

Facility Planning and Design

for Health, Physical Activity, Recreation, and Sport

13th ed.

Thomas H. Sawyer

Editor-in-Chief, Contributor

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健康、身体活动、娱乐与体育设施规划与设计

Thomas H. Sawyer

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This book is dedicated to my grandson, Grayson James Rosselli.

He is a builder at heart and always makes his grandfather proud.



Foreword

As the cost of construction for sports- and health-related facilities skyrockets, it becomes ever more paramount for those who plan, design, construct, and use these facilities to have access to a comprehensive facilities guide. The 13th edition of *Facility Planning and Design for Health, Physical Activity, Recreation, and Sport* is a tool for all professionals involved in facility planning and construction use.

The 21st century is a time of increased interest in health, fitness, recreation, physical activity, and sport. A synopsis of the historical development of this text is important. In 1945, at the board of directors meeting of the American Alliance for Health, Physical Education, Recreation, and Dance (AAHPERD) in Washington, D.C., support was given to a proposal submitted by Caswell M. Miles, AAHPERD vice president for recreation, to prepare a grant to finance a national workshop on facilities. Subsequently, a request for \$10,000 was submitted to and approved by Theodore P. Bank, president of the Athletic Institute, to finance the first workshop. The December 1946 workshop at Jackson's Mill, West Virginia, resulted in the publication of the premiere edition of the *Guide for Planning Facilities for Athletics, Recreation, Physical and Health Education*.

The 1956 edition of the guide was a product of the second facilities workshop, held May 5-12, 1956, at the Kellogg Institute, and was held again January 15-24, 1965, at the Biddle Continuing Education Center, Indiana University in Bloomington. Two years later, April 29-May 8, 1967, another workshop was held at Indiana University. Among those invited were a number of outstanding college and technical personnel engaged in planning and administering programs of athletics, recreation, outdoor education, physical education, and health education. Other planning authorities and specialists receiving invitations included city planners, architects, landscape architects, engineers, and schoolhouse construction consultants.

The 1974 guide was reconstructed in such a way that it would serve as a more practical tool for school administrators, physical education heads, architects, planning consultants, and all others interested in planning new areas and facilities or checking the adequacy of those already in use.

The Athletic Institute and AAHPERD Council on Facilities, Equipment, and Supplies initiated the 1979 revision of the guide. A blue-ribbon steering committee was appointed by the Council. Edward Coates from Ohio State University and Richard B. Flynn from the University of Nebraska at Omaha, were appointed as coeditors and contributing authors.

Professionals well known for their expertise in facility planning, design, and construction were invited to assist in a complete rewrite, which resulted in *Planning Facilities for Athletics, Physical Education, and Recreation*.

The 1985 edition of *Planning Facilities for Athletics, Physical Education, and Recreation* represented a continuing effort on the part of The Athletic Institute and AAHPERD to keep the text current and relevant. Richard B. Flynn was selected to be editor and contributing author. Many of the contributors to the previous edition updated their chapters, and some new material was added.

The American Alliance for Health, Physical Education, Recreation, and Dance published the 1993 edition, entitled *Facility Planning for Physical Education, Recreation, and Athletics*, and Richard B. Flynn again was asked to serve as editor and contributing author. Again, many of the contributors to the previous edition updated their chapters, and some new material was added.

The AAHPERD Council on Facilities and Equipment selected Thomas H. Sawyer of Indiana State University to serve as chair of the editorial committee and editor-in-chief of the 1999 and 2002 editions of *Facilities Planning for Physical Activity and Sport*. Many new contributors were selected to complete a major revision of the text, which resulted in a great deal of new material and many fresh ideas and concepts. The editorial team for both the 1999 and

2002 editions was Thomas H. Sawyer, Ed.D. (Indiana State University); Michael G. Hypes, DA (Indiana State University); Richard L. LaRue, DPE (University of New England); and Todd Seidler, Ph.D. (University of New Mexico). There were 21 authors involved in writing 29 chapters in the 1999 edition, and 21 authors involved in writing 37 chapters in the 2002 edition.

