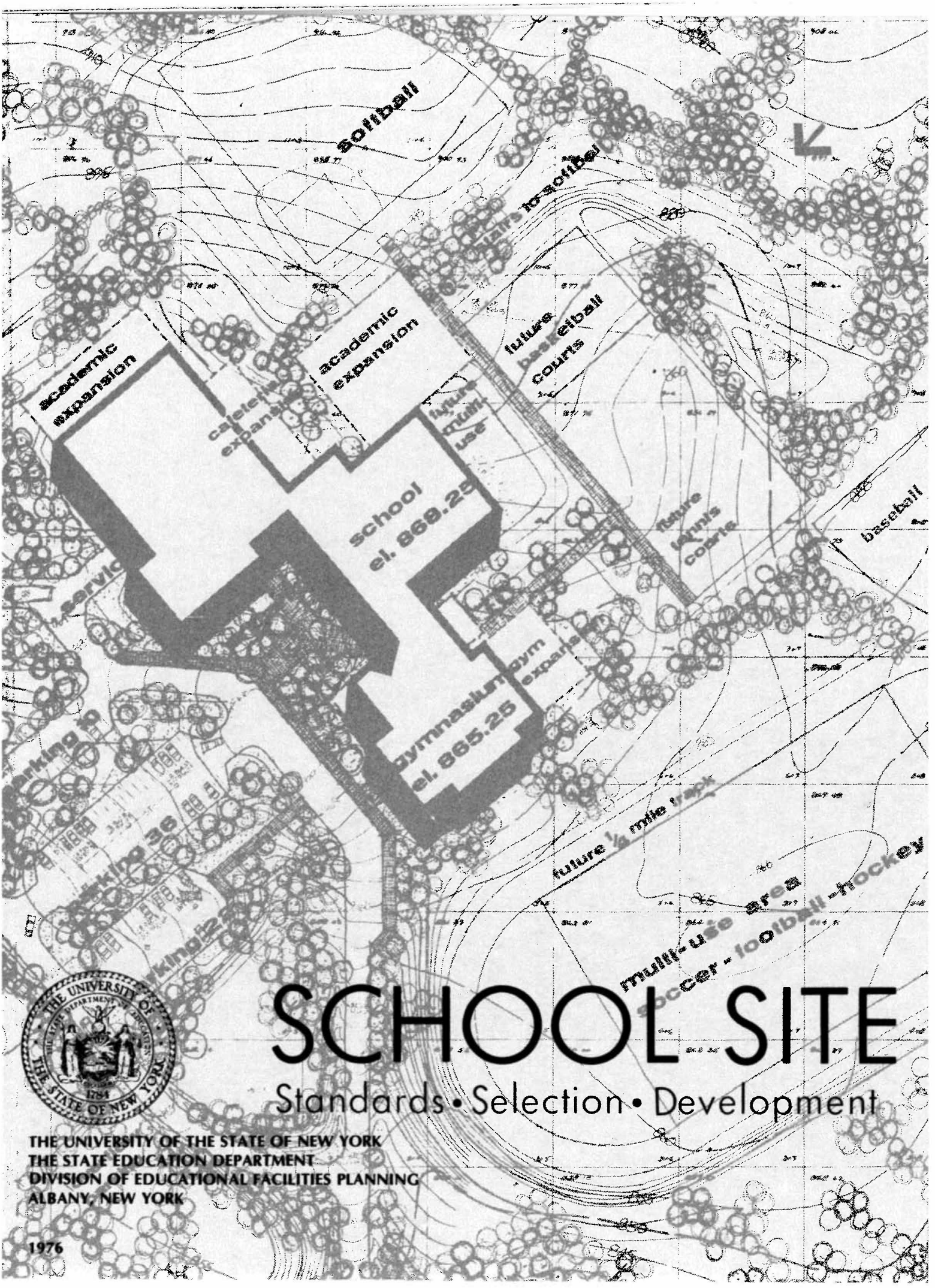

SCHOOL SITE

Standards • Selection • Development

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
DIVISION OF EDUCATIONAL FACILITIES PLANNING
ALBANY, NEW YORK

1976

THE UNIVERSITY OF THE STATE OF NEW YORK

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SCHOOL SITE STANDARDS, SITE SELECTION AND SITE DEVELOPMENT

THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
DIVISION OF EDUCATIONAL FACILITIES PLANNING
ALBANY, NEW YORK 12234

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PREFACE

Changing trends in educational concepts have prompted consequential development of educational facilities and their related sites. Focus on physical development of students, especially by outdoor activities, and space required for vehicular circulation and parking as well as increasing need for school and community recreational facilities all dictate the need for large sites. Development of school sites has historically contributed to the attractiveness and improvement of a community. However, in these times it is even more important that the selection and development of a school site be consistent with, and a positive factor in regard to, environmental concerns and the conservation of natural resources.

A school site must be approved by the Commissioner of Education prior to the approval of working drawings and specifications for the erection or enlargement of an educational facility. (Education Law—Section 408, Subdivision 3) This publication contains standards applicable to a site for the erection or enlargement of a school. It lists and explains the criteria which will influence the selection of a site and it suggests considerations to be included during the development of a site.

The Division of Educational Facilities Planning is available to provide many forms of assistance to any district which is unable to readily identify the most satisfactory site by application of the procedures described in this publication. The Division also is ready to answer any questions which may occur during the site selection process.

