   j. Library facilities
   k. Storage space for educational materials
   l. Facilities for the preparation and the eating of food
   m. Supply facilities
   n. Such office facilities as are consistent with individual needs.

3. Teachers' service facilities should be adapted to the need for cooperative inter-teacher relationships. Teachers should be provided with—
   a. Facilities for social meetings
   b. Facilities for individual supervisory conferences
   c. Facilities for professional teachers' meetings
   d. Recreational facilities
   e. Facilities for eating together
   f. Facilities for the development of an esprit de corps
   g. Facilities for recognizing that teaching school is a learning situation for teachers.

4. Teachers' services should be adapted to the need for cooperative parent-teacher relationships. Teachers should be provided with—
   a. Facilities for receiving individual parents at school
   b. Facilities for group meetings of parents
   c. Facilities for teacher social gatherings
   d. Facilities adapted to the need for public appreciation of the school.

5. Teachers' service facilities should be adapted to the need for correlation and integration with the rest of the physical plant. Teachers' services should conform to—
   a. High standards of safety, sanitation, lighting, heating, and ventilation
   b. Teachers' services should be properly orientated in the building structure, and—
   c. Properly located in the building structure, and—
   d. Adapted to the need for the conservation of energy
   e. Teachers' service rooms should be highly flexible
   f. Teachers' service rooms should be highly utilitarian
   g. Teachers' service rooms should be air-conditioned
   h. Teachers' service rooms should be soundproofed
   i. Adequate floor space should be provided for all teachers' service rooms
   j. Teachers' service facilities should emphasize the esthetic throughout the area being considered
   k. Teachers' service facilities should set community standards in their respective areas.[1]

SCOPE OF THE PLANNING

Analysis of such criteria as are listed above shows that service to teachers is not confined to the relatively narrow area of lounging rooms and study facilities. The implication is that service to teachers should be conceived as an integral part of the total enterprise. Teaching school is not just a mental exercise. It is hard physical labor also. It is consistent with the major objectives of education so as to serve teachers in building planning that they may devote all of their energies to teacher-pupil contacts, to parent-school relationships, to inter-teacher relationships, and to participating administrative relationships. It is consistent with good practice to encourage teachers to execute, as well as to plan, the furnishings and interior decorations of rooms designed for teacher use.

LIBRARY FACILITIES FOR THE FACULTY

In the modern school the library is of central importance. It is the logical hub about which much of school life rotates. Usual practice is to plan and organize the library in terms of pupil needs. More adequate practice is to consider library facilities in terms of joint pupil-teacher activities made possible through library materials. Centralization of library facilities in a single unit of the school building is a desirable practice. However, such centralization does not eliminate the possibility of

[1] Hanson, Abel, "Planning Teachers' Service Facilities," *American School and University, 13th edition, 1941,* New York, American School Publishing Corporation, 1941, pp. 53-60.

strategic decentralization of much needed library services. Adequate supervision and care of library materials may be maintained even though they are distributed about the building in convenient places for use. Preferred practice is to locate related library materials in the several units of the building where they become immediately available for the joint use of teacher-pupil activities.

PROFESSIONAL BOOKS AND MATERIALS

In addition, the school library should provide the professional books and materials for which teachers have constant need. Recreational and browsing materials should also be made available on the same basis. These library materials should be located in lounging rooms, office, study rooms, and any other parts of the building designed especially for teacher use. The administration of a school is not only responsible for making reading suggestions to teachers; it is also obligated to provide these materials and make them conveniently and attractively available to the teacher staff.

TEACHER OFFICES AND SECRETARIAL SERVICE

A significant trend in the planning of school buildings is the tendency to provide office facilities and secretarial and mechanical services for all teachers. Several factors have been conducive to this type of planning. First, there exists the philosophical tenet which conceived of education as a series of dynamic and related experiences taking place about natural centers of activity under the guidance of the teaching personnel. Conference rooms, classrooms, and laboratories are grouped together into relatively compact units, and associated teachers' offices are considered necessary for the accomplishing of stated educational purposes. Secondly, successful teaching requires careful preparation and study on the part of teachers. Offices are provided in order that teachers may have places in which to concentrate and where their related activities may be centered. Third, the evaluative process in modern education is such that it requires concentration, mechanical equipment, and clerical assistance.

The exact nature of the office services to be provided for teachers must vary with schools and with communities as well as with specific teaching responsibilities. Many schools in the past have entirely lacked teacher office provisions. In so doing they have ignored the importance of the teacher in the contributions to be made by the school. Faculties may vary with respect to the kinds of office provisions which they desire. Some may feel that several offices can be included in one room with adequate glass partitions and with soundproof ceiling and walls. Other faculties may desire separate cubicles. The development of teacher offices may be through economy because it may make possible the release of larger educational spaces which teachers would have to occupy alone if there were no rooms provided to which they might retire during hours of conference or of study.

It is quite possible that stenographical and mechanical services may be shared by several teachers in some school systems. It is a safe assumption that machines and stenographers will not be in constant use by any one teacher. By means of staggering work schedules, it is quite probable that a single clerk or stenographer may serve the needs of a group of teachers. In the same manner, single statistical machines may serve the needs of a relatively large number of teachers if time schedules are properly planned. Dictaphone equipment is especially valuable in that it permits a stenographer to distribute work in the most efficient and economical manner. The space in which these services are to be provided might adjoin a major teacher study or in some buildings may be closely associated with the main office.

TEACHER SERVICE FACILITIES AND MAIN OFFICE SUITE

The central office of the school building should also be planned with due regard for the needs of teachers. A conference room in connection with the administrative suite is necessary for purposes of participation in the formulation of educational policies. Mail boxes should be planned for control by the individual teacher. They should be of such size that they will take books and circulars as well as letter mail. Teacher bulletin boards should be placed in the central office where they are readily observable by the faculty. A desirable practice is to divide such a bulletin board into two parts, one designed for the important bulletins of the day which should be read each morning by the staff, and the other designed for general bulletins which may be read at the convenience of the faculty.

Teachers frequently are required to bring valuables to school and should be afforded vault service protection. Locked boxes in the school vault for the use of teachers accepting school financial responsibilities become invaluable.

SUPPLY AND STORAGE SERVICE

Careful planning of supply and storage service is requisite to the maintenance of teaching efficiency. It may be assumed that teachers are the best judges of all supplies related directly to the teaching-learning process. The same reasoning indicates that their opinions are valuable in determining the places where instructional materials should be kept and the times and the circumstances under which supplies may be requisitioned for use. The logical place to keep supplies is near the scene of educational action. Specific provisions should be made in building planning for such conveniently located storage facilities. It may be recognized that large centrally located storage spaces are necessary for the receipt and safe-keeping of large quantities of supplies. The exact point of emphasis is that these large central storage spaces should be used as distribution centers from which supplies move out to the lesser storage spaces provided in the several units of the building.

Ample storage space should also be provided for the use of teachers in connection with materials not in present use. Many of the materials of instruction are used but periodically. Good economy demands that such materials be carefully preserved in convenient and orderly arranged storage spaces. Every opportunity should be taken to provide storage spaces in classrooms, laboratories, and work shops. Spaces under chalk rails and unused space in partitions should liberally be devoted to storage purposes. It is even possible in some cases to plan mezzanine storage in classrooms as well as work shops. Teachers need files for their curriculum materials. Such files frequently inset in wall partitions should take legal size paper, namely, 8½″ x 13″. Most teachers today desire space for books, objects of display, and materials of instruction of varying sizes. Liberality in planning for teacher storage in places where teachers work will make for the best type of school.

FOOD SERVICE FOR TEACHERS

Food service for teachers is one of the areas frequently neglected in school building planning. It is true that on many occasions teachers will find it desirable to dine in the school cafeteria with their pupils. This has definite values. However, in addition to a general cafeteria, teachers should be provided with a dining room which enables them to eat together and enjoy the informal exchange of ideas possible under such circumstances. Specific dining engagements may be planned in this room, or activities may move on a completely informal basis. In any case, contribution to faculty morale and cooperation is a return to be expected from such planning.

In planning the general cafeteria the question should be raised of whether one large room truly satisfies school needs. The cafeteria hour might well be used for teacher and student conferences, or student group conferences, just as men and women in normal life assemble for conference during the lunch hour. This may make it desirable to plan more than one small dining room. Assignments made through the central office could provide for their proper use.

FACULTY KITCHENETTE

In connection with lounging and social rooms there should be provided a kitchenette which permits the preparation of teas or light lunches. The opportunities for the profitable use of such facilities are numerous. Pupil-teacher relationships may be made more effective by occasional or spontaneous teas and lunches. Inter-teacher contacts may be strengthened, and parent-teacher relationships may often be reduced from confusion to harmony by the tactful use of kitchenette facilities. The classroom or the office often set up barriers between parties who must work together in the school enterprise. A lounging room, with comfortable furniture, a home-like atmosphere, and a cup of tea, may frequently break down barriers and settle misunderstandings more effectively than hours of conversation. Teachers are entitled to the services possible through the use of such facilities.

PLANNING FOR PROFESSIONAL NEEDS

Previous mention has been made of the possible service to teachers through professional library facilities. Other professional needs should receive consideration. Most school administrators agree that the individual supervisory conference is one of the most valuable of the several devices used in the improvement of instruction. Special attention should be given to the design and arrangement of facilities used for this purpose. It is an established fact that light shining in the face of a conferring party is a psychological disadvantage. The traditional swivel chairs and desks commonly used by principals and supervisory officers are frequently barriers to friendly action. Informal furniture serves more adequately.

Another widely recognized device for the improvement of instruction is the professional teachers' meeting. For this essential purpose, a typical practice is to use a large room like the auditorium, and to place the speaker up in front from which point he talks "down" to those seated below. Better practice is to provide the round-table type of equipment for relatively small groups of teachers. For larger groups the panel-type of equipment should be given preference in planning. Everything possible should be done in planning these facilities to create a feeling that parties are meeting together to discuss common problems. Furniture, interior decoration, and lighting are important factors in setting the stage for successful group conferences.

PLANNING FOR TEACHERS' PERSONAL NEEDS

Teachers who are well served in their personal needs are better teachers because of the service. Planning for teachers' personal service facilities should proceed coordinately with the other phases of school building planning. Facilities for the safekeeping of clothes, books, keys, and records should be provided by means of conveniently located lockers, book shelves, and filing cases. Teacher use of bulletin boards is of no less importance than administrative and supervisory use of them. Bulletin boards should be provided in teacher rooms with this fact in mind.

Teachers are often faced with the necessity of changing from informal to formal clothes while at school, or for dressing to meet particular school needs. Extra-curricular and social activities form a regular part of school life in which teachers play an important role. Frequently the time elapsing between two types of responsibility does not permit going home to dress. Dressing accommodations for both sexes should be included in the building planning.

Minimum requirements also indicate that at least one rest room for each sex should be provided in each school building, and that these rooms should not be used for other purposes. These rooms may be relatively small, but they should be equipped with a cot and should have a toilet adjoining. Relaxation should be made possible at all times without disturbance from light, smoke, or nearby conversation.

Lavatories should be planned for the particular privacy and convenience of teachers, and should be located in studied relation to other teachers' service facilities. Standard requirements should be observed rigidly in the details of ventilation and sanitation.

HEALTH AND RECREATION FACILITIES

Standards of health and safety maintained throughout a school building should be conditioned by the needs of teachers as well as pupils. It is a mistaken conception of education which plans health and recreational facilities for pupils only. To a large extent the same facilities arranged for the health and recreational service of pupils, both indoors and out, may also serve the needs of teachers, provided the needs of teachers are considered in the original planning. The health services commonly provided by schools for pupils should be made available to teachers on much the same basis. Little variation from the standard equipment is needed to accommodate teachers adequately in this type of service.

Recreational facilities for teachers should be planned with due regard for the interests as well as the physical welfare of the employed personnel. Games involving violent physical activity are not advisable for the needs of most teachers. Tennis, volley ball, ping pong, and badminton are representative of more adaptable activities for which provision should be made. Both in the building and on the campus, teachers should be encouraged to plan recreational facilities which are consistent with their own interests and needs.

Nothing stated above is meant to imply isolation of teachers from their logical social environment. Teachers will want to participate in recreational activities with their pupils and with adults in the community. But in addition to these contacts, they will want to share recreational experiences with their fellow teachers. The important point of emphasis is that in every phase of the recreational program of a school the teachers are planners, supervisors, or participants. Due recognition of this fact should be apparent in planning the recreational facilities of the school.

PARENT-TEACHER SERVICES

One of the prime requisites to successful teaching is mutual understanding between parents and teachers. The future school building should be planned with full acknowledgment of the role of parents in the educational career of their children. Group meetings of parents and teachers, and individual conferences between parents and teachers, are the types of activities for which specific provision may well be

made. Parents should realize that there is a place in the school which is as much theirs as it is of any other group.

The informal social gatherings which draw parents and teachers closer together in service to common purposes should be considered in the planning activities. Facilities for the preparation and serving of food should be made available. Any unnecessary barriers which may separate parents and teachers should be eliminated as far as it is possible through building planning. Public appreciation of the schools can be better achieved when those persons in direct charge of the schools have many contacts with those who pay for them. Whether formal or informal, professional or non-professional, these contacts should be given major emphasis in planning teachers' service facilities.

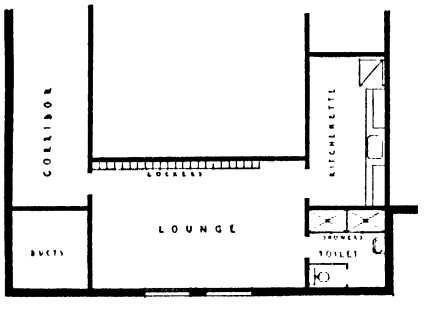
ILLUSTRATIONS OF TEACHER SERVICE ROOMS

Plan 1 presents a well planned unit, designed to serve a variety of teacher needs. The utility of such a unit goes far beyond the ever present and immediate needs of teachers. Many of the informal activities of parents, of school clubs, and of community organizations could readily be accommodated in such a suite. It will also be noted that the whole unit occupies no more space than might be assigned to a typical classroom. Architecturally, it is simple and inexpensive. Some improvement could be made by placing individual lockers in the passage or against the side walls of the lounge. Direct light and ventilation for the toilet would improve this plan.

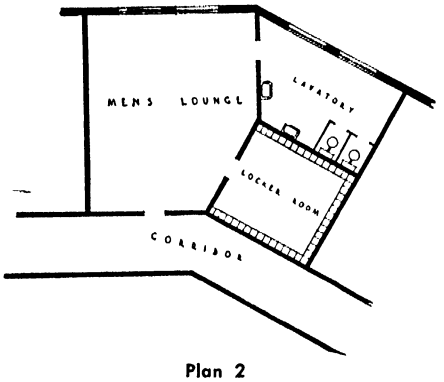
The necessity for using odd-shaped areas of floor space need not seriously impair or lessen the ultimate utility of the teacher service facilities provided. The practice of assigning such floor space to teachers' rooms, merely as an after-thought, is especially to be warned against. However, careful planning for the use of odd-shaped areas can off-set most disadvantages in the case of teachers' rooms as well as in any other unit of the school building.

Plan 2 is a unique and well conceived arrangement for a man's service suite. It shows planning to meet identified needs and makes admirable use of odd-shaped floor space which could not be used conveniently for general classroom purposes. The location of the lavatory in relation to the rest of the suite, its ventilation, and its lighting appear to be especially desirable. The lack of natural light and direct ventilation for the locker room may not be an ideal arrangement, but the over-all appearance of the unit is that most of the needs of faculty men are well served.

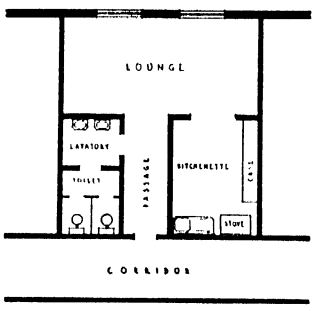
Unusual features of teachers' service suites are not to be criticized alone on the basis of broadly stated generalities. Plan 3 shows shower baths in the same suite with lounging and kitchenette facilities. It would seem that the placing of showers in a unit designed for study, lounging, and social meetings might well be questioned. However, if the showers were so placed to satisfy the studied needs of the local situation, the wisdom of such placement cannot be questioned. In general, the facilities provided in this suite give the impression of being well-planned.



Plan 1



Plan 2



Plan 3

Hanson, Abel, "Planning Teachers' Service Facilities," *The American School and University*, 1941, p. 57.

CHAPTER 20: student service facilities

The modern secondary school has found it important to provide ample space for student directed enterprises and for a well rounded program of student social activities. In many respects, the aspects of the school program emphasized here are the most direct training for living that the school affords. Again, skills gained in ability to get along with other people, in poise, self confidence, and social customs are marketable skills and are basic to a more complete preparation for work. The student activities of a more or less self directed nature include the various types of student government, the literally tremendous variety of student clubs and interest groups, student publications, actual student enterprises and a great diversity of allied functions. In some schools classified as extra-curricular and in others incorporated into the regular school day, this area of the school program represents one of the greatest adaptations of the secondary school to individual interests, informalization of instruction, and education in standing on one's own feet.

Planning space for the student social program and the student directed activities cannot be haphazard or of the afterthought variety. From the beginning of the project, time and effort must be expended to the end that this basic area of student experience shall be suitably provided for. Space provisions will vary in accordance with the local program.

It is likely that the ultimate plant will provide for student activities in two manners. Certain spaces within the building will be planned for use for students' social functions, clubs, and the like in addition to their regularly assigned function. Other spaces will be provided principally or solely to house such student work.

Student Social Activity Spaces

ADAPTATIONS

The *Gymnasium* is the space provided in almost all secondary schools that lends itself easily for use for school dances. These will vary from regular noon hour social dancing to the music of a victrola to formal evening dances. The provision of an attractive gymnasium with tasteful use of color will do much to promote its usefulness in this respect. Provisions should be made for permanent installation of loud speakers with plug-in connections for the record player and amplifier. Consideration should be given to the problem of decorating a gymnasium for social affairs. A narrow strip of tackboard above the wainscoting and a device that can be lowered from the center of the gymnasium ceiling to support streamers is one type of adaptation for decoration that costs little and contributes neatly to the effective use of this space.

The *Homemaking Suite,* particularly the portion of the area devoted to interior decoration or the living room of the unit serves well for small group social meetings, small dances, teas, receptions and the like. It can be assumed that an attractive space, informally furnished, is available. It will be desirable to provide ample storage space for additional chairs, dishes and other materials for the proper service of foods. Electric outlets for a victrola or radio will undoubtedly be available.

The *Library* is customarily a handsome gracious large room. Skillful planning and location of service facilities will allow this space to carry some of the burden of a heavy social calendar. Provision of a browsing room in the library suite and equipment of it with lounge furniture and a radio victrola will

provide a fine student lounge for the small high school. Use out of regular school hours will not interfere with the library program and probably will enhance the effectiveness of the library if intelligently used.

The *Cafeteria* is an essential aspect of the school social program. Its effectiveness will be increased in this respect as the change from mass feeding to groups lunching together is made. Change of this type can be assisted by the provision of small dining rooms supplementary to the larger dining hall and breaking up of the large unit into a series of smaller dining areas. Again, provision should be made for music. In this area, it may be necessary to remove tables and chairs from the dining unit for dances or other social functions. Storage space for tables and chairs is needed. Folding tables and permanent installation of tables that fold into the wall have been used.

Outdoor dining areas and picnic sections provide admirable settings for social events. Location and planning of these spaces should involve from the beginning the anticipated use for this purpose.

The *Auditorium* will be the focal point of many school and community functions. Spaces should be provided near the auditorium for social hours. For this purpose, a well planned lobby with nearby food preparation or service units will be admirable. The school cafeteria may also serve this function.

The above material is not intended to be an exhaustive treatment of the possibilities of adapting school spaces to serve a social function. Other means of achieving the purpose will come to mind. Further treatment will be found in the several chapters dealing with specific spaces. It is hoped however that the point of view illustrated above will be involved in the planning from the beginning.

SPECIALIZED SPACES FOR STUDENT SOCIAL ACTIVITIES

The Student Lounge. World War II saw mushrooming all over the country variations of the Youth Center or Teen Age Club. Those that were successful were usually the ones that the "teen agers" made their own. The program was developed by the youthful users, the rules and regulations for its conduct were decided upon by them. Often the refurnishing, painting, and furnishing of the centers was carried on entirely by the membership.

The modern secondary school will provide space for its students to carry on the spirit of the Youth Centers. Of basic importance is the requirement that the unit be a student project. A large unfinished space may well be the best provision for this activity.

The nature of the student lounge or youth service space will vary from community to community. Probably of widespread use will be a lounge with a snack bar and a juke box or its equivalent. Game areas may also be provided. In other sections youth counseling services may be located within or adjacent to the unit.

The student lounge will have begun to prove its possibilities when out of school youth as well as students use it freely and when services to out of school youth are provided as a result of the stimulus of their use of the school plant and program.

SPACES FOR STUDENT DIRECTED ACTIVITIES

Included here are those student activities, a vital part of the school program, in which students are to a great degree in control, such as general student government, clubs and interest groups, student publications, student enterprises, and the like. Probably few high schools in America attempt to operate without some form of student government. It is probably safe to say that to the extent that the will of the students, expressed through their representatives and their voting, is given serious and just consideration in the operation of the school program, to that extent is the program of self government successful and the entire operation meaningful training in the democratic way of living.

For the efficient functioning of the central *student government,* offices are essential. Here records may be kept, communications typed or mimeographed, and meetings and conferences held. A work room with the usual office equipment and a conference room will provide the basic requirements. In larger schools with student government having greater ramifications additional offices may be needed. Some schools have provided such specialized spaces as a room in which the legislative body of the student government might meet. Its size, the location of the ceiling, and a raised platform on which the presiding officers are seated create the impression of a governmental legislative chamber. Still other schools have provided a court room with the distinctive features of a court reproduced including the bench for justices, a jury box, and the like.

Obviously, the physical facilities provided will depend in large part upon the nature of the local program. In the long run, the less elaborate spaces tend to wear best and adapt best to changes in procedure and emphasis. Adequate space provisions are vital, however, and office space for student organizations is a must.

