DOCUMENT RESUME

ED 072 512 24 EA 004 799

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TITLE Physical Education Facilities. Educational Facilities Review Series Number 14.
INSTITUTION Oregon Univ., Eugene. ERIC Clearinghouse on Educational Management.
SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
BUREAU NO BR-8-0353
PUB DATE Feb 73
CONTRACT OEC-0-8-080353-3514
NOTE 8p.

EDRS PRICE MF-$0.65 HC-$3.29
DESCRIPTORS Air Structures; Athletic Fields; Building Materials; Educational Specifications; Field Houses; Gymnasiums; *Literature Reviews; *Physical Education Facilities; *Planning (Facilities); Playgrounds; Swimming Pools

ABSTRACT

Current thinking on elementary and secondary school physical education emphasizes motivating young people to develop habits of physical exercise and expression that will persist into adulthood. To help foster such a lifetime commitment, athletic programs must provide a range of opportunities for students to realize their particular physical potentials. Accordingly, athletic facilities must accommodate numerous individual and group-oriented activities. The reviewed documents, previously cited in RIE, are restricted to issues of design and construction and concern indoor facilities (gymnasiums and wide-span structures), outdoor areas, and swimming pools. (Author)

February 1973 Number 14

Physical Education Facilities

Alan M. Baas

Rather than bury the gym, what needs burying is the concept which created it. With few exceptions, recently-built athletic facilities and sports complexes have been designed much as they were in the 1930's: spectator oriented, full of special purpose areas, and divided men's and women's areas. In general they ignore many user needs or fail to live up to the building's purpose.

. . . the multipurpose facility does more things for more people for less, and is our greatest hedge against obsolescence.

Browne (1971)

Current thinking on elementary and secondary school physical education emphasizes motivating young people to develop habits of physical exercise and expression that will persist into adulthood. To help foster such a lifetime commitment, athletic programs must provide a range of opportunities for students to realize their particular physical potentials. Accordingly, athletic facilities must accommodate numerous individual and group-oriented activities.

In physical activities, motivation is closely associated with availability. There is a growing recognition that conventional gymnasiums do not offer sufficient spaces to meet adequately individual needs and preferences. In response, many schools are entering into agreements with community agencies for the joint funding and use of wide-span structures large enough to shelter track and field events. Where possible, the tracks in such buildings are made wider than normal to permit multiple use for games such as volleyball

and badminton. Synthetic surfaces and the technology of cable and air-supported membranes offer cost-effective solutions for many school and community needs.

Much of the literature on school-community athletic facilities pertains to financing and operation. The documents cited in this review are restricted to issues of design and construction and, therefore, include very few dealing directly with school-community facilities.

Abstracts of the following documents can be located in *Research in Education*. The complete texts are available from the ERIC Document Reproduction Service (EDRS), commercial channels, or both. Publications can be ordered in either Xerox copy form (HC) or microfiche (MF).

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GENERAL PLANNING INFORMATION

Athletic Institute. Planning Areas and Facilities for Health, Physical Education, and Recreation by Participants in National Facilities Conference. Revised 1965. Chicago: 1965. ED 014 848 Document not available from EDRS. (Available from The Athletic Institute, Merchandise Mart, Chicago, Illinois 60654; or American Association for Health, Physical Education, and Recreation, 1201 Eighteenth Street NW, Washington, D.C. 20036. $5.00.)

Includes an extensive treatment of all areas and facilities for physical activities. Facilities for all levels of education and the community, including swimming pools, receive detailed attention. Appendixes include planning checklists, diagrams of various types of athletic courts, and a glossary of terms.

Massachusetts School Building Assistance Commission. Physical Education, Elementary Schools Facilities and Basic Equipment, 1965. Boston: 1965. 12 pages. ED 021 396 MF $0.65 HC $3.29.

———. Physical Education, Secondary Schools Facilities and Basic Equipment, 1966. Boston: n.d. 19 pages. ED 021 397 MF $0.65 HC $3.29.

New Jersey State Department of Education. A Guide For Planning Physical Education and Athletic Facilities. Trenton: 1964. 48 pages. ED 014 845 MF $0.65 HC $3.29.

Smoll, Frank L. Areas and Facilities for Physical Education and Recreation. An Interpretive Bibliography. Madison: ERIC Clearinghouse on Educational Facilities, University of Wisconsin, 1970. 100 pages. ED 035 266 MF $0.65 HC $3.29.