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SCHOOL SITE STANDARDS, SITE SELECTION, AND SITE DEVELOPMENT

A. SITE STANDARDS

1. *Education Law and Regulations of the Commissioner of Education*

Pursuant to Section 408, Subdivision 3 of the Education Law, the following Regulations of the Commissioner have been derived to assure the adequacy of sites for schools:

Part 155.1(c)—Sites for the erection or enlargement of facilities shall be approved by the Commissioner, provided they have been selected with reasonable consideration of the following factors:

(1) Size and location of a site shall be consistent with the long-term building plans of the district;

(2) Sites shall be educationally adaptable with consideration for situation of building and development of grounds for outdoor educational program and related activities, without excessive initial or development costs and shall provide the following minimum usable acres, unless otherwise approved by the Commissioner:

(i) Elementary schools (kindergarten through sixth grade): Three acres base plus one acre for each one hundred pupils, or fraction thereof;

(ii) Secondary schools (seventh through twelfth grade): Ten acres base plus one acre for each one hundred pupils, or fraction thereof;

(3) Sites shall be developed to conserve natural resources and avoid environmental problems within the limits of the educational program. Care shall be taken to insure that the site and facilities thereon are consistent with and contribute to the school and community environment and provide for the health and safety of occupants.

2. *Required Acreages*

It is important to note that the site standards are based on *usable* acreage and are *minimum standards* which are below, or only equal to, the majority of other states. These standards are also below recommendations published by the Council of Educational Facility Planners. These standards are indicated in graph 1 and are analyzed in tables I and II.

3. *Site Selection Factors*

Factors which must be considered in the evaluation process of site selection are discussed in section B of this publication and a checklist is included in table III. The formal approval of a site by the Commissioner is discussed in part 5 of this section—*Application for Examination and Approval of a School Site.*

4. *Permits*

ONSITE SEWAGE DISPOSAL: A State Pollutant Discharge Elimination System (SPDES) permit is required for sewage discharge into surface or ground waters. Where discharge is into a municipal system, the SPDES permit is *not* required.

The application for a SPDES permit has a definite effect on procedures for the selection of school sites, and for school construction projects generally. The extended time element for processing permit applications must be taken into account with regard to the anticipated date of commencing construction.

When evaluation in accord with the criteria outlined in this publication indicates an acceptable school site on which onsite sewage disposal is necessary, the Division of Educational Facilities Planning should be contacted prior to purchase to determine that there are no factors which will prevent formal approval of the site by the Commissioner. See part 5 of this section, *Application for Examination and Approval of a School Site.* Then, preliminary subsoil investigations should be made and the Department of Environmental Conservation (D.E.C.) regional office contacted regarding the feasibility of onsite sewage disposal, based on preliminary design criteria such as student capacity, grades housed, and program considerations (showers, swimming pools, etc.) and the preliminary subsoil information.

Following a positive indication from D.E.C., the site should be presented to the voters or board of education in the case of a city. Next, an Application for

Examination and Approval of a School Site, form EFP-S, must be submitted to the Division of Educational Facilities Planning for consideration. Immediately subsequent to purchase, an application for the SPDES permit should be made to D.E.C.

If, after review of an application for permit, it is found adequate, a public notice must be published by the school district. The form of this notice, indicating an intent to issue a permit and inviting public reaction will be prescribed to the district, together with instructions for publishing. If formal objection to issuance of a permit is received during a mandatory 30-day waiting period, public hearings must be held prior to final determination on the permit. If no formal objection, the permit will be issued after expiration of the 30-day period. Public hearings are not anticipated in the great majority of public school cases; however, even without hearings, the time period between application for, and issuance of, a permit will be 30 to 180 days. Most certainly this points up the absolute necessity of applying for a permit well in advance of the anticipated construction date.

STREAM POLLUTION: All natural waterways of the State are classified either AA, A, B, C, or D with special cases including AA(special) and (T)—which indicates "trout." Where construction would involve a waterway, an initial step must be undertaken with the regional D.E.C. office to ascertain the classification of the stream involved. A Stream Protection Permit is required prior to construction for any disturbance of a stream classified C—(T), or higher. Included are any disturbance of streambed, culvert work, bulkheads, bridge work, and dams which are over 10 feet high or impound over 1 million gallons, or involve a drainage area greater than 1 square mile and collect storm water discharge.

Following review and investigation, in most cases, a stream protection permit, including possible conditions, will be issued by the regional D.E.C. office. A period of 60 to 90 days should be allowed from time of application to receipt of permit. Again, the need for timely submission well in advance of the date for commencing construction is obvious.

MUNICIPAL WATER SUPPLY: Where water supply will be from a municipal system, no approval from D.E.C. is required. However, contacts and arrangements need to be made with the particular municipal water authority to assure proper planning and work necessary to accommodate the new connection.

ONSITE WATER SUPPLY (WELLS): Specific permits to drill wells for onsite water supply are not required, except in the counties of Nassau and Suffolk. In Nassau and Suffolk Counties, approval is required for any new well or combination of wells which will have an installed pumping capacity of 45, or more, gallons per minute. The regional D.E.C. office must be contacted regarding specific procedures. Additionally, licensed well drillers must be used.

Elsewhere in the State, where any new well or combination of wells will have an installed pumping capacity of 45, or more, gallons per minute, it is recommended that D.E.C. in Albany be contacted to determine if detailed evaluation is advisable.

TESTING OF WATER SUPPLY: Water quantity and water quality of a well supply must be approved by the State or local Department of Health prior to its use for human consumption. The appropriate local health unit—city, county, or State regional office, must be contacted relative to specific procedures, application forms, samples, etc., necessary for their initial evaluation and approval. Additionally, periodic checks on water quality will be required on a continuing basis.

Since no school shall be operated without an approved water supply, water quantity and water quality must be approved as early in the building program as possible, even at the time of selection of site.

5. *Application for Examination and Approval of a School Site (Form EFP-S)*

Any site for the erection or enlargement of an educational facility must be approved by the Commissioner of Education prior to approval of working drawings and specifications for the construction project.