The revised 2013, 13th edition, with Thomas H. Sawyer again serving as editor-in-chief, fulfills the intent of the Council on Facilities and Equipment to update and revise the text on a regular basis. Regularly revising and updating a text of this magnitude is no easy task. Basically, at the completion of one edition, the planning for a new edition begins—therefore never-ending work for the editor, editorial board, and authors. I would like to commend these selfless individuals. With rapid changes in both technology and construction methods, the regular updating of this text is a necessity. This new edition now adds one new chapter.

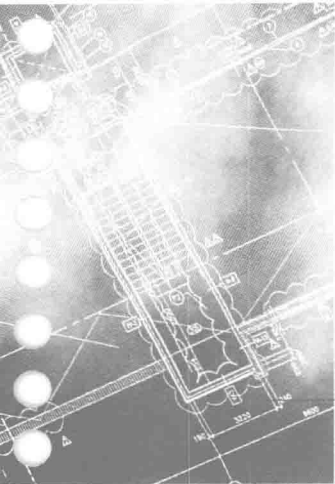
It should be noted that much of the material in this text reflects the composite knowledge of many professionals who have contributed to past AAHPERD text editions, as well as of those individuals who were solicited to serve as authors, editors, and reviewers for the current text. The American Alliance for Health, Physical Education, Recreation, and Dance, the American Association for Active Lifestyles and Fitness (AAALF), and the Council on Facilities and Equipment (CFE) have endorsed this book as one of the best on the topic of planning facilities for sport, physical activity, and recreation.

Having had the pleasure to work closely with Thomas H. Sawyer and the editorial board and the Facilities and Equipment Council and having been an author in four editions of the text, I would at this time give my sincere thanks and appreciation to all of those involved in this 13th edition of this text—a job well done! I recommend this edition of *Facility Planning and Design for Health, Physical Activity, Recreation, and Sport* as the most comprehensive source guide for planning, designing, and constructing facilities related to health, physical activity, and sport.

From its inception, this text has been a milestone resource for sports and physical activity facility designers, users and managers. Each edition builds on and adds to the field of knowledge in sport and physical activity facility design, planning, and construction. I give my highest endorsement to this 13th edition of the “bible” for facility designers and planners.

With gratitude,

Edward (Ed) Turner, PhD
Professor Emeritus
Department of Health, Leisure and Exercise Science
Appalachian State University



Acknowledgments

Appreciation is expressed to the editorial committee members of the Council for Facilities and Equipment (CFE) for assuming initial responsibility for outlining the content and chapters for the text and selection of the chapter authors. While some served as authors/editors for specific chapters in the text, all served as reviewers for assigned chapter drafts. The editorial committee members for the 13th edition consisted of:

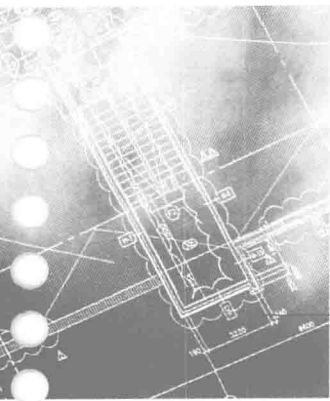
- Dr. Thomas H. Sawyer, NAS Fellow, Chair and Editor-in-Chief, Contributor, 1999-2014 (9th, 10th, 11th, 12th, and 13th editions), Indiana State University, Chair CFE, 1995-97
- Dr. Julia Ann Hypes, Morehead State University, Chair CFE, 2007-08
- Dr. Michael G Hypes, Morehead State University, Chair CFE, 2008-2009
- Dr. Jeffrey C. Peterson, Baylor University, Chair CFE, 2005-07

We are indebted to a number of authoritative sources for permission to reproduce material used in this text:

- The National Collegiate Athletic Association (NCAA) for permission to reproduce drawings from selected 1997 NCAA rulebooks. It should be noted that these specifications, like others, are subject to annual review and change.
- Athletic Business for permission to reprint selected drawings.
- Selected architectural firms for supplying photographs, line drawings, artists renderings, and other materials.

Special recognition is due to those professionals who served as chapter authors or assistant editors, including Kimberly Bodey, Mark Cryan, Steven Dalcher, Tonya Gimbert, Bernie Goldfine, Susan Hudson, Julia Ann Hypes, Michael G. Hypes (Contributor and Assistant Editor), Lawrence W. Judge, Richard LaRue, David LaRue, John Miller, Jeffrey Peterson, Donald Rogers, Gary Rushing, Todd Seidler, Donna Thompson, LeLand Yarger, Hal Walker, Todd Weaver, and Jason Winkle. These individuals worked diligently to present chapter material in an informative and useful manner.

