This book is dedicated to my daughter, Jacqueline “Jacs” Teresa Sawyer.

She keeps her Daddy young at heart.
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As the cost of construction for sports and health-related facilities skyrockets, it becomes paramount for those who plan, design, construct, and use these facilities to have access to a comprehensive facilities guide. The 14th 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 co-editors 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 (9th) and 2002 (10th) editions was: Thomas H. Sawyer, Ed.D. (Indiana State University), Michael G. Hypes, DA (Indiana State University), Julia Ann Hypes, Ph.D. (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 9th edition, and 21 authors involved in writing 37 chapters in the 10th edition.
In 2005, the 11th edition was published followed by the 12th edition in 2009 and the 13th edition in 2013, all with Dr. Sawyer again serving as editor-in-chief and the same editorial team, fulfilling 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. At the completion of one edition, the planning for a new edition begins—therefore never-ending work for the editor, editorial board, and authors. We would like to commend these selfless individuals for their continued support and contributions to this project. With rapid changes in both technology and construction methods, the regular updating of this text is a necessity. Unfortunately, under the new SHAPEAmerica organizational structure, the Council on Facilities and Equipment was disbanded. However, this group of professionals remains dedicated to providing relevant and up-to-date content on sport and physical activity facilities. This 14th edition has the same editor-in-chief and most of the same authors as well as two new chapters: (1) Facility Maintenance and (2) Planning for Facility Security.

Having had the pleasure to work closely with Dr. Sawyer and the editorial board (10 years) and the Facilities and Equipment Council (23 years) and having been authors in four editions of the text, we would at this time give our sincere thanks and appreciation to all of those involved in this the 14th edition of this text—a job well done! We recommend this edition of *Facility Planning and Design for Health, Physical Activity, Recreation and Sport* as the most comprehensive source guide for planning, designing, constructing, and managing facilities related to health, physical activity, and sport.

From its inception, this text has been a milestone resource for sport and physical activity facility designers, users, managers, and educators. Each edition builds on and adds to the field of knowledge in sport and physical activity facility design, planning, and construction. We give our highest endorsement to this 14th edition of the “bible” for facility designers and planners.

With gratitude,

*Julia Ann Hypes, Ph.D.*
*Michael G. Hypes, D.A.*
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Morehead, Kentucky
Acknowledgments

Appreciation is expressed to the Editorial Committee members. The Editorial Committee members for the 14th edition consisted of:

Dr. Thomas H. Sawyer, Chair, Editor-in-Chief, and Contributor, Emeritus Professor, Indiana State University
Dr. Steven Dalcher, Taylor University
Dr. Andrew Gallucci, Baylor University
Dr. Bernie Goldfine, Kennesaw State University
Dr. Lawrence W. Judge, Ball State University
Mr. David A. LaRue, Landscape Designer
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Dr. Craig Morehead, Indiana State University
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Dr. Donald Rogers, Indiana State University
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Dr. Todd L. Seidler, University of New Mexico
Dr. Brad Stinnett, Western Kentucky University
Dr. Jason Winkle, Monroe County YMCA
Mr. Leland Yarger, Ball State University

Special recognition is due to these professionals above who also served as chapter authors. These individuals worked diligently to present chapter material in an informative and useful manner.

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

— The National Collegiate Athletic Association (NCAA) and the National Federation of High School Associations (NFHS) for permission to reproduce drawings from selected 2018 NCAA and NFHS 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.

Without great assistance from a number of very special and important folks, this book would not have been possible: Tonya Sawyer, who was responsible for the glossary and author information; Meghan “Muffin” Sawyer Rosselli for her graphic and photography expertise; and Sagamore Publishing for invaluable advice, counsel, patience, and encouragement during the final edit of the manuscript, especially Susan Davis.
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 does a shower room floor made from terrazzo (very slick when wet) get designed and built? Or Charlotte Coliseum, that was torn down before it was 19 years old because its lack of luxury suites and premium seating put the NBA Hornets at such a financial disadvantage that they moved to New Orleans. 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 (The Big O) 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 $1.4 billion and has been renicknamed “The Big Owe.”

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 demands fluctuate, new trends occur or technology changes. 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.

Todd Seidler
University of New Mexico

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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; Sawyer, 2013). Conklin (1999), Farmer, Mulrooney, and Ammon (1996), Frost, Lockhart, and Marshall (1988), Horine and Stotlar (2002), and Sawyer (2013) suggested these errors include, but are not limited to (1) failure to provide adequate and appropriate accommodations for 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

Chapter 1
Planning Facilities Master Plan, Site Selection, and Development Phases

Thomas H. Sawyer, Emeritus Professor, Indiana State University
Tonya L. Sawyer, Indiana State University
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. Finally, the pictures clearly show examples of the “Dos” and Don’ts” related to facility safety.