In the case of completely new facilities, not additions, as soon as a site has been tentatively selected by the board of education in accord with the criteria outlined elsewhere in this publication, a written site analysis, as outlined below, must be prepared initially and the Division of Educational Facilities Planning contacted to determine that there are no factors which will prevent formal approval of the site. Following a positive reaction by the division, a proposition for purchase of the site shall be presented to the voters or to the board of education in the case of a city. With an affirmative vote, the formal application to the Commissioner shall be made on form EFP-S, Application for Examination and Approval of a School Site, and submitted to the division.

The *written site analysis*, which must be prepared by the architect, the engineer, or the site planner, is most important in evaluation of the site by the division. It will subsequently form a part of the formal application for site approval. This site analysis *must* be written in the following format and *must* include:

1. A description of the proposed construction project relative to:

a. the number of students and grades to be housed
b. its place in the district's long-range plan—such plan being required by section 155.1.a of the Regulations of the Commissioner of Education
c. the need—with reference to student enrollments and student population projections
d. all considered alternatives and the reasoning which led to the proposed course of action.

2. A commentary regarding the site proper relative to:

a. all other sites considered and the factors which led to the decision on the proposed site
b. educational adaptability of the site—including references to geographic location within the district, accessibility, area traffic patterns, possible detrimental highway conditions, adjacent potential hazards such as railroads, airports, and gas and electric transmission lines
c. development costs—including references to soil conditions, bearing capacities, drainage, siting of the building, playfields, roadways and parking areas
d. the present environmental setting of the site and the surrounding area with reference to the factors listed in 3a below.

3. An analysis of the proposed construction project relative to:

a. environmental impact on the site and on the surrounding area—both immediate and long-range—including such factors as:

air quality
water quality, sewage disposal
noise pollution
ecosystems (wildlife, vegetation)
drainage patterns, storm water disposal
aesthetics
historic, archeological and/or architectural aesthetic resources in area
population concentrations and distribution
public services
traffic patterns
adjacent land uses

b. unavoidable adverse environmental effects which would permanently curtail the range of beneficial uses of the environment of the area
c. irreversible or irretrievable commitments of natural resources
d. conservation and efficient utilization of energy resources
e. measures planned to mitigate negative environmental impacts—including measures to be taken during construction activities
f. positive actions taken to produce beneficial environmental results and assure that the proposed construction project is consistent with and will contribute to the school and adjacent community environment.

The properly executed *application form*—form EFP-S, Application for Examination and Approval of a School Site—provides specific information to the division and supplements data contained in the written analysis and the required small scale site plan. Required information on the application form includes:

type of project
identification of the site
size of site (acres)
purchase price
considerations regarding water supply and sewage disposal

The required *small scale site plan* (maximum sheet size of 11" x 17") must be in sufficient detail to accurately indicate:

property lines
streets and rights-of-way
orientation
relative elevations and drainage
natural landscape features
water, sewer, and storm drainage lines
electric powerlines and poles or towers
gas transmission lines
railroads
streams
existing buildings
proposed buildings
developed playfields

Only the application form and the small scale site plan need be submitted for the enlargement of an educational facility or for an addition of contiguous land to an existing site, in which case, the site plan must indicate both the existing site and the land to be acquired.

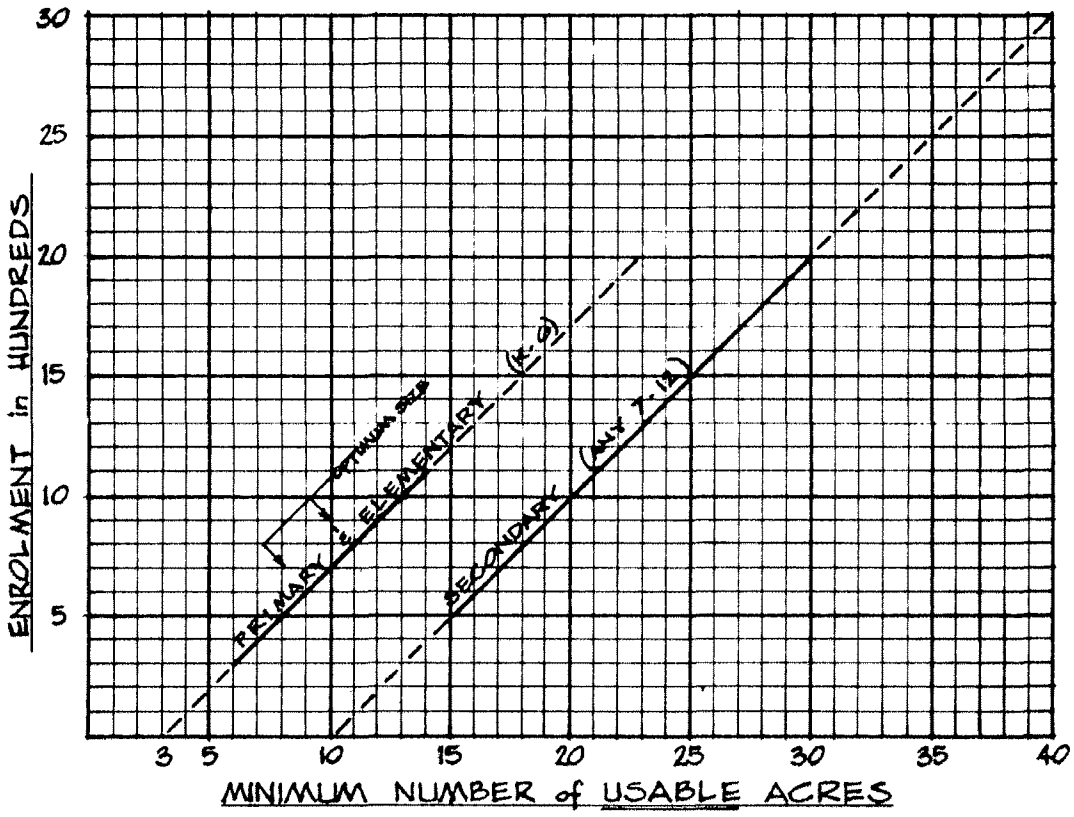
Graph 1 relates only to the minimum number of usable acres of a site. Other factors as discussed in SITE SELECTION must also be considered.

