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NEW PHYSICAL FORMS FOR CITY SCHOOLS

The physical, social, and economic problems of the large, older central cities have triggered new responses from public agencies. The central city -- with its high population density, crowded conditions, high land values, little vacant land, decaying neighborhoods, poverty, racial segregation, and scarce fiscal resources -- demands innovative solutions to complex problems. Although some urban critics suggest the rebuilding of central cities to emulate the low-density pastoral suburb, and although in many ways we are still using nineteenth century solutions and attitudes to solve twentieth century problems, there is a growing awareness that urban institutions must remold and restructure themselves in order to make high-density urban living not only tolerable, but desirable.

Many urban community facility and service systems have begun to respond with new and experimental programs that are more apt to the particular nature of the central city. For example, a series of interrelated public services are being decentralized by the establishment of neighborhood service centers (see ASPO Planning Advisory Service Report No. 234, Neighborhood Service Centers, May 1968). Whereas in the past certain services were located in a central and inaccessible location, the services are now being taken to the neighborhoods where they are needed. Another kind of response is evident in the field of library services where there is an increasing use of small branch libraries and mobile units. The rationale is that if the people do not come to the service, the service must then be taken to the people. Still another example is the way in which central city park and recreation departments have created vest pocket parks (see ASPO Planning Advisory Service Report No. 229, Vest Pocket Parks, December 1967). Although large city parks are still considered desirable, park authorities are now experimentally developing sites that were once considered too small. High-density living and high building coverage have caused the park planner to use ingenious design techniques to exploit a limited land resource.

Similar changes are taking place in large city public school systems in response to the same kinds of forces influencing other basic city institutions. The purpose of this report is to bring to the attention of urban planning agencies significant changes in public school systems that influence the type and location of physical facilities. More particularly, this report will discuss new ideas, innovations, and experiments in school construction such as the educational park, high-rise school buildings, school buildings over air rights, schools combined with other land uses, mobile and prefabricated classrooms, buildings originally built for other uses that have been converted into schools, and a variety of other design innovation such as schools on stilts, school roof play areas, "atrium" schools, underground facilities, and schools built on land fill.

The discussion is descriptive and, where possible, tries to point out implications for the urban planning agency. However, in many cases innovations in school construction are still at the discussion stage and therefore there is not a great deal of information on practical results or implications.

The Educational Context

Before discussing specific types of school building innovations, it might be useful to sketch the context within which these changes are occurring.

The stereotype image (perhaps not too far from the truth) of the urban school is the old, crumbling, ill-equipped two- or three-story school on a small, asphalt-paved site surrounded by a decaying neighborhood. The traditional city school is not equipped with libraries, auditoriums, cafeterias, and the other modern facilities that are found in the new suburban school. At least two factors account for this kind of urban school being with us far after it has outlived its usefulness. First, many school administrators and perhaps school planners, too, grew up and probably had their first professional experience in small, nonmetropolitan communities or suburbs. Professional school planning literature dealt almost exclusively with standards for the new suburban community with many acres of vacant land. The school planner, with his suburban-oriented standards was discouraged and dismayed when confronted with the reality of central city space problems. For example, the 500-pupil elementary school on its two-acre site surrounded by a built-up area could never be expanded to the "ideal" size of at least 10 acres.

The second factor that influenced the lack of interest in urban schools was the lag in new school building during the depression and World War II. The post-war period was one in which many school officials and planners assumed that new growth would take place in the suburbs and central cities would decline in population. By the time it was realized that the population characteristics of central cities were changing and that families with large numbers of children were moving in, the urban schools were burdened with financial difficulties. Boston provides a dramatic example of the decline of urban schools:

. . . a Harvard Graduate School of Education Study in 1962 found that 40% of Boston school children were housed in buildings over 50 years old and one-third of those in schools more than 70 years old.

The city's last large-scale building program, which created the junior high school system, ended in 1931. Since then, depression, war, and a postwar squeeze on city finances have slowed Boston's school construction program to less than a crawl.

In fact, since World War II, Boston has been able to erect only 13 new schools, all since 1952. Of 63 old buildings recommended for abandonment in a 1953 report, only 32 were closed by the target date of 1960. . . .¹

Other cities, such as Chicago, have had very rapid and energetic building programs. However, urban school officials have learned that it is not enough to build more classrooms. It is also necessary that schools be racially integrated and that they be designed as integral parts of their communities. Moreover, the school cannot any longer be an 8:00 a.m. to 3:00 p.m., five-day-a-week, 10-month-a-year, institution. It has also been realized that school officials have a unique opportunity, when building a new school, to either create a full, separate, unrelated institution or instead to create a vital part of a renewed neighborhood.

Significant changes in teaching methods and educational techniques also influence the physical design of school buildings. One of the most important changes is an increasing emphasis on team teaching, which requires the interior of school buildings to have large, flexible-partitioned rooms where various activities can take place at the same time. The school and its rooms must be designed so that it is possible to have large classes together at one time, and at other times to be separated into working groups that do not disturb one another. For example, some schools now have large multipurpose rooms or auditoriums which can hold scores of students for a single lecture and then may be divided with the use of partitions into classrooms. Similarly, the increasing use of educational "hardware" such as teaching machines, electronic data processing equipment, and visual aid equipment require flexible interior arrangements which permit the central location of expensive equipment. The new schools must also house ever more complex science laboratories as well as new libraries. Greater emphasis on facilities for physical education has obvious financial implications, particularly since central city school systems have not kept up with their suburban counterparts in providing a wide range of facilities such as gymnasiums and swimming pools.

The necessity and great expense of catching up in providing these facilities mean that central city school systems must develop centrally located facilities that may be used by large numbers of students. Finally, the central city school system has placed, and will continue to place, a greater emphasis on vocational training programs that require special equipment and buildings. For example, New York City has special schools, such as fashion, aviation, and maritime trades; Miami has a special hotel and tourist business school; and Chicago has a new commercial high school located in the central business district.

¹Educational Facilities Laboratories, The School House in the City (New York: EFL, 1966), pp. 1-2.