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 new or renovated facilities/venues:
- Stadiums for baseball, football, soccer, softball, or track and field
- Arenas for basketball or ice hockey
- Gymnasiums for public and private schools, colleges and universities, YMCAs, YWCAs, or Boys & Girls Clubs

30 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

**Dos**

This is an example of proper use of safety fencing for a baseball or softball shelter. The fence in front of the shelter extends from ground level to the top of the roof of the shelter. Notice the 5-ft. fence has a protective cover.

This is an example of proper use of a protective covering for a short fence that provides a greater measure of safety for the players.

This is a good example of proper design with a warning track, 8-ft. fence with protective covering, and a wind screen.

**Don’ts**

This is an example of an unsafe fence without a protective covering for a short fence.

This is an example of a proper 10-ft. safety buffer zone, but with an unprotected wall. This wall should be covered with mats under the basket.

This is an example of poor planning with the exit doors located directly behind the basketball backboard.
- Natatoriums (indoor aquatic centers)
- Outdoor aquatic centers
- College and university recreation centers
- Private for-profit recreation and sport facilities
- Roller skating facilities
- Summer youth camps
- Field hockey, football, lacrosse, and soccer
- Municipal parks and recreation areas
- Skateboard parks
- Adventure areas, including rope courses, challenge courses and climbing walls, and combative/wrestling areas

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

---

*Figure 1.1.* Facilities Master Plan (Source: White & Karabetsos, 1999; Sawyer, 2002, 2005, 2009, 2013)
Planning Facilities Master Plan, Site Selection, and Development Phases

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. There are four typical phases of a master plan including the following:

1. Establishment of an ad hoc program committee and a plan for planning
2. Organization briefings and initiation of the organization master plan studies
3. Identification and confirmation of the organization’s goals and objectives
4. Synthesis and evaluation of findings

**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 these members:

- Program specialists
- End users
- Financial consultants
- Maintenance personnel
- Community representatives
- Management representatives
- Facility consultants
- Risk management and safety consultants

The role of the planning advisory committee includes representing all of the organization’s constituencies; overseeing and reviewing the ongoing work; communicating with the various stakeholders about the work in progress, findings, and results; validating the process; resolving unsettled issues; and endorsing the results and forwarding the master plan for approval.

The committee should be assisted by the office staff within the organization, who should keep the senior administration advised of the ongoing work, coordinate and schedule the planning efforts, serve as committee recorder, assist in communicating the ongoing work to the stakeholders, and represent the committee at planning work sessions and related meetings.

**Organization Briefings and Initiation of Organization Master Plan Studies**

The committee should organize and schedule information meetings to (a) notify the organization and the community of the organization’s planning activity, purpose, method, and schedule; (b) solicit immediate concerns, comments, and suggestions; (c) encourage participation in the planning process and identify organization or community issues; and (d) identify the planning staff who will be available for further discussions of these and related matters.

**Identification and Confirmation of the Organization’s Goals and Objectives**

Now detailed planning can begin with three concurrent studies: development of an organization profile, identification of capital improvements, and analysis of existing conditions. The development of the organization’s program statement is intended to generally describe the organization’s niche (see Figure 1.2). The statement should include, but not be limited to, a brief history of the organization; the organization’s mission; the organization’s programs, products, and services; the administrative structure; critical issues and strategic responses; goals and objectives for the organization; details about clientele; an outline of short-range planning, mid-range planning, and long-range planning; and other programmatic features that describe the organization as a distinctive operational entity (see Table 1.1). The statement should conclude with a descriptive overview of how the existing situation is expected to change strategically during the period covered by the proposed organization master plan and the implications and consequences such changes may have on the physical development of the organization.

It is important to compile a 10-year listing of projected capital improvements for the organiza-
Capital improvement items should include buildings, landscape, circulation (i.e., pedestrian and vehicular traffic), infrastructure (i.e., chilled air, electricity, roadways, sewage, sidewalks, steam, telecommunications, water, etc.), land acquisition, and actions that will change and modify the existing physical plant (e.g., new state highway right-of-way).