The size of an elementary school site is based on 3 acres plus 1 acre for each 100 pupils enrolled, with a minimum of 5 acres. The size of any site housing secondary students is based on 10 acres plus 1 acre for each 100 pupils enrolled.

Some districts in completely urbanized areas may be unable to meet these standards. In these cases, when circumstances warrant, adjustments in the site standards may be made by the Commissioner.

An appreciation of school site acreage requirements is essential to selecting a proper site. Typical hypothetical situations are presented in the following tables which demonstrate the requirements of a school site. Table 1 analyzes basic requirements of 200-, 600-, and 800-pupil elementary schools. Table 2 analyzes 1000-, 1500-, and 2000-pupil secondary schools.

SCHOOL SITE STANDARDS — GRAPH 1.



B. SITE SELECTION

1. General:

Many factors enter into selection of an appropriate school site. While some factors may be more important than others, all should be appraised. Only rare sites are satisfactory in all respects. To assist in making a decision between several sites, a Checklist for Evaluation of Site Selection Factors, table III, is included below which summarizes the following discussion and allows a "satisfactory" (S) or "unsatisfactory" (U) rating of the factors for each site. The final decision on a site must consist of a relative consideration of all factors; however, there will be instances when, if a particular characteristic of a site is unsatisfactory, the site must be rejected.

Of prime importance in the selection of sites for educational facilities is the concern for the environmental impact and effects of the proposed construction project. Environmental concerns must be identified and analyzed as indicated in section A.5 of this publication. This section indicates the specific environmental concerns which must form a part of the formal "Application for Examination and Approval of a School Site" to the Commissioner.

The architect and site planner should become involved early in the consideration of sites so that technical advice and assistance are available. In some instances a special site selection committee composed of qualified local citizens, the architect, the site planner and members of the school board may be formed. The place of any site in the long-term school building program of the district should be documented in the Comprehensive Long-Range Plan for Educational Facilities required by Part 155.1(a) of the Regulations of the Commissioner.

Since selection of a site should be based on local investigation, only in particular instances may onsite inspections by division representatives be arranged. Section 7203 of the Education Law requires engaging a licensed architect or engineer for all public work which costs $5,000 or more.

2. Size and Location:

The place of a site in the long-range planning of a school district is influenced by growth and population trends as well as present and future commercial and industrial zoning and development and highway development.

A site must be large enough to serve the ultimate pupil population and at least equal to State standards. Ultimate pupil population and corresponding building site size should consider not only the current building project, but also future additions and, conceivably, completely separate future buildings on the same site. Environment of the surrounding locale and of the site itself must be considered for the effect of the locale on the school, the effect of the school on the locale, and the adaptability of the site for school purposes.

A site must be reasonably accessible from safe, properly maintained public roads and have favorable existing and future traffic patterns. An elementary school is often near the pupil population served and the children must not be exposed to busy highways and unusual traffic hazards while going to and from school. For secondary schools and schools where most pupils are bussed, geographic location is more important than nearness to population centers.

3. Shape and Contour:

Sites must be shaped and contoured to provide reasonable space for the building, drives and parking areas, walks, and outdoor educational spaces. Attractive natural landscape and even a view from the site are desirable features.

Site selection must anticipate the correlation of the proposed building with site features, including natural topography, existing trees, and orientation to sun and prevailing winds. In the energy-wasting past, buildings have often ignored their natural environment and relied upon artificial lighting and mechanical heating and cooling. Natural lighting can be utilized to minimize use of artificial lighting. Adequate control of such natural lighting is important, the quality depending upon sun location, diffusion by trees, natural and artificial obstructions in the surrounding terrain, and whether such light is admitted directly through windows or reflected from overhangs or ground surfaces. Solar heat gain through glazed areas as well as that absorbed by the structure can be utilized to reduce heating requirements; but overtaxing of cooling requirements must be avoided. Natural ventilation of a building is affected by airflow resulting from the prevailing wind path over the natural terrain and existing obstructions of the site. The exposure to airflow will affect air infiltration through the building during the heating season as well as provide maximum desirable natural ventilation during spring and fall seasons.

Ideal contours would present a slight convex surface with the building positioned at the high point. This situation is rarely—if ever—found, and some reshaping and grading will probably be necessary. Sites with sharp changes in elevation should be avoided and even uniform slopes between large changes of elevation can

Table I. *Basic acreage requirements for typical elementary schools*

Required for:	200 Pupils		600 Pupils		800 Pupils	
	Square Feet	Acres	Square Feet	Acres	Square Feet	Acres
Building[a]	200 × 90 sq. ft. = 18,000	½	600 × 90 sq. ft. = 54,000	1¼	800 × 90 sq. ft. = 72,000	1¾
Approaches (drives, walks, and service areas)		½		1½		1¾
Grounds		1		1½		2
Parking[b]	10 *teachers and admin.* 10 *visitors* 20 × 300 sq. ft. = 6,000	⅛	30 *teachers and admin.* 15 *visitors* 45 × 300 sq. ft. = 13,500	¼	40 *teachers and admin.* 20 *visitors* 60 × 300 sq. ft. = 18,000	½
Outdoor physical education						
Kindergarten[c]	5,000	⅛	10,000	¼	20,000	½
Primary[d]						
Apparatus		¼		¼		½
Circle games		1		1½		2
Intermediate						
Court[e]		¼		½		½
Organized games[f]		2		3		4
Total recommended		5¾		10		13½
Minimum acceptable usable acreage in New York State School Site Standards (see graph I)		5		9		11