Permeating every discussion of central city schools, of course, are the problems of racial segregation and educating the ghetto child. These two inter-related subjects have caused much discussion and debate and will not be treated here. However, it should be noted that these discussions have generated renewed concern about central city school systems, not only in terms of their educational programs, but in terms of their physical facilities as well. New programs such as Head Start, the coordination of social service and school programs, and the desire to achieve racial balance in the schools have manifested themselves in new designs for city schools. Perhaps one of the most important examples of this manifestation is the "educational park" (to be discussed later) which is a response not only to technical educational needs, but to racial dynamics as well.

The Urban Context

There are important differences between the urban school and the small town or suburban school. One definition of an "urban school" is almost a definition of the city itself:

An urban school is a school serving an area that is densely populated, where many people live in multi-family dwellings -- whether garden apartments, row houses, flats, brownstones, public housing projects, or skyscraper apartment towers -- and where land costs are high and building sites small.²

Land in the city is expensive. While the suburban school site may cost hundreds of dollars an acre, the city equivalent can cost hundreds of thousands of dollars an acre. Thus, while the suburban elementary school may have a site of 10 acres or more, the elementary school in the central city may be only one or two acres. In addition, since the high-rise structure is relatively common within the city, it is quite unrealistic to expect the city school to be a rambling one-story structure. It is inevitable that the city school will have to be designed with greater ingenuity than its suburban counterpart.

The central city school will also present design opportunities in the sense that the school can help shape the character of the neighborhood in which it is located. In the suburbs the large, spread-out school tends to create its own campus-type environment. But in the central city:

. . . the school is a part of the total environment, contributing to and gaining from the street scene and enriching the neighborhood and making it a part of its "campus." There is another difference: good town or suburban schools usually reflect their natural surroundings; city schools seldom have natural, but more often manmade environs. Geometric land patterns and the cubistic building shapes of neighbors create a "hard" environment. This is not necessarily

²Schools for America. Report of the AASA Commission on School Buildings. (Washington, D.C.: American Association of School Administrators, 1967), p. 67.

bad -- urban forms can be interesting, and some animated urban areas enjoy the excitement of city architecture. The potential advantages of urban neighborhoods certainly should help create new forms for urban schools.³

Urban renewal in the central city will provide still other opportunities for imaginative school design. In some renewal areas, school planners will undoubtedly attempt to recreate a suburban school environment -- but low-density development will unquestionably come at a high cost. What may be more interesting will be those projects where the school is more compact, multi-level, and designed as a city building.

THE EDUCATION PARK

One of the most significant innovations in public school organization and design is the concept of the education park, also called the school park, the educational plaza, the school campus, and other similar names. Although the concept is being discussed at a time when there are profound changes in educational philosophy and technique, the most important source of impetus for this innovation is the various problems associated with racial segregation. In this sense, at least, the educational park concept is a proposal that has grown out of disenchantment with redistricting, pairing, open enrollment, and bussing experiments that have resulted in only limited degrees of success in achieving racial integration.

In terms of educational programs and administration, the education park provides an opportunity for economies of scale, specialization, concentration, and flexibility that are not possible at scattered, separated schools. For example, an educational park enrolling between 10,000 and 20,000 students would have a staff and program that could be highly specialized. Programs for both the gifted and the handicapped child could be offered. In addition to administrative efficiencies, such an institution could also have superior library facilities containing not only a large collection of books, but other information systems such as films, tapes, and other audio-visual equipment. A closed-circuit television system would be possible. A large student body would enable the school administration to provide full-time counseling, testing, and medical attention. Unusual professional opportunities for the teaching staff would be provided. Educators are, however, raising questions concerning problems that will be created by over-centralization, excessive travel distances for students, and the problems related to younger students.

The planning agency's competence to deal with educational philosophy and policy is obviously limited. However, the potential impact on the planning of school locations, related public facilities, the structure of neighborhoods, the city as a whole, and other physical factors makes the educational park a facility that should receive close attention from planning agencies.

³ Ibid., p. 68.

There are four basic types of education parks: the education park with all community schools on one campus; the park with all schools in one section of the city in one location; a park with all schools of the same level (e.g., elementary) at the same location; and a metropolitan school park serving both central city and suburban students.

The education park with all city schools in one location is highly impractical in a large city. However, in the smaller city a central campus with all elementary, junior, and senior high schools (and junior college) can be located in a single educational complex. For example, the school board of East Orange, New Jersey, has adopted a 15-year construction program that will create a consolidated educational park for over 10,000 students.⁴ East Orange is a compact city of 80,000. Because the 18-acre site is convenient to city expressways, travel distances will not be excessive. The educational park will contain a nursery school; a number of primary, middle, and upper schools; a junior college; a physical education and recreation center; a dramatic arts, music, and dance center; a resource tower, consisting of the junior college, cafeteria, administrative offices, and a branch city library; a sub-terrace service level; and a parking structure. The education park is located in the center of the city on land cleared through urban renewal and will eventually replace all existing schools in the city.

The second type of educational park is similar to the first in terms of the comprehensiveness in grade level, but which serves only one section of the city. Such an educational park might contain two or three elementary schools, a junior high school, a senior high school, and have over 10,000 students. Proposals for this type of educational park emphasize the need to draw carefully the park's boundary so that a truly racially integrated student body is achieved. This type of park is a "pyramid" park in that a large number of elementary schools feed a few junior high schools, and these in turn feed either one or a few high schools. This grade structure allows pupils from one large geographical area to remain on the same campus from kindergarten through high school. Such a system of education parks has been suggested in Philadelphia and Chicago.⁵

The less comprehensive education park (at times called a school park) is one where school facilities for a single level (e.g., all elementary schools) are concentrated at one location. For example, a proposal has been made in New York City, for a number of education parks which would be designed for middle school students on campuses of about 15,000 each and located to achieve racial integration. Another example of a single-level park is in Syracuse, New York, where a study has proposed locating four educational parks at the edge of the city, encompassing kindergarten through grade six. The 15-year Syracuse plan would phase out all existing neighborhood elementary schools. Each of the

⁴James E. Mauch, "The Education Park," American School Board Journal, (March 1965), p. 9.