Clubs and *interest groups* of various kinds are usually located in one of two ways, either they are centered about a specialized area such as the photography club near or in the photographic studio or they meet in available rooms usually located by the room assignment of the club faculty sponsor. Since clubs usually are small in membership to provide closer student faculty contacts and are often broken into sections when the membership becomes too large classrooms and specialized areas serve as meeting places. Provision should be made for storage of club supplies and records in the various spaces to which clubs are assigned.

Care should be taken in analyzing space requirements for the club program that ample meeting spaces for larger groups is provided. A group of clubs may plan to join for a program or students outside the group may be invited to attend a meeting. The school plant should be able to meet these valid calls upon its resources without the necessity for inflexible and far in advance scheduling of spaces. Somewhere in the plant, facilities should be available for preparation and service of simple refreshments for student groups.

Student publications in a modern high school are often extensive undertakings. A wide variety of publications is found and many schools carry on a considerable number. Typical of these publications are the school newspaper, a weekly or semi monthly production, a literary magazine, a yearbook, and publications of interest groups such as a language magazine. Office space should be provided in accordance with the requirements of the local situation. A large high school with a number of students participating in the preparation of the newspaper may need an office suite patterned generally after the offices of a regular newspaper. Additional space will be needed for the other types of magazines and the like produced. Space should be provided for the business and editorial sides of the publication. The small high school may combine this space with the headquarters for the student government.

Student enterprises are flourishing in the modern secondary school. This may range from selling tickets to a dance, to operating a concession at the football field, or carrying on some other type of business function such as a school store or livestock agency. In addition, drives for funds for the student government, Red Cross or other purpose may be carried on.

At some central point in the building, space should be provided for these functions as the local program requires. At the minimum, a sales space for tickets might be provided. In other schools a store or a group of stores and offices might be arranged at a central point reproducing the effect of Main Street. A powerful force in the life of the school might be harnessed by joint student-faculty and architect thinking through the implications in the school program of student activities of the type indicated.

Health Suite

One of the major services rendered to secondary school students revolves around the health services. In this area the schools from the kindergarten or nursery school upwards check periodically on the health status of each pupil and do their utmost to see that remediable defects are cared for. In addition, in this unit is housed the driving force of the schools' ceaseless campaign against communicable diseases. As the school nurses carry on with the educational campaign for parents and pursue the follow up of physical defects discovered by examinations, the medical suite becomes a public health education center and headquarters for the nurses' work in the field.

There are several functions for the health unit. They are:

1. Provide waiting space for those desiring services of health unit
2. Provide physical examination space
3. Provide resting space for ill or injured students
4. Provide dental examination space.
5. Provide first aid space
6. Provide office space for preparing and filing records
7. Storage of health supplies

WAITING SPACE

The size of the waiting room will vary with the

size of the school and will be affected by school health policies. If students must be checked by nurse before being readmitted to school after an illness, a spacious waiting room will be needed. The usual size of the waiting room is approximately 100 sq. ft. Larger spaces may be desirable in accordance with program requirements.

Seating space for at least 10 students should be provided. The health unit serves an educational function as well. Hence, ample bulletin board area should be provided in the health unit. The furniture should be easily cleaned and of simple yet attractive design. The walls of the suite should be painted in light colors to insure proper maintenance. Although washable white paint is often used for walls, light green or yellow is more attractive.

EXAMINATION SPACE

A minimum of 150 sq. ft. is required for the examination space. Since increasingly parents are present at physical examinations of their children, this should be a separate room with doors to insure privacy. Lighting of the space should be ample and evenly distributed without glare. Floors should be of asphalt tile with hard rubber rounded bases. Walls are of plaster without wainscoting. Ceilings should be of acoustical tile.

Equipment includes a couch, instrument and dressing table, a sterilizer on a stand, weighing scale, spotlight, paper towel dispenser, paper cup dispenser, sanitary disposal can, desk and three chairs.

In the large secondary school, it may be advisable to have a group of doctors each specializing in one phase of the examination. A series of rooms will be necessary for this type of annual physical examination. Careful planning of the health unit with this procedure in mind will contribute considerably to the efficiency of the examination. Care should be taken that the room used for checking hearts be as quiet as possible to assist the doctor. Sound control treatment of ceilings and walls is advisable. If one room, preferably the examination room, can be made reasonably soundproof, audiometer examinations will be facilitated.

In some part of the health unit, over 20 feet of unobstructed space should be allowed for vision testing. A permanently installed lighted eye chart with changeable testing charts should be provided. Dark shades should be installed with proper channels to cut out light. This is important also for testing with Wood's lamp for ringworm of scalp.

REST ROOM

A rest room holding from two to four cots should be provided. This space should be capable of being isolated from the rest of the unit. Adjacent to the rest room and with direct access to the examination room should be provided a room with wash basin and toilet.

DENTAL EXAMINATION ROOM

A space with minimum floor area of 150 sq. ft. should be available for dental examinations. A permanently installed dental chair with cuspidor is required. Provision should be made in planning for the necessary service connections. Equipment includes a supply cabinet, instrument and dressing table, sterilizer, paper cup and towel dispensers, dental instrument cabinet, wash basin and desk and chairs. A flexible arm focusing light should be installed at the chair for use during the examinations.

STORAGE SPACE

A large supply closet with wooden shelving should be available. Space is needed to store group audiometer, individual audiometer, and Wood's Lamp and stand. This space should be capable of being securely locked. A separate clothes closet should be provided.

RECORD KEEPING SPACE

In small schools, adequate number of filing cabinets should be provided. These are usually of the visible record type. The large schools may provide clerical help for the medical staff. A separate record room may then be provided or an enlarged waiting room with the clerk acting as receptionist as well as keeping records up to date.

LOCATION

The medical unit should be located near the administrative unit primarily so that files and records of the health staff may be easily available to the general staff for guidance and counseling purposes. The unit should be centrally located and should be somewhat remote from interfering noises.

Sanitation and Safety Provisions

It is axiomatic that the school plant should be so designed and constructed as to reduce to a minimum the hazard of accident and should reflect the best planning possible in creating hygienic and sanitary conditions in which students may work.

Fires occur with great frequency even in school buildings. Nothing should be overlooked that will reduce the possibility of a fire breaking out. At the same time careful and detailed consideration should be given to proper fire alarms, equipment for getting fire under control, and ease, speed and simplicity of exit from school buildings.

CIRCULATION

Educators, architects, and engineers, all agree that school buildings should be planned in terms of the highest standards of safety. An obvious assumption is that the building should be completely fire resistive. In cases where the site is ample, one-story buildings are to be preferred. Where it is necessary to construct multi-storied buildings, elevators are desirable if the height is more than three stories. To provide for physically handicapped children an elevator is desirable in a two-story building. The arrangement of buildings should be such that vertical travel is reduced to a minimum. In three-story buildings, vertical travel may be reduced greatly by placing laboratories, libraries, study halls, and other large units on the first and third floors, and leaving the second floor mainly for academic classrooms.

Stairways, passages, and corridors should be planned coordinately in a manner which eliminates dead-ends in which pupils might conceivably be trapped. The maximum distance of classroom doors from exits is generally placed at 100 feet by safety engineers. All exit doors should be so hung that they swing outward, and the hardware equipment should be such that it is impossible to lock the doors from the inside. Pressure bars for opening are especially desirable.

In a school building planned with due regard for the safety of pupils, the corridors are of central importance. Easy and quick emptying of the building and smoothness of passage between its parts are major objectives. Recognized corridor widths are eight feet for eight room schools, ten feet for sixteen room buildings, and twelve feet for larger structures. Natural and artificial light should be such as to provide a minimum of four foot-candles at floor level. Obstructions of any kind should not be permitted to protrude from the walls. Fire apparatus, radiators, drinking fountains, and all other kinds of corridor equipment should be recessed in a manner which eliminates interference with free passage. Narrowing of circulation artery on way to an exit must be avoided. Non-resilient and noisy floor materials should be avoided. Good quality linoleum and asphalt tile are highly desirable. Display cases and museum equipment may be installed in corridors without lowering safety standards provided attention is given to the foregoing details of planning.

The modern secondary school utilizes recent advances in the control of noise. Sound absorbent materials are particularly strategic with respect to corridors. It is desirable to use some type of sound deadening materials for corridor ceilings. Walls above the wainscoting may be similarly surfaced. If this is not done, a rough finish such as cinder blocks, painted if desired, will be less conducive to sound reverberations than smooth plaster walls.

Stairways should be constructed of fireproof and highly durable materials, and they should be so located that every floor of a building has direct exit to the out-of-doors. In the case of wide stairs, handrails are considered a necessary provision. Landings should be the same width as the stairways, and the run of stairs should in no case exceed thirteen or fourteen risers. Natural and artificial light should be provided in an amount at least equal to the four footcandles maintained in the corridors.

TOILET FACILITIES

Previous mention has been made of the need for toilet, restroom, and lavatory facilities in connection with the larger service rooms and units of the high school building. In addition, general toilets and lavatories are necessary, at least one for each sex, on each floor of the building. The law in most states requires that all toilets have direct ventilation. Corner rooms are especially desirable for this purpose because they permit a cross ventilation. An abundance of natural sun light should be provided by means of much window space. Northern exposure is particularly undesirable for this purpose. The fixtures for toilet rooms should be selected on the basis of their durability and the ease with which they can be kept clean and sanitary.

The Committee on School Plant Research of the American Council on Education makes the following recommendations on school sanitary facilities: [1]

	Ratio
Girls' Toilet Units	
Elementary school	1:35
Secondary School	1:45
Boys' Toilet Units	1:100
Boys' urinals	1:30
Lavatories	
Elementary school	1:60
Secondary school	1:100

When elementary and high school grades are housed in combination within a single building, the standards for sanitary facilities should be the same as those here proposed for elementary schools. The above ratios are recommended only on the condition that not less than two fixtures of each type be installed in each toilet room. This qualification is suggested so as to meet the pupils' needs when a single fixture may be out of order and to provide adequate facilities in the smaller schools."

Simple and compact flushing equipment should be installed which operates with maximum effectiveness. Automatic flushing has its sanitary advantages, but individual flushing valves on toilet seats and urinals have the advantage of immediacy.

The interior decoration of all pupil service rooms should be in light colors to promote sanitation and cleanliness. Tile is preferred for floors and wainscoting. Water-proof, non-absorbent materials should be used in the walls above the wainscoting and on the ceilings. Stalls for toilet seats are highly desirable and should be equipped with hardware which keeps door open when they are not in use. Stalls should clear the floor at least twelve inches so as not to interfere with cleaning operations. Soap dispensers, paper dispenser, and hampers should be provided in a number commensurate to the number of washbasins and toilet seats. The better qualities of toilet room supplies are most economical in terms of service rendered.

LOCKERS FOR PUPILS

Fire-resistive, well-ventilated lockers constitute a standard service facility for pupils. Many schools provide one locker per pupil for general purposes in the corridors of the building. If the lockers are countersunk to the level of the wall, this is acceptable practice, although such location may still be the cause of undue corridor congestion. If lockers are to be located in the corridors, it is generally necessary to increase the corridor width somewhat to relieve congestion. Other schools provide special locker alcoves in which a comparatively large number of lockers may be located in compact blocks. This also is acceptable practice when the alcoves are so placed that they are accessible from all parts of the section of the building they are designed to serve. This arrangement also tends to lessen traffic stoppage in the corridors although increasing the problem of supervision. Care should be taken that lockers in the corridors are no closer than 12 to 15 feet from stair wells and that they do not interfere with swinging doors as pupils make entrance to classrooms and other units of the building.

Lockers should also be provided in connection with the more specialized pupil services. In relation to gymnasiums, swimming pools, dressing rooms, and team rooms, lockers are essential. The purposes for which classrooms, laboratories, and special rooms are used may be such that lockers should be also provided. Lockers are needed in the dressing rooms adjoining the auditorium stage. In short, wherever pupils are obliged to keep personal supplies and equipment, they should be provided the convenience and the safety of lockers.

The size of lockers should be determined from a careful consideration of the use to which they are to be put. General purpose lockers in which street clothing is kept should be from 60 to 72 inches in height, and not less than 12 inches wide and 12 inches deep. Hooks and a single shelf are usually standard equipment. Where books or light gymnasium clothing are kept, lockers 30 to 36 inches in height are sufficient. For purposes of books and laboratory materials, 12 inch sizes may be advisable. Smaller sizes of lockers may be tiered to advantage, and thus economy of space is achieved. Athletic lockers, in which are stored heavy equipment, should be relatively larger and well ventilated. Whether equipped with tumbler or combination type locks, the locker systems should be masterkeyed. The base which raises lockers from the floor should be of solid construction in order to facilitate cleaning of floors and to prevent the lodging of dirt and refuse under the lockers.

[1] Committee on School Plant Research, *The Utilization of School Sanitary Facilities*, Series VII, School Plant Research, No. 3, American Council on Education, Washington, D. C., The Council, 1942, pp. 22-23.

DRINKING FOUNTAIN SERVICE

Proper drinking fountain service in a school building is essential to the health of pupils. Fountains should therefore be easily accessible to all parts of the building and the campus. The exact number to be provided can be determined only by careful analysis of such factors as enrollment, activities, length of corridors, location of special rooms, and location of play areas. A minimum of two drinking fountains for each floor or corridor is advisable, but longer corridors may require more. Safety demands that fountains be recessed in the side walls at a reasonable distance from stair wells.

Sanitation requires that drinking fountains extend out from the walls rather than up from the floor in order to permit ease of cleaning. Side jet or angle set fixtures are preferred over those which bubble in a vertical direction. In the former there is less inclination to place the mouth in direct contact with the fountain while drinking. All metal parts should be rustproof materials, and receptacles should be of highly-glazed, stain-proof vitreous china. The color of china should be in harmony with the color scheme of the environs, although white is always good. Water pressure regulation should be possible at each individual fountain. Recessed drinking fountains and cuspidors may be provided in the side walls of gymnasiums or other play rooms in such manner that use of the former automatically flushes the latter. The standard height of drinking fountains from the floor is 36 inches.

SHOWER FACILITIES

Shower rooms in connection with the various service and activity units of the high school building are recognized as standard equipment. Adjoining gymnasiums, game rooms, team rooms, swimming pools, and outdoor play areas, showers may be considered a necessity. Only the highest standards available in regard to construction and plumbing should be used in providing these facilities.

Shower floors should be equipped with numerous drains in order to reduce the slope to the minimum necessary for drainage. They should be surfaced and finished in slip-proof materials. The entire shower area should be underlaid with a lead pan to eliminate all possibility for leakage. Wall materials should also be of waterproof construction in colors sufficiently light to demand cleanliness in maintenance. Hardware, pipes, and all other metal fittings should be of non-corrosive construction. The exposure of pipes at the top or on the walls of showers constitutes a safety hazard, and because of abuse, may cause undue maintenance and repair problems. It is therefore recommended that pipes be run concealed and that they be pressure tested before the final wall finish is applied. Non-clogging, swivel type shower heads of a standard size and design should be installed for each shower head. If group showers are used at all, they should be equipped with a master thermostatic mixer which eliminates the possibility of accidental scalding.

Girls' shower rooms should be equipped with individual stalls and receptors with curtain rods and curtains. Hair driers arranged at various heights from the floor should be installed in the adjoining drying room. All group shower rooms should be equipped with a curb to prevent overflow. Well placed floor drains should be planned for all drying rooms. Soap dispensing equipment should be planned in accordance with the needs of individual showers, and its design should harmonize with other plumbing fixtures.

FIRST AID SERVICE FOR PUPILS

No matter how carefully a school building is planned and no matter how skillful and efficient its administration, strategically placed first aid equipment is a necessary feature of a service program for pupils. In schools equipped with clinics, a large responsibility for first aid may be assumed there. However, under no circumstances may the need be completely met in the clinic. Laboratories, shops, playrooms, gymnasiums, swimming pools, and all of the other larger units of the school building should be equipped with simple first aid kits or cabinets. Outdoor play areas have the same need. A first-aid kit should be standard equipment for each school bus. Many schools find it desirable to provide each classroom, regardless of its use, with such facilities.

For use outside of the clinic, it is not necessary that first aid equipment be elaborate. Gauze bandage, adhesive tape, a small bottle of disinfectant, and a scissors are essential. Splints, tongue depressors, smelling salts, probes, and a tourniquet may also be included. It is important that all persons using the various parts of the school plant should know exactly where the first aid materials are kept.

CHAPTER 21: storage facilities in secondary school buildings

One of the most common complaints registered by principals and teachers after a new school building has been occupied for a short time is that storage spaces have not been provided in sufficient amount, or that they are not accessible to those who wish to use them. It is often stated that the storage space does not fit the requirements of the materials to be stored or that the space does not adequately protect the materials. It has been a practice on the part of architects to plan the educational spaces and then designate spaces lacking natural lighting, or basement spaces as storage. This practice ignores the importance of storage in the educational processes.

In all types of classes and in all kinds of instruction, much storage space is needed so that materials can be conserved or laid aside temporarily for subsequent use. If storage space is remote or difficult of access, this causes a definite embarrassment to the educational worker and may result in hiding away materials which deteriorate and which are forgotten for later use.

In planning a schoolhouse it should be recognized that there are places where no storage should be allocated, e.g., no provision should be made in stair wells. This is a protective phase of the complete safety program of the school. Naturally, storage should not be placed where materials can not be readily delivered or in a location from which they can not be easily removed.

Storage should be so arranged that the manpower of the custodial staff is conserved and will not be expended unwisely over the life of the building. Storage plans must be developed so that the utmost of safety to personnel and materials results. Inflammables must be placed in proper containers; the walls of the storage space in which oils, varnishes, paints and the like are stored must be fully protected against the expanding of a fire throughout the other portions of the building. Chemicals must be fully protected in fire resistive storage spaces, and any inflammable materials used in the fine arts or in the shops must be fully safeguarded.

Storage space must also protect against thievery or vandalism. It should be the practice of the administrative officers not to store money or other negotiable materials in a school safe the walls of which are not highly burglar resistant. Band instruments, microscopes, typewriters, and other business machines are frequently stolen from schools because the original storage has not been adequately planned or the locking devices have been of such a common and simple character that they are easily broken down by culprits.

Certain kinds of equipment and material can be satisfactorily stored and protected against waste or loss only if the provisions for storage are planned in terms of specific materials. Large sheets of paper in the art classes are frequently partially destroyed because they overhang shelves planned for their storage. A storage room often becomes a partial shambles because the original equipment has been omitted, shelves are lacking, and no place has been provided to hang materials or equipment, and floor space only can be used, when the entire space in the room—outside of a reasonable passageway—should have been carefully planned.

Visitation to schools brings to light cases where failure to provide storage space has resulted in the use of other spaces which were originally designated for quite a different purpose; for instance,

the access chambers to plumbing lines may be filled with stored materials. This hampers the services which can be rendered in maintaining the plumbing facilities. The end of a corridor may be blocked off by shelving erected for school supplies, thus destroying the lighting of a corridor and leaving an unpleasant effect. Storage should be so planned that such subsequent misuse of other than storage space will not ensue.

ELIMINATION OF UNNECESSARY STORAGE

The tendency on the part of workers in a school building is to conserve all school property even though it appears that future use of the property may be remote. This is a proper attitude, but it results in the piling up of broken down and unusable materials and equipment in a school building unless a thoroughgoing program of removal of this material to a central school service warehouse is carried on. Every school needs a certain limited amount of surplus equipment for classrooms or auditorium or shops. Emergencies arise or changes in enrollment take place for which equipment should be immediately available in reasonable amounts. The school maintenance division should, however, be provided with adequate space in a central building where repairs to equipment can readily be made and where surplus materials can be stored, inventoried, and made ready for use. The removal of materials needing repair should be made two or three times during the school year from each of the school units. This results in reducing the amount of needed storage space in a school, and, at the same time, conserving the investment the city has made in school equipment.

Storage Provisions for Classrooms

There are few, if any, educational spaces in a school that do not require storage facilities. The following illustrate provisions that should be made for classrooms.

ENGLISH

Legal size file, preferably inserted in the wall space. Display cabinets. Storage closets for chairs, models and audio-visual aids. Provision for library books.

MATHEMATICS

Exhibit case for models and diagrams relating to mathematics. Equipment to be stored includes transit or surveyor's level, sextants, hypsometer, alidades, angle mirrors; a large, portable, markable globe-sphere; geometrical models; blackboard tools such as stencils, protractors, large triangles, compasses, and rulers; a large slide rule; charts and graphs; blueprints and photographs.

SOCIAL STUDIES

Extensive storage provision should be made for large globes, maps, panoramas, project models and other exhibits; large charts, slides, photographs, and motion picture materials must be stored in large amounts.

LANGUAGES

Instruction centers around a specific country and its language. Library materials must be stored as well as maps, charts, photographs and material characteristic of the country.

ADULT USE OF CLASSROOMS

If classrooms are serving adults, provision must be made for the storage of adult folding chairs in a closet or compartment by itself, or through rubber-tired trucks which transport the chairs to the place of need.

AUDITORIUM

As the auditorium use is extended in the school, storage space needs are multiplied. The major storage provisions should be as follows:—

Property Room: for scenery and other such properties.

Costume Room: for hanging and maintaining costumes.

Instrument Room: for musical instruments of the stage and orchestra.

Locker Provisions: for stage characters. All storage spaces around the auditorium should be of fire resistant construction.

CAFETERIA

The storage spaces of the cafeteria may consist of the following:

(1) Storeroom for current supplies.
(2) Major storeroom for general supplies.

(3) Storeroom for surplus equipment.
(4) Storage for service.
(5) Well protected storage for garbage and refuse cans.
(6) Proper storage for books and materials of students as they enter cafeteria for service. This may be a checking alcove or some similar provision. Storerooms associated with the cafeteria should be vermin- and burglar-proof. They should have concrete floors, smooth concrete or plaster walls, metal bins and shelves, and adequate lighting, all desirable characteristics of the food storage spaces. The equipment storage spaces may have wooden shelves. Provision should be made so that easy access is had to high shelving.