Without great assistance from a number of very special and important folks, this book would not have been possible: Julia Ann Hypes, who was responsible for the glossary and author information; Meghan “Muffin” Sawyer Rosselli for her graphic and photography expertise; and Susan Davis and Amy Dagit of Sagamore Publishing for invaluable advice, counsel, patience, and encouragement during the final edit and design of the manuscript.



Prologue

Todd Seidler, *University of New Mexico*

Bernie Goldfine, *Kennesaw State University*

Have you ever seen a facility with so many design problems that it left you shaking your head in disbelief? Each facility presents its own unique design challenges; if these challenges are not addressed and overcome, the result is a facility with design problems. Typically, the larger a building project, the greater the likelihood that mistakes will be made in the planning and design process. Often, details are overlooked, and sometimes even major mistakes are made in the planning process and not discovered until after the facility is built and opened for use. For example, most of us have seen buildings with poor lighting, ventilation, or access control that could have been prevented with appropriate planning. In particular, one of the most common design flaws in recreational, physical education, and sports facilities is a lack of proper storage space. Surely, we have all visited buildings where hallways, classrooms, and even activity spaces were used for temporary or permanent storage of equipment.

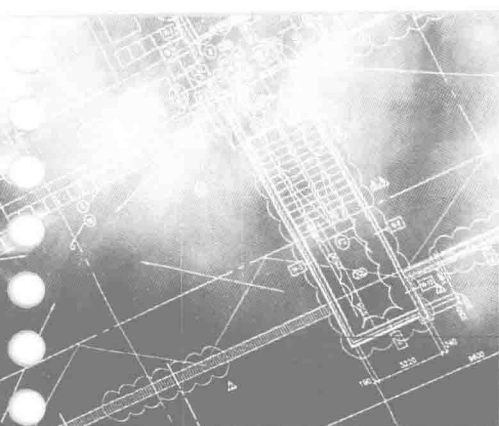
Inadequate planning has resulted in countless design flaws in sports and recreation facilities. Can you imagine a high school football team playing on an 80-yard football field? What about a recreation center with access to the locker rooms available only by crossing the gym floor? Do you believe a facility designer would locate a locker room toilet one foot lower than the septic field it was supposed to drain into? How about a gymnasium with large picture windows directly behind the basketball backboards? And how safe is an indoor track constructed as part of a pool deck that has water puddles present in every running lane? Impossible? Unfortunately, it is not.

These “building bloopers” are real and not as uncommon as we would like to believe. Such mistakes can be embarrassing, expensive, amazing, and sometimes humorous (if it is not your facility). These and many other design errors can usually be traced to insufficient planning. An example of an outrageous building blooper is Olympic Stadium in Montreal. Constructed as the track and field site for the 1976 Montreal Olympics, it has yet to be completed satisfactorily. Originally estimated to cost about \$60 million, the price thus far is in excess of \$1 billion.

Building bloopers are often caused by devoting insufficient time, effort, and/or expertise to the planning process. The earlier in the process that mistakes are discovered and corrected, the less they will cost to rectify. It is inexpensive to change some words on a paper, somewhat more expensive to change lines on a blueprint, and outrageously expensive or even impossible to make changes once the concrete has been poured. Furthermore, the impact of a poorly designed building is staggering when compared with other management problems. Problematic staff can be relieved of their responsibilities. Funds can be raised for underfinanced programs. However, the consequences of a poorly designed building will have to be endured for decades. Therefore, it is essential to devote all available resources early in the planning process.