⁵See, for example, The Corde Corporation, The Education Park, Report to the School District of Philadelphia (Philadelphia: The Corporation, 1967) and Chicago Urban League, Plan for a System of Educational Parks in Chicago (Chicago: The League, 1967).

four new parks will contain five classroom buildings (900 students in each) and a central building containing a library, audio-visual services, auditorium, cafeteria, art and music studios, health center, special education facilities, and student guidance.

Pittsburgh's Great High Schools program is an interesting example of the education park -- and more particularly, an example of how a restructuring of the school system can be used as a focus for basic policies in urban planning.⁶ Over the next decade the Pittsburgh program would replace 17 existing high schools with five Great High Schools. Each of the schools will serve a population of over 120,000 people, have 5,000 students, and will require a site of 35 to 40 acres. The Great High Schools plan will provide a framework for urban physical, social, and economic development. Specifically:

Each of the five schools will become the focus for the revitalization and restructuring of the sector which it serves, including new housing, commercial, and community developments planned in direct physical relation to the school plans, and the repatterning of the neighborhood, pedestrian and other traffic systems.

They will be sited between isolated, often racially segregated, neighborhoods, thus serving to bridge sectors of the city. And the sites will be tied in with the city's major transportation network of highways and the new rapid transit system that Pittsburgh hopes to build soon.

The schools themselves will be designed as community and cultural centers. Citizens and organizations will be encouraged to use their libraries, auditoriums, exhibition halls, gymnasiums, and other facilities. And the schools will offer a greatly expanded program of adult education and training.⁷

The fourth major type of education park is the metropolitan school park serving both city and suburban students. This type of school park would attempt to integrate schools in situations where the central city is predominantly Negro and the suburbs predominantly white. Each of the education parks would be located on the periphery of the central city and would require complex political agreements between school systems. Although no metropolitan community has plans at the present for such an educational park, a number of areas have had experimental city-suburb student exchanges.

The pros and cons of the educational park as an answer to central-city educational problems will be debated within the education field for some time to come. Most of the proposals are still in the very early stages of discussion, and only a few have reached the drawing board stage. The decision of accepting or rejecting the education park in particular cities will be made primarily

⁶James Bailey, "Pittsburgh Goes Back to School," Architectural Forum, June 1967. pp. 40-51. See, also, Center for Field Studies, Harvard Graduate School of Education, Education for Pittsburgh (Boston: The Center, 1966).

⁷Ibid., p. 40.

by boards of education. Decisions on matters of educational philosophy and racial integration will be made with little or no participation by the typical city planning agency. But if a board of education determines that it is educationally desirable to construct education parks, then the role of the planning agency can be extremely important.

The education park will influence the development plans of cities where it is adopted because it will be a significant change in the structure of the city. Although it is difficult at this early date to be specific about the change that may take place, it is possible to speculate about the implications of the education park for the urban planning agency.

The education park would change one of the city's most important public facility systems. The order and magnitude of the change may be as significant as the changes that have come about with urban expressways, the decentralization of business and industry, and extensive urban renewal programs.

One of the first implications that will face the planning agency is the possible complete or partial abandonment of neighborhood elementary schools. If only partially abandoned as an elementary education center, the elementary school may still serve as a primary grade center, with the youngest children still attending school relatively closely to their homes. In neighborhoods where the elementary school is now crowded, the elimination of some of the upper elementary grades would make it possible for the lower grades to have more space for either smaller size classes or special rooms. Vacant classrooms or an entire vacant elementary school could be used for the growing number of nursery and pre-school programs.

The abandoned elementary school could provide a location for neighborhood service centers housing adult education, health services, city administration offices, and other similar types of public service uses. Finally, if great numbers of older children will be bussed to other locations, the school site may also serve as a convenient collection point.

In many cases, the old elementary school building in the central city may have to be demolished because of age and physical condition. The site might then be reclaimed for use as a neighborhood park or playground and be appropriately developed and landscaped. The shifting of elementary education from the elementary school to more centrally located educational parks may indirectly provide hitherto unavailable opportunities for more, small-scale neighborhood recreation facilities than might otherwise be possible because of the prohibitive costs of acquiring developed properties.

If the elementary school is abandoned, there may also be pressures to use the former school site for residential, commercial, or other private use. Boards of education may find the opportunity to sell prime real estate almost irresistible, especially if large sums of money have to be spent for new facilities elsewhere.

If the educational park brings significant changes to the neighborhood, it will also bring equally important changes to the communities in which these larger centers will be located. In essence, a new type of urban district will have been created, in some ways similar to the urban university campus.

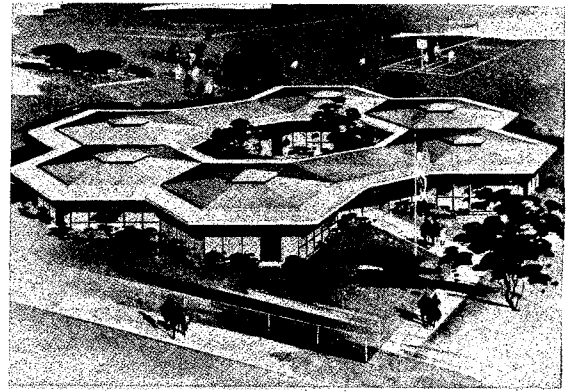
Most major cities have at least one university campus in highly built-up areas. The fact that city planning literature contains many references to campus planning, campus parking, and town-gown relations indicates that the large educational institution exerts important influences within the city. It seems reasonable to conclude that the educational park for education below the college level somewhat resembles the college campus in terms of planning problems.

Merely to consider the size of an educational park (at least 20 acres) implies a number of things about its development. First, large urban sites are difficult and expensive to acquire. Large vacant areas are simply nonexistent in most major cities; thus, the urban renewal process will unquestionably play an important role in educational park development. The urban renewal project with an educational park may have all the same kinds of problems -- e.g. relocation, administrative coordination, and so on -- but the renewal process would also provide particularly unique opportunities to plan an educational park as the focus of community renewal. Locating educational parks in urban renewal areas may also provide opportunities to coordinate the parks with other educational institutions. For example, one of the proposed educational parks in Chicago will be located near the Chicago Circle Campus of the University of Illinois, itself the site of an urban renewal project. This will allow for cross-fertilization between public school and university of the type that may now only be possible in laboratory schools of colleges of education.