GYMNASIUM

Storerooms for gymnasiums serve inadequately unless they are protected against theft, and are operable under proper administrative control. Each gymnasium should have its storeroom for the following purposes:

(a) Storeroom for day school use.
(b) Storeroom for community or evening use.
(c) Locker provisions for all students, protected against vandalism and theft.
(d) Storeroom for towels, laundry and the like.
(e) Storage space for folding bleachers or for knock-down bleachers, or other type of seating.
(f) Storage for portable equipment used on the athletic field.
(g) Storage for small play paraphernalia such as footballs, basketballs, bats and the like.
(h) Storage for team football suits, where they can be dried as well as preserved.

SWIMMING POOLS

Locker space for protection of students' equipment must be provided. Official storeroom for instructor to use for storage of game material or any portable equipment. Storage rooms for the protection of towels, laundry and the like.

LIBRARY

In planning a school, the library may serve through its main provisions or through auxiliary spaces, the book, magazine, pamphlet and similar needs of students as well as the film, slides, etc. A minimum of five books per pupil is essential in any school library. Many provide in excess of ten books for a student. Special storage should be provided for unusual books or treasured books which require protection.

The bookstore or book room for free textbooks may be in close proximity to the administrative offices or may be connected with the library, depending upon the plan of distribution to be used. The equipment of this room should consist largely of shelving. Equipment provision should be made for the repair of books. Special attention should be paid to the floor load when double shelving capacity is utilized. A service counter at the corridor end of the book room frequently is desired. Special attention should also be paid to the artificial lighting so that the titles of all books on shelves may be easily read.

A desirable film storage has become essential in every modern school. Today 16 mm. non-inflammable films predominate. Their storage should be provided for in a room where machines also may be stored and repaired. Schools with limited film storage space will find that the increasing use of films will create the need for an expression of this space. In some cases a work room at basement level may be available for this film storage. This room may also serve as a supplementary repair and general storage room. In special cases this room may also serve as a general receiving room for books and may house the mimeographing unit which takes care of the library's needs.

ADMINISTRATIVE OFFICES

Storage spaces in administrative offices are divided into these categories:

(1) Storage space for current record cards to be used by teachers and administrative officers.
(2) Storage space for current materials such as announcements, bulletins, guides, instruction handbooks, registration cards, program cards, and the like, which are used in daily contact between the office and the student.
(3) Storage space for non-public materials, including reports, communications, which have a bearing upon problems or personnel and which require protection and isolation.

(4) Filing sets for all communications; filing space for catalogs, yearbooks, and other publications of vendors, filing space for college catalogs.
(5) Provision for professional library.
(6) The permanent file room in which historical records of pupils, faculty and school are kept. This may be a vault which should be moisture-proof and burglar-proof.
(7) The central school supply storage should be so located that paper and teaching materials will be amply protected from dampness, overheating, and thievery. The equipment should include steel shelving and bins so arranged as to permit ready inventory, ready access, and ready distribution. The main storage should be located near the administrative offices and should be directly accessible to the receiving and shipping office. All supply storage rooms should have adequate artificial light.
(8) Locker or closet space for storage of personal property of all personnel should be proof against uninvited entry.
(9) Storage space should be provided in the mimeograph room for papers, stencils, etc., standardized forms, machines and used material designed for repeat work. Provisions for shelving for assembling pages or pamphlets into final form should also be made.

Administrative officers may include the principal, vice-principal, deans, guidance officers, and department heads. Each one of these officers is entitled to storage to meet his specific needs.

DAY SCHOOL AND EVENING SCHOOL STORAGE

To avoid conflict between the needs of the day and the evening school, separate storage must be provided each type of school.

MEDICAL AND DENTAL SUITE

In addition to instrument cabinets, supply cabinets, and medicine cabinet, within the offices of the suite, a special storeroom of approximately 100 sq. ft., should be provided for surplus supplies and equipment to be used during the year. Closet space should be provided for children's clothing, nurse's uniforms, and outdoor wraps, etc.

STUDENT ACTIVITIES

Student activities may include:—

(1) A general student organization.
(2) Specialized clubs, such as those in language, drama and music.
(3) Social activities centering around class or school needs.
(4) School bank.
(5) School store.
(6) School magazine or newspaper, and other types of school activities under student management or with a maximum of student participation.

In each case where such activities are included in the planning of the building, adequate provision must be made for separation of the supply and storage problem from that of the general program of the school. Protection of funds and the proximity of materials to the place of use should be sought. These materials may include paper, bound volumes, and, in the case of social rooms, the paraphernalia needed in serving refreshments to groups. The supply room for the school store should be ample to care for the kinds of materials sold to students, such as books, writing materials, athletic material, special books, souvenirs and the like.

DRAWING

Freehand Drawing: Built-in cases should be provided for exhibit purposes. Also cases for storing vases, jugs, other forms of earthenware and glassware used in drawing, storage cabinets for paper and drawing materials ample in character. For the larger sizes of paper, the architect's type of blueprint file is desirable. A cabinet with lockers for students should be sufficiently large to contain drawing boards and students' individual materials. A storeroom should adjoin the freehand drawing room, provided with cabinets for filing all sizes of paper, with adjustable shelving and sliding doors.

Mechanical Drawing: Cabinets should be provided for filing drawing boards and drawing materials. Students' desks should be equipped with individual lockers so that each student is provided with a locker, an auxiliary storeroom should adjoin the mechanical drawing room.

HOMEMAKING

The homemaking units may consist of the following:—

(1) Foods laboratory.
(2) Clothing laboratory.
(3) Home arts apartment.
(4) Child care center.
(5) Consumer education classroom.
(6) Variations or combinations of these spaces.

In all of these areas of instruction storage is an exceedingly important function. The instruction covers the use of storage facilities which are fitted to specialized needs and which make available materials with a minimum amount of travel and with ease of access. In the planning full consideration should be given to devices used in the modern home for simplifying the work of the housewife. Some of the storage functions will be to serve from built-in cabinets and to adjust to utensil and material needs. Refrigeration is essential; deep-freeze units may be installed; a towel drying closet will be needed; space for a library and for food and equipment catalogues will be required. Particular attention must be paid to the storage of student garments, making possible the exchange for the library work. In the clothing laboratory, storage of dressmaking forms, of finished products, of students' personal equipment, and of students' work while in progress is essential. Storage space for oils should be of asbestos and metal construction to reduce fire hazards.

In the home arts apartment, special attention should be given to storage which covers the needs of home life and which follows the most recent progress made in home installation.

Child Care Unit: This provision will be made in certain high schools. Storage must be provided for materials and equipment which in a large measure follow the practices of the kindergarten. Storage for cots, for food, for supplies meeting young children's needs and for toys and limited play apparatus will be required.

PHYSICAL SCIENCE LABORATORIES

This includes laboratories for general science, biology, chemistry, physics, geography, and other science laboratories which may be incorporated in junior or senior high schools.

The storage problem centers around the following functions:—

(1) Protection of growing plants.
(2) Segregation and protection of chemicals.
(3) Storage of delicate and costly as well as less expensive instruments.
(4) Storage of supplies needed in current experimentation.
(5) Storage of audio-visual materials used in instruction, including slides and motion pictures.
(6) Provision of library collections.
(7) Storage of keys used by students.
(8) Storage lockers or locking drawers built into equipment for student use.
(9) Protection of students from acids and other injurious chemicals.
(10) Preservation of live specimens and plants used in instruction.
(11) Storage of students' library books.

As a rule each science laboratory will have its own storage room or will share its storage space with an adjacent laboratory. Storage and teacher preparation rooms are preferably adjoining, but each has a unity of its own.

BUSINESS EDUCATION

Practically all phases of business education require the use of mechanical equipment and of books of accounting as well as much specialized paper which fits various business practices. The storage facilities should accommodate machines currently out of use, machines having temporary use, globes, charts, maps, and other large flat display material, the accounting books of students, trade catalogs and periodicals, railway guides and directories and the like, handbooks, yearbooks, and other collections of important information. Four-drawer legal size curriculum files, cabinets with drawers interchangeable with those in students' desks, and general supply rooms for several types of materials varying with the nature of the instruction should be provided.

The storage should be so planned that teacher instruction with respect to storage and filing will result in additional student skills and understanding.

MUSIC INSTRUCTION ROOMS

The storage problem divides itself into several parts, viz:

(1) Storage of instruments of band and orchestra.
(2) The provision for a library for sheet music and song books and for music to be used

for large choruses as well as for individual practice and instruction.

(3) Storage of books, encyclopedias, dictionaries, biographies and the like covering the history of music, and the definitions of music.

(4) The storage of costumes where instruction eventuates in any uniformed bands or orchestras.

(5) The storage of stands used by bands or orchestras.

Special attention should be paid to the placement of storage for instruments so that a minimum of time is spent as students arrive and take their places in their instrumental groups. Storage for uniforms should be vermin-proof. The object in planning storage space should be to reduce unnecessary travel for access to materials and to make the provisions so that groups may be served on the stage and in the orchestra section.

STUDY HALL

The storage functions of the study hall are limited. Sets of major reference books, dictionary and atlas are provided. A small closet will care for general storage needs.

R.O.T.C.

The major storage functions are for uniforms, for rifles, for office services, and for paraphernalia of parade. Storage should be provided in the gun-cleaning room.

ART LABORATORIES

Art rooms may be divided into several groups:—general arts; arts and crafts; clay modelling; preparation of scenery and sets for the stage; costume design. Each one of these areas of instruction requires very special storage provisions, for instance, the material used in the art studio includes easels and tools, tables, model stands. Cabinets, closets and drawers are needed. Vertical cabinets for large sizes of paper are essential. Storage of some equipment will be required. For the arts and crafts laboratories storage facilities will include an outside ventilated space for acids used in etching. Storage closets will be needed for tools and metal supplies; locker space for students' aprons and smocks will be needed.

In ceramics a special storage cabinet should be devised to prevent rapid drying of clay products. The storage in ceramics should provide for materials in all stages of production.

In a scenery and sets laboratory there will be tools requiring special storage; inflammable materials such as paints, oils, varnishes, needing fire-resistive storage; storage spaces for the materials of construction will be needed; and large storage spaces for the final product.

In each type of art laboratory, special attention should be given to the most recent trade procedures so that the most modern methods of handling materials and products will be followed.

Art Stock Room: A general art stock room of approximately 325 sq. ft. may be needed to service several art laboratories. In providing storage, attention should be paid to the sizes of paper consumed in the class work, and provision should be made for easy access to such paper by both students and teachers.

VOCATIONAL SHOPS

The number of different kinds of shops will increase over the years. The amount of storage needed in shops varies greatly for it is dependent entirely upon the character of the materials, the value of materials, and the amount of materials to be stored. The storage function in shops may be broken down into several parts, viz.:

(1) The storage of raw materials.
(2) The storage of tools currently in use.
(3) The storage of surplus tools and equipment.
(4) The storage of materials fitted to project needs.
(5) The storage of students' working apparel and personal materials.
(6) The storage of inflammable materials.
(7) The storage of partially finished projects.
(8) The storage of completed products.
(9) The storage of models, exhibits.
(10) The storage of curriculum plans and programs, including blueprints.
(11) The placement of library books, trade journals, vendors' catalogs, and other printed matter associated with instruction.
(12) The storage of audio-visual instruction materials.

INDUSTRIAL ARTS SHOPS

Here may be included print shops, woodworking shops, electric shops, machine shops, and other types of laboratories in which students are not training specifically for a vocation, but are exploring in the technological fields. The storage functions of these shops are not dissimilar to those of the vocational shops of Section 18.

Personal Service Spaces

Locker Service in Secondary Schools: This service usually divides itself into two parts, viz: home lockers and gymnasium lockers.

HOME LOCKERS

Each pupil of the building capacity should be provided with a locker for safeguarding his books, supplies, musical instruments and outer garments. Single tier lockers are preferred. There are various arrangements possible: insertion in corridor walls with access from the corridor itself has been found preferable during the past twenty years of high school management. Handles and locks should be recessed. Lockers should be decorated to conform to the corridor color scheme. All lockers should be of metal construction, well ventilated, built to thwart thievery and provided with student-owned padlock, erected on a cement base, equipped with shelf and hooks and provided with a pitched top to prevent collection of dust and waste.

Another method of arranging home lockers is through alcoves leading from main corridors. If alcoves are used they should be distributed among the floors of the building, preferably near exit points, but should be so staggered as to reduce congestion when children are arriving in the morning or leaving in the afternoon. Sometimes a combination of the alcove and built-in type has been found desirable.

GYMNASIUM LOCKERS

(a) *Boys' Locker Equipment.* Either a provision of a half-size locker 12″ x 12″ x 36″ for each member of the school or an equipment of full-size lockers for two large classes with box lockers 13″ x 9″ x 8″ for each member of the school. Lockers to conform to the standards set above. Located in locker rooms equipped with mirrors, benches, wash-bowls, etc., adjoining the gymnasiums. Adequate locker provisions for visiting teams will consist of full-sized locker to permit of the storage of suitcases as well as outer garments. Locker service for football teams and baseball teams will require full-length locker. It is also desirable to provide storage lockers for lost, outgrown and misplaced uniforms, etc.

(b) *Girls' Locker Equipment.* Either the individual lockers or the box lockers may be used for girls as for boys, with the same space requirements. The box lockers may be used where the street clothes are kept during the exercise period in the dressing booths.

STUDENTS' STORAGE PROVISION WHILE USING CAFETERIA

In a high school students carry many books while traveling from one class center to another. It is difficult to serve oneself at a cafeteria counter while at the same time holding an armful of books. In fact, in many schools where no provision is made for books, students seek the easy way out by trying to store books on window ledges, in corners of the floor, or in some spot where they will not be damaged or destroyed. Good planning will meet the service needs of the student. He is being taught by the school to care for his books. He must have the place to store them. This provision either is in his own locker which is nearby, or through a system of checking on ledges or counters especially designed for this purpose. It may be a box system of checking or some other ingenious device for assuring rapid handling of materials.

PERSONAL STORAGE FOR TEACHERS, SUPERVISORS, CUSTODIANS AND OTHER SERVICE WORKERS

No building is completely planned unless storage provision is made for those who render service in the building. The building plan is respected and served best when the individual teacher or worker knows that provision has been made in the planning for safeguarding his personal property. The teacher needs a locker or closet in which he can lock up his hat, coat, umbrella and rubbers, as well as any other materials which he wants protected. This is equally true of the principal, the clerks in the office, the workers in the cafeteria, the custodian and the

engineer. The working service stations should be carefully reviewed by the architect, and provision for care of personal property should be made for every potential worker.

STORAGE OF VISITORS' PERSONAL PROPERTY

The single teacher, the group attending a P. T. A. meeting, the hundreds coming to the auditorium or gymnasium for school exercises, require the checking or storage service for their wraps which frequently reaches large proportions. The degree to which this need has been recognized in planning helps to promote better school-community relationships.

Plant Utility Service

EDUCATIONAL EQUIPMENT STORAGE

Special provision should be made for storing seats, desks, tables, and other types of educational equipment while not in use. Frequently, this storage space will be used also as a workroom for the repair of equipment. In such cases adequate lighting should be provided, as well as water and electrical services.

JANITORS' STOREROOMS

From these rooms janitors will secure all water, supplies and equipment for interior cleaning. All heavy equipment, such as vacuum cleaning hose, electric scrubbing machines, and the like, will be stored in these rooms. This requires that spaces should be located on each floor and in sufficient numbers to permit easy access to and from all parts of the building. Ample provision for the storage of cleaning apparatus and custodial supplies, under the direct control of the custodian, should be made.

General Service Provisions

STORAGE OF AUDIO-VISUAL MATERIALS

In connection with the vault planned for administrative purposes provision should be made for vault storage for films of all kinds. Only non-combustible films will be used in schools, but film storage in vaults always provides an additional precaution. The air in the vault should be kept cool and reasonably moist. Films should be arranged on metal racks which should be constructed so that the film cans are placed vertically on their circumference. In schools where only small numbers of films are used, fireproof film cabinets may be used to hold such films.

RECEIVING AND SHIPPING ROOM

The receiving and shipping room should be located where equipment and supplies may be transferred readily to their destinations in the building. The transfer of materials from trucks to their receiving space should be made direct and should be facilitated through the planning provided for the building. This room should be in close proximity to any elevator or lift service provided in the building.

STORAGE FOR NON-TEACHING STAFF

The amount and character of the storage space in the high school principal's office will vary with the size of the school and the method of handling supplies. Regardless of the size of the school, storage provision for the wraps of workers and visitors, office supplies, and also supply storage in the office counter is necessary. The radio storage room should be under the control of the clerk and not of the principal of the school.

BICYCLE STORAGE

Where space which can serve no instructional or operating purpose can be found in the basement of a building, it should be used for the storage of bicycles. The room should be easily accessible to driveways, and the entrance should be properly ramped to facilitate handling of bicycles. The rooms should be equipped with standard bicycle racks and special attention should be paid to ease of exit to prevent congestion. Where storage space is not available within the building, full rating should be given substantial bicycle racks adequately protected from the weather. These racks should be

easily accessible to pupils, and should provide for locking attachments for all bicycles.

OUT-OF-DOORS SERVICE STORAGE

Frequently, storage space to meet these needs can be provided in building space undesirable for any other purpose. This space should be easily accessible from the out-of-doors. It should be of sufficient length and depth to provide for the storage of play equipment of all kinds, as well as the heavier equipment used in surfacing grounds, lawns, and the care of shrubs, and the like.

Traffic Spaces

PARKING SPACE

Parking space should be provided for buses, private cars of faculty members, and the cars of visitors to the school. The approach to this space should be guarded so that there will be no traffic hazard to children. The parking space and its approaches should be provided with illumination for night gatherings at the school. No parking of cars should be allowed directly on the perimenter of the school or school grounds.

CHAPTER 22: interior materials for schools of all types. Floor and wall finishes, and doors.

On the next few pages appear certain suggestions * covering the kinds of indoor materials for floor and wall finishes which educational experience has found to be satisfactory for many school systems. This list is given here not as a final authority, but for reference and checking. An architect may prefer material different from the one listed. He should feel free to use that material after consultation with the school authorities to discover whether their experience dictates its elimination or not. The architect should, in every case, feel free to suggest because new materials may become available which are better than those listed; or the varied experiences of the architect may bring to bear upon the local situations new facts not heretofore known.

The types of doors for the various rooms are also designated. These doors, as listed, have proven to be acceptable. It is conceivable that other types of doors would fit particular situations as well as those indicated. If variations are, however, to be made by the architect from the types indicated, he should first secure approval from the school authorities before making a change. In determining types of doors, educational experience, length of life of materials, or problems of maintenance have been the criteria used.

The following legend should be used in interpreting the table on materials and finishes. The table uses the code letters of this list below:

* Prepared in its original form by the New York City School Planning Staff under the direction of N. L. Engelhardt, Sr., and adapted subsequently for use in the Louisville, Ky., and San Francisco, Calif., school building programs.

LEGEND

Ac. P	Acoustical Plaster	FC	Furred Ceiling	R	Hard Rubber
Ac. T	Acoustical Tile	FM	Flush Marble	RM	Raised Marble
AT	Asphalt Tile	FT	Flush Tee Saddle (Welded to Frame)	RT	Rubber Tile
ATC	Arch. Terra Cotta			S	Steel
B	Brick	FW	Fireproof Wood	SA	Spray Asbestos
Br.	Bronze	G	Glass	SC	Steel Carborundum
C	Cement	GB	Glass Block	SD	Sound Deadening
Co. B	Concrete Block	GT	Glazed Tile	SFT	Saltglazed Facing Tile
CB	Cinder Block	HC	Hung Ceiling	SL	Slate
CC	Cement Coated	HM	Hollow Metal	SPA	Spark Proof Asphalt
C. Con	Cinder Concrete	HTB	Hollow Tile Blocks	Spec.	Special
CFT	Ceram. Glzd. Fac. Tile	K	Kalamein	S. Pl	Steel Plate
Co	Composition	L	Linoleum	SS	Soap Stone
Con.	Concrete	Lv.	Louvre	T	Transom
Cu. C	Copper Covered	Ma	Marble	Ter.	Terrazzo
CP	Cement Plaster	NF	Non Ferrous	U	Unfinished
CRP	Concrete Finished Smooth for Paint	NS	Non-Slip	VCT	Vitreous Ceramic Tile
		P	Plaster	W	Wood
CT	Cork Tile	Pc	Plastic	WP	Wire Partition
EB	Enameled Brick	QT	Quarry Tile	X	None

Picture molding should be installed in all rooms which serve educational purposes. Inasmuch as a Board of Education desires to have every part of the building contribute substantially to the advancement of education, picture molding will be needed in most spaces occupied by human beings.

As a rule, a wood base in a room will not be found as satisfactory as other types which stand up under the cleaning processes. This should be borne in mind, and wood should be specified only where absolutely necessary for purposes of finish.

Acoustical plaster loses its efficiency after a short period of time and should be used only in limited degrees.

KINDS OF DOORS FOUND DESIRABLE FOR SCHOOL PURPOSES

As a rule, the planning of doors should be such that they interfere to the least possible degree with traffic throughout the building. They are so hung that their use eases the floor traffic. When open, doors should in no sense constitute an obstruction or a hazard. Classroom doors and doors serving other educational spaces should be locked only from the corridor side. They should be so equipped that they can always be opened from inside the educational space.