All too often, facilities are planned without in-depth consideration of the programs that they will support. Basically, a facility is a tool. The better it is planned, designed, and constructed, the better it will support the objectives of the programs it will house. Strange as it may seem, sport facilities often are designed without a great deal of consideration given to programming and user desires. Aesthetics, the interests of one popular sport or program at the time, or the personal desires of decision-makers may, in fact, dictate the design of the facility. Implementing a new program in an existing or poorly planned facility often requires designing the programs based on the limitations of the facility. Poorly designed venues may limit or even prevent some activities from taking place. Conversely, a well-designed facility will support and enhance the desired programs. Planning and building a new facility is a great opportunity to ensure that it will optimally support these programs. Furthermore, well-planned venues allow for flexibility when the popularity of activities and user demand fluctuate. Planned with an eye toward future trends, these facilities are designed to be easily altered so that new activities can be added as needs change.

This book is intended to provide a basic understanding of the planning and design process as well as the unique features of many different areas and types of facilities. Although there is no such thing as a perfect building, with significant time, effort, and expertise devoted to the planning and design process, future building bloopers can be kept to a minimum. It is hoped that those of you involved with the planning of sports facilities will find this book to be a significant resource.



Contents

Foreword	ix
Acknowledgments	xi
Prologue	xiii
Todd L. Seidler, University of New Mexico	
Bernie Goldfine, Kennesaw State University	

Section I Common Facility Components

1	Planning Facilities: Master Plan, Site Selection, and Development Phases	3
	Thomas H. Sawyer, <i>Indiana State University</i>	
	Michael G. Hypes, <i>Morehead State University</i>	
	Tonya L. Gimbert, <i>Indiana State University</i>	
2	Planning Facilities for Safety and Risk Management.....	21
	Todd L. Seidler, <i>University of New Mexico</i>	
3	Sustainable Design, Construction, and Building Operations	29
	Rick Gonzales, <i>University of Wisconsin, Eau Claire</i>	
	Jeffrey C. Petersen, <i>Baylor University</i>	
4	Universal and Accessible Design: Creating Facilities That Work for All People.....	39
	Richard J. LaRue, <i>University of New England</i>	
	Donald Rogers, <i>Indiana State University</i>	
5	Electrical, Mechanical, and Energy Management	49
	Richard J. LaRue, <i>University of New England</i>	
	Thomas H. Sawyer, <i>Indiana State University</i>	
6	Ancillary Areas.....	71
	Jeffrey C. Petersen, <i>Baylor University</i>	
	Rick Gonzales, <i>University of Wisconsin, Eau Claire</i>	
7	Graphics and Signage.....	95
	Michael G. Hypes, <i>Morehead State University</i>	
	Julia Ann Hypes, <i>Morehead State University</i>	
	Mark Cryan, <i>Elon University</i>	

8	Indoor and Outdoor Surfaces	107
	Hal Walker, <i>Elon University</i>	
	Tony Weaver, <i>Elon University</i>	

9	Landscape Design, Sports Turf, and Parking Lots	125
	Richard J. LaRue, <i>University of New England</i>	
	David A. LaRue, <i>Landscape Designer</i>	
	Thomas H. Sawyer, <i>Indiana State University</i>	

Section II Field and Court Specifications

10	Indoor and Outdoor Courts	141
	Bernie Goldfine, <i>Kennesaw State University</i>	

11	Field Spaces	163
	Thomas H. Sawyer, <i>Indiana State University</i>	
	Tonya L. Gimbert, <i>Indiana State University</i>	

12	Bleachers.....	179
	Michael G. Hypes, <i>Morehead State University</i>	

Section III Recreational Spaces

13	Aquatic Facilities.....	187
	Leland Yarger, <i>Ball State University</i>	
	Steven Dalcher, <i>Water LLC</i>	

14	Playgrounds.....	201
	Donna Thompson, <i>University of Northern Iowa</i>	
	Susan Hudson, <i>University of Northern Iowa</i>	

15	Designing Facilities for Parks and Recreation	215
	Kimberly J. Bodey, <i>Indiana State University</i>	
	John H. Pommier, <i>Indiana State University</i>	
	Thomas H. Sawyer, <i>Indiana State University</i>	

16	Campus Recreational Sports Centers	237
	Thomas H. Sawyer, <i>Indiana State University</i>	
	Tonya L. Gimbert, <i>Indiana State University</i>	