[a] Enrollment times reasonable square feet per pupil
[b] Day-to-day parking — no provision for extended community use
[c] Fenced-in kindergarten play area
[d] Circle games, apparatus, running and chasing, and hard-surface areas
[e] Court area — volleyball, handball, dropball
[f] Organized team games — touch football, softball, soccer, speedball

The following assumptions have been made in the preparation of these tables:

a. All acreage is usable.

b. The shape and topography of the site are satisfactory.

c. No supplementary space has been allotted for such as nature study, driver education, agriculture or conservation planting, grandstands, or field houses.

d. Only modest parking for daily use is included. Parking for large auditorium or gymnasium functions must be added.

Table II. *Basic acreage requirements for typical secondary schools*

Required for:	1,000 Pupils Square Feet	1,000 Pupils Acres	1,500 Pupils Square Feet	1,500 Pupils Acres	2,000 Pupils Square Feet	2,000 Pupils Acres
Building[a]	1,000 × 120 sq. ft. = 120,000	3	1,500 × 120 sq. ft. = 180,000	4	2,000 × 120 sq. ft. = 240,000 (part two story)	5½
Approaches (drives, walks, and service areas)		3		3½		4
Grounds		3		3		4
Parking[b]	50 *teachers and admin.* 15 *visitors* 50 *students* 200 *community*		70 *teachers and admin.* 20 *visitors* 75 *students* 250 *community*		100 *teachers and admin.* 30 *visitors* 100 *students* 275 *community*	
	315 × 300 sq. ft. = 94,500	2	415 × 300 sq. ft. = 124,500	3	505 × 300 sq. ft. = 151,500	3½
Outdoor physical education						
Boys' inst. and intramural[c]		3		6		9½
Girls' inst. and intramural[d]		2		4		5
Interschool[e]		7		7		9
Courts[f]		1		1½		2
Total recommended		24		32		42
Minimum acceptable usable acreage in New York State School Site Standards (see graph I)		20		25		30

[a] Enrollment times reasonable average square feet per pupil
[b] Day-to-day parking and community parking for spectator sports, assemblies, PTA, multiple use for wet-weather play area
[c] Organized team games — touch football, soccer, speedball; conditioning activities
[d] Organized team games — field hockey, softball, speedball; conditioning activities
[e] Track and field activities, baseball, football, soccer, lacrosse
[f] Multiuse court area for tennis, volleyball, basketball, wet-weather class instruction

e. Building areas are determined from a reasonable gross square footage allowance per pupil. All examples are assumed one story, except a portion of the 2000 pupil secondary school which is assumed two stories. The actual building area requirements are normally 10 to 15 percent of the size of the entire site with required approaches, drives, parking, and grounds, generally about twice the area of the building.

f. No provision has been made for future building additions or for the additional outside area required by the resulting added pupil population.

(A more detailed discussion of area requirements will be found in SITE DEVELOPMENT.)

present problems with larger buildings and in developing playfields.

Flat, poorly drained areas and areas which are "pocketed" by surrounding topography would not be as desirable as naturally drained sites. There must be no danger of flooding and the site must be above the surrounding water table.

4. Health and Safety:

The site environment must provide safe and healthful conditions for the building occupants. Sites adjacent to or affected by sources of odors, dust, and other types of pollution and of disturbing noise should be avoided.

Available municipal water and sewage is most desirable. However, where a facility must be served by an individual onsite water supply and/or sewage disposal system the water and the disposal system must meet the requirements of the New York State Department of Health and Department of Environmental Conservation, respectively, as discussed in section A.

Local representatives of those departments should examine the site before funds are authorized for purchase to determine whether water supply and/or sewage disposal facilities are feasible and can be made available.

5. Hazards:

Hazardous conditions and installations in the vicinity of and on sites must be avoided. Hazards exist in many forms including nuisance type situations, such as municipal dumps and junkyards, railroad yards, and even electric substations, which attract children.

Gas transmission lines—both existing and future—must receive consideration. Such lines convey gas under various pressures and must comply with Public Service Commission regulations. The distance between gas transmission lines and school buldings is regulated and varies with high and low pressures in the lines.

High voltage electric transmission lines must be considered hazardous and must not cross portions of a site used for outside educational activities. Student foot traffic under such lines also should be avoided. Where towers for the lines and poles occur, positive provisions must be taken to prevent access by students. To a lesser degree, these same criteria apply to domestic type electrical distribution.

Dangerous highway conditions relating to speed, traffic density, access, vision, topography, and pedestrian traffic must be considered. Adjacent railroad yards and tracks also present hazards. While such areas can be isolated by physical barriers, the noise factor will still exist. Conditions at railroad grade crossings in the vicinity should be investigated. The location of school buildings in relation to the flight patterns surrounding airports is regulated by the New York State Department of Transportation as a matter of safety.

Topography may also create inherent hazards such as falling in the case of ravines and embankments, and drowning in the case of rivers and ponds.

6. Costs: Purchase Price and Development

The cost of land varies greatly throughout the State, even in the same general area. Therefore, comparisons between districts are often misleading. To determine if the price of a site is reasonable, in terms of the current market value in the area, it is wise to consult real estate appraisers and/or other persons familiar with the locality.