The objective of the survey of existing conditions is to discover and describe elements that, in combination, typically create, inform, and/or express the organization as a physical place designed and operated for a specific purpose and located in a setting that has tangible physical characteristics. Certain items should be identified and defined in graphic and narrative formats so as to describe location, function, and physical character of elements. Such items include land ownership, land forms and topography; microclimate, soils and related subsurface conditions; recreational, social, and cultural patterns; land use; building use; buildings rated by physical condition; building entrances, exits, and service points; pedestrian and vehicular circulation systems; public transportation; parking; landscapes; ecological and natural settings, views, vistas, and related design features; major utilities by location, type, and condition; site history and heritage; site and building accessibility; and site and building problems.

**Synthesis and Evaluation of Findings**

After an ad hoc planning advisory committee is established, briefings are completed and plan studies are initiated, and master plan goals and objectives are identified and confirmed, it is time to synthesize and evaluate those findings. This effort should begin to clarify issues and opportunities that the organization should address and should establish and confirm the direction of the master plan. The issues and opportunities that should surface during the synthesis and evaluation effort relate to the following:

- The organization’s image
- A sense of place for the improvements

![Program Statement (Education Specifications)](image-url)
Table 1.1
Sample Building Program Statement Outline

**Part I. Objectives of the Programs**
- a. Instructional (professional service)
- b. Recreational sports
- c. Adapted activities
- d. Athletics (interscholastic and intercollegiate)
- e. Club sports
- f. Community/school programs
- g. Others

**Part II. Basic Assumptions to be Addressed**
- a. Facilities will provide for a broad program of instruction, adapted activities, intramural and other sports
- b. Demographics of the population who will use the facility
- c. Existing facilities will be programmed for use
- d. Basic design considerations. What is most important?
- e. Facility expansion possibilities will be provided for in the planning
- f. Outdoor facilities should be located adjacent to indoor facilities
- g. Consideration will be given to administration and staff needs
- h. Existing problems
- i. Others

**Part III. Comparable Facility Analysis**
- a. Visit comparable facilities that have been recently constructed
- b. Compare cost, design features, etc.

**Part IV. Factors Affecting Planning**
- a. Federal and state legislation
- b. Club sports movement
- c. The community education or “Lighted School” program
- d. Surge of new noncompetitive activities being added to the curriculum
- e. Expansion of intramural sports and athletic programs
- f. Sharing certain facilities by boys and men and girls and women (athletic training rooms and equipment rooms)
- g. Coeducational programming
- h. Emphasis on individual exercise programs
- i. Physical fitness movement
- j. Systems approach in design and construction
- k. New products
- l. Others

**Part V. Explanation of Current and Proposed Programming**
- a. Instructional
- b. Intramural sports
- c. Club sports
- d. Adaptive programs
- e. Community/school
- f. Recreational programs
- g. Priority listing of programs
- h. Others

**Part VI. Preliminary Data Relative to the Proposed New Facilities**

• Existing and new initiatives that may require new building(s) and infrastructure, improvements and revitalization of existing physical resources, and potential demolition
• The expansion of present facilities, which should occur only after careful and thorough evaluation of projected needs and capabilities of existing facilities
• The following approaches, which are listed in priority order, and which are generally considered the most appropriate way to proceed with the program requirements: (1) higher usage of existing space, (2) renovation of existing structures, (3) infill (i.e., adding vertically or horizontally to existing structures), and (4) expansion of facilities into new areas on the organization’s site.

The master plan, during this phase, needs to consider generally accepted land use guidelines such as (1) the highest and best use should be made of all land, (2) land use conflicts should be avoided (i.e., neighboring residential and commercial areas), (3) areas should complement each other and promote a visual interest and functionally fit the remainder of the organization's site, (4) facilities should be constructed only on sites that best meet programmatic and environmental objectives of the organization, and (5) the organization should develop a no-build policy relating to the preservation of historic sites or open spaces.

Furthermore, the master plan should contain goals and objectives for circulation and transportation on the organization’s site. These goals and objectives should include, but not be limited to, (1) general access to the organization, (2) vehicular circulation, (3) parking, (4) pedestrian and bicycle circulation, and (5) transit.

Another extremely important aspect of the master plan is the utilities and service elements. A consolidated utility system consistent with the projected needs of the organization should be developed. This system should be designed for simplicity of maintenance and future needs for extension or expansion of the utility network.

The master plan should consider the landscape design. The primary landscape goal for the campus should be to present an image with a high degree of continuity and quality. The landscape design should consider the organization's buildings and grounds, accessibility issues, fire, security, energy conservation, and desired development beyond the organization's property line.