The size of the educational park also means that it may take on an institutional flavor with the danger of having the disadvantages of one-use districts which are used only for part of the day or part of the year. Educational parks will have to be planned carefully to include other evening and year-round uses; otherwise, they may become forbidding deserted pockets within the city.

The institutional character of an educational park will also have implications for areas surrounding the park. For example, with a large number of faculty positions at one location, faculty housing in surrounding areas may be expected, particularly if the educational park is related to a university or junior college. Although it is doubtful whether an educational park would spawn rooming and fraternity house uses nearby, it probably would encourage the establishment of related commercial facilities such as book stores, snack shops, and other businesses catering to students.

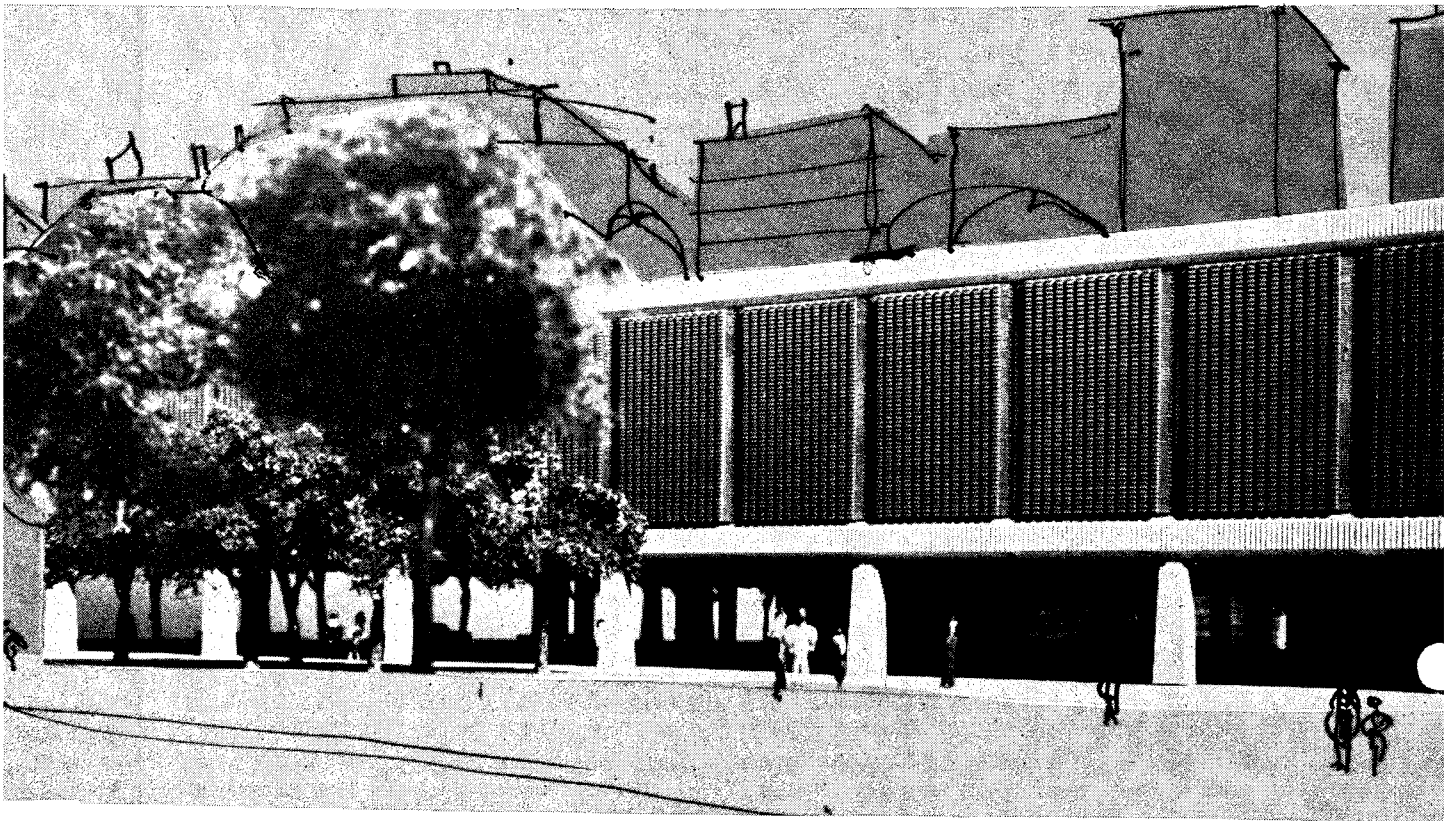
The impact on surrounding areas in terms of traffic generation will probably be quite significant. In addition to the hundreds of faculty members and supporting staff coming to the educational park, there will be thousands of students being transported by rapid transit, bus, and private car. No doubt a significant proportion of the high school and junior college students will drive cars. The younger children will be transported in buses from neighborhood collecting points. The fact that most public schools still operate on relatively fixed starting and dismissal times means that the traffic volume may reach the proportions that are now seen only at stadiums for major athletic events. Thus, to as great an extent as possible, educational parks should be located at major mass transit points. However, there are two problems that might be insurmountable. First, many of the younger children may



Portable classroom complex (above); Relocatable School Facilities, Educational Facilities Laboratories.

Apartment with school (left); Engineering News Record, October 5, 1967.

School on stilts (below); Architectural Forum. November 1963.