17	Strength and Cardiovascular Training Facilities	243
	Lawrence W. Judge, <i>Ball State University</i>	

18	Adventure Programming Facilities	265
	Donald Rogers, <i>Indiana State University</i>	

19	Skateparks, Roller Skating Rinks, and Winter Sports Areas	281
	Thomas H. Sawyer, <i>Indiana State University</i>	
	Tonya L. Gimbert, <i>Indiana State University</i>	
20	Camps	295
	Thomas H. Sawyer, <i>Indiana State University</i>	
	Tonya L. Gimbert, <i>Indiana State University</i>	

Section IV Specialty Areas

21	Track and Field and Cross-Country Facilities.....	305
	Lawrence W. Judge, <i>Ball State University</i>	
	Thomas H. Sawyer, <i>Indiana State University</i>	
22	Designing Facilities for K-12 Health, Physical Education, and Driver Education	323
	Thomas H. Sawyer, <i>Indiana State University</i>	
	Tonya L. Gimbert, <i>Indiana State University</i>	
23	Developing Combative Areas for Boxing and Martial Arts.....	343
	Jason Winkle, <i>Indiana State University</i>	
	Thomas H. Sawyer, <i>Indiana State University</i>	
24	Equestrian Spaces.....	353
	Michael G. Hypes, <i>Morehead State University</i>	
	Julia Ann Hypes, <i>Morehead State University</i>	
25	Athletic Training Facilities	361
	Michael G. Hypes, <i>Morehead State University</i>	
26	Shooting Facilities: Archery, Rifle, and Pistol.....	373
	Jason Winkle, <i>Indiana State University</i>	
27	Dance Spaces	383
	Thomas H. Sawyer, <i>Indiana State University</i>	

Section V Trends, History, and Standards

28	Design Trends in Stadiums and Arenas, 1975–2012	393
	Todd L. Seidler, <i>University of New Mexico</i>	
	John J. Miller, <i>Troy University</i>	
29	Trends in Equipment and Supplies, 1975-2012.....	407
	Jeffrey C. Petersen, <i>Baylor University</i>	
30	History of the Council on Facilities.....	419
	Thomas H. Sawyer, <i>Indiana State University</i>	
	Michael G. Hypes, <i>Morehead State University</i>	

31	Equipment and Facility Design Standards	427
	Thomas H. Sawyer, <i>Indiana State University</i>	
	Tonya L. Gimbert, <i>Indiana State University</i>	
	Appendices	435
A	Planning Checklist for Indoor and Outdoor Spaces	435
B	Existing Facility Assessment and Future Planning Checklist	441
C	Indoor Activity Area Planning Checklist	442
D	Indoor Activity Dimensions	446
E	Park and Recreation Open Space Standards	447
F	Metric Conversion Formulas	460
G	Associations Pertinent to Planning	461
H	Associations Pertinent to Planning for Accessibility	463
I	Retrofitting or Replacing Facilities	464
J	Facility Maintenance	466
	References	475
	Glossary	486
	About the Authors.....	497
	Index	502

Section I

Common Facility Components



Planning Facilities

Master Plan, Site Selection, and Development Phases

Thomas H. Sawyer, *Indiana State University*

Michael G. Hypes, *Morehead State University*

Tonya L. Gimbert, *Indiana State University*

Anyone who has been involved in facility planning and development understands that errors are common during the planning and development process. The challenge is to complete a facility project with the fewest number of errors. Before becoming too deeply involved in the planning and development process, it is important to review

some of the common errors that have been made in the past (Conklin, 1999). Conklin (1999), Farmer, Mulrooney, and Ammon (1996), Frost, Lockhart, and Marshall (1988), and Horine and Stotlar (2002) suggested these errors include, but are not limited to (see photos on p. 5), (1) failure to provide adequate and appropriate accommodations for

25 Years of Indoor Innovations

According to Dennis Read (2013), it is extremely hard not to be amazed by all the new features facilities offer spectators and players. This is a list of the top 25 innovations in indoor facilities since 1989:

1. Video scoreboards
2. Unbreakable basketball goals
3. Bleacher seats with full backs, comfortable cushions, armrests, cup holders, and seats that fold
4. Portable basketball goals
5. Wood lockers
6. Synthetic gymnasium floors
7. Green floor finishes
8. Enhanced sound systems
9. Volleyball posts
10. Game clocks that stop and start on the official's whistle and shot clocks
11. Automated delivery of pool chemicals
12. Scoring tables with high-definition messages through LED lighting
13. Wall mats
14. Energy efficient lights
15. Practice structures
16. Gymnasium dividers
17. Customized sideline chairs
18. Indoor track surfaces
19. Antimicrobial locker rooms
20. Bleacher safety
21. Antimicrobial indoor surfaces
22. Wireless scoreboard controls
23. Floor and wall graphics
24. Faster pools with larger gutter systems and improved lane lines to reduce turbulence
25. Floor cover storage

(Source: Summarization of "Indoor Innovations," by D. Read, 2013, *Athletic Management*, 25(2), 55–61)

persons with disabilities throughout the facility; (2) failure to provide adequate storage spaces; (3) failure to provide adequate janitorial spaces; (4) failure to observe desirable current professional standards; (5) failure to build the facility large enough to accommodate future uses; (6) failure to provide adequate locker and dressing areas for both male and female users; (7) failure to construct shower, toilet, and dressing rooms with sufficient floor slope and properly located drains; (8) failure to provide doorways, hallways, or ramps so that equipment may be moved easily; (9) failure to provide for multiple uses of facilities; (10) failure to plan for adequate parking for the facility; (11) failure to plan for adequate space for concessions and merchandising; (12) failure to provide for adequate lobby space for spectators; (13) failure to provide for an adequate space for the media to observe activities as well as to interview performers; (14) failure to provide for adequate ticket sales areas; (15) failure to provide adequate space for a loading dock and parking for tractor trailers and buses; (16) failure to provide adequate numbers of restroom facilities for female spectators; (17) failure to provide adequate security and access control into the facility and within the facility; (18) failure to provide adequate separation between activities (buffer or safety zones) in a multipurpose space; (19) failure to provide padding on walls close to activity area, as well as padding and/or covers for short fences, on goal posts, and around trees; (20) failure to plan for the next 50 years; (21) failure to plan for maintenance of the facility; (22) failure to plan for adequate supervision of the various activity spaces within the facility; and (23) failure to plan to plan.

Planning Facilities for Health, Fitness, Physical Activity, Recreation, and Sports

The planning process defined in this chapter should be used for planning any of the following facilities/venues:

- stadiums for baseball, football, soccer, softball, or track and field;
- arenas for basketball, football, or ice hockey;
- gymnasiums for public and private schools, colleges and universities, YMCAs, YWCAs, or Boys and Girls Clubs;
- natatoriums (indoor aquatic centers);
- outdoor aquatic centers;
- municipal parks and recreation areas;
- skateboard parks; and
- adventure areas, including rope courses, challenge courses and climbing walls, and combative areas.

Furthermore, the process should include a planning committee, a master plan, a predevelopment review, a facility checklist, and site selection and development phases.

Development of a Master Plan

Master planning is a decision-making process that promotes changes that will accommodate new and revised needs and will search for ways to improve existing conditions. The master plan is critical during periods of excess and limited resources. The planning process can and does change attitudes about the needs and utilization of current assets, as well as provides a way for communicating with the stakeholders.

The master planning process requires coordination, organization, and integration of program, financial, and physical planning. Such planning is cyclical in nature and requires the architectural, strategic, and master planning staff to develop and implement procedures and schedules to ensure that the various activities occur in the proper sequence (see Figure 1.1).

Another important characteristic of the master planning process is its ability to respond to changing needs. It must be a flexible and dynamic plan so that it is easy to amend, taking into consideration future projections as reflected by the realities of the present and the absolutes of the past. This means the process will be more important than the eventual product.

Master planning is a process structured to promote cost-effective development decisions that best serve the goals and objectives of the organization. The process operates on the premise that the development of facilities and their ongoing management can best serve specific program needs if the organization's standards of space planning, facilities programming, design, and construction management are closely linked.

Typical Phases of a Master Plan

The master plan can be used to answer three common questions: Where are we? Where do we want to go? How do we get there? This approach is flexible to allow the individual organization to reflect local conditions, priorities, and emphases.

Establishment of an Ad Hoc Program Committee and a Plan for Planning

The organization's ad hoc planning advisory committee (sometimes called the program committee) should be composed of

- program specialists,
- end users,
- financial consultants,
- maintenance personnel,
- community representatives,