INDOOR FACILITIES: GYMNASIUMS

The literature contains a variety of general observations on gymnasiums and related indoor facilities. Gyms should be located away from classrooms and have their own public entrances. If the gym is to be open to community use and for more

than school hours, it should be designed so that portions of it may be locked when unsupervised.

Recommended minimum sizes of gymnasiums are 84' x 98' x 22' for junior high schools, and 90' x 106' x 24' for senior high schools.

Provisions for basketball, volleyball, badminton, and paddle tennis are considered standard. Whenever possible, additional provisions should include areas for gymnastics, dance, wrestling, and remedial work. Swimming pools are valuable but are frequently too expensive for single school purposes.

Gymnasium ceilings, floors, and walls require special attention to ensure adequate acoustical and lighting effects. Acoustics should minimize distracting reverberation noise; lighting should be nonglare and shadow-free. All surfaces should be easy to clean and resistant to scars and stains.

The walls should have no hazardous projections or sharp corners. Radiators and other heating devices should be covered. Benches should, where appropriate, be attached to the floor.

Gym floors should never be located below the grade level and should be ventilated underneath to prevent dryrot.

In addition to providing general discussion and specifications of various athletic areas, the planning manuals listed in the bibliography of this review also describe seating arrangements, teaching and health services areas, lockers, showers, training rooms, and storage areas. There are also several documents dealing with gym renovation and maintenance.

Applegate, Lindsay M. "Saving the Old Gym Floor." *School Management*, 16, 4 (April 1972), p. 34. EJ 054 551.

Ashton, Dudley, and Irey, Charlotte, editors. Dance Facilities. Washington, D.C.: Council for Facilities, Equipment, and Supplies, American Association for Health, Physical Education, and Recreation, 1972. 28 pages. ED 064 763 MF $0.65 HC not available from EDRS. (Available from AAHPER, Publications-Sales, 1201 Sixteenth Street NW, Washington, D.C. 20036. Stock No. 240-25242, $1.95.)

Includes recommendations for administrators in planning dance facilities and equipment, and offers adaptations for elementary, secondary, and college programs.

Department of Education and Science. Secondary School Design: Physical Education. London, England: 1965. 30 pages. ED 035 246 Document not available from EDRS. (Available from Pendragon House, Inc., 899 Broadway Avenue, Redwood City, California 94063. $1.20.)

Analyzes current trends in physical education programs and facilities in England and discusses all aspects of indoor athletic accommodations, including diagrams and figures wherever relevant.

Dickey, Donald D. Athletic Lockers for Schools and Colleges: Their Design–Selection– and Purchase with Functional Tips and Suggestions for the Modern Athletic Locker Room. 1967. 29 pages. ED 031 041 MF $0.65 HC $3.29. (Also available from Donald D. Dickey, P.O. Box 20338, Bloomington, Minnesota 55820. $1.50.)

Ezersky, Eugene M. "Mini-Gyms and Fitness Corners." *Journal of Health, Physical Education and Recreation*, 43, 1 (January 1972), pp. 38-39. EJ 048 782.

Finchum, R. N. "Maintenance of School Gymnasiums." *School Activities* (May 1965). ED 025 104 Document not available from EDRS. (Available from School Activities Magazine, Box 196, Tescott, Kansas.)

"Gym Floor in Perfect Condition After 18 Yea." *School Management*, 15, 5 (May 1971), p. 43. EJ 037 898.

Hase, Gerald J., and Hick, Basil L. Planning The Indoor Physical Education Facilities. Albany: State University of New York, 1962. 20 pages. ED 017 146 MF $0.65 HC $3.29.

Kelsey, Lamar, and others. "New Generation Gyms: Design Ideas for PE. in the Seventies." *Nation's Schools*, 84, 6 (December 1969), pp. 51-56. EJ 012 087.

Illustrates new design concepts that stress flexibility for multiple purposes; use of integrated lighting, ventilating, and acoustical systems; and innovative athletic equipment.

"Movable Walls Provide Flexibility in New High School." *School Management*, 15, 10 (October 1971), pp. 40-41. EJ 044 216.

Describes how multiple uses in an auditorium-gymnasium are provided by movable partitions.

Penman, Kenneth A. "Let's Build Useful Gyms." *American School & University*, 42, 12 (August 1970), pp. 14-15. EJ 025 640.