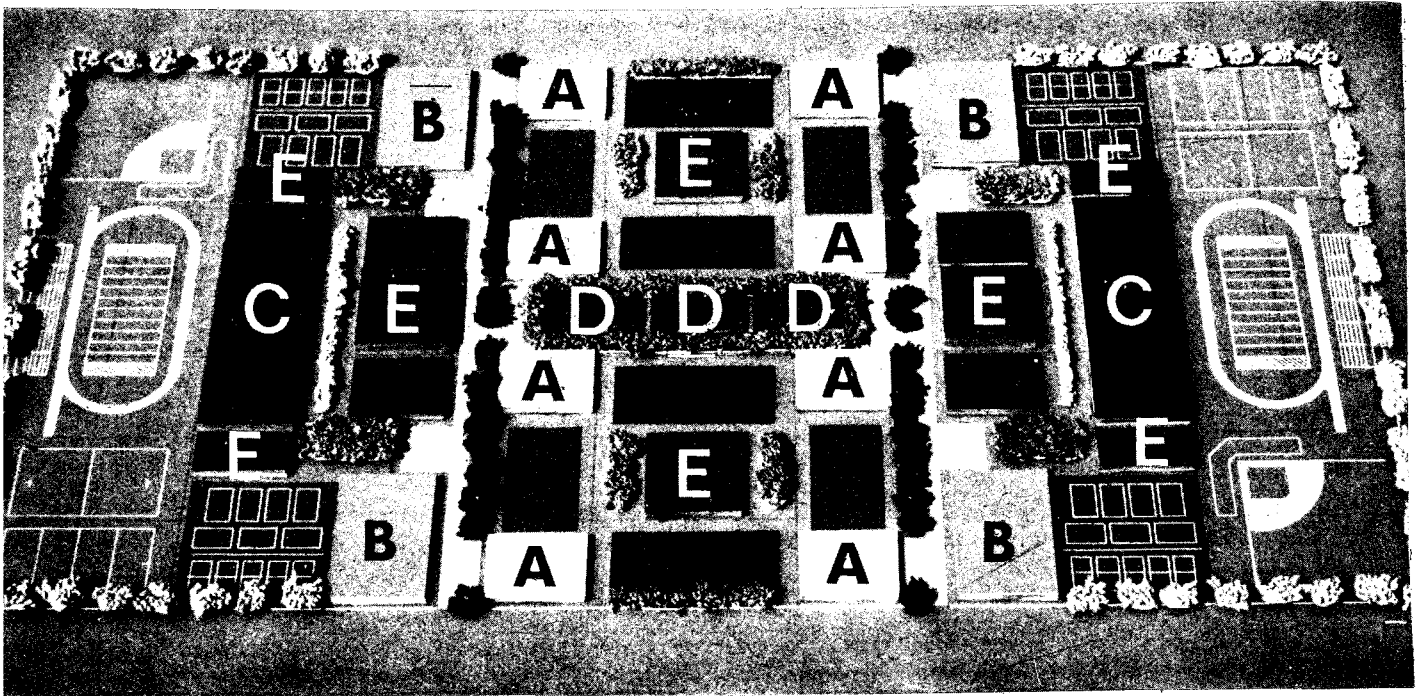
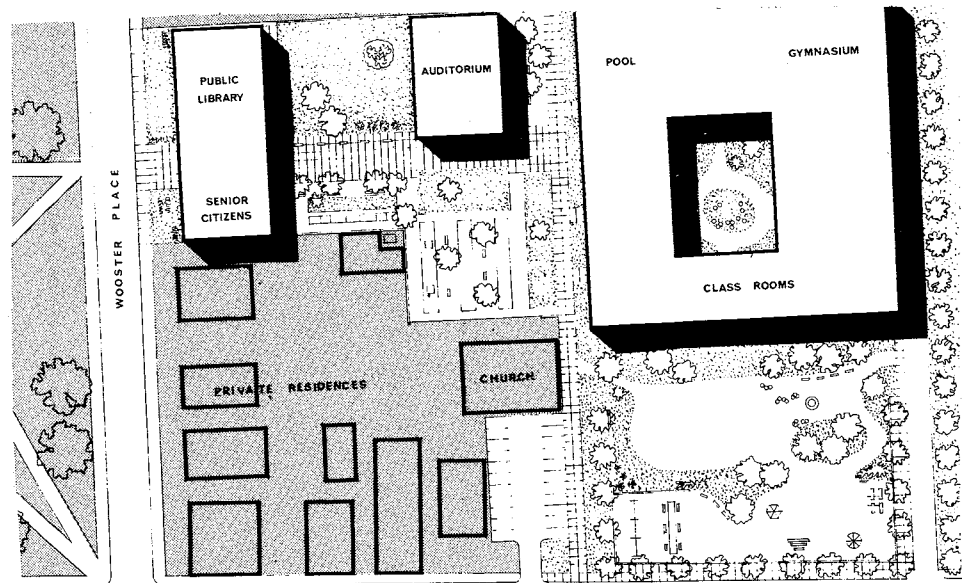


Diagram of an educational park, Philadelphia ad hoc Committee for educational parks; Plan for a System of Educational Parks, Urban League. A) primary grade school; B) middle grade school; C) senior high school; D) administrative suite; E) core facilities.



Atrium school combined with other uses; New Architecture in New Haven, MIT Press.

need more supervision en route and may therefore not travel on public transit systems. Second, a city undertaking a full program of educational parks will have to be prepared to handle the additional trips generated by facilities, particularly since these trips will be occurring at the peak morning and evening rush hours. Many students who are now walking short distances will in the future be riding and therefore adding to street congestion.

A word or two about the concept of "park" in the term "educational park" is also in order here. Some of the educators and writers who talk about the educational park assume that it will in fact be "park-like." Visions of scattered low-rise buildings in a vast landscaped setting are perhaps most typical. However, a more realistic concept of the educational park might be a tightly knit urban complex that is more similar to other urban institutional settings than the sprawling small-town college campus with large malls and open spaces. It seems highly unlikely that urban school systems, with all the demands made upon tax resources, will acquire such large areas that would make the word "park" meaningful. Planning agencies should also be alert to the possibility that there may be pressures and demands to build educational parks in existing public parks. Highway authorities have had no problem whatsoever in going through urban parks because that is the "easiest" way to go. In addition, other cultural institutions, such as art galleries, municipal auditoriums, and so on, are frequently put forth as appropriate uses to be placed in parks. Of course, once the buildings and asphalt parking areas are installed, the land is no longer a park.