Doors should be suited to the age groups that use the spaces to which they are attached. Heavy doors should be avoided for all small children some of whom may be found in high schools. This is equally true of classroom doors as it is of exits to the out-of-doors. Extra wide doors are needed at certain points in a school building; namely, at the entrance to shops, on stages for the transfer of properties, and in places where heavy equipment will be installed. The school system does not seek uniformity in the size and character of doors, but stresses the major principle of having doors adapted to their particular uses and the size of children to be served. All doors leading to the outside of the schoolhouse should be so planned that breaking into the building is definitely discouraged. Doors which open up on one another without a mullion or partition between cannot be considered satisfactory. The following schedule of doors has been divided into two groups: HM, or Hollow Metal Doors, and W, or

Schedule of Doors

Hollow Metal Doors						Wood Doors					
Door	Type	Width	T	G		Door	Type	Width	T	G	
HM 1	A	3′–4″	T			W 1	A	3′–4″	T		
HM 2	A	3′–4″				W 2	A	3′–4″			
HMG 3	B	3′–4″	T	G		WG 3	B	3′–4″	T	G	
HMG 4	B	3′–4″		G	*	WG 4	B	3′–4″		G	
HM 5	A	3′–1″	T			W 5	A	3′–1″	T		
HM 6	A	3′–1″				W 6	A	3′–1″			
HMG 7	B	3′–1″	T	G		WG 7	B	3′–1″	T	G	
HMG 8	B	3′–1″		G	*	WG 8	B	3′–1″		G	
HM 9	A	2′–6″	T			W 9	A	2′–6″	T		
HM 10	A	2′–6″				W 10	A	2′–6″			
HM 11	B	2′–6″	T	G		WG 11	B	2′–6″	T	G	
HMG 12	B	2′–6″		G	*	WG 12	B	2′–6″		G	
HM 13	A	2′–0″	T			W 13	A	2′–0″	T		
HM 14	A	2′–0″				W 14	A	2′–0″			
HM 15	A	2′–6″									

* A. Single flush doors, hinged at walls, mullion or partition section between.

L. B. Louvres on Bottom

L. T. B. Louvres Top and Bottom

B. Glass panel door.
T. Transom.

Wooden Doors. The transom should be installed for light as well as ventilation, but so that entrance into the room through the transom is difficult.

Where the school will be run on a departmental basis so that masses of students change rooms each hour, it will be found desirable to plan two doors to each classroom. As a rule, it will also be desirable to provide two ways of exit from educational spaces which have an area in access of the regular classroom area.

I—CLASSROOMS

No.	Section	Floor	Base	Wainscot	Wall	Ceiling	Door	T	Saddle	Remarks
1	Kindergarten	L	R	X	P	Ac. T / Ac. P	WG 3	T	FT	
2	Nursery Classroom	L	R	X	P	Ac. T / FC / Ac. P	WG 3	T	FT	
3	Classrooms (Movable Furniture)	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3* / WG 7	T / T	FT	* WG 3 in Elem.
4	Nature Study	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3	T	FT	
5	Geography	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3 / WG 7	T / T	FT	
6	Science	W	W / SL	X	P	Ac. T / Ac. P	WG 7	T	FT	
7	English	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 7	T	FT	
8	Social Studies	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 7	T	FT	
9	Cardiac	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3	T	FT	
10	Cripple	L	W / SL	X	P	Ac. T / Ac. P	WG 3	T	FT	
11	Mentally Handicapped	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3	T	FT	
12	Sight Conservation	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3	T	FT	
13	Remedial	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3 / WG 7	T / T	FT	
14	Doubly Handicapped	L	W / SL	X	P	Ac. T / Ac. P	WG 3	T	FT	
15	Orthopedic	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3	T	FT	
16	First Aid	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3	T	FT	
17	Occupational Therapy	L	W / SL	X	P	Ac. T / Ac. P	HMG 7	T	FT	

II—DRAWING

No.	Section	Floor	Base	Wain-scot	Wall	Ceil-ing	Door	T	Sad-dle	Remarks
1	Art Room	W	W / SL	X	P	CRP	WG 3 / WG 7	T / T	FT	
2	Blueprint & Stor. Rm.	C	C	X	P	CRP	HMG 8		FT	
3	Commercial Art	W	W / SL	X	P	CRP	WG 7	T	FT	
4	Adv. Layout & Design	W	W / SL	X	P	CRP	WG 7	T	FT	
5	Freehand Drawing	W	W / SL	X	P	CRP	WG 7	T	FT	
6	Mechanical Drawing	W	W / SL	X	P	CRP	WG 7	T	FT	

III—HOMEMAKING

1	Homemaking Apartment									
	Living Room	W	W	X	P	HC	W		FT	
	Bed Room	W	W	X	P	HC	W		FT	
	Bath Room	VCT	VCT	GT	P	HC	W		FM	
	Foyer	W	W	X	P	HC	W		FT	
	Kitchen	L	GT	GT	P	HC	HM		FT	
2	Home Nursing Lab.	L	W / SL	X	P	Ac. T / Ac. P	HMG 7	T	FT	
3	Cooking	L	GT	GT	P	CRP	HMG 3 / HM G 7	T / T	FT	
4	Advanced Cooking	L	GT	GT	P	CRP	HMG 3 / HMG 7	T / T	FT	

IV—SCIENCE

No.	Section	Floor	Base	Wain-scot	Wall	Ceil-ing	Door	T	Sad-dle	Remarks
1	Biology Laboratory	W	W / SL	X	P	CRP	WG 7	T	FT	
2	Chemistry Laboratory	QT	QT	X	P	CRP	HMG 7	T	FM	
3	General Science Lab.	QT	QT	X	P	Ac. T / Ac. P	HMG 7	T	FM	
4	Physics Laboratory	W	W / SL	X	P	CRP	WG 7	T	FT	
5	Chemistry Lecture Rm.	W	W / SL	X	P	Ac. T / Ac. P	WG 7	T	FT	
6	Physics Lecture Room	W	W / SL	X	P	Ac. T / Ac. P	WG 7	T	FT	
7	Science Lecture Room	W	W / SL	X	P	Ac. T / Ac. P	WG 7	T	FT	
8	Science Prep. Room	QT	QT	X	P	CRP	WG 3 / HMG 3 / WG 4	T / T	FM	
9	Storage & Acid Room	SS	SS	SS	P	CRP	HM10 *		SS	L. B.

V—COMMERCIAL

1	Bookkeeping	W	W / SL	X	P	CRP	WG 7	T	FT	
2	Business Machines	W	W / SL	X	P	Ac. T / Ac. P	WG 7	T	FT	
3	Business Practice	W	W / SL	X	P	CRP	WG 7	T	FT	
4	Filing	AT	AT R / SL	X	P	CRP	WG 7	T	FT	
5	Secretarial	W SL	W	X	P	CRP	WG 7	T	FT	
6	Stenography	W	W / SL	X	P	CRP	WG 7	T	FT	
7	Typewriting	W	W / SL	X	P	Ac. T / Ac. P	WG 7	T	FT	

VI—MUSIC

No.	Section	Floor	Base	Wainscot	Wall	Ceiling	Door	T	Saddle	Remarks
1	Music Room	W	W / SL	X	P*	Ac. T* / Ac. P	Spec.		RM	* Sound insulation
2	Instrument Storage Rm.	C	W / SL	X	P	CRP	W 6 / HM 6		FT	
3	Band Practice Room	AT	SL W / AT	X	P	Ac. T / Ac. P	WG 8 / Spec.		RM / FT	
4.	Music Library	CT	W	X / W	P	Ac. T / Ac. P	WG 7 / WG 8	T	FT	

VII—AUDITORIUM

1	Auditorium Body	C	MA / FW*	MA / FW*	Ac. T	Ac. T / Ac. P	HM / Spec.		FT	* Up to 6′–0″ High
2	Stage and Wings	W	S/	X	U	CRP	HM		FT	Walls painted
3	Dressing Rooms	AT	SL R / AT W	X	P	CRP	HM 6		FT	
4	Property Room	C	C	X	U	CRP / U	HM 2 / HM 10 / HM 6		FT	
5	Orchestra Space	L	MA / W	MA / W	X	X	X		X	
6	Projector Space	C	C	X	CP	CP / CON	HM*		FT	* 2′2″ asb. Lined
7	Lobby	Ter.	ATC / SFT / Ma	X	CFT / ATC / Ma	Ac. T / Ac. P	HM / W		FTer	
8	Public Toilets	VCT	VCT	GT	P	HC	W 10* / HM 10		FM	L. B.
9	Rest Rooms (not) toilets)	AT	SL R / AT W	X	P	HC	HM 10	T	FT	
10	Coat Check Rooms	C	C	X	P	CRP	HM*		FTer	* Dutch Door
11	Ticket Booth	AT	SL R / AT W	X	P	CRP	HM 10		FTer	
12	Telephone Alcove	Ter	Ma*	X	Ma*	HC	X		X	* Same as maj. unit

VIII—LIBRARY

No.	Section	Floor	Base	Wain-scot	Wall	Ceil-ing	Door	T	Sad-dle	Remarks
1	Library Class Room	AT	SL R / AT W	X	P	Ac. T / Ac. P	WG 3 / WG 7	T / T	FT	
2	Library	CT	W	X / W	P	Ac. T / Ac. P	WG 7 / WG 8	T	FT	
3	Stock Room	AT	SL R / AT W	X	P	CRP	HM 6		FT	
4	Library Office	CT / AT	W SL / AT R	X	P	CRP	WG 7 / WG 8	T	FT	
5	Work Room	W	W / SL	X	P	CRP	HMG 7	T	FT	
6	Library Ref. Room	L / AT	SL R / AT W	W	P	Ac. T / Ac. P	WG 7 / WG 8	T	FT	

IX—CAFETERIA

1	Lunch & Play Room	AT	CFT / ATC	X	CFT / ATC	Ac. T	W / HM		FT	
2	Kitchen & Serving Counter (Elem. School)	VCT	VCT	GT	P	P / CRP	HMG 8		FT	
3	Teachers' Lunch Room	AT	SL R / AT	*	P	Ac. T / Ac. P	HMG 7 / WG 7	T / T	FT	* Chair rail or as selected
4	Pupils' Cafeteria	AT	X	ATC / CFT	P	Ac. T / Ac. P	HMG 8 / HMG 7	T	FT	
5	Teachers' Cafeteria	AT	SL R / AT	X	P	Ac. T / Ac. P	WG 7	T	FT	
6	Teachers' Cafeteria Serving Unit	AT / VCT	VCT W / SFT	GT / SFT	GT / P	Ac. T / Ac. P	HMG 8*		FM	* 2'–10" wide
7	Cafeteria Kitchen	VCT	GT	X	GT	P	HMG 8 / varies		FM	
8	Serving Unit Area	AT / VCT	VCT W / SFT	GT / SFT	GT / P	Ac. T / Ac. P	HMG 8*		FM	* 2'–10" wide
9	Store Room	C	C	X	P	CRP	HM 6 / L. B.		FM / FT	
10	Business and Dietitians' Office	AT	R	X	P	CRP	WG 8 / HMG 8		FT	
11	Dishwashing Room	VCT	VCT	X	GT	Ac. T	HM*		FM	* Spec. Door 2'-10" wide See Detail
12	Refuse and Can Washing Room	C	GT	SFT	GT	CRP	HM 6 / L. B.		FM	

IX—CAFETERIA (Continued)

No.	Section	Floor	Base	Wain-scot	Wall	Ceil-ing	Door	T	Sad-dle	Remarks
13	Interior Circulation	AT	X	ATC / CFT	P	P				
14	Help Locker Room	AT	C	X	P	CRP	HM 5	T	FT	

X—GYMNASIUM

1–6	Gymnasiums	W*	3″ ∠	X	SFT	H C / Ac. T	HM / W		FT	* 1″ cork over important spcs.
7	Admin. Office	AT	SL R / AT W	X	P	CRP	WG 7	T		
8	Instructors' Office	AT	SL R / AT W	X	P	CRP	W 6 / W 5	T	FT	
9	Physical Exam. Room	AT	SL R / AT	X	P	CRP	W 6 / W 5	T	FT	
10	Health Training Room	W	3″ ∠	X	SFT	Ac. T	WG 8 / HMG 8		FT	
11	Storeroom	C	C	X	P	CRP	HM* L. B.		FT	* 5′–0″ open-ing
12	Community Store Room	C	C	X	P	CRP	L. B. HM 6 / HM 10		FT	
13	Locker Rooms	C	X	X	CFT	HC	W 2 / HM 2		FT	
14	Shower Rooms	VCT	VCT	GT	P / GT	HC / RCRP	W 6 / HM 6		FM	
15	Gym Toilets	VCT	VCT	GT	P	HC / CRP	W 10 L. B.		FM	
16	Emergency Rest Room	AT	W	X	P	Ac. T / Ac. P	W 5	T	FT	
17	Athletic Team Room	VCT	VCT	X	GT	GRP	W 6		FT	

XI—ADMINISTRATIVE

No.	Section	Floor	Base	Wainscot	Wall	Ceiling	Door	T	Saddle	Remarks
1	General Office	AT	SL R / AT W	X	P	Ac. P / CRP Ac. T	WG 7	T	FT	
2	Principal's Office	AT W*	SL R / AT W*	W	P	HC / Ac. T Ac. P	WG 7 Spec.	T	RM	* H. S. only
3	Principal's Sec. Off.	AT	SL R / AT W	X	P	CRP / HC	WG 7	T	FT	
4	Admin. Assist's Off.	AT	SL R / AT W	X	P	CRP	WG 7	T	FT	
5	Record File Room	AT	SL R / AT*W	X	P	CRP	HM 6	X	FT	* Flush Base
6	Medical & Den. Suite	L / AT*	R	X	P	Ac. T / Ac. P	Vary		FT	* AT Standard L at times
7	Custodian's Office	AT	SL R / AT W	X	P	CRP	WG 7	T	FT	
8	Guidance Office	AT	SL R / AT W	X	P	HC / CRP	WG 7	T	FT	
9	Program Room	AT	SL R / AT W	X	P	CRP / HC	WG 7	T	FT	
10	Mimeograph Room	AT	SL R / AT W	X	P	CRP / Ac. T / Ac. P	HMG 7	T	FT	
11	Record Vault	C	C	X	B	slab	vault	X	FT	
12	Conference Room	AT	SL R / AT W	X	P	HC / Ac. T / Ac. P	WG 7	T	FT	
13	Dept. Heads' Off.	AT	SL R / AT W	X	P	CRP	WG 7	T	FT	
14	Evening School Off.	AT	SL R / AT W	X	P	CRP	WG 7	T	FT	
15	Radio Control Room	L	SL	Asb. BD.	Ac. T	HC / Ac. T / Ac. P	W. Spec.		RM	W. Chr. Rail
15a	Radio Control Closet	C	C	X	P*	HC / Ac. T / Ac. P	HM 14 Rear Door		FT	* lv. 8"x18" over door at ceiling
16	Teachers' Work Room	AT	SL / AT	X	P	Ac. T / Ac. P	WG 7	T	FT	

XII—STUDENT ACTIVITY

No.	Section	Floor	Base	Wain-scot	Wall	Ceil-ing	Door	T	Sad-dle	Remarks
1	Student Activity	AT	W C / SL R / AT	*	P	CRP	WG 8 / WG 7	T	FT	* Keen Cement
2	Photographic Dark Room	C	C	X	P	CRP	HM 10	T	FT	L.B.
3	General Organization	AT	R SL / W AT	X	P	CRP	WG 7	T	FT	
4	Bank	AT	SL R / AT W	X	P	CRP	HMG 12 *		FT	* 2 doors. See layout
5	Store	AT	SL R / AT W	X	P	CRP	HMG 12 *		FT	* 2 doors. See layout
6	Boy Scout, Girl Scout and Other Activity Rooms	AT	SL R / AT W	X	P	CRP	WG 7	T	FT	

XIII—SHOPS

1	Arts and Crafts	C* / W	CFT / 3″∠	CFT	P	Ac. T / Ac. P	HMG 3 / HMG 7	T / T	FT	* Area under shop Heating Appliance
2	Art Metal	C* / W	X / 3″∠	CFT	P / CFT	Ac. T / Ac. P	WG 3 / WG 7	T	FT	* Area under shop Heating Appliance
3	Art Studio	W	SL R / AT	X	P	CRP	WG 3	T	FT	

Auto Mechanics 4–10 incl.

4	Chassis Work	C	CFT	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
5	Body and Fender	C	CFT	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
6	Electricity	W	3″∠	X	CFT	CRP	HMG 3	T	FT	
7	Elementary	C	CFT	CFT	P / CFT	CRP	HMG 3	T	FT	
8	Engine	C	CFT	X	CFT	CRP	HMG 11	T	FT	
9	Repair and Testing	C	CFT	X	CFT	CRP	HMG 3 / spec.	T	FT	
10	Maint. & Servicing	C	CFT	X	CFT	CRP	HMG 3	T	FT	

Aviation Trades 11–16 incl.

No.	Section	Floor	Base	Wainscot	Wall	Ceiling	Door	T	Saddle	Remarks
11	Covering & Finishing	C / W	CFT / 3″ ∠	X	CFT	CRP	HMG 11	T	FT	
12	Elementary	C	CFT	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
13	Fuselage and Wing Assembly	C	CFT	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
14	Welding and Brazing	C	CFT	X	CFT	CRP	HMG 3 / HMG 7	T	FT	
15	Wing Const. & Repair	W	3″ ∠	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
16	Overhaul	W / C	CFT / 3″ ∠	X	CFT	CRP	HMG 11	T	FT	

Building Trades 17–27 incl.

No.	Section	Floor	Base	Wainscot	Wall	Ceiling	Door	T	Saddle	Remarks
17	Air Conditioning	W / C*	CFT / 3″ ∠	X	CFT	CRP	HMG 3		FT	* Area under Shop Heating Appliances
18	Carpentry	W	3″ ∠	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
19	General Constr. Shop	W	3″ ∠	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
20	Glass and Plastics	W / C*	3″ ∠	X	CFT	CRP	HMG 3	T	FT	* Area under Shop Heating Appliances
21	Heating	W / C*	CFT / 3″ ∠	X	CFT	CRP	HMG 8		FT	* Area under Shop Heating Appliances
22	Millwork	W	3″ ∠	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
23	Masonry	C	CFT	X	CFT	CRP	HMG 11	T	FT	
24	Paint & Decorating	W	3″ ∠	X	CFT	CRP	HMG 11	T	FT	
25	Plumbing	C	CFT	X	CFT	CRP	HMG 11	T	FT	
26	Sheet Metal & Roofing	C	CFT	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
27	Trowel Trades	C	CFT	X	CFT	CRP	HMG 11	T	FT	

Personal Service Shops 28–30 incl.

No.	Section	Floor	Base	Wainscot	Wall	Ceiling	Door	T	Saddle	Remarks
28	Barber Shop	L / AT	SL R / AT W	X	P	CRP	WG 7 / HMG 7	T / T	FT	
29	Beauty Culture	L	SL R / AT	X	P	CRP	WG 7 / HMG 7	T / T	FT	
30	Doctor's or Dentist's Assistant	L / AT	SL R / AT W	X	P	CRP	WG 7	T	FT	

Electrical Trades 31–33 incl.

No.	Section	Floor	Base	Wain-scot	Wall	Ceil-ing	Door	T	Sad-dle	Remarks
31	Elementary	W	3″ ∠	X	CFT	CRP	HMG 3	T	FT	
32	Radio Mechanics	W	W / SL	X	P	Ac. T / Ac. P	HMG 3	T	FT	
33	Advanced	W	3″ ∠	X	CFT	CRP	HMG 3	T	FT	

Food Trades: I—Production

34	Nutrition Laboratory	W	X / 3″ ∠	X	GT	CRP	HMG 7	T	FT	

Food Trades: II—Merchandising 35–36 incl.

35	Cafeteria & Tea Room	AT	SL R / AT W	X	P	Ac. T / Ac. P	HMG 7	T	FT	
36	Grocery	AT / W	SL W / AT R / 3″ ∠	X	P / GT	HC	WG 7 / WG 11	T / T	FT	

Metal Trades 37–42 incl.

37	Foundry	C	CFT	X	CFT	CRP	HMG 11	T	FT	
38	General Metal Shop	C / W	CFT / 3″ ∠	X	CFT	Ac. T / Ac. P	HMG 3 / HMG 7	T	FT	
39	Machine Shop (Elem.)	C / W	CFT / 3″ ∠	X	CFT	Ac. T / Ac. P	HMG 3	T	FT	
40	Machine Shop (Adv.)	C / W	CFT / 3″ ∠	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
41	Sheet Metal Shop	C / W	CFT / 3″ ∠	X	CFT	CRP	HMG 11	T	FT	
42	Welding	C	CFT	X	CFT	CRP	HMG 11	T	FT	

Needle Trades 43–45 incl.

43	Dressmaking	W	SL W	X	P	CRP	WG 7	T	FT	
44	Millinery	W	SL W	X	P	CRP	WG 7	T	FT	
45	Tailoring	W	SL W	X	P	CRP	WG 7	T	FT	
46	General Print Shop	W	3″ ∠	X	CFT	Ac. T / Ac. P	WG 7 / HMG 11	T	FT	
47	Sign Painting	W	3″ ∠	X	CFT	CRP	HMG 11 / WG 11	T	FT	

Wood Trades 48–49 incl.