In view of the great expansion of school construction which has taken place and promises to continue in the future, it is important to provide sufficient acreage not only for the current educational program, but also for the future. Adding acreage to an existing site in the future may be very costly or impossible. The relationship of cost of site to total building project cost becomes much less advantageous as surrounding lands develop and the prices of property or land improvements rise.

Initial costs for land acquisition must be considered in conjunction with ultimate development costs in order to make a realistic evaluation of the true cost of a proposed site. Development costs are directly related to the topography of the site and character of subsoil.

Subsoil characteristics influence the cost of grading and filling on a site, and the more extensive the grading and filling necessary to properly accommodate the school complex or provide for drainage, the higher the cost.

When no knowledge of below ground conditions exists, test pits should be dug to determine the general character of the soil, water table, and drainage. The subsoil must provide a proper base for economical and substantial building foundations and, while bearing capacities are not determined until detailed analyses are made at a later date, test pits can indicate if other than usual conditions exist.

Well-drained soils and a reasonably deep ground water level will make playfields more economical to maintain and allow more extensive use than poorly drained soils, since grass areas and plants will generally thrive better. Soils permitting ready percolation

and the ground water level are particularly important where municipal sewers are not available and onsite disposal is necessary. Where municipal water is not available, experience with existing wells in the area should be investigated to determine, insofar as possible, the quantities and quality of water before making any commitment on a site.

Costs of onsite sewage disposal and/or water supply are part of the ultimate cost of a site and must be evaluated carefully with yearly use costs of available municipal sewer and/or water on alternate sites.

Availability and proximity of gas and electricity will also influence ultimate development costs.

C. SITE DEVELOPMENT

1. General:

After the site has been selected, and before the architect and his site planner can proceed with plans for the development of the total site, it is of the utmost importance that an accurate boundary line and topographic survey of the property be obtained. Also, at this time, detailed investigations of subsurface conditions must be made and recorded.

In planning the school site development, every effort must be made to develop a coordinated plan in which every unit of the site functions properly with the adjacent unit and is compatible with it. Consideration of all elements which make a total school program—proper, safe relations between buildings, roads, parking areas, and play areas—can avoid dissatisfaction, increased maintenance costs, and inefficient operation. To accomplish this, location, size, shape, and orientation of the site, and its topography, as well as soil, drainage, and vegetative growth must be considered.

Thought must be given to the ultimate utilization of the total site which might include future additions or even one or more separate buildings. The location of driveways and parking areas, play areas, and subsurface installations such as sewage leaching fields, should be determined with regard to possible additions. Similarly, where site size is adequate for more than one building, the current building project and related outside educational spaces should not monopolize the total site and compromise the location and utilization of future facilities.

Initial studies by the site planner must consider interrelationships between the interior and exterior functions of the building. The most appropriate location for the building is determined in its relation to major areas of the site. Careful studies of the building need to be made and checked with surrounding exterior requirements to assure proper coordination. The ground should slope slightly away from all sides of the building to assure surface drainage. Every effort must be made to avoid steep banks or retaining walls. From building to recreation areas, the transition from higher to lower level should avoid harsh mechanical slopes and abrupt changes in grade. Roads and walks must be graded and aligned to blend with the topography and planned to avoid steep slopes and long flights of steps. This is especially important due to the increased use of school facilities by the physically handicapped. Natural features of the site should be used in the overall scheme wherever possible, and made assets of the design. When such features can be incorporated into the total design, they will provide a distinction that can be obtained in no other way.

When outdoor facilities are planned, a number of essential features must be considered in connection with the program to be offered; namely, location, size, shape, topography, natural features, soil drainage, and water supply. Plans for the outdoor educational areas should be developed with the building plans to avoid oversights which cannot be easily corrected later. Under no circumstances should pedestrian traffic between the building and playground areas be forced to cross roadways or driveways. At the same time, however, the facilities should be reasonably accessible to parking areas to encourage community use.

Ample space near the building must be allocated to permit easy flow of pedestrian and vehicular traffic as well as adequate parking spaces. All access roads and walks should be designed for safety, convenience, economy, and ease of maintenance. Approaches from the highway or street leading to the school must also be planned with this in mind, with consultation and cooperation with proper authorities. The design and construction of these approaches are important features of school site development and must provide safety during heaviest traffic loads. Reemphasizing a point, approach or service drives cannot separate the building from play areas or recreational fields, and under no conditions shall a driveway completely encircle a building.

Approaches to bus loading areas should be convenient and safe, with adequate turning radii for all possible vehicles using the approaches. Vehicles should be able to pull up to and park parallel with the curb of the loading area, without backing, for safest *unloading* operation. Approaches must be designed so that buses will load and unload on the school side of the drive and never where students must cross traffic lanes. Children should board buses or vehicles directly from

Table III. *Checklist for Evaluation of Site Selection Factors*

U — Unsatisfactory Site Name *S — Satisfactory*	.....		.....		.....		.....	
	U	S	U	S	U	S	U	S
Size and Location								
State Standards								
Future Expansion								
Local Community Environment								
School Environment								
Accessibility								
.....								
Shape and Contour								
Topography and Landscape								
Area for Building								
Area for Outdoor Activities								
Drainage								
.....								
Health and Safety								
Odors								
Dust, etc.								
Noise								
Water Supply								
Sewage Disposal								
.....								
Hazards								
Gas Lines								
Electricity								
Traffic—RR, Air, Highways								
Topography—Streams, Ravines								
Nuisances								
.....								
Purchase Cost								
.....								
Development Costs								
Soil Characteristics								
Ground Water								
Drainage								
Grading and Filling								
Services								
.....								

the loading areas. Furthermore, buses should continue in a forward motion without the necessity of backing up or turning around in the immediate area of the loading platform.