In summary, the educational park represents a basic and radical change in public school facilities. This change is important enough that the public planning agency will have to play an important role in site selection, planning, and development. The planning and development process of an educational park is exceedingly more complex than that of a single school site and therefore requires the participation of public agencies other than the local school board. In terms of its basic responsibilities and role, the public planning agency can provide information to the school board on population, race composition, housing type and density, income characteristics, and the location of other planned changes that would be of importance to the school official (such as new expressway interchanges and rapid transit stations). The agency can play its usual role in the urban renewal process in those cases where urban renewal is an integral part of the development process for the educational park.

OTHER CHANGES IN SCHOOL FACILITIES

The educational park is perhaps the most significant of all of the changes in the design of public schools. However, there are a variety of other urban school design concepts that present equally important changes in terms of public school site selection, development, and utilization.

Schools Combined with Other Uses

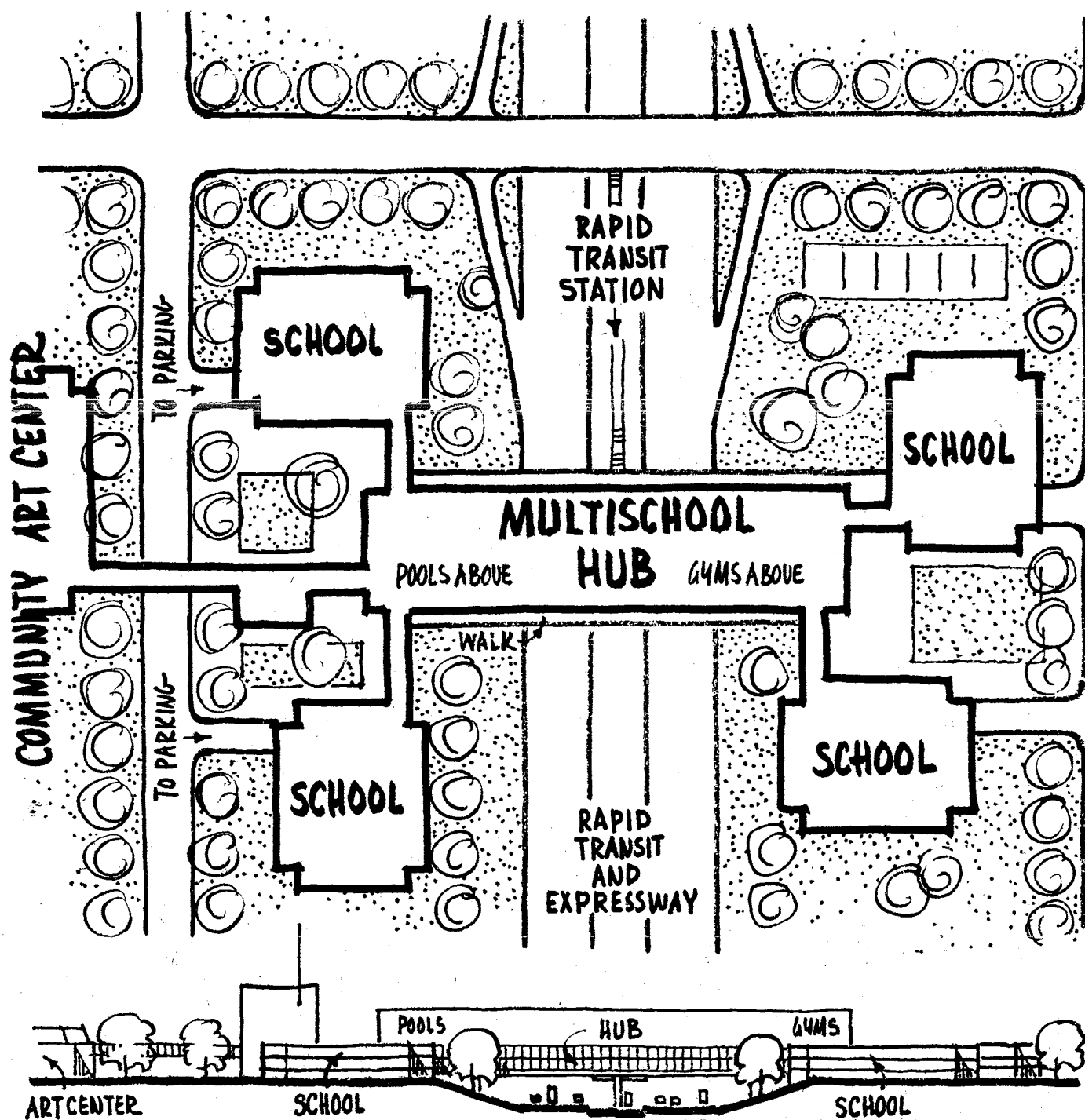
The public school of the future may no longer be an isolated single-use public facility. In the past, the public school has been separated from its surroundings, and the school building itself has been designed for one purpose: the education of children during weekday hours from September to June. The only possible exception has been the joint cooperative efforts of school and park officials to develop coordinated park-school programs. Now, however, school planners realize that the public school can be combined with other uses and services to provide a more comprehensive type of community service.

An example of a single elementary school combined with other uses is the Conte School in New Haven. The Conte School is considered the first architecturally significant step in the Wooster Square Redevelopment Project. The school building contains the usual classrooms, a gymnasium, and a pool. On the same site is a separate auditorium building, a building containing a public library and a senior citizen center, with open spaces between the buildings. The open spaces are well-landscaped and contain play areas, tables, and benches. The general site area also contains a church and private homes. The school's gymnasium and pool are available for community use.