No.	Section	Floor	Base	Wain-scot	Wall	Ceil-ing	Door	T	Sad-dle	Remarks
48	Cabinet Making	W	3″ ∠	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	
49	General Woodwork	W	3″ ∠	X	CFT	Ac. T / Ac. P	HMG 11	T	FT	

XIV—PLANT

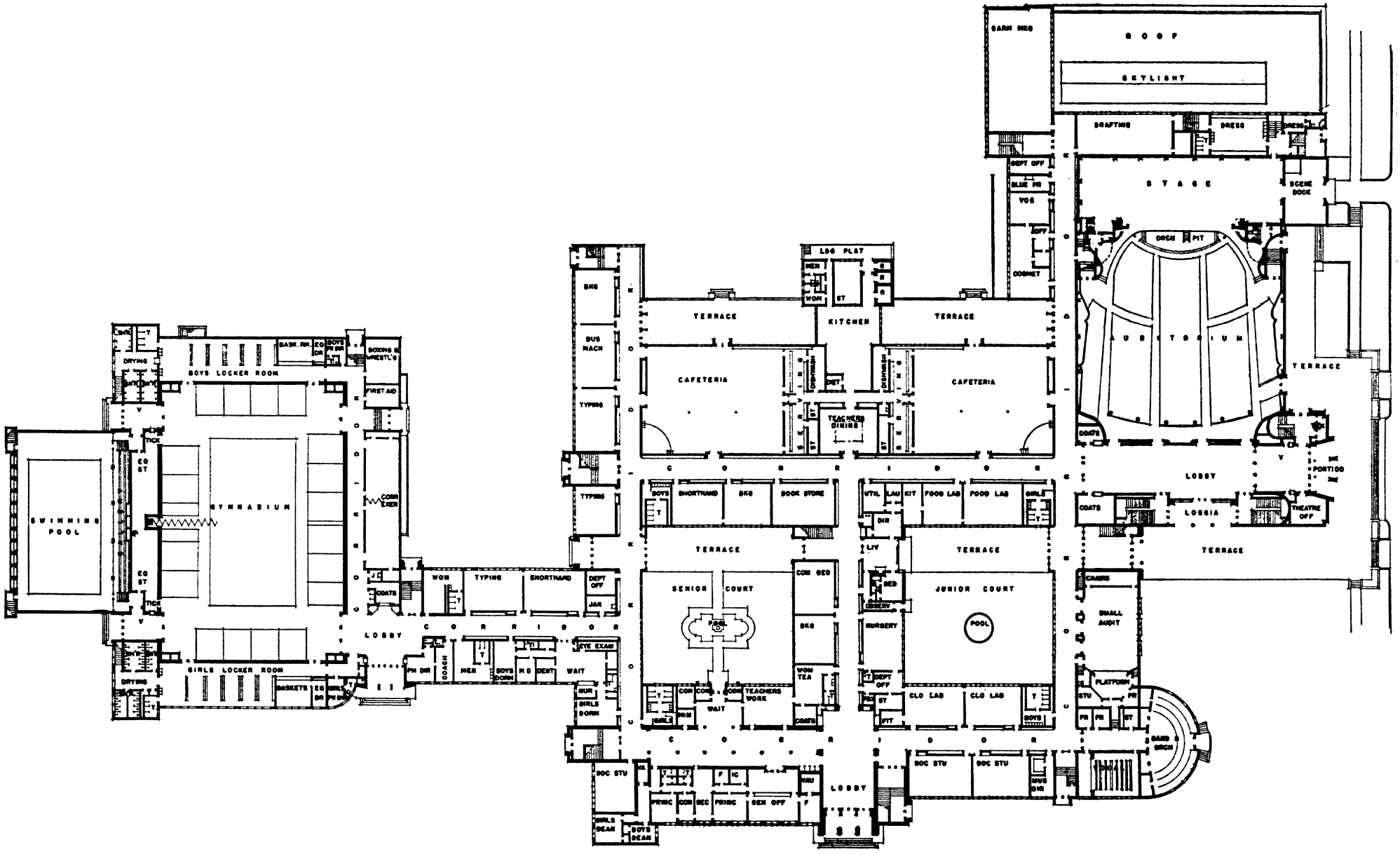
1	Boiler Room	C	X	X	U / *	SA*	H ∧ 2		FT	* Insulated for sound & heat under imp. spaces
2	Fuel Storage	C	X	X	U	U	S. Pl		FT	
3	Fan Room	C	X	X	G. B.	U	HM 6		FT	
4	Dust Bin	C	X	X	U	U	S Pl* L. B.		FT	* To Dust Bin
5	Meter Room	C	X	X	Co. B	U	HM 6 / S. Pl		FT	
6	Switchboard	C	X	X	Co. B	X	S. Pl* / HM		FT	* Double Dr. (Pr.)
7	Telephone Room	C	X	X	P / CRP	CRP	HM 6		FT	
8	Furniture Storage	C	X	X	Co. B	U	HM 6*		FT	* L. B.
9	Janitor's Storage	C	X	X	Co. B	CRP / U	HM 6		FT	
10	Garden Storage	C	X	X	Co. B	CRP / U	HM 6		FT	
11	Custodial Work Shop	C	X	X	CB / WP	U	HMG 8*		FT	* Or Wire Mesh
12	Help Lockers	AT	SL R / AT W	X	P	CRP	HM 5 / W 5	T	FT	Wood Chair Rail
13	Jan. Sink Closet	VCT	CFT	X	CFT	Con	HM 6*		FM	* L. TB.
14	Dust Chute	CFT	L	I N I N	G		HM		FT	See Detail
15	Dust Chute Vestibule	C	C	X	CP	Con	HM*		FT	* L. B.
16	Dust Bin (Basement)	C	X	X	HT B / U	W	S. Pl*		FT	Meet Code Requirements
17	Engineer's Closet	C	X	X	Co. B	U	S. Pl*		FT	Meet Code Requirements
18	Access Chambers	C	X	X	U	U	HM 22			Provide Weep Holes
19	Blower Rooms	C	X	X	Co. B	U	HM 6		FT	
20	Elev. Machine Room	C	X	X	Co. B	U	HM 6		FT	
21	Receiving Room	C	C / X	X	Co. B	HC / U	HM 6 / HM 2			

XV—SERVICE SPACES

No.	Section	Floor	Base	Wain-scot	Wall	Ceil-ing	Door	T	Sad-dle	Remarks
E	*TOILETS*									
1.	General Toilets	VCT	VCT	GT	P	HC / CRP	W 10		FM	
2.	Special Toilets									
2.1	Kindergarten	VCT	VCT	GT	P	HC	*		FM	* 2'–6" Trimmed Open
2.2	Dressing Rooms	VCT	VCT	GT	P	CRP	W LB / HM *		FM	* When related to stage
2.3	Engineer's Toilet	VCT	VCT	X	CP	CP / Con	HM 10* / S. Pl		FM	* L. B.
2.4	Med. & Dental Suite	VCT	VCT	GT	P	HC	W 10*		FM	* L. B.
2.5	Principal's Office	VCT	VCT	GT	P	HC	W 10*		FM	* L. B.
2.6	Playground Extension	VCT	VCT	GT	P	CRP / HC	W10*		FM	* L. B.
2.7	Teachers (Elem. & J. H. S.)	VCT	VCT	GT	P	HC / CRP	W 10*		FM	* L. B.
2.8	Teachers (S. H. S.)	VCT	VCT	GT	P	HC / CRP	W 10 L. B.		FM	
2.9	Public Toilets (Aud.)	VCT	VCT	GT	P	HC	W 10 * / HM 10		FM	L. B.
2.10	Gym. Inst. Office	VCT	VCT	GT	P	CRP	W 10		FM	L. B.
2.11	Cafe. Help Lock. Rm.	VCT	VCT	GT	P	HC / CRP	W 10 L. B.		FM	
2.12	Gym. (Elem. School)	VCT	VCT	GT	P	HC / CRP	W 10 L. B.		FM	
2.14	Swimming Pool	VCT	VCT	GT	P	HC / CRP	W 10 L. B.		FM	
3.	*SHOWERS*									
a)	Shower Rooms	VCT	VCT	GT	P / GT	HC / CRP	W 6 / HM 6		FM	
b)	Shower Stalls	SS	X	MA			Spec*		FT	* Stainless Steel
c)	Drying Space	VCT / C	X	X	GT / CFT	HC / CRP	X		FM	
d)	Engineer's Shower	Soap	Stone Sh	ower in	Engine	er's Toile	t			
4.	*LOCKER SPACES*									
a)	Gymnasium	C	X	X	CFT	HC	W 2 / HM 2		FT	
b)	Swimming Pool	C	X	X	CFT	HC	W 2 / HM2		FT	

XV—SERVICE SPACES (Continued)

No.	Section	Floor	Base	Wainscot	Wall	Ceiling	Door	T	Saddle	Remarks
5.	*MISCELLANEOUS*									
a)	Public Telephone	Te AT	CFT Ma ATC	CFT Ma ATC	P	HC	X		X	
b)	Receiving Room	C	C X	X	U	HC U	HM 2		FT	
c)	General Supply Room	C	C	X	P	CRP	HM 2 HM 6		FT	
d)	Shop Storage	C W	C W	X	P	CRP	HM 6		FT	
e)	Eraser Cleaning	C	C	X	P	CRP	HM 10* W 10		FT	L. B.
f)	Teachers' Rest Room	AT	SL AT	X	P	CRP	W 5	T	FT	
g)	Bicycle Room	C	X	X	CB U	U CRP	HMG 8*		FT	* Interior
h)	Outdoor Playground Storage	C	C	X	CB U	U CRP	W HM		FT	
6.	*TRAFFIC SPACES*									
a)	Corridors	AT	ATC CFT	ATC CFT	P	Ac. T	X		X	See Rooms
b)	Vestibules	C	C	ATC X CFT	P	HC X	HM* W		FT	* Where stairs control
c)	Lobbies	Te	ATC CFT Ma	ATC CFT Ma	P	Ac. T	Spec.		Spec.	
d)	Stair Halls	AT	ATC CFT	ATC CFT	CFT	FC P CRP	HMG 4* varies		FT	* Double Doors
e)	Main Entry	Te	CFT Ma ATC	ATC CFT Ma	P	HC	HM*		FT	* Where stairs control
f)	Stairs	NS	*	X	ATC	FC	To meet Code	X	X	* Stairs—S. String



FIRST FLOOR PLAN

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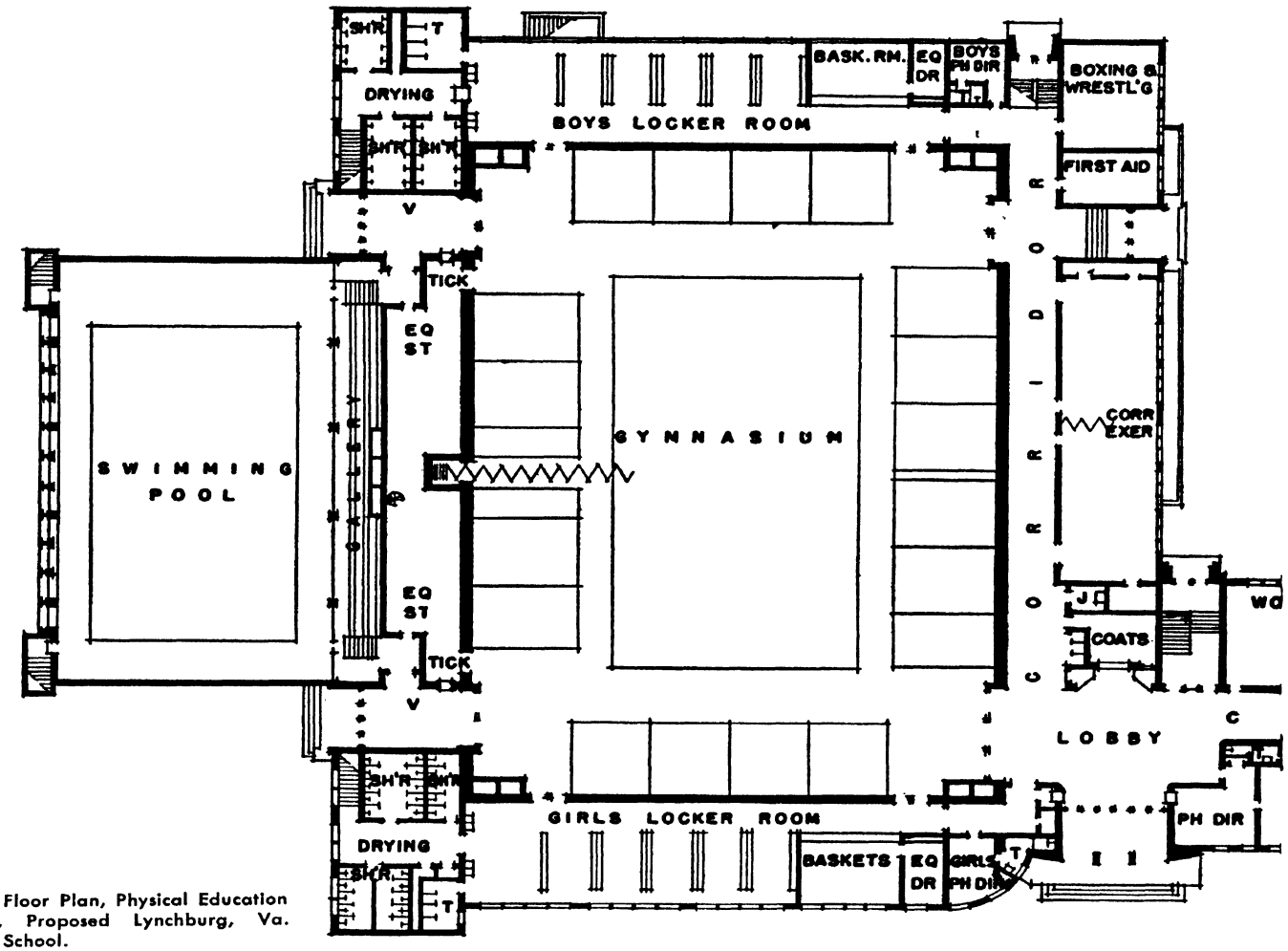
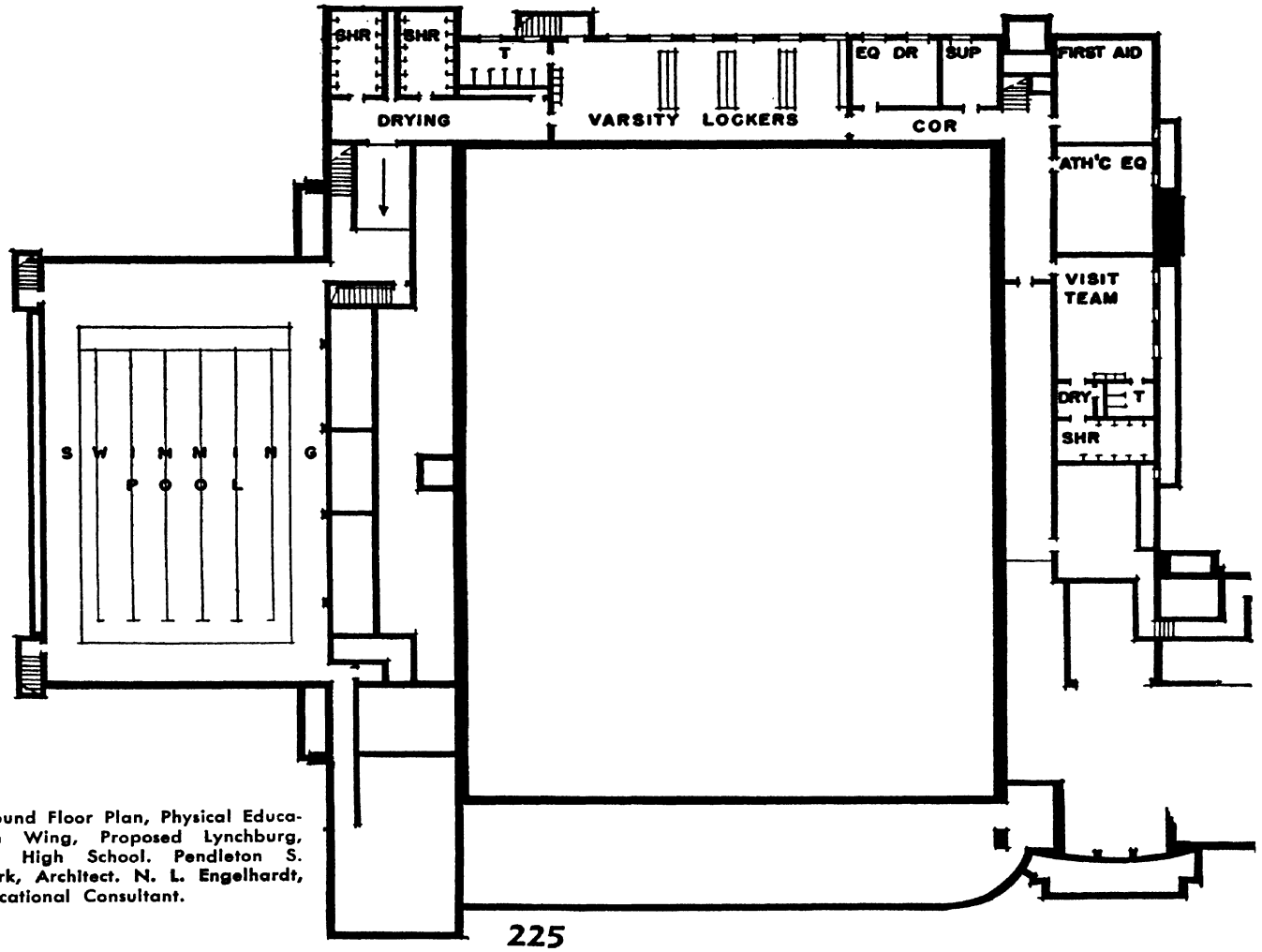
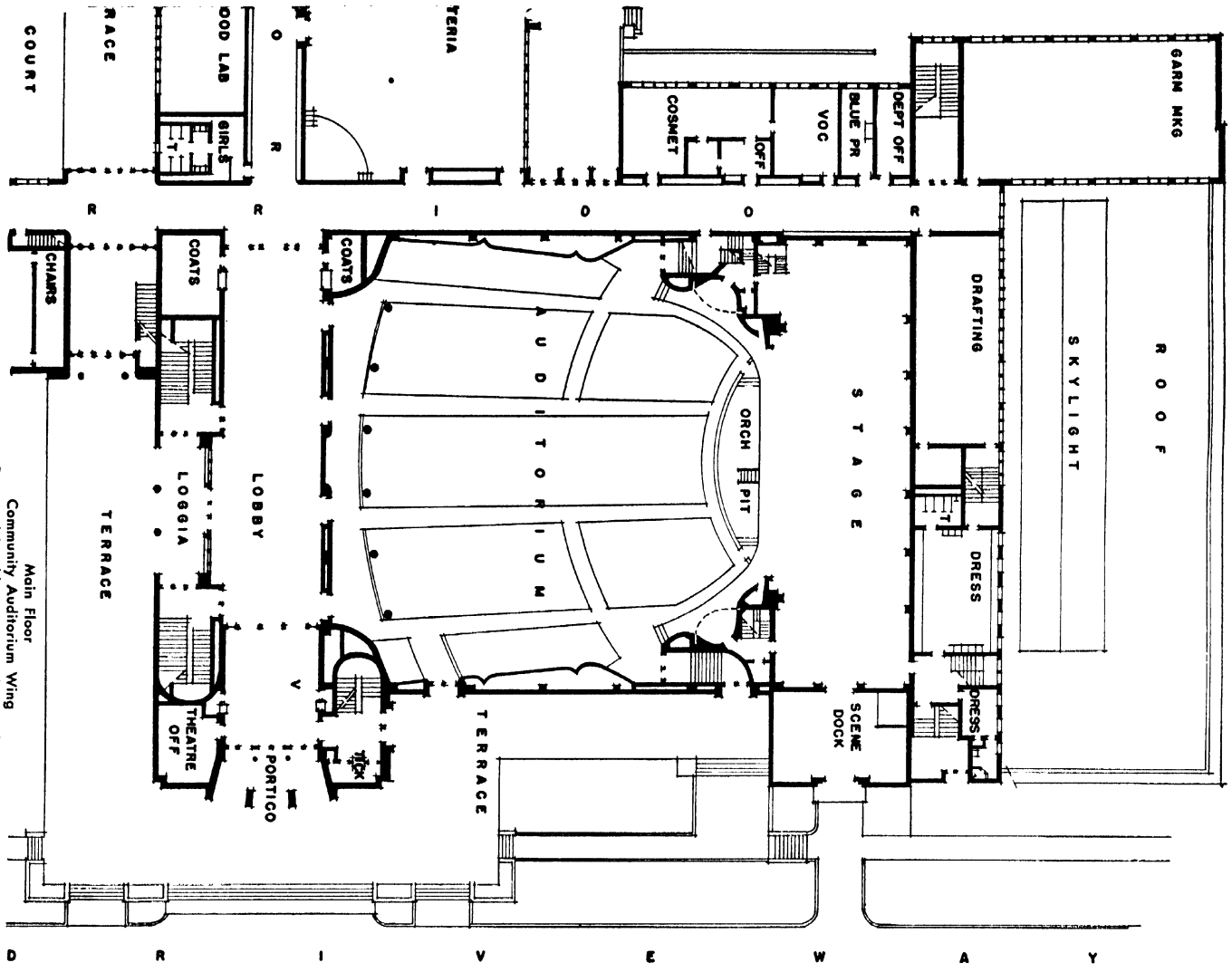
First Floor Plan, Proposed New High School, Lynchburg, Virginia
Pendleton S. Clark, Architect N. L. Engelhardt, Educational Consultant



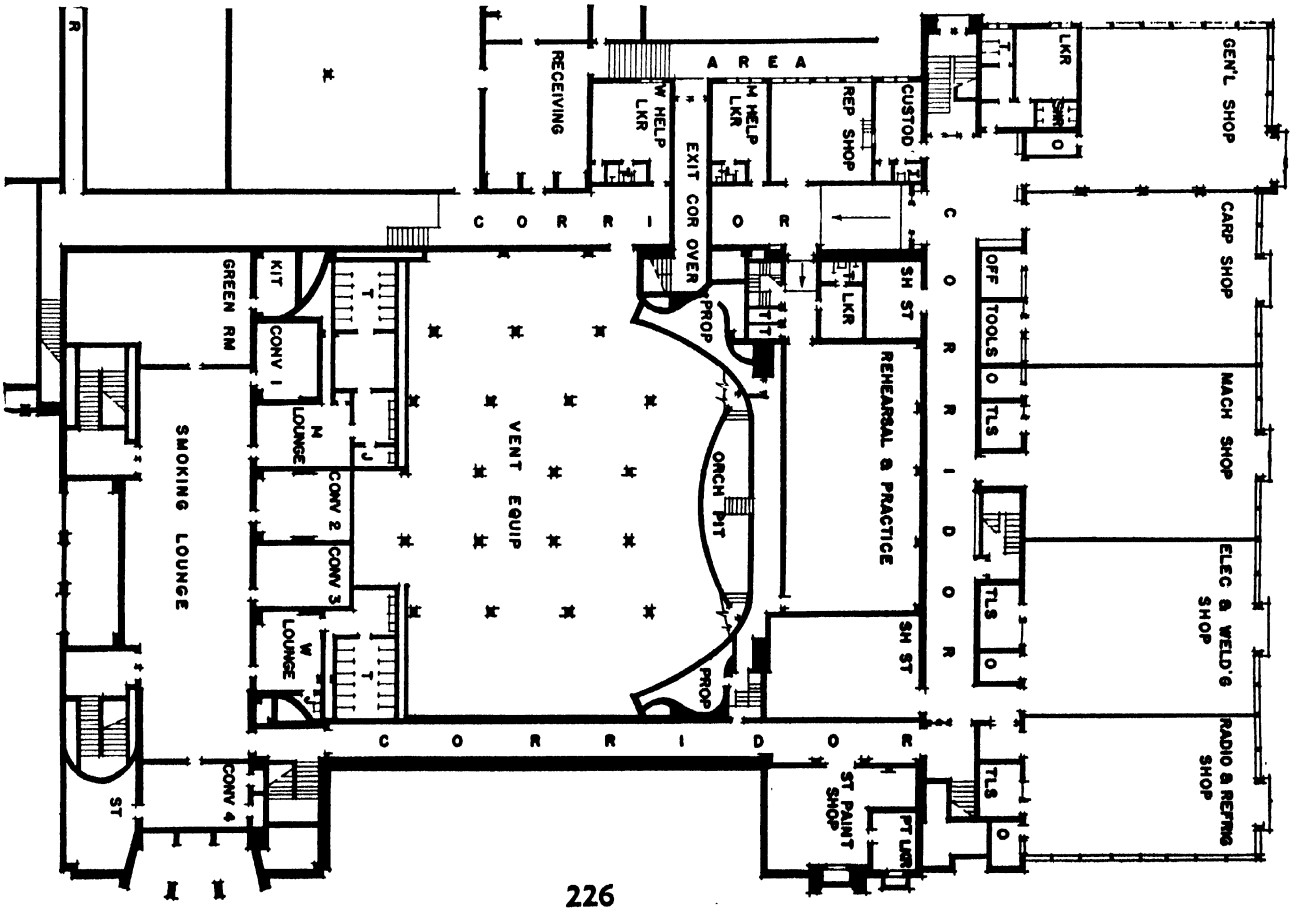
Main Floor Plan, Physical Education Wing, Proposed Lynchburg, Va. High School.