A "diagonal" pattern of bus parking has proved very successful for bus *loading* in districts with many buses. With this pattern, buses park at an angle to the curb, with front wheels 4 to 8 feet from the curb. All buses are in position before students are released from the school. When all buses are loaded, on signal, the first bus proceeds forward (never backwards) and to the left. Subsequent buses "peel off" similarly.

Design of drives, parking areas, and service areas must consider the weight, size, and probable speed of vehicles anticipated to use the areas, as well as the limiting factors of local weather conditions. Proper design can materially reduce the yearly maintenance costs of these areas. Durable curbing is recommended, particularly on steep grades, along curved approach roads, and at parking and service areas. Such curbing will control storm water runoff, prevent breaking the edge of the pavement, keep cars off grassed areas, and provide added protection for children on adjacent walks and play areas. Additionally, adequate area must be provided at the perimeter of these areas to accept piles of plowed snow.

Parking areas are becoming more important in the planning of school grounds and the design of parking areas must be carefully considered for initial cost, probable use, maintenance, and the probable schedule of events that will demand their use. Many students drive cars and school grounds are increasingly used for community purposes. Careful study should be made of and ample space provided for parking areas to accommodate the maximum population that may attend special functions.

Landscaped "islands" are often provided to "break up" the visual vastness of large areas of parked cars. Any aesthetic value gained must be weighed against lesser initial and maintenance costs and the efficiency of open "shopping center" type parking areas.

In choosing materials for parking areas, consideration must be given to cost, maintenance, and compatibility with materials used in adjacent buildings, as well as conditions of the base on which the materials are to be laid. This does not necessarily mean that all areas must be hard-surfaced. It may be possible where soil and drainage are adequate to use certain turf areas for overflow parking.

It is often possible to design paved play areas for alternate use as overflow parking during nonschool hours where provisions are taken to prohibit cars from using these areas while children are at play—a removable chain or gate is considered best. Parking areas must be readily, conveniently, and safely approached from the road system and convenient to the building; however, care must be taken to avoid inviting loops which might lead to speeding and "racetrack" driving.

Service areas should be of adequate size, located inconspicuously, and designed to cause the least interruption to normal traffic. Study should be given to the type of vehicles which will use the area and ample space provided for easy maneuvering. Provision must also be made for proper storage of garbage and rubbish containers, keeping the service areas not only safe, but neat and clean as well.

Walks deserve special attention and study. Their location, width, grade, construction, and relationship to roads, entrances, and paved areas are important and should result in interesting as well as useful patterns. There must be a definite relationship between traffic and width. Walks of ample width, easy grade, interesting pattern, and reasonable directness invite use. It can be noted that students seldom if ever turn square corners and if reasonable directness is not provided, they will soon wear their own footpaths of directness. As with drives and parking areas, cost, maintenance, compatibility with materials in the adjacent building, and conditions of the base will influence choice of materials. Concrete walks generally give the best results; however, less expensive blacktop walks can be used where traffic is lighter, where conditions require less rigid patterns, or where walks occur over areas subject to settlement.

Exterior lighting can be considered with the site development so that principal approaches, parking areas, drives, and school entrances will have adequate illumination for people attending evening activities.

In some locales, nighttime lighting may discourage vandalism; however, in other localities, such lighting may encourage vandalism by creating a lighted area which invites congregation which could shield malicious acts.

With all of the above spaces, as well as the play areas to be discussed later, proper disposition of storm water and proper drainage must be considered. Good drainage results in long-lasting surfaces and a minimum of maintenance.

2. *Outdoor Educational Areas:*

Outdoor educational areas, whether they be playfields, turf, or hard surface areas, must be carefully designed and constructed. Their number, size, location, and use will, to a great extent, determine design. Economies in materials and improper construction may provide temporary advantage, but years of trouble and expense. It is far better to achieve

economy through good planning, design, and proper construction that provides for maximum use of such areas.

Whenever any outdoor facility is being planned, there are many essential features that must be considered—location, size, shape, topography, natural features, soil, drainage, and water supply. Plans for the development of such areas should proceed in conjunction with the study of the building plans. The location of the outdoor physical education facilities should be as near the gymnasium and locker rooms as possible, yet far enough removed from the classroom windows to prevent playground activity and noise from interfering with classroom instruction. Streets, roadways, or driveways must not be constructed between the building and playground areas; however, the facilities should be reasonably accessible to parking areas to encourage community use.

Five distinct play areas are normally found in the recreation area requirements of school facilities:

1. Elementary area
2. Courts area
3. High school girls area for day-to-day use
4. High school boys area for day-to-day use
5. Interschool athletic area

(A more detailed discussion of these areas will be found in the publication, "Planning the Outdoor Physical Education Facilities," published by the Division of Educational Facilities Planning, The University of the State of New York.)

The *elementary area*, serving the needs of children from kindergarten through the sixth grade, should be located nearest the building and should be easily accessible from the elementary classrooms. Each kindergarten class should have a section of the elementary area of not less than 5,000 square feet set aside for their exclusive use. Such an area is often separated from the balance of the elementary playground by a fence or a hedge. The elementary physical education and recreation area should be about 3 acres, exclusive of the building area, lawn, parking facilities, etc., for every 12 classrooms. An additional one-half acre should be added for each additional four classrooms. Within this area should be a turf area, an apparatus area, and a shaded area.