The Great Schools program in Pittsburgh, discussed above, will also coordinate various community facilities at the site of educational parks, while the Chicago educational park will be related to the University of Illinois campus. Another kind of land sharing is a practice, in both New York and Chicago, to locate elementary school classrooms within public housing buildings. These classrooms are particularly convenient to the student, and the facilities also double as community centers for public housing residents during evening and weekend hours. After-school use includes such activities as community meetings, adult education, and social affairs. In New York City, for example, construction is under way of a 25-story middle-income apartment building on top of a three-story public school in the Bronx. The site is a little less than four acres and will contain the school, the apartment building, a parking garage for apartment residents, and a school playground on top of the parking garage. A zoning change allowed the planning commission to modify certain open space requirements for residences utilizing air rights over schools. Basically, the school and apartment house share open spaces for their mutual benefit, although each contains some exclusive areas. Play areas, such as the roof playground, are available to tenants when school is not in session. It can be anticipated that in the future, proposals and studies combining schools and other land uses, such as retail stores or office buildings, will be made.

High-Rise and Air Rights

The high-rise buildings is a basic type of city structure that evolved in response to the extremely high land values in central cities. The modern office building and apartment tower are the most common examples. Because of high land costs, the high-rise building may be an economical structural type for the new city school.



Air rights school development; Nation's Schools, March 1968.

The new Jones Commercial High School in Chicago is the only example at the present time of a high-rise school. The school was located on a small (1.2 acres) downtown site because students also work in downtown offices. In addition to a building containing an auditorium and cafeteria, a classroom building is constructed in the typical high-rise floor plan with a central elevator and service core and column-free space surrounding the core. The academic building is now seven floors in height, with a foundation and structural design that can accommodate up to 24 stories.

Although the Jones school is the only example of an existing high-rise school, school planning studies have suggested some interesting possibilities. For example, students at the Harvard Graduate School of Design studied the possibility of building a combined high-rise high school and office building. Another study proposed a high school and community college with six separate four-floor schools stacked vertically in a single tower.⁸

The use of air rights in central-city school development also presents an opportunity for innovative solutions to site problems. For the purpose of this report it would be useful to differentiate between two basic types of air rights development. First, there is the type which takes place on an ordinary site, but in which ownership agreements are made to separate the vertical rights. The second type of air rights development is that in which a building is constructed over the right-of-way of an expressway or railroad, for example.

The first type of air rights development is essentially a joint-use and financial technique that may be attractive to the central city school systems that must build schools with limited financial resources. The development of PS 126 in the Bronx, mentioned earlier in this report, is an example where the school board owns the site and sells the air rights to a private developer. If the site is a particularly valuable one, the school board may realize a handsome price for the sale of the air rights. In fact, the payment for the use of air rights may completely finance the cost of constructing the school. In addition to PS 126, the New York Board of Education is planning a second combined structure on the east side of Manhattan. Preliminary plans for five additional combined-occupancy structures are under way, and New York officials expect to have 10 such facilities under construction within the next two years.⁹

The type of air rights development where the structure is built over the right-of-way of an expressway or railroad is still largely in the idea and preliminary drawing stage. However, educational planners feel that there are great opportunities to be realized in constructing schools over the air rights of expressways and rail lines. Perhaps the boldest schemes are proposed in the Pittsburgh Great High Schools program.¹⁰ Each of the five Great High Schools will occupy sites that will attempt to bridge the boundaries between

⁸Schools for America, op. cit., p. 71.

⁹The Wall Street Journal, March 8, 1968, p. 1.

¹⁰James Bailey, op. cit.

neighborhoods. In Pittsburgh, the location of hills, valleys, rivers, expressways, and rail lines resulted in a development pattern where residential neighborhoods are on the tops of hills, there is little or no development on steep slopes, and industry, railroads, and highways are in the valleys. The Great High School program may go a long way toward pulling the separate parts of the city together. For example, the North Side High School will be built on an abandoned railroad yard. However, part of the school will be built over air rights on an existing railroad and proposed new rapid transit line. Two parts of the school, a concourse and a play field, will completely cover portions of the right-of-way. A two-level, 1,000-car parking garage will be located under the concourse. The East Liberty High School proposal does not place any of the school's structures over a rapid transit right-of-way. However, a station occupying the air rights would connect the school to the new shopping center on the other side of the highway and transit line. A preliminary study for the Mount Washington High School, overlooking the golden triangle, also proposes the development of air rights over rail lines.

New urban expressways and older railroad lines have cut neighborhoods into separate parts isolated from one another. Construction of a school utilizing the air rights of the rights-of-way can provide a particularly good opportunity to connect separated neighborhoods. Thus, the highway or the rail line may become a potential school site. In addition, the use of air rights over ordinary city streets can help create larger, more unified sites by connecting buildings over streets on upper floor levels. A school board may acquire property in two or more adjacent blocks. The use of air rights at upper levels could, in effect, create a single unified site.

Other Building Innovations

A number of other design solutions to the problems of building urban schools either exist or are on the drawing boards. For example, the new United Nations School will be built on a pier on the east river. Also in New York City, the board of education plans to fill in 40 acres of Jamaica Bay to create a high school site. In addition to substantial monetary savings, no site needs to be cleared, nor do residents need relocating.

Other solutions to the problems of small urban sites include the design of roof play areas whereby open space is covered with a building on one level and provided on an upper level. A variation of using the same ground area for both building area and open space is a school building on stilts with covered play areas. Examples are in Brooklyn and Harlem. Another variation of more efficient use of space is the idea, still on the drawing boards, of an underground school. One such proposal¹¹ is only partially underground, and would be for a relatively small primary school. A school would be combined with a small neighborhood park by excavating and depressing a central courtyard. The roofs of the classrooms could serve as paved play and parking areas. The central courtyard concept is also evident in a number of surface-level elementary schools, such as Chicago's Doolittle elementary school, with

¹¹Charles William Brubaker, "What's New in Urban School Buildings?" NEA Journal, (December 1966), p. 27.

windowless exterior walls and classroom windows facing an interior courtyard, making it an "atrium" school.

Another innovation in central city school building is the conversion of existing commercial and industrial buildings for school use. For example, the Chicago Board of Education converted a grocery warehouse into a vocational high school. The board also converted three obsolete manual telephone exchange buildings to three vocational and educational guidance centers in neighborhoods where these facilities are most needed. In Cleveland, an abandoned warehouse in an urban renewal area has been converted for temporary use as a supplementary education center, pending the erection of a permanent building. Another example is the school district which purchased a single-story warehouse building and converted it into a high-ceiling gymnasium by excavating the floor area of the relatively column-free building area. In all of these cases the principal advantage of building conversion is that the school authorities can respond more quickly to needs since it is usually cheaper and faster to convert existing buildings than it is to start from scratch.