Piele, Philip K. Building Maintenance. Educational Facilities Review Series Number Three. Eugene: ERIC Clearinghouse on Educational Management, University of Oregon, 1972. 8 pages. ED 058 623 MF $0.65 HC $3.29.

Ragsdale, Lee, and others. Dressing Rooms and Related Service Facilities for Physical Education, Athletics, and Recreation. Washington, D.C.: Council for Facilities, Equipment, and Supplies, American Association for Health, Physical Education, and Recreation, 1972. 48 pages. ED 064 764 MF $0.65 HC not available from EDRS. (Available from AAHPER, Publications-Sales, 1201 Sixteenth Street NW, Washington, D.C. 20036. Stock No. 240-25282, $2.50.)

"Remodel the Armory or Build a New Gym?" *American School & University*, 43, 4 (December 1970), pp. 20-24. EJ 031 127.

INDOOR FACILITIES: WIDE-SPAN STRUCTURES

When a proposed facility is to be funded and used jointly by a school and a community, it will frequently be designed along the lines of a field house rather than a gymnasium. Providing the most indoor space possible for all types of sports, the field house concept is familiar in the northern parts of this country where snows and wet weather prohibit extensive use of outdoor playing fields for a substantial part of the year. Field houses are distinguished from traditional gymnasiums by their dirt or turf floors and exceptional size.

Petersen (1963) presents a history and detailed treatment of field house planning and design. In addition to equipment and facilities, various aspects of field house operation and service receive attention.

Development of artificial surfaces and lightweight structures has made field house construction a plausible solution to many school and community recreation needs. In an interview for *American School & University*, Thiebert ("P. Richard Thiebert on Facilities. . ." November 1971) suggests that lightweight membrane (either cable or air-supported) structures can best provide the large, wide-span shelters necessary for community involvement in lifetime programs of physical fitness. He recommends building athletic facilities to house "anything you enjoy doing" and condemns the "form of torture" characterizing conventional physical education approaches to enjoying and understanding human movement.

Thiebert points out that making sports facilities large enough to accommodate a range of activities also deters obsolescence by providing for changes in user needs. He notes that this factor is particularly impor-

tant in the design of secondary or elementary facilities. To permit uses such as volleyball and badminton, he recommends indoor tracks be made 60 feet wide instead of the usual 32 or 40 feet. Although he stresses the value of large spaces, he also cautions that acoustical problems in such structures will require special solutions.

In another *American School & University* article, Browne (November 1971) proposes new ideas for multipurpose space, wide-span structures, found space, playing surfaces, and track and field layouts. He notes that technological advances in synthetic surfaces and turf make possible a variety of multiple-use facilities. Widespread use of tent and air structures cannot occur, according to Browne, until contractors and building officials become more familiar with technical aspects, and accurate cost predictions are available for their long-term use. His article identifies potential athletic uses in such existing wide-span spaces as shops, factories, and warehouses.

A publication by the Ontario Department of Education (1972) summarizes current information on air structures and identifies their relative merits. According to the document, advantages include low initial cost; speed of erection; ease of deflation, inflation, and repair; portability; adaptability for temporary functions; long span and high ceiling; integrated heating, ventilating, and air-pressure systems; and maximum utilization of daylight illumination.

Disadvantages are due in part to the fact that air structures are still in their developmental stages. Performance over long periods of time is still uncertain, and there are special thermal and acoustical problems. The types of construction used for foundations and services can limit portability. Municipal codes often restrict the number of people and uses such structures may shelter, and the slight increase in air pressure necessary to inflate the membrane can be uncomfortable for some people.

Other articles concerning lightweight and wide-span structures, including geodesic domes, appear in the bibliography.

"Advanced Encapsulated Fieldhouse." *American School & University*, 44, 3 (November 1971), pp. 31-32. EJ 047 237.

Browne, Robert Lee. "Innovations in Sports Facilities," *American School & University*, 44, 3 (November 1971), pp. 24-30. EJ 047 236.

"Bubble, Bubble—Less Cost, Minimum Trouble." *Nation's Schools*, 85, 2 (February 1970), pp. 76-78, 80. EJ 014 550.

Cites realistic advantages afforded by inflatable structures when used in physical education programs.

Dexter, Genevie, and Early, Doyt. Facilities and Space Allocations for Physical Education Outdoor Teaching Stations for Elementary and Intermediate Public Schools. Sacramento: California State Department of Education, 1967. 29 pages. ED 016 371 MF $0.65 HC $3.29.