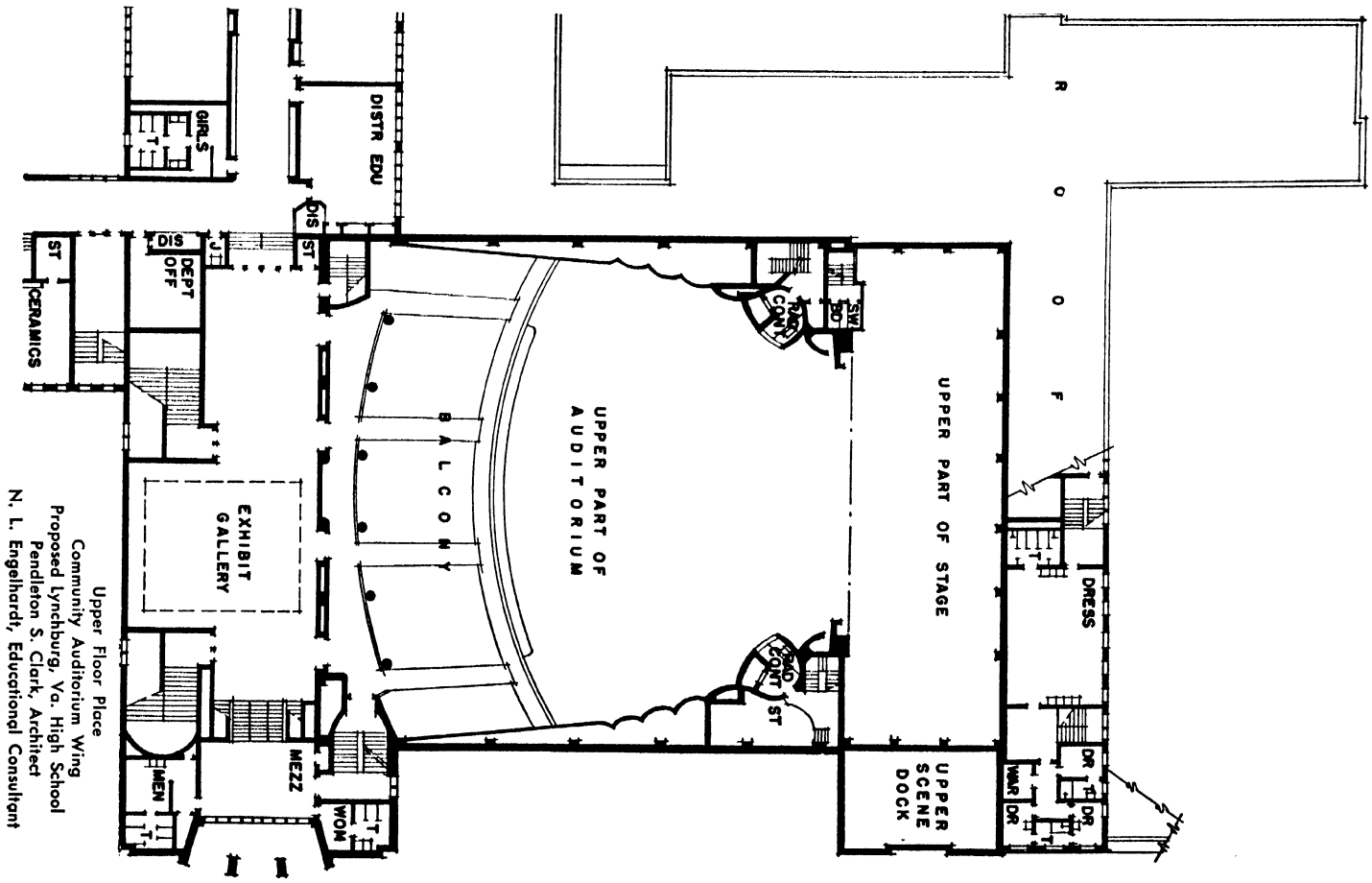
Ground Floor Plan, Physical Education Wing, Proposed Lynchburg, Va. High School. Pendleton S. Clark, Architect. N. L. Engelhardt, Educational Consultant.



Main Floor
Community Auditorium Wing
Proposed Lynchburg, Va. High School
Pendleton S. Clark, Architect
N. L. Engelhardt, Educational Consultant



Ground Floor Plan
Auditorium Wing, Proposed
Lynchburg, Va. High School



Upper Floor Place
Community Auditorium Wing
Proposed Lynchburg, Va. High School
Pendleton S. Clark, Architect
N. L. Engelhardt, Educational Consultant

CHAPTER 23: building and site service facilities

The planning of the site service facilities requires the cooperation of many individuals. The landscape architect coordinates the detailed suggestions of recreational director, school administrator, maintenance and operation staff, and the planners of the building unit or units. Several considerations should be constantly in the minds of all.

1. The over-all effect of the campus as a planned unit.
2. The protection of teaching and learning areas from unnecessary noises and traffic.
3. The ready future access of utility underground lines for repairs.
4. The widest possible utilization of the entire site for educational, social, recreation and esthetic ends.
5. The establishment of the proper relationship in the use of site and building facilities.
6. The provision of service roads to make for least interference with site use.
7. The installation of drainage facilities to provide against storm conditions around buildings and designated use areas, in the watering of plants and grounds, for the wetting down of running track and athletic fields, and for flooding for ice skating. In schools, where large agricultural and animal husbandry projects constitute part of the curriculum, special attention may be required for irrigation problems, stock watering, large area sprinkling and the like. Where a pond or lake is part of the school site, precaution must be taken to protect the inflow and outflow against health and safety hazards. Similarly with out-of-door swimming pools.
8. The installation of fencing to fix boundary lines, provide protection for recreational areas, protect against building damages, control traffic, safeguard planting and insure control and supervision of the entire property.
9. The placement of floodlighting to make possible night use of parking areas and outdoor recreational and educational spaces and to safeguard approaches to buildings and fields.
10. The allocation and protection of areas to be used for automobile driver training.
11. The planning of facilities for the storage and protection of bicycles.
12. The routing of school buses, the protection of entrances to be used by bus patrons during stormy weather, and the provision of garages for storage and repairs.
13. The complete segregation of all areas set aside for out-of-doors aviation purposes.
14. The recognition of superior standards for the school garden layout including compost pit, cold frames, walks, curbing and the storage of implements.
15. The use of a greenhouse as an adjunct to indoor laboratory instruction.
16. The designation of an area for school and community picnic purposes with installation of essential facilities.
17. The planning of approaches and entrance to school facilities for physically handicapped children.
18. The consideration of problems of seating, lighting, staging, plumbing, protection and storage associated with the outdoor theatre.
19. The inclusion of provisions for the disposal of waste resulting from crowds at games, of trimmings of trees, shrubs and grass, and of discards from buildings.
20. The planning of utility extensions for facilities to be included for future expansion of buildings or use of site.

PROVISIONS FOR WATER ON SITE

The availability of water for its many purposes will contribute to the operation and maintenance programs of the site and other facilities. Water for drinking and plumbing is a requisite on all large sites. The care of grounds includes cleaning of walks, watering of certain areas, protecting against fires and cleaning of equipment and refuse containers. The installation of lines and outlets should protect against hard use, as well as vandalism. The degree to which water provisions are included in the original planning influences in large degree future programs of use of site and associated facilities.

SEWAGE DISPOSAL

Where possible and economical, all sanitary drain lines from toilets, floor drains, slop sinks and the like are connected with a sanitary sewer directly connected with the community's sewer system. Likewise a comprehensive plan provides for storm drains and catch basins so that all site facilities are readily cleared of rain waters. Where the school authorities are required to provide their own sewerage disposal facilities, the location should be such as to safeguard all health needs and to assure no interference with other planned uses of the school site.

Plant Operation and Custodial Spaces

Among these spaces are included the boiler room, fuel storage, incinerator ventilation cubature, meter room or switchboard room, telephone exchange room, receiving room, furniture storeroom, custodial supplies room, custodian's workshop, helper's locker room, custodial sink closets, dustbin and chutes, engineer's closet for oils and greases, receiving room and elevator provisions in large and medium size schools.

THE HEATING PLANT

The heating plant consists of the boiler provisions, the network of heating apparatus throughout the building and the machine room where controls of various types are installed for service. The heating plant should serve two purposes, namely to keep all occupied building spaces at a comfortable temperature and also to serve as an educational laboratory for study and work experience for students. The problems associated with the heating plant are significant parts of the curriculum studied by students. Planning should ensure use by students of this expensive laboratory, immediately accessible to them. In fact, the basic considerations upon which the heating plant was incorporated into the building should be made a part of the teaching curriculum. Other primary factors entering into the planning of the heating plant are as follows:

1. The location at a central place in the ultimate building plan so that all building sections may be equally well planned.
2. The utilization of the minimum possible cubature to ensure economy of construction while equally serving future as well as present needs.
3. Functional planning with emphasis upon ease of operation and conservation of supervisory and operating manpower.
4. Planning to provide hot water and the relatively light loads of certain spring and autumn months.
5. Arrangement of separate lines to heat large spaces, offices and other rooms which will tend to be used when the remainder of the building will be unoccupied.
6. Planning an entirely fire-resistive space with metal self-closing doors.
7. Complete separation of heating apparatus from fuel and incinerator bins.
8. Provision of adequate openings in exterior wall for removal of boiler sections or other large pieces of apparatus.
9. Adequate lighting of all parts of the boiler room to ensure frequent and overall inspection.
10. Placement of boilers to facilitate cleaning and repairs and to make possible easy access to tubes.
11. The maintenance of the heating spaces at the highest level of cleanliness can be achieved when due thought is given this objective in the original planning.
12. Ease of removal of all ashes and other nonburnable waste.
13. The construction of all pipe tunnels leading to building units so that repairmen can operate comfortably and efficiently.
14. The incorporation in the original plan of spaces for the safe storage of combustibles needed in the operating service.
15. The inclusion of a protected area for the engineer in keeping records and making reports.
16. Providing readiness of access to the out-of-doors and the building structure.

17. The insurance of communication with officials and strategic building points during building occupancy.

18. The immediate accessibility of fire extinguishers and the installation of a sprinkler system to prevent the spread of fire.

19. Boiler room connections with the school fire alarm system with signal apparatus easily accessible to engineer.

20. Location of lighting switches at points following best practice of placement.

21. A low pressure boiler system should be adopted.

CONSERVATION OF MANPOWER

The manpower cost of operating a school heating plant should receive full recognition in all phases of the planning. Coal chutes should be built so that bins fill without reshoveling. Apparatus should be placed so that frequently used or serviced features are readily reached. The hauling of coal from bin to fire pit should be made easy through mechanical devices. Stokers should be included in original planning of coal boilers. Mechanical hoists should be available for ash removal from the building. Floor levels should be uniform throughout. The overflow of drainage water from areaways, the bottom of stairwells or through window sills should be definitely prevented by adequate sizes of drains or proper exterior drainage provisions. Where access to high room levels is necessary, well protected steel stairs and landings should be built in. The boiler room is for many months the major source of occupancy comfort in the building. Its service must not be impaired or discontinued because of lack of consideration of foreseeable items.

THE SOURCES OF HEAT

The main sources of heat for schools have been coal, gas, and oil. In isolated cases, heat from the sun has been captured for school use and in the not too distant future, heat from the earth may be used for larger buildings than homes, where it has been successfully employed. The future use of electricity for extensive school heating purposes is still to be advanced. A school's use of fuel is largely determined by local availability and practice. Economy frequently dictates a change-over from one fuel to another. Oil and gas are found to be more convenient and economical when all associated costs are calculated. Coal, of all kinds, has been the most used fuel for schools in general. Its use represents a greater consumption of manpower in the associated required services.

In planning for coal, fuel storage space of considerable magnitude is needed. The storage of at least one-half year's requirements is essential, but preferably a year's supply should be put into the bins. The filling of the bins should get full consideration in the planning. The out-of-doors access to the bins, the location of the intake to facilitate flow and the ease of transfer from bin to boiler require careful planning. The placement, size and accessibility of the storage tank for oil demand consideration in original planning if changeover from coal to oil is a possibility, or in case oil is used in the first instance. The interchangeability of fuels must play a significant part in the planning processes.

If gas is to be used, the intake to the boilers must be direct and not through lines that approach the building.

The elimination of fire hazards is rudimentary in planning for fuel storage. Protection against coal combustion may be required. Complete removal of stored coal from fire sources and protection against gas leakages are planning essentials.

INCINERATION

Large amounts of waste paper and other materials collect each day in the instructional processes. The sweepings from the floors as well as the contents of waste baskets and containers must be disposed of daily. This is best done through the inclusion of dust chutes, storage bins and an incinerator within the building itself. Fire-resistive chutes with self-closing fire doors placed at readily accessible points on each floor represent an imperative need. The storage bins must be entirely separated from the incinerator doors, but sufficiently close to make easy the transfer of waste. The incinerator must be of such a type as to make impossible the upward flow of sparks or paper ash with the heat currents. The ash removal pit should permit easy cleaning, the incinerator flue is independent of any other. An out-of-doors incinerator may also be necessary to care for waste that accumulates in the site programs. It should be located remote from the building and at a point where smoke and odors will not constitute a nuisance to school or neighbors.

If the school policy is to bale paper for sale purposes, the storage bin and the baling machine should

be directly adjoining or opening upon the receiving room. This makes for easy handling to trucks for carting away. Such a space should be of fire-resistive construction and should be protected with a sprinkler system.

METER ROOM OR SWITCHBOARD ROOM

In a small school the electrical meters and the distribution panel may be located in one space. In large schools, which require a more extensive switchboard, a separate room will be necessary. These rooms should be located where readily accessible in emergencies, should be completely enclosed, and under the lock and key control of the chief custodian. The meter room will be improved with an air vent to the out-of-doors.

TELEPHONE EXCHANGE ROOM

With extensive community use of a secondary school, such a room may be required. Before final decision is made for its inclusion or elimination, the maximum possible use of building and site should be envisaged.

FURNITURE STOREROOM

A storage room of about 300-350 square feet is required for the housing of new, unused furniture, pieces temporarily in excess and those requiring repairs. Metal hangers on ceiling, wall brackets and a steel rack with adjustable shelves will make for orderly storage. The room should be of fire-resistive walls and well lighted.

CUSTODIAL SUPPLIES STOREROOM

The cleaning and operating of a secondary school require many kinds of equipment and large quantities of supplies. A room with 300-400 square feet of floor space usually suffices. It, however, should be sufficiently large to contain a year's supply of the most needed materials. Paper towels and toilet paper will occupy much space. Cartons of lighting fixture replacements may bulk large. Vacuum cleaning apparatus tends to take more space than its appearance indicates. Custodians need mops, brushes, brooms, pails, stepladders, liquid soap, cleansing powders, cleaning cloths, small tools, nails, screws, and minor replacement materials for floors, shades and the like. In each local situation, the determination of space size should be on the basis of practice followed in the use of materials. The room should be equipped with movable metal shelving, brackets on walls and arrangements for hanging brooms and floor brushes from ceiling racks.

CUSTODIAN'S WORKSHOP

Facilitation in making minor repairs of equipment or building is secured through a well planned workshop which can be used by the custodian and his assistants. If located near the boiler room or directly separated therefrom by a glass partition, is becomes readily available for repair activity during off-service periods. Three to four hundred square feet of floor area will suffice for the shop and in large schools a supply room adjacent of 200-300 square feet will be found invaluable. The shop equipment should include (a) heavy duty workbench, (b) woodworking bench, (c) steel counter and shelves, (d) tool cabinet and material bins, (e) material brackets and shelves, (f) oily waste can, (g) rubbish waste can, (h) woodworking vise, (i) swivel pipe vise, (j) electrically operated emery wheel, (k) sundry other devices for glass cutting, lock repair and the like. As a part of the workshop or connected therewith, there should be placed an electrically operated eraser cleaning outfit. If funds permit, such installation may be on each floor in conjunction with the custodian's sink closet. The school should be equipped with two sets of erasers, one set being in use while the second set is being cleaned.

HELPERS' LOCKER PROVISIONS

The number and area of these rooms is dependent upon the size of the school and whether both sexes are to be served. Space must be provided for lockers, toilets, hot plate, first aid cabinets, and lunch table for each sex. The number of persons to be provided for should be determined before planning proceeds. The space should adjoin a service entrance, if possible, and should be finished in keeping with other similar service spaces in the building.

CUSTODIAL SINK CLOSETS

At carefully selected points on each floor, custodial sink closets should be provided. They should be of sufficient size to house a mop wagon and the paraphernalia used in cleaning. The minimum in-

side dimensions of such a closet should be 8 x 6 ft. A sink or hopper approximately 16″ x 16″ should be floor sunk, of stainless steel with perforated grating cover. The mop wagon may have dimensions of 2′3″ x 4′6″ and empties directly into floor sink. Shelving and brackets should provide for storage of toilet paper, vacuum cleaning tools, toilet paper cartons, wringer foil, mops, brooms, ladders and cleaning supplies. A small workbench and shelves for tools and a double faucet, swinging spout, amply high above the sink, are other necessities. These closets, when properly equipped, assure the program of cleanliness with trained custodians whose work is fully planned.

ELEVATOR SERVICE

The vertical load of human travel and material transfer is so great in a medium or large size secondary school that elevator service is required. If conditions warrant, a passenger as well as a freight elevator should be installed. The former serves the physically handicapped, the middle aged teachers, visitors and the sick. The latter provides the only rapid and safe method of transferring heavy loads between floors, makes for more rapid cleaning and enables the service personnel to adjust more readily to the work problems of the building. Elevators may be operated under strict rules laid down by the administration and will not necessarily require paid operators. Elevators should be easily accessible from the receiving room and the supply, textbook and furniture storerooms.

GENERAL RECEIVING AND SHIPPING ROOM

The receiving room requires a location easily approached by trucks from the street and should be planned so that transfer is readily accomplished from truck to floor level. The room size varies with the enrollment to be served. At the beginning of school terms, this room will carry its heaviest loads as all incoming and outgoing materials, supplies, furniture and equipment must pass through this station, unless special exception is authorized as in the case of shops and cafeteria. The equipment of this room is simple, consisting mainly of a counter for recording purposes, a heavy duty table for wrapping and crating outgoing goods, departmental bins for the small packages received and ample floor space for heavy boxes and crates. The receiving room should be in close proximity to storerooms. A size of 640 square feet may suffice.

ENGINEER'S SUPPLY CLOSET

The engineer's supply closet is preferably located in the boiler room, as here are stored the oils, grease and paint used in his work. Drums of oil, large cartons or bundles of waste, stepladders and the containers and tools of boiler room maintenance are stored here. Completely fire-resistive, the room should have its floor finished with oil resistant, waterproof dressing.

The Heating and Ventilating System

The most comprehensive state-wide study of heating and ventilating problems was undertaken in New York State through the joint efforts of the Division of School Buildings and Grounds and the Division of Research of the New York State Education Department. A committee, made up of Charles B. Cox, George B. Cummings, Dr. N. L. Engelhardt, Dr. Ray L. Harmon, Dr. James E. Perkins, Paul W. Seagers, and Adrian B. Waterbury, together with the consultants, Dr. C.-E. A. Winslow, Director of the John B. Pierce Laboratory of Hygiene, Yale School of Medicine, and Philip E. Nelbach, Assistant Professor of Public Health, Yale School of Medicine, produced a report in 1945, pertinent sections of which are presented below:

HEATING AND VENTILATING SYSTEMS FOR CLASSROOMS

"Capacity of the heating plant should be figured after studying the past weather experience of the locality. Extreme low temperatures over past years should be considered, tempered by judgment as to the severity of exposure to cold winds offered by the site and as to structural materials and insulation to be used in the building. Reference should be made to the design temperature zone map which can be found in the ASHVE Guide. Reserve heating capacity should be provided for 'pickup' and pipe losses. Additional capacity for future extension of the building should be considered carefully.

"A part of the heating system present in the classroom, often not clearly recognized as such, is the congregation of heat-producing human bodies. During mild weather or periods of high solar heat input through the windows, the human heat liberated, alone, or combined with sun heat, often exceeds that escaping from the classroom through the structure; so that cooling may be needed even after the installed heating system has been turned off either by hand or automatic control.