The *courts area* may be located near the building, easily accessible from the gymnasium and as near the parking facilities as possible. The courts area should be paved with asphalt or some similar material and fencing of the area is a requisite. Rapid and efficient drainage is very essential in this area in order that it be ready for use soon after a rain. About 1 acre will readily accommodate four tennis courts, four handball courts, three badminton courts, and two volleyball courts. The area can also be designed for ice skating in the winter. Consideration should be given to allowing additional space immediately adjacent to this area for future expansion of these facilities.

The *high school girls area* provides space to allow girls to participate fully in an adequate physical education program. A minimum area of approximately 2 acres will normally meet the physical education and recreation needs of two classes of girls. There will be sufficient space in these 2 acres for two softball diamonds or two minimum-sized official fields for soccer, field hockey, speedball, or lacrosse.

For the *high school boys area* approximately 3 acres will provide for two classes of boys. This space is sufficient for playing softball, soccer, football, speedball, touch football, and lacrosse and provides for either one full-sized official field or two minimum-size official playing areas for any of these sports.

In the area provided for *interschool athletics*, a turfed area should be provided to accommodate both boys' and girls' activities, as well as coeducational activities. A football field and running track can be planned in an area of approximately 4 acres. A field hockey area requires slightly over 2 acres, as does a soccer field. Additionally, two softball diamonds can be accommodated in the area of a field hockey or soccer field. A baseball diamond requires a square area of approximately 3 acres. It should be noted that a baseball diamond does not fit advantageously within a running track and that such a plan should be discouraged.

The goal of safety in the development and use of school grounds cannot be overemphasized. Studies by the National Safety Council indicated that 42 percent of school accidents occur on the grounds, with 23 percent of these accidents occurring during organized activities. Regardless of the size of the area, the partial segregation of different age groups and different physical activities is advisable. While all authorities do not agree with the use of fences, obvious hazards such as streets, railroads, and streams, etc., should be fenced. The fencing material should be smooth—never barbed wire—and should be high enough to discourage hurdling. Playground apparatus should be concentrated in a single location and a program of constant supervision and education followed. Apparatus should be located away from all games and at such location that it is not necessary to cross courts to reach the apparatus.

3. Playground Surfaces:

Attention must be given to provide the most proper and practical surfacing material at varying locations for varying activities. While natural soil surfaces are the most common—no doubt due to economy—they are a

constant source of dust and dirt and may cause health problems. This surface lacks durability and smoothness and is most susceptible to rutting in wet weather.

Blacktopped areas provide durable, relatively inexpensive, firm, dust free areas which will drain quickly. Blacktop lacks resiliency and will soften with heat; however, contrary to popular opinion it is relatively nonabrasive. The major application of blacktopped areas would be all-weather, year-round play areas such as for courts and in elementary playgrounds.

Special surfacing materials such as tanbark, sawdust, and shavings have particular application under playground apparatus where resiliency is essential. The materials commonly are mixed with up to 20 percent sand and placed in 4- to 6-inch depths. Curbing to contain the material is normally required and drainage of the curbed areas is most important. The high cost of maintenance and replacement of such materials makes application limited.

Composition surfaces of natural and synthetic materials are being marketed by many manufacturers. Such surfaces as cork-asphalt, rubber-asphalt, and "astrograss" are generally used to add resiliency to the features of blacktop. High initial costs limit application.

Turf areas must be considered ideal surfaces despite several negative features. Turf is not durable, may have drainage problems, is unusable during periods of thaw and immediately after rain, cannot stand up under long periods of extensive use, and must be rested periodically to allow rejuvenation of the grass. On the positive side, turf areas are resilient, dust free, have no heat effects, and are nonabrasive.

Further information on play areas and playground surfacing is available in "Safety Education Data Sheets" published by the National Safety Council, 425 Michigan Avenue, Chicago, Illinois 60611.

4. Planting:

Planting should be designed to integrate buildings and open spaces with the surrounding property. While the value of attractive and appropriate planting is generally accepted, it is difficult and expensive to obtain competent personnel to maintain grounds and planting. More and more grounds maintenance is mechanized and therefore, in the planting design, efforts should be made to minimize the need for manual labor.

The preservation of existing plantings on the site and the introduction of new plantings should be limited to those varieties having few objectionable characteristics—trees or shrubs with large fruit, coarse leaves, and brittle branches and thorns should be used with caution. With the great variety of plant material available, the characteristics desired can be predetermined and plants chosen that will provide the desired results. This, of course, can be best done by competent and qualified landscape architects who know and understand plant materials, but who do not benefit commercially from their sale.

All plantings should be considered from the standpoint of the maintenance they require as well as their adaptation to soil, exposure, proximity to play areas, etc. Existing trees and shrubs should be integrated into the plan wherever this can be done to advantage. Trees and shrubs may provide interest and usefulness in many diverse ways: providing screens for protection against wind, sound, and dust; providing coolness and shade and interesting shadow; and presenting varieties of foliage, flower, fruit, and bark characteristics.

Turf areas must be carefully prepared and properly graded. Deep topsoil of good quality will materially reduce maintenance costs. Lawn areas should have a minimum of 4 inches of good topsoil, while 5 to 6 inches is almost essential where heavy use of the turf area is anticipated. A good and suitable grass mixture is likewise of utmost importance. The quality of soil, exposure, weather conditions, and the intended use of the area should be considered in the makeup of a grass seed mixture. Due to so little cost difference between ordinary seed and high grade grass seed, high grade grass seed will be the most economical in the long run.

5. Other Facilities on School Sites:

Other facilities such as an administration building or bus garage should not be contemplated on the same site as a school building. If absolutely necessary to be on the same site, such facilities must in no way interfere with the operation of the daily school program.

Traffic patterns to other facilities should not be required to use the same drives used for bus loading and unloading of students. In the case of bus facilities, access to the bus facility should not require use of any of the drives serving the school, but should be a separate access from the public road.