Educational Facilities Laboratories, Inc. Conventional Gymnasium vs. Geodesic Field House. A Comparative Study of High School Physical Education and Assembly Facilities. New York: 1961. 20 pages. ED 031 038 MF $0.65 HC $3.29.

Recommends considering the use of geodesic structures for better physical education facilities.

"Geodesic Domes Span Full Educational Range." *American School & University*, 44, 3 (November 1971), pp. 33-35. EJ 047 238.

Koppes, Wayne F. An Investigation of Costs of Inexpensive Enclosures for Recreational Areas. New York: Educational Facilities Laboratories, Inc., 1969. 48 pages. ED 036 111 MF $0.65 HC $3.29.

Ontario Department of Education. Air-Supported Structures. Toronto: School Planning and Research Section, 1972. 16 pages. ED 061 600 MF $0.65 HC not available from EDRS. (Available from School Planning and Research Section, Ontario Department of Education, Fourteenth Floor, Mowat Block, Queen's Park, Toronto 182, Ontario, Canada. $1.50.)

Petersen, Alexander, Jr., A Guide for Planning the Field House as a College or School Physical Education Facility. New York: Institute of Field Studies, Columbia University, 1963. 62 pages. ED 031 911 MF $0.65 HC $3.29.

"P. Richard Theibert on Facilities for Lifetime Sports. An Interview." *American School & University*, 44, 3 (November 1971), pp. 14-18. EJ 047 235.

Robertson, Nan. Air Structures for School Sports. New York: Educational Facilities Labs, Inc., 1964. 28 pages. ED 031 064 MF $0.65 HC $3.29.

"A Scoop of the Sky." *School Progress*, 40, 12 (December 1971), pp. 20-23. EJ 050 371.

Shaver and Company. Lightweight Structures. Michigan City, Indiana: 1972. 14 pages. ED 064 755 MF $0.65 HC $3.29. (Also available from The Shaver Partnership, 305 South Santa Fe, Salina, Kansas 67401. Free.)

Promotional brochure illustrating lightweight structures for educational and athletic facilities.

"Synthetic Covering for College Field House." *American School & University*, 42, 12 (August 1970), p. 18. EJ 025 641.

OUTDOOR AREAS

Opinions vary on how much land is needed for outdoor athletics. At the elementary level average recommendations suggest three acres per three hundred students, plus one-half acre for each additional hundred students. Junior high schools should begin with twenty acres and add one acre for each hundred students; senior high schools should begin with thirty acres and add an acre per each hundred students.

Preparation of outdoor areas for athletic use requires specialized knowledge of grading and drainage principles, soil cultivation and seeding techniques, and types of hard-surfacing materials. ERIC files list several substantive documents dealing with these considerations.

England's Department of Education and Science (1966) presents guidelines for planning, layout, construction, and maintenance of all types of outdoor fields and hard-surface areas. It also considers the dual use of playing fields by school and community. Appendixes include maintenance costs of grass fields, specifications for playing fields and other games provisions, and analyses of seed mixtures and seed-turf. The document is amply illustrated and supplied with statistical information where necessary.

Specialized information about outdoor physical education facilities also appears in a publication by Delamater (1963). His treatment is intended for use by architects, engineers, designers, program specialists, administrators. and consultants. In addition to describing comprehensive planning and objectives for outdoor areas, he discusses site selection, common problems of space utilization, physical education play surfaces, sports lighting, and service facilities.

"Artificial Turfs: Easier to Maintain, Safer for Play, but Costs Still High." *Nation's Schools*, 84, 6 (December 1969), pp. 60-61. EJ 012 088.

Asphalt Institute. Asphalt for Off-Street Paving and Play Areas. 3rd Edition. College Park, Maryland: 1965. 39 pages. ED 017 131 MF $0.65 HC $3.29.

Delamater, James B. The Design of Outdoor Physical Education Facilities for Colleges and Schools. New York: Institute of Field Studies, Columbia University, 1963. 135 pages. ED 028 626 MF $0.65 HC $6.58.

Department of Education and Science. Playing Fields and Hard Surface Areas. London, England: 1966. 89 pages. ED 035 239 Document not available from EDRS. (Available from Pendragon House, Inc , 899 Broadway Avenue, Redwood City, California 94063. $2.60.)

Jones, Thomas E. How to Build a Track. Madison: University of Wisconsin, 1955. 86 pages. ED 035 161 MF $0.65 HC $3.29.