Portable Classrooms

Although not as new as some of the other types of physical facilities that have been discussed in this report, the portable classroom continues to grow in importance as a method of solving city school space problems. The portable classroom has been called a variety of other names such as transportable, mobile, movable, relocatable, prefabricated, and so on. Essentially, the portable classroom is a small nonmasonry structure that can be prefabricated at a factory site, easily moved in major sections or modules, and quickly assembled on a prepared site.

The portable classroom is a response to a number of trends and factors in city school systems. In particular, there is the perennial problem of the shortage of classrooms. Although an average of 70,000 classrooms were built annually during the 1960's, the reported shortage of classrooms remained well over 100,000.¹² The need for more classrooms is also caused by increase in school populations. New families with greater numbers of children have moved into the central cities, and more students are staying in school longer, resulting in an increased demand for school space. Increases in population density of particular neighborhoods also contribute to the need for more classrooms. An older neighborhood, the original residents of which have moved on, may now be occupied by lower-income residents. This kind of neighborhood is frequently typified by an increase in population densities caused by building conversions (both legal and illegal) which contribute to overloading all the public facilities of the neighborhood. The schools, because they are frequently the oldest facility in the neighborhood, are often the hardest hit. Other neighborhoods may experience fluctuating school populations based on the natural maturation of family units the children of which filled the schools two decades ago. The neighborhood may undergo a period during which older families without children remain and the school is under-

¹²Educational Facilities Laboratories, Relocatable School Facilities (New York: EFL, 1964), p. 6.

utilized. At a later date newer and younger families with children (and perhaps more children) begin moving in and the old school is found to be inadequate in size.

The ideal solution for a rapid school population growth is to build new schools. But the process of planning, designing, approving, bidding, contracting, and building a school may take many years and the need for classrooms may be immediate. Therefore, many school officials have turned to the portable classroom to enable them to respond very rapidly to classroom needs in particular neighborhoods. The portable classroom can also prevent double sessions or excessive travel times to other schools.

The major advantages to portable classrooms are that they can serve to provide classroom space in neighborhoods where there are either sudden increases in enrollments or greatly fluctuating enrollments. Other advantages are that they can be quickly constructed and are cheaper on a square-foot basis than regular classrooms in a school building. The portable classroom can be placed on the neighborhood school site and be served administratively by the "parent" school. At times, such classrooms have also been placed on the edges of neighborhood parks on a short-term lease basis. The portable classroom may also be used in urban renewal projects where an old school has been demolished or where housing with children is built before a new school is ready.

A disadvantage of mobile classrooms is that they are being used at a time when educational concepts tend to lessen emphasis on the separate 30-student classroom and instead emphasize team teaching, flexible space utilization, and other educational innovations. This kind of disadvantage can be partly overcome if the proper type of portable unit is chosen and the units are combined to create, in effect, a small school. There are aesthetic problems with the portable classroom. Unfortunately, some of them look like overgrown, badly-designed mobile homes. They tend to look like an object that moves on the highway rather than one that is placed on a site. If the specific units are carefully chosen for their design qualities and are carefully sited and landscaped, the aesthetic problem is considerably lessened.

CONCLUSIONS

Changes in school facilities will require the planning agency to take on new roles and to reassess its knowledge about school planning.

In reassessing its role in school planning, the agency will have to realize that the city educational system has been undergoing profound changes. No longer will it be organized in terms of neatly spaced elementary schools which in turn feed neatly spaced junior and senior high schools. In the past there may have been differences from city to city in terms of basic school organization. For example, one school system may have had a K-6, 7-9, 10-12 system of schools; while another may have had a K-8, 9-12 system. In the future, however, a city school system may encompass a variety of systems. For example, neighborhood schools may be retained in certain parts of the city, while in other parts the elementary school will be in an educational park. Thus,

within a single school system there may be educational parks, supplemental education centers, traditional elementary schools, and other combinations.

Educational philosophy is in a state of flux. The physical and architectural manifestations of educational changes will be of concern to the planning agency. These changes will require the planning agency to keep up to date on changes within the field of education. More particularly, the planning agency will have to become aware of the sources of information on changes and innovations. The planning agency will also have to rethink its own planning conceptions and proposals for cities in which the elementary school may no longer be the center of a traditional neighborhood.

The planning agency will also have to work much more closely with educators in planning the basic school system, particularly where the system is completely reorganized into larger units such as educational parks. Large land areas needed for such educational facilities will require the active and careful participation of the planning agency in terms of determining the adequacy of and relationship of transportation networks, population trends, housing densities, adjacent land uses, potential urban renewal sites, and special opportunities where educational developments must be closely coordinated with other plans and programs.

The planning agency will also be required to cooperate with a growing number of agencies in related fields that are working with educators. For example, the study of an educational park in Pittsburgh involved "the Citizens' Renewal Council, the major banks, the director of manpower and training, the Regional Planning Association, the county health department, the local colleges and universities, the chamber of commerce, the Urban League, the Urban Redevelopment Authority, the County Conference on Community Development, the Housing Authority, the NAACP, the foundations, the major corporations, and others."¹³

Changes in educational facilities may also require the planning agency to re-examine selected provisions from zoning ordinances. For example, lists of permitted uses may need to be amended to permit schools in districts other than residential. Similarly, a permitted use list may have to be amended to permit the combining of uses such as schools and apartments or schools and offices. Parking requirements for joint uses may present some special problems. The ordinance may have to be amended so that two uses on the same site with different operating and performance characteristics may be able to claim the same parking spaces because they are used at different hours of the day. Site planning review will have to be carefully carried out since some schools will now be in large educational parks, while others (such as those combined with other uses) may need to be carefully designed to separate streams of pedestrian and vehicular traffic.

In summary, the typical city planning agency will have to educate itself concerning changes in public school facilities and will have to reassess its own role in the educational planning process.

¹³James E. Mauch, op. cit., p. 9.

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