"In operating principle, heating systems rely on convection and radiation heat transfer to the human body to create comfort. Referring to the discussion of physiological principles governing heat exchange between the body and its environment, it may be stated that those heating systems which transfer more of their heat input to the room by radiation than by convection are more likely to produce superior sensations of comfort.

"In general, the essential objectives as outlined above should be attained by the simplest and most economical but effective means. Complex machinery is subject to repeated and expensive breakdowns unless the quality of maintenance and operation is high. Proper standards must be assured before elaborate installations are made. Among the methods available for heating and ventilating the school building, five of the most important types are described briefly in the following—as procedures which may attain the desired results under various circumstances.

"*Direct heating with window air supply and gravity exhaust.* This is the simplest and commonly least expensive procedure available both as to installation and operation. When installed with care and intelligence, it is capable of obtaining all essential results. It includes the following provisions:

"(1) Conventional cast iron or copper radiation should be installed beneath *all* the windows along that side of the room and shielded to prevent excessive radiant heat output to the adjacent row of children. Control should be by thermostatic means with a hand valve in addition for emergency use, enabling the teacher to turn off the heat should the automatic control fail to give correct conditions at all times.

"(2) All of the windows should be equipped with deflectors; so that when each window is opened slightly, incoming cold air will be warmed by either first passing down through part of the radiation or by blending directly with the rising warm air. A superior method of admitting cool air will be through long narrow horizontal louvers opening under each window. These louvers can be designed to produce better blending of cool and warm air, and can be controlled automatically by thermostat or by a single manual control, which is more convenient than adjusting four or more individual windows.

"(3) Two or three exhaust openings should be located near the ceiling, evenly spaced along the side wall opposite to the windows, connecting to gravity ducts. These ducts may be gathered into trunk lines, properly sized and sloped, connecting to a cowl on the roof designed to keep out the weather and prevent back drafts. Both ducts and trunk lines should be located in the interior of the building, within the insulated area, in order to prevent their being chilled. In design, an air change of 15 cubic feet per minute per person should be used, and the size and detail of ducts and accessories should be in accordance with the formulas and principles set forth in the chapter on natural ventilation in the ASHVE Guide. Tight-closing dampers with clearly marked controls should be installed in all exhaust duct inlets. Protective grills over exhaust duct openings impede the passage of air. Where their use is necessary for the sake of neatness, they should be of such design as to exert minimum drag on the air stream.

"Under normal conditions of operation, the cold air which enters is tempered by the radiation below the windows, so that it is cooler than the general room air but not cold enough to produce objectionable drafts. This cool air moves slowly toward the floor and, as it is warmed by the bodies of the occupants, rises again on the inner side of the room and moves up to the exhaust ducts at the ceiling. The desired result is a very slow movement of air, along almost the entire length of the room from the windows across the room to the inside wall.

"*Direct heating with window air supply and duct exhaust with central fans.* (1) The installation is the same as with the preceding system except that the exhaust duct and trunk lines connect to a central exhaust fan or fans. This arrangement should be used in large buildings where the length of duct lines are considerable, proper slopes cannot be obtained, and the ductwork must be exposed to chilling in cold attics. Fan operating switches with pilot lights should be located in the custodian's room, the boiler room, the principal's office or all three. Such visual reminders should aid in producing proper use of equipment.

"(2) As a design figure, an air change equal to 15 cubic feet per minute per person should be used, and the details of duct design and fan installation should follow the formulas and principles set forth in chapters 30 and 32 of the ASHVE Guide. Tight-closing dampers with clearly marked controls should be installed in all exhaust inlets. In general, fan exhaust ducts will be smaller in cross-section than gravity ducts of the same capacity. Where protective grills are necessary over exhaust duct inlets, they

should be of such design as to produce minimum drag on the air stream.

"Direct heating with forced unit ventilator air supply and corridor gravity exhaust. (1) Sufficient conventional radiation is installed under *all* of the windows to warm the room quickly in the morning and to help carry the load in very cold weather. The remainder of the time the thermostat which controls this radiation is usually in the low position and the capacity of the heating coils in the unit ventilator is normally sufficient to carry the load throughout the day without assistance.

"(2) Fresh air is drawn through an outside grill and warmed to within about 15 degrees of room air temperature before discharge into the room. The amount of outdoor air brought in for cooling, when the latter is required to remove excessive metabolic heat, should be controlled by a thermostat actuating damper or by changing the speed of the fan. The fan should be silent in action, and the exit grills into the room from the fan should be properly equipped with vanes to direct the air stream upwards to all parts of the room in such a way as not to strike any of the occupants.

"(3) Air from the room should be recirculated only when the unit is operating to preheat a cold, unoccupied room.

"(4) A quantity of air equal to that brought in from outdoors exhausts through one or two grills into the corridor and stairwells and out through cowls placed above grills in the ceiling of the top floor corridors. The exhaust grills in the classroom should be spaced, close to the floor, along the side wall opposite the windows.

"This system, when all the thermostats and control mechanisms are in adjustment, will maintain room air temperature within closely fixed limits. Often, however, its operation is accompanied by excessive air movement in the classroom, with complaints of drafts. This difficulty is due both to a large amount of useless recirculation and to the more fundamental disadvantages of concentrating the admission of all fresh air through one "bottleneck"; so that high air velocities become inevitable, requiring an increase to 73° to 74° average room operative temperature to assure comfort. It is absolutely essential that the unit be centrally located along the exterior wall to obtain optimum distribution and so minimize drafts.

"Forced warm air with central or zone fans. (1) Conventional radiation is usually installed under the windows to assist with peak loads, but most of the heat input is applied to the air stream after it passes through the circulating fan and before it enters the supply plenum for distribution through ducts to the classrooms.

"(2) From the plenum, individual ducts, or trunk lines splitting into individual ducts, supply each classroom. The first arrangement gives more reliable supply, but the cost of duct work is obviously more expensive. One or two supply grills are usually located in the wall opposite the windows and near the ceiling. One or two exhaust grills are located on the same wall but near the floor.

"In large buildings it is customary to divide the duct system into separate zones, each with its own heating coils and circulating fan. Successful layout of such zones requires careful study of building exposure to weather, and of room use. It is usually a serious mistake to zone simply by the wings or floors of the building.

"In determining the amount of air necessary, and in deciding whether recirculation should be employed, there are two considerations to be borne in mind. First, from the standpoint of freshness, ten cubic feet of air per minute per pupil should be introduced and this should be clean outside air. There is no physiological object in increasing this amount except where special conditions obtain. Second, the recirculation of air may spread the germs of respiratory disease. Definite information is lacking, however, as to the full importance of this factor, and present knowledge does not justify prohibiting the practice. On the other hand, there is no need to dilute fresh air with recirculated air, except to provide a larger volume of air to conduct heat during the warming up period. This additional heating might better be accomplished through the use of radiators. If this arrangement is impossible, large volume recirculation might best be permitted with provision of efficient air-disinfecting equipment to treat all recirculated air.

"The forced warm air system can be so designed and operated as to yield satisfactory results. It is particularly adapted to large buildings in dusty, smoky or noisy environments where the use of windows as air inlets is undesirable and where it is preferable to use a single plenum inlet equipped with washing or filtering devices. Should the design or operation of the system be such that overheating or drafts exist in certain rooms, conditions may be very uncomfortable. In such instances, it is often

found that the equipment is simply not operated at all.

"Panel heating with window air supply and duct exhaust by gravity or central fans. This type of system yields thermal conditions, since it provides a more generally uniform temperature throughout the room at all levels, and may come to be considered the most acceptable installation for homes, schools, offices and the majority of business and industrial buildings. Ventilation for odor control and for convection cooling may be obtained by window supply and gravity or fan exhaust.

"The panels should have minimum heat capacity such as those made of fairly thin metal, wood or plastic sheets, having high heat conductivity, with thin-walled warm water coils so bonded to them that rapid heat transfer will result. There are some disadvantages in the practice of imbedding the coils in concrete floors, in lath and plaster walls and ceilings, or behind thick wood panels, since the high heat capacity of these materials creates lagging reaction to thermostatic control modulations. Response to the indoor thermostat should be as prompt as possible, eliminating the necessity for accessory outdoor thermostat units.

"Locating the panels in the ceiling and in the outside wall beneath the windows will prove most effective. The panels will act as large area low temperature convectors, as well as radiators, and warming the floor and furniture in the room by radiation, will cause these surfaces to act also as secondary radiators and convectors. The degree of exposure of the bodies of the room occupants to radiation direct from the panels is of little significance with low temperature panel heating. The panels may be faced with paper, a thin layer of pressed wood or plastic, or painted. For determining the panel area necessary, the operating surface temperature may be planned to fluctuate between 70° and 100°.

"It must be realized that panel-heating installations using warm water coils are subject to freezing if the heating plant is shut down during cold weather. Using an antifreeze solution instead of water alone, or providing for convenient complete draining and refilling of the system are effective precautions.

"Other new types of low temperature radiant heating systems show promise. Warm air circulated through tile ducts in floors, ceilings and walls yields much the same conditions as warm water coils imbedded in these structural members. Unfortunately, the lag behind thermostatic control found with this kind of installation is typical of the high heat capacity panel.

"For regions where the climate is mild and the cost of electric power is very low, heating by electricity will become popular. Panels heated by resistance wiring are quite satisfactory in operation. Infrared electric lamps are a recent application. The lamps, in batteries, are focused on wall and ceiling areas which are well insulated and have low heat capacity and high emissivity. These areas in turn re-emit radiation diffusely, thus removing the unpleasant directional concentration of the original high temperature source. A particular advantage of this system is its immediate response. Wide application must await the prevalence of cheap electric power, but somewhat similar results may be obtained by substituting steam coils backed by properly shaped reflectors in place of the batteries of lamps.

HEATING AND VENTILATING SYSTEMS FOR OTHER THAN CLASSROOM SPACES

"All rooms of large assembly. Where it is planned for over 50 people to assemble closely, arrangements for removing the metabolic heat collectively released must be adequate. The location of the assembly room and the heat transfer possible through its walls must be considered in determining the capacity of the cooling system required. If the room is to be used often in hot weather, the attendant more severe conditions should also be taken into account.

"Probably the simplest arrangement is to heat and cool by convection, that is, cool by mechanical air exhaust and by turbulence, and heat by warm air. For heating, and cooling, the air is best admitted close to the ceiling and exhausted beneath the seats or near the floor. Both heating and cooling systems for assembly rooms should be separate from all other such systems in the school building. A certain amount of stand-by direct radiation is a good device for keeping the room warm when empty, but it should be turned off before occupancy. With maximum exhaust for cooling, upwards of 30 cubic feet of fresh air per minute per person may be needed.

"For hot weather conditions far more than this will be needed and high turbulence becomes essential; so that the use of open windows, direct electric fans, or air cooling and dehumidifying equipment should be considered.

"Gymnasiums, dressing rooms and swimming pools. For gymnasiums we are faced with a double

problem, namely, providing for the comfort of the audience and for that of the athletes, two groups whose thermal needs are quite different.

"Heating by warm air or by free-standing radiators is the usual practice, and it is a common condition for the athletes to be too cold while the audience is too hot. There probably are unrealized opportunities for applying warmth only where it is needed through the use of radiant heating, preferably of the higher temperature type such as infrared electric flood lamps or steam coils backed by reflectors. Heating economies also may be expected since it will not be necessary to heat the huge volumes of air in these large rooms beyond that already accomplished by a small amount of stand-by direct convection heating.

"The exhaust ducts of recirculated warm air heating systems when used for these spaces should be kept separate from the other return ducts in the building. Unit hot air blowers are initially cheap but tend to produce high air velocities which have a chilling effect.

"*Kitchens, shops and laboratories.* Typical classroom heating systems are satisfactory for these rooms with mechanical ventilation a required item. Exhaust ducts should be kept separate from all other systems in the building. Both for heat removal and odor control, exhaust hoods over stoves and burner equipment are the most efficient equipment for obtaining quick and adequate results.

"*Toilet rooms.* Direct heating is convenient. Positive exhaust ventilation with fan is essential. The system of exhaust ducts from toilet rooms should be kept separate from all other duct systems in the building." [1]

TEMPERATURE CONTROL

A temperature control system should be installed to control automatically the temperature in all rooms with exception of small offices, small toilets, entrances and stairs.

PROVISIONS FOR WATER SUPPLY

A comprehensive plan of water distribution throughout buildings and grounds contributes to the success of the educational program.

The arrangements should envisage the need for water supply in all the educational processes, in all human service needs and in the plant requirements for all phases of servicing. Some of the high points of emphasis are as follows:

(a) Sprinkler system for protection against fire spread at all places of distinctive hazard.

(b) Provision in classrooms, laboratories, and shops to expedite the educational work and for personal use.

(c) Drinking fountains on each floor located at conveniently distributed points.

(d) Washing facilities in connection with each toilet and in sufficient amounts to render service for the pupil load. Also at approaches to cafeteria.

(e) Complete servicing of building for cleaning, heating, ventilating and fire protection purposes,

(f) Full equipment for grounds, athletic buildings, stadia, and separate service structure.

(g) Complete servicing of all toilet and shower fixtures.

(h) Special provisions for pools with water filters, heaters, circulating pump and chlorine treatment.

(i) Adequate arrangements for the care of all cafeteria cooking, washing and clean-up needs.

(j) Discovery of unusual needs growing out of special developments in local program.

HOT AND COLD WATER SERVICE

The plumbing and drainage design will provide for an adequate system of cold water supply through the building for all fixtures and equipment and a complete hot water and circulating water system to provide adequate hot water for general use throughout the building. Tempered water should be provided at all pupils' washing facilities and shower baths, by means of thermostatic mixing valves. In buildings having dishwashing units, a hot water supply for the dishwashers should be maintained at a temperature of 180°.

HEATING OF HOT WATER

The hot water for domestic supply, cafeteria and showers may be heated by means of steam coils installed in storage tanks. Steam may be supplied to these coils from the boiler equipped with a fully automatic burner and so arranged that this boiler can be operated independent of the other heating boilers.

[1] New York State Department of Education, *Heating and Ventilating Recommendations for New York State Schools,* Albany, University of the State of New York Press, 1946, pp. 22-29.

TABLE 1: Suggested Location and Equipment of Special Toilets

Special Toilets	Female			Male				Location Floor			
	Rm. No.	Fixtures Per Room		Rm. No.	Fixtures Per Room						
		W. C.	Lav.		W. C.	Ur.	Lav.	B	1	2	3
Dressing Room Toilets	one	1	2	one	1	—	2		X	x	
Custodial Employee Toilets	one	1	1	one	1		1	X	x		
Medical & Dental Suite Toilet	one	1	1						X		
Principal's Toilet	one	1	1	or one	1		1		X		
Teachers' Toilet	three	2	1	three	1	2	1		X	X	X
Public Toilet, Aud.	one	3	2	one	1	2	2	x	X	x	
Gym. Instructors' Toilet	one	1	1	one	1		1		X	x	
Cafeteria Help Toilet	one	2	2	one	1		1	X	x	x	
Gym. Toilets Jr. & Senior H.S.	one	4	1	one	1	3	1		x	x	

All water closets, where possible, should be the wall hung type with access space provided behind the toilets for pipes. The seat should be selected which provides the highest degree of sanitation. The bowl should be preferably the elongated type. The method of flushing should follow the best installations in homes.

Urinals 18″ wide are preferably of the floor type with a hooded vent to provide for adequate ventilation and may be flushed with concealed flushometers. The urinals in junior high schools are usually 21″ on centers, and in high schools and vocational schools, they are 24″ on center.

Building Communication Systems

This system includes all features which operate mechanically, completely or partially, to convey information.

FIRE DEPARTMENT ALARM

A fire alarm box may be placed in the corridor adjacent to the principal's office. This fire alarm box should be used to summon the fire department and should be connected to the lines of the fire department.

FIRE SIGNAL SYSTEM

Gongs should be placed in corridors and at such locations as may be necessary to be heard in all parts of the building in case of fire or other emergency. These gongs should be operated from a control board by means of fire signal boxes conveniently located on each floor of the building. Punch registers may be located in the custodian's office and push button in general office, with boxes coded.

SPRINKLER ALARM SYSTEM

Where sprinklers are used, an alarm system should be planned for.

TELEPHONE SYSTEM

Public Telephone—Concealed conduits should be provided to most of the offices, including cafeteria office, which may be used for public telephones. Space in the general office for a public telephone switchboard is required. Telephone booths should also be provided for, convenient to entrances of all large spaces heavily used by the public.

Interior Telephones—are required for office intercommunication with all other parts of the building.

PROGRAM SYSTEM

Classroom Bells—Each classroom should be provided with a suitable bell operated from a key on a keyboard in the general office or from selected

groups made on connection strips behind the keyboard by means of an electric program device.

ELECTRIC CLOCK SYSTEM

Clocks should be placed in corridors, auditoriums, cafeterias and in libraries and other large rooms. Two-way corridor clocks are preferred. Time recorders with suitable time card racks may be desired in the general office for clerks' and teachers' records.

PUBLIC ADDRESS SYSTEM

Each instruction room should be equipped with a loudspeaker. A control board to permit the selection of rooms to receive broadcasts should be provided in a fireproof closet under the control of the central office. Each control board should be equipped with amplitude and frequency modulated radio receivers as well as phonographs and microphones. Facilities should be extended for amplification of speech in auditoriums, gymnasiums, cafeterias and other places where large groups gather.

INDICATOR SYSTEM

Entrance gates and entrance doors require push buttons operating at keyboard, and indicators should be placed in the custodian's office and in the boiler room.

TELEVISION SYSTEM

Suitable conduits should be provided from the television outlet locations to the roof location of the antenna. Care should be taken to avoid interference from other electrical systems.

RISER DIAGRAMS

For proper maintenance of buildings, the following riser diagrams should be installed in the switchboard rooms, showing all junction boxes, cut-out boxes, panels, switching devices and connected equipment:

Light and Power System
Public Address System
Bell and Telephone System
Fire Signal System
Sprinkler Alarm System
Electric Clocks System
Stairway Lighting System

SCHEMATIC DIAGRAM OF SCHOOL SOUND SYSTEM

The complete sound system proposed for the New York City schools, as developed under the direction of Mr. William A. Veit, is presented in Figure 1 as a reference for building planners.

THE FUNCTIONAL OPERATION OF SOUND SYSTEMS IN SCHOOL BUILDINGS AS PROPOSED FOR NEW YORK CITY

The extent of the sound system installation should be determined in terms of the educational needs of the school. In addition to serving administrative needs and local sound amplification in the larger school units, these facilities are used to broadcast special events to all rooms of instruction and for other educational purposes.

If the optimum return from a sound system is to be realized the maximum use must be made of its equipment and accompanying facilities. Like all other educational investments, the solution lies in the fullest pupil participation. This participation depends, more or less, on the age level of the pupils, and consequently varies in elementary schools, junior high schools and senior high schools.

Student participation programs, properly controlled, afford a splendid means of self-expression and training in various areas. The sound system is an excellent device for the advancement of such activities as plays, skits, forums and discussions, musical and vocal programs, and student organization activities. The recording and reproducing of students' work serve as invaluable aids for analysis and further study in stimulating creative and corrective habits in speech and English.

In high schools, the sound system may also serve as a practical laboratory for the training of such radio technicians as station engineers, managers, program directors, producers, anouncers, script writers and other specialists. The scope of such a program requires the utilization of sound equipment for the entire school day. Groups of varying interests work separately or as a unit. The Schematic Diagram of School Sound Systems illustrates the provision of adequate facilities for this program. The distinct advantage of this arrangement is that the use of the sound equipment for the auditorium and studio does not deprive the school proper, the cafeteria, nor the gymnasium of their combined or separate programs. The equipment is so wired that separate activities may be carried on in the studio or on the stage; or they may be connected through

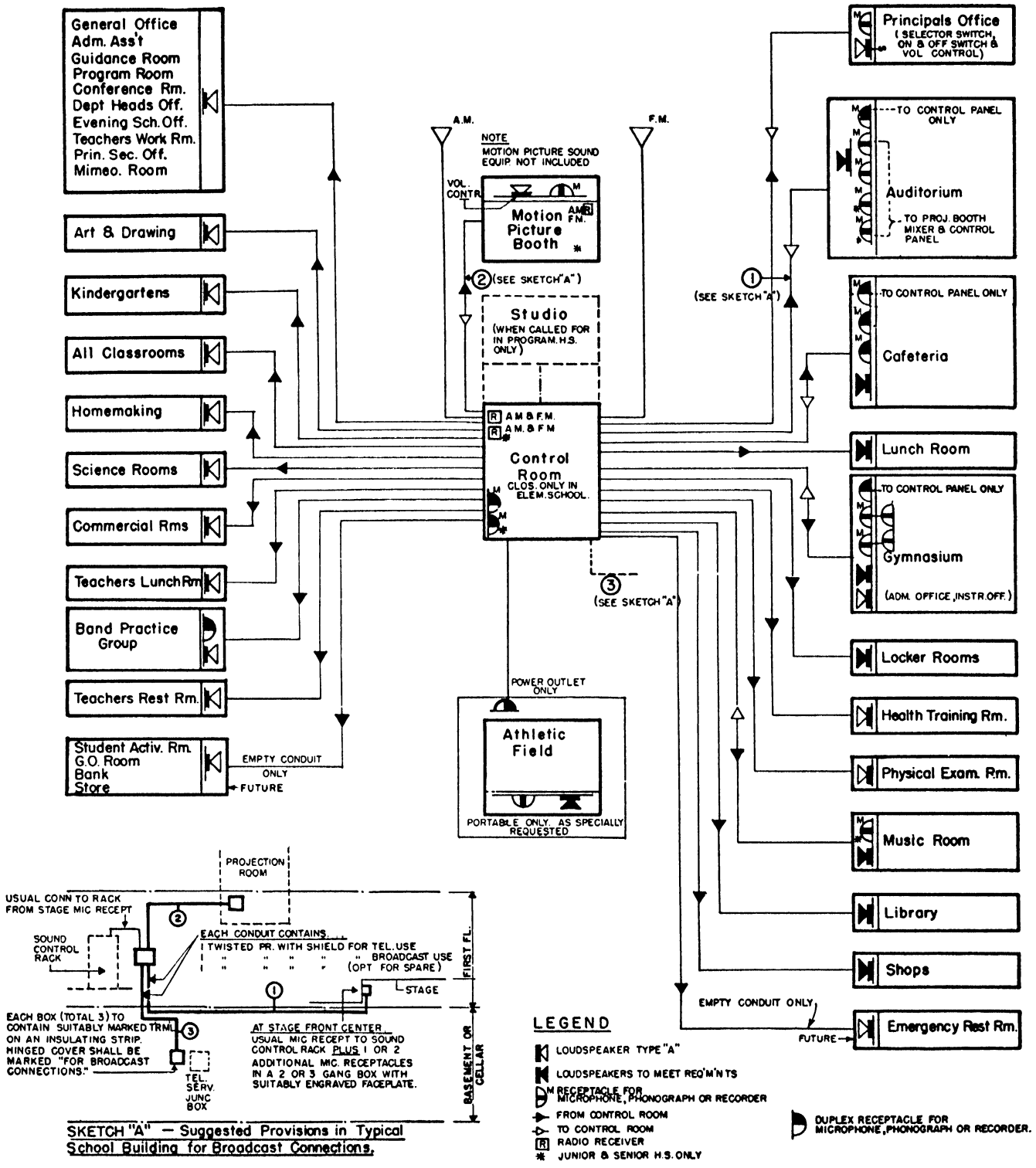


Figure 1. Schematic Design of School Sound System. Prepared by William A. Veit for the New York City School System.

the main control board to provide programs for the entire school.