Gives general requirements for tracks, takeoffs, runways, circles, and field areas. Includes site selection, indoor tracks, and preparation for track meets. Amply illustrated.

Planning the Outdoor Physical Education Facilities for Central Schools. Planning the Outdoor Physical Education Facilities, No. 10. Albany: State University of New York, 1967. 29 pages. ED 018 923 MF $0.65 HC $3.29.

Provides brief overview of general outdoor area requirements for a central K-12 school and presents drawings of regulation fields and courts.

SWIMMING POOLS

Two documents deal directly with swimming pool design and construction. Gabrielsen (1969) edits a lengthy presentation on all phases of swimming pool development and operation from earliest planning considerations to final programming. Both indoor and outdoor pools for community, school, and competitive use receive attention. Information is also given on water circulation, filtration, and treatment; pool equipment and accessories; bathhouses and auxiliary services; and all types of permanent and temporary enclosures.

The Ministry of Housing and Local Government (1962) sets forth technical and engineering data for the design and construction of swimming pools. The document considers site selection, pool construction, comparative merits of combining open air and enclosed pools, and alternative uses. Guidelines describe pool size and use, locker and changing rooms, spectator accommodations, and entrance hall and ancillary spaces.

In addition, a number of technical manuals on swimming pool equipment and filters appear in the bibliography.

American Public Health Association, Inc. Suggested Ordinance and Regulations Covering Public Swimming Pools. New York: 1964. 37 pages. ED 027 709 MF $0.65 HC $3.29.

Gabrielsen, M. Alexander, editor. Swimming Pools. A Guide to Their Planning, Design and Operation. Washington, D.C.: Council for National Cooperation in Aquatics, 1969. 224 pages. ED 033 566 Document not available from EDRS. (Available from Hoffman Publications, Inc., Sunrise Professional Building, Fort Lauderdale, Florida 33304. $12.50 + $0.50.)

Ministry of Housing and Local Government. Swimming Pools. London, England: 1962. 16 pages. ED 035 237 Document not available from EDRS.

National Sanitation Foundation. Diatomite Type Filters for Swimming Pools. Standard No. 9, Revised October, 1966. Ann Arbor, Michigan: 1966. 37 pages. ED 025 900 MF $0.65 HC $3.29. (Also available from National Sanitation Foundation, P.O. Box 1468, Ann Arbor, Michigan 48106. $1.00.)

———. Sand Type Filters for Swimming Pools. Standard No. 10, Revised October, 1966. Ann Arbor, Michigan: 1966. 32 pages. ED 025 899 MF $0.65 HC $3.29. (Also available from National Sanitation Foundation, P.O. Box 1468, Ann Arbor, Michigan 48106. $1.00.)

———. Recessed Automatic Surface Skimmers for Swimming Pools. National Sanitation Foundation Standard Number 11. Ann Arbor, Michigan: 1966. 18 pages. ED 019 842 MF $0.65 HC $3.29. (Also available from National Sanitation Foundation, P.O. Box 1468, Ann Arbor, Michigan 48106. $1.00.)

———. Centrifugal Pumps for Swimming Pools. National Sanitation Foundation Standard Number 17. Ann Arbor, Michigan: Committee for Swimming Pool Equipment Standards, 1967. 30 pages. ED 025 896 Document not available from EDRS. (Available from National Sanitation Foundation, P.O. Box 1468, Ann Arbor, Michigan 48106. $0.50.)

———. Adjustable Output Rate Chemical Feeding Equipment for Swimming Pools. National Sanitation Foundation Standard Number 19. Ann Arbor, Michigan: 1967. 18 pages. ED 019 844 MF $0.65 HC $3.29.

———. Swimming Pool Water Treatment Chemicals and/or Processes. Standard No. 22. Ann Arbor, Michigan: 1968. 42 pages. ED 025 905 Document not available from EDRS. (Available from National Sanitation Foundation, P.O. Box 1468, Ann Arbor, Michigan 48106. $0.50.)

———. 1968 Listing of Swimming Pool Equipment. Ann Arbor, Michigan: Testing Laboratory. 1968. 26 pages. ED 025 904 MF $0.65 HC $3.29. (1973 edition available from National Sanitation Foundation, Testing Laboratory, P.O. Box 1468, Ann Arbor, Michigan 48106. $0.50.)

Clearinghouse Accession Number: EA 004 799

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