The heart of the system is the sound control room. Its location with respect to the auditorium stage, studio and motion picture booth is an important feature, in that it allows multiple use of much of the usual sound equipment. This room has two glazed vision panels, one affording full view of the auditorium and stage, and the other affording full vision of the adjoining studio room. A vestibule provides a sound insulated entrance from the corridor and motion picture booth. An electrical warning sign is provided over each control room and studio entrance. The control room contains the principal control and amplification equipment of the school as well as a control console. This control console, located at the vision panel, contains the controls for five stage microphones and switching facilities, so that two of these controls may be used for the two studio microphones. The five stage microphones can be used singularly for speech amplification, or simultaneously for large stage productions or orchestral recitals. Small groups may find it more desirable to use the studio with its provision for two microphones. These studio microphones can also be employed to produce sound effects for stage productions. Control and switching arrangements are also provided at the console for recordings or reproducing programs originating within the school or over broadcast programs. Another important feature of this arrangement is the desk microphone at the console with tall-back keys. It provides instantaneous contact between the operator and backstage, operator and studio, and operator with main sound system. A monitor speaker with volume control on the console allows supervision of all programs. To facilitate visual volume control and rapid adjustments with least distortion, a visual volume level indicator supplements the monitor speaker.

In spite of the remoteness of the sound control units for the administrative center, and the isolation of the separate units, the administrative use of the system is not sacrificed. In fact, short announcements may be made to the entire school by simply pressing a button and talking into the microphone at the Principal's desk whether the control room is attended or not. Moreover, any announcement originating in the Principal's office, or in the control room may take precedence over any or all local programs.

The equipment and facilities described provide a radio laboratory with a professional atmosphere. The optimum of such a radio laboratory would embrace the entire school organization. It offers a challenge to each and every department. It is not difficult to conceive ways in which each department could contribute to the educational or social program of the community.

The technical aspect in the operation of an extensive sound system requires an experienced and qualified person. Consequently, no educational radio laboratory of this nature would be complete without a faculty member, of the vocational or science department, who is well experienced in radio equipment and operation. His duties would include the operation and minor maintenance of equipment. With proper care and supervision, the major maintenance item should be the occasional testing and replacements of tubes. It may be well to mention in this respect, the maintenance costs can be kept at a minimum by utilizing standard stock units in all major pieces of equipment. Such units can be serviced easier and replaced more economically. Furthermore, in an emergency, replacements can be made very readily if standard units are employed. If due consideration is given to the type of wiring between such units, replacements could be made by the experienced and responsible member of the faculty.

A system as complete as the one described need not confine itself to school programs. It should develop an enterprising community radio program. Therefore, provision should be made for radio broadcasts, by transmitting the programs over telephone wires, to municipal or commercial broadcast stations or through evening use of the school radio station.

Bibliography in the School Building Field

American Association of School Administrators, *American School Buildings,* Washington, D. C.: American Asso. of School Administrators, 1949. 525 p.

American Association of School Administrators, *Planning School Buildings for Community Uses,* Washington, D. C.: American Association of School Administrators, 1941.

American School and University, Yearbooks, 1928-1949 inclusive, American School Publishing Corporation, 470 Fourth Avenue, New York.

American Standards Asso., Inc., *American Standard Practice for School Lighting,* New York, Illuminating Engineering Society, 1948. 79 p.

Barrows, Alice, and Simonson, Lee, *The School Auditorium as a Theater,* Bulletin 1939, No. 4, U. S. Government Printing Office, Washington, D. C.

Betzner, Jean, *Schoolhousing Needs of Young Children.* Bulletin of the Association for Childhood Education, Washington, D. C., 1939.

Blair, Herbert, *Physical Education Facilities for the Modern Junior and Senior High School,* A. S. Barnes and Co., New York, 1938.

Brodshaug, Melvin, *Buildings and Equipment for Home Economics,* Bureau of Publications, Teachers College, Columbia University, 1931.

Bryan, Mary de Garmo, *The School Cafeteria,* F. S. Crofts and Co., New York, 1936.

Bureau of Cooperative Research, A Bibliography of School Buildings, Grounds and Equipment, Part I, by Henry L. Smith and Leo M. Chamberlain; Parts II-IV, by Henry L. Smith and Forest R. Noffsinger, Indiana University, Bloomington, Indiana, 1928-1935.

Burris-Meyer, Harold, and Cole, Edward C., *Theatres and Auditoriums,* New York, Reinhold Publishing Corp., 1949. 228 p.

Bursch, Charles W., and Reid, John Lyon, *You Want to Build a School?,* New York, Reinhold Publishing Corp., 1947. 128 p.

Butler, George D., editor, *Introduction to Community Recreation,* Edited for the National Recreation Association, McGraw-Hill Publishing Co., New York, 1949.

Byrne, Lee, *Check List Materials for Public School Building Specifications,* Bureau of Publications, Teachers College, Columbia University, 1931.

Caudill, William Wayne, *Space for Teaching.* Bulletin 59 of the Agricultural and Mechanical College of Texas.

Clay, Sir Felix, *Modern School Buildings, Elementary and Secondary,* B. T. Batsford, Ltd., 94 High Holborn, London, 3rd edition, 1929.

Donovan, John J. and Others, *School Architecture: Principles and Practices,* Macmillan, New York, 1921.

Dressler, F. B., and Haskell, Pruett, *Rural Schoolhouses, School Grounds, and Their Equipment,* Bulletin 1930, No. 21, U. S. Government Printing Office, Washington, D. C.

Dudley, L. Leland, *The Location of City School Plants,* Harvard University Press, Cambridge, Mass., 1929.

Earle, Frank M., *Reconstruction in The Secondary School,* Beckley, Kent, University of London Press, 1944.

Elsbree, Harold M., *Planning the Elementary School Classroom,* State Department of Education, Albany, New York, the Department, 1946. 16 p.

Engelhardt, N. L. (in collaboration with School Planning Associates, Elizabeth, N. J.), check list for *Architects' Working Drawings for School Buildings,* Bureau of Publications, Teachers College, Columbia University, 1940.

Engelhardt, N. L. (in collaboration with School Planning Associates, Elizabeth, N. J.), *Engelhardt School Building Portfolios, Portfolio A —Elementary Classrooms,* Bureau of Publications, Teachers College, Columbia University, 1941.

Engelhardt, N. L., *Elementary School Building Score Card and Survey Manual,* Bureau of Publications, Teachers College, Columbia University, 1936.

Engelhardt, N. L., *School Building Programs in American Cities,* Bureau of Publications, Teachers College, Columbia University, 1928.

Engelhardt, N. L., *Standards for Junior High School Buildings,* Bureau of Publications, Teachers College, Columbia University, 1932.

Engelhardt, N. L., *Survey Field Book for the Analysis of a High School Buildings,* Bureau of Publications, Teachers College, Columbia University, 1931.

Engelhardt, N. L., Chairman, *The Planning and Construction of School Buildings,* Part I, Thirty-Third Yearbook of the National Society for the Study of Education, Public School Publishing Co., Bloomington, Ill., 1934.

Engelhardt, N. L., and Engelhardt, Fred, *Planning School Building Programs,* Bureau of Publications, Teachers College, Columbia University, 1930.

Engelhardt, N. L., and Engelhardt, N. L., Jr., *Planning the Community School,* American Book Company, New York, 1940.

Engelhardt, N. L., Jr., *School Building Costs,* Bureau of Publications, Teachers College, Columbia University, 1939.

Engelhardt, Engelhardt, Leggett, *Program of Educational and Community Requirements for Myers Park High School—Charlotte, North Carolina,* New York 63, New York, Engelhardt, Engelhardt, Leggett, 1949.

Engelhardt, Engelhardt, Leggett, *Program of Educational and Community Requirements for the New Sunset Junior High School,* San Francisco, California, Board of Education, 1949. 70 p.

Engelhardt, Engelhardt, Leggett, *Program of Educational and Community Requirements for the New Ulloa Elementary School,* San Francisco, California, Board of Education, 1949. 69 p.

Engelhardt, Engelhardt, Leggett, *San Francisco School Building Survey Report,* Volume I, Analysis of School Population; Volume II, Elementary School Buildings; Volume III, Junior High School Buildings; Volume IV, Senior High School Buildings; Volume V, Proposed School

Building Program; Volume VI, Physical Facilities for City College of San Francisco, Vocational and Special Education, Adult Education, and Special Classes in All Schools; Volume VII, Planning Guides for San Francisco's School Buildings; Volume VIII, Guides for the Selection of Furniture and Equipment in Elementary and Junior High Schools; Volume IX, Proposals for Color Schemes in San Francisco's Schools; Volume X, Planning Guides for a New Administration Building; Volume XI, Planning Guides for a Proposed School Servicing Plant. San Francisco, California, Board of Education, 1948.

Engelhardt, Engelhardt, Leggett, *The School Building Needs of Pittsfield,* Pittsfield, Massachusetts, School Department, 1949. 179 p.

Engelhardt, Engelhardt, Leggett, *The School Building Needs of Wilton,* Wilton, Massachusetts, The Town of Wilton, 1948. 39 p.

Evenden, E. S., Strayer, G. D., and Engelhardt, N. L., *Standards for College Buildings,* Bureau of Publications, Teachers College, Columbia University, 1938.

Federal Works Agency, *The Influence of Lighting, Eyesight, and Environment upon Work Production.* Washington, D. C., Superintendent of Documents, Government Printing Office, 1947. 45 p.

Fowlkes, John Guy, "Planning Schools for Tomorrow," U. S. Office of Education, Leaflet No. 64, Washington, D. C., The Government Printing Office, 1942.

Gerould, James T., *The College Library Building; Its Planning and Equipment,* Charles Scribner's Sons, New York, 1932.

Hamon, Ray L., *Utilization of College Instruction Rooms,* Ph.D. Thesis, Teachers College, Columbia University, 1930.

Hardesty, C. D., *Problems and Practices in Housing Junior College Programs in California,* Los Angeles, University of California Press, 1934.

Harrison, W. K., and Dobbin, C. E., *School Buildings of Today and Tomorrow,* Architectural Book Publishing Co., Inc., New York, 1931.

Hayes, Harriet, *Planning Residence Halls,* Bureau of Publications, Teachers College, Columbia University, 1932.

Herber, Howard T., *The Influence of the Public Works Administration on School Building Construction in New York State,* 1933-1936, Bureau of Publications, Teachers College, Columbia University, 1938.

Holy, Russell A., *Relationship of City Planning to School Plant Planning,* Bureau of Publications, Teachers College, Columbia University, 1935.

Holy, T. C., Chairman, *The School Palnt and Equipment, Review of Educational Research,* October, 1938. American Educational Research Association, Washington, D. C.

Hynds, Harold D., *Guide for Supervising Custodian-Engineers,* New York, Bureau of Plant Operation and Maintenance, Board of Education of the City of New York, 1946. 48 p.

Klauder, Chas. Z., and Wise, H. C., *College Architecture in America and Its Part in the Development of the Campus,* Scribner's Sons, 1929.

Lamar, Emil, *The Athletic Plant—Layout Equipment and Care,* New York, McGraw-Hill, 1938.

Larson, Frederick J., and Palmer, Archie M., *Architectural Planning of the American College,* McGraw-Hill Book Co., New York, 1933.

Lievallen, R. E., *A Manual for School Building Construction,* Salem, Oreg., Department of Public Instruction, 1947. 90 p.

Linn, Henry H. *et al., The Report of the Survey of the Plant Facilities of the Public Schools of Worcester, Massachusetts,* New York, The Institute of Field Studies, Teachers College, Columbia University, 1949. 346 p

Los Angeles City Schools, "Good Housekeeping in Schools," Publication No. 433, Los Angeles, School Board, 1947. 51 p.

Luehring, Fred W., *Standards for the Swimming Pool in Educational Institutions,* A. S. Barnes and Co., New York, 1939.

Michigan State Department of Public Instruction, "A Guide for Planning School Buildings," Departmental Bulletin 338: 53-56, 1945.

Misner, Frank M., *Extra Costs and Incidental Costs in the Erection of School Buildings,* Bureau of Publications, Teachers College, Columbia University, 1934.

Modern Architecture for Modern School, Circulating Exhibition Prepared by the Museum of Modern Art, 11 West 53rd Street, New York, Available to School Systems.

Moehlman, Arthur B., *Public School Plant Program,* Rand McNally, 1929.

Morphet, Edgar L., *Measurement and Interpretation of School Building Utilization,* Bureau of Publications, Teachers College, Columbia University, 1927.

National Council on Schoolhouse Construction, Proceedings of the Twenty-Third Annual Meeting, Part II, *Guide for Planning School Plants (Tentative).* (Sec. W. D. McClurkin, George Peabody College for Teachers, Nashville, Tennessee), 1946, p. 33-143.

National Education Association, Research Division, "Teaching about Light and Sight," Washington, D. C., the Association, April 1946. 79 p.

National Education Association, *The Nation's School Building Needs,* Research Bulletin, Vol. XIII, No. 1, January, 1935, Washington, The Association, 1935.

National Facilities Conference, *Guide for Planning Facilities for Athletics, Recreation, Physical and Health Education,* Chicago, Illinois, Athletic Institute, Inc., 1947. 127 p.

National Fire Protection Association, *School Fires,* Boston, Mass., National Fire Protection Association (International), 1946. 48 p.

National Recreation Association, *Conduct of School Community Centers.* A Practical Guide, New York, The Association, 1946. 44 p.

National Recreation Association, *Planning School Buildings for Community Use,* New York, The Association, 1944.

New York City, *Report of Architectural Commission,* Appointed December, 1936, Board of Education, Brooklyn, N. Y., 1938.

New York City Schools, *Manual of School Planning,* New York, Board of Education, 1946. 101 p. (Mimeo.)

New York City, *Manual of School Planning,* Board of Education, Division of Housing and Business Administration. A comprehensive Manual giving educational and general planning data for use in the building of new schoolhouses and the rehabilitation of existing buildings. Revised, 1947.

New York City Schools, *Operation-Maintenance Requirements for School Buildings,* New York, Board of Education, 1947. 80 p.

New York City, *Special Community Studies,* Board of Education, Division of Housing and Business Administration, 1943-1947:

- Community Study No. 1—Report on School Building Needs for Governor Alfred E. Smith Houses and Adjoining Areas.
- Community Study No. 2—A Study of School Building Needs in the Public School No. 2, Bronx Area.
- Community Study No. 3—A Report on School Building Needs in the Vicinity of Public School No. 9, Borough of the Bronx.
- Community Study No. 4—A Report on The School Building Needs of the Rugby-East Flatbush Neighborhood, Brooklyn, New York.
- Community Study No. 5—Riverside-Manhattanville Community Needs and School Trends.
- Community Study No. 6—The Idlewild Neighborhoods. An analysis of the population trends by health areas and census tracts, as well as existing schools, and the proposed changes growing out of the development of the Idlewild Airport, April, 1945.
- Community Study No. 7—The Longacre Neighborhood. A study showing the need of the continuation of Public School 51 and its improvement, based upon population trends, April, 1945.
- Community Study No. 8—Yorkville-East Harlem Communities. A study of elementary and junior high schools from 60th Street to 110th Street with proposals for mergers and new facilities, November, 1945.
- Community Study No. 9—The Riverside Neighborhoods. A study of population trends in the area served by Public School 54, and recommendation for replacement of this school, November, 1945.
- Community Study No. 10—Kew Gardens Hills-Queens Valley Neighborhoods. An analysis of the rapidly growing population in these neighborhoods indicating the need for an early construction of a new elementary school, December, 1945.
- Community Study No. 11—Population study of the Red Hook-Gowanus Neighborhoods.
- Community Study No. 12—Queensbridge-School Facilities for an Industrial Community, 1947.
- Community Study No. 13—Schools and Public Rehousing in the Lower East Harlem Area, 1947.

New York City, *Population Analyses,* Board of Education, Division of Housing and Business Administration, 1944-1947:

- Population of New York City by Boroughs with Interpolations and Extrapolations from 1920 to 1960, November, 1944.
- Population Analyses and Anticipated School-Building Needs of the Bronx, November, 1946.

New York City, *Building Utilization Studies,* Board of Education, Division of Housing and Business Administration, 1944:

- Utilization Study No. 1—Survey of the Room Utilization of Vocational High Schools in New York City. An analysis of room utilization in all vocational high schools; serves as a guide to assist in the determination of new school building needs.

Utilization Study No. 2—Survey of Room Utilization of the Academic High Schools in New York City. An analysis of room utilization in all academic high schools; serves as a guide to assist in the determination of new school building needs.

New York City, *Furniture and Equipment in Post War Schools,* Board of Education, Division of Housing and Business Administration, 1946-1947:

Part I of a revised study. This is a comprehensive report on inventory of furniture and equipment in elementary schools, Kindergarten to 6B. It lists all equipment as recommended by the Divisions and Bureaus responsible for the supervision of these schools.

Part II is a similar report on furniture and equipment in elementary schools, Kindergarten to 8B.

Part III is a similar report on furniture and equipment in junior high schools.

New York City, *Recommendations for School Heating and Ventilation in New York State.* A joint report of New York City Committee and New York State Committee on school heating and ventilation, June, 1945.

New York City, *Air Sterilization in School Buildings,* January, 1946. Study of literature and experiments conducted in school systems and recommendations for New York City.

New York City, *Specialized High Schools in New York City,* 1946. The consideration of specialized high schools in the United States and New York City.

New York Commission on Ventilation, *School Ventilation-Principles and Practices,* Bureau of Publications, Teachers College, Columbia University, 1931.

New York State Department of Education, Division of School Buildings and Grounds, *Designing the Central School Plant as a Community Center,* Albany, New York, 1945. 10 p.

New York State Education Department, *Heating and Ventilating Recommendations for New York State Schools,* Albany, New York, The Department, 1946. 34 p.

Oregon State College, *Standards for Working Surface Heights and Other Space Units for the Dwelling,* Bulletin 348, Agricultural Experiment Station, The College, Corvallis, Oregon, 1937.

Payne, Carl, *Planning the Outdoor Physical Education Facilities for Central Schools,* New York State Department of Education, Albany, New York, The Department, 1947. 29 p.

Reeves, C. E., and Ganders, H. S., *School Building Management,* Bureau of Publications, Teachers College, Columbia University, 1928.

Roger, Poulain Ecoles, Vincent Freal et Cie., 4 Rue de Beaux Arts, Paris, France.

Sahlstrom, John W., *Some Code Controls of School Building Construction in American Cities,* Bureau of Publications, Teachers College, Columbia University, 1935.

Seagars, Paul W., *Community Participation in School Building Planning,* New York, N. Y., Teachers College, Columbia University, 1947. (Doctor's Dissertation)

Secchi, Luigi L., *Edifici Scholastici Italiani, Primari E. Secondari,* Ulrico Hoepli, Milano, Italy, 1937.

Seymour, W. Douglas, *Heating, Ventilation and Lighting of School Buildings,* Oxford University Press, 1939.

Sohl, C. E., *State Control of Location, Planning, and Erection of Public School Buildings,* University of Pennsylvania, 1934, Printed Privately.

Spain, Charles L., Moehlman, Arthur B., and Frostic, Fred W., *Public Elementary School Plant,* Rand McNally, 1930.

Stoneman, Merle A., and Broady, Knute O., *Building Standards for Small Schools,* University of Nebraska, Lincoln, Nebraska, 1939.

Strayer, George D., and Engelhardt, N. L., *Standards for Elementary School Buildings,* Bureau of Publications, Teachers College, Columbia University, 1933.

Strayer, George D., and Engelhardt, N. L., *Standards for High School Buildings,* Bureau of Publications, Teachers College, Columbia University, 1924.

Strayer, G. D., Engelhardt, N. L., and Others. *A report of a Survey of the Public Schools of Newark, N. J.,* Bureau of Publications, Teachers College, Columbia University, 1941.

Thomas, Minor W., *Public School Plumbing Equipment,* Bureau of Publications, Teachers College, Columbia University, 1928.

U. S. Office of Education, "Lighting Schoolrooms," Pamphlet No. 104, 1948, Washington, D. C., Superintendent of Documents, Government Printing Office, 1948. 16 p.

U. S. Office of Education, *Space and Equipment for Homemaking Instruction,* Home Economics Series, No. 18, 1935, Government Printing Office, Washington, D. C.

Wright, H. M., and Gardner-Medwin, R. J., *Design of Nursery and Elementary Schools,* Architectural Press, Ltd., 9 Queen Anne's Gate, Westminster, London, S.W. 1, England.

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