**Steps Specially for an Organization Planning a New Facility**

The following steps assume an organization is planning a new facility from the ground up:

**Regional Analysis**

Sufficient data must be gathered about the off-site surroundings to ensure that the project will be compatible with surrounding environments, both man-made and natural. This part of the design process is referred to as the regional analysis. It should include the following:

• Service area of the facility under construction (i.e., major facilities such as parks, large commercial areas facilities, and minor facilities such as children’s playgrounds, senior citizen centers, local library, etc.)
• User demand (i.e., determine the kind of use clients desire, activity interests, demographic makeup of residents, and local leadership and calculate the number of users)
• Access routes (i.e., major and secondary routes)
• Governmental functions and boundaries (i.e., contact the local planning agency and local government offices)
• Existing and proposed land uses (i.e., gather information about abutting land ownership, adjacent land uses, land use along probable access routes, off-site flooding and erosion problems, off-site pollution sources, views [especially of aesthetic and historic interest], and significant local architectural or land use characteristics), and
• Regional influences (i.e., check for anything unusual or unique that could either enhance or cause problems to the project)
Site Analysis

The planning committee will need to consider various pieces of information prior to selecting the building site. The considerations for site selection (Flynn, 1985; Sawyer, 2002, 2005, 2009; White & Karabetsos, 1999) include the following:

- Access to the site (i.e., ingress and egress, surrounding traffic generators, accessibility via public transportation)
- Circulation within the site (e.g., roads—paved and unpaved—bicycle trails, walking and hiking trails)
- Parking
- Water supply
- Sewage disposal
- Electrical service
- Telecommunication service
- Other utilities, including oil/natural gas transmission lines or cable TV
- Structures to be constructed or renovated
- Environmental concerns and conditions on and off property (e.g., noise, air, water, and visual pollution)
- Easements and other legal issues (e.g., deed restrictions, rights-of-way, and less than fee simple ownership)
- Zoning requirements (i.e., changing the zoning is usually time consuming and expensive and frequently not possible)
- Historical significance
- Any existing uses (activities) on the site
- Climactic conditions prevalent in the area by season (e.g., temperature; humidity; air movement velocity, duration, and direction; amount of sunshine; precipitation—rain, sleet, snow; sun angles and subsequent shadows; special conditions—ice storms, hurricanes, tornadoes, heavy fog, heavy rainstorm, floods, and persistent cloud cover)
- Nuisance potentials (children nearby, noise, etc.)
- Natural features (e.g., topography, slope analysis, soil conditions, geology, hydrology, flora and fauna)
- Economic impact of a site (e.g., labor costs, growth trends, population shifts, buying power index, available workforce, property taxes, tax incentives, surrounding competition, utility costs, incentives, area of dominant influence, designated market area, and established enterprise zones)
- Natural barriers and visibility
- Supporting demographics (age, gender, occupation, marital status, number of children, expenditures, education, income, number of earners in the family, ethnic background, etc.) and psychographics (e.g., lifestyle data or lifestyle marketing)
- Security concerns (e.g., proximity of police, fire, emergency medical personnel, hospitals)

The most important aspects of site selection are location, location, and location. If the site is not in the most accessible location with a high profile for people to recognize, the success of the venture will be negatively affected.

Typical Steps in Planning for New or Renovated Facilities

The following are the typical seven planning steps apply to both new ventures and established organizations planning major overhauls (Flynn, 1985; Fogg, 1986; Miller, 1997; Sawyer, 2002, 2005, 2009, 2013; White & Karabetsos, 1999):

1. **Master plan agenda.** The master plan agenda is a specific list of issues, opportunities, and projected physical improvements. The plan will include the number and type of structures to be constructed or renovated, the estimated capital costs over a set period of time, approximate locations of new structures, and probable priority to be considered in the preparation of the master plan (see Figure 1.3).

2. **Review and discussion.** This step offers the organization and its stakeholders the opportunity to review and comment on the work completed on the master plan to date. The planning committee should be present at these open forums to answer questions and understand the issues and concerns raised. The presentations for these open forum meetings should include the following:
A description of the process
A summary of the organization’s profile
A review of the projected capital improvements
A summary of the surveys and analysis of existing conditions
An accounting of issues and opportunities
A list of items on the master plan agenda

- A description of the next steps in the planning process

The committee should review and evaluate all reactions and concerns raised at the meeting(s). Then the committee should determine appropriate modifications to the master plan.

3. Preparation of the draft master plan.
The preliminary master plan should be expressed in both general and specific terms. The former is intended to communicate
the major features of the campus plan. The latter view enriches the vision by showing in greater detail the character, justification, feasibility, and phasing of selected significant improvements. The following components typically appear in a master plan: (1) new construction; (2) building and site reconstruction, renewal, and demolition; (3) revisions to and extension of the circulation systems; (4) new and improved landscape projects; (5) parking patterns; (6) transportation proposals; (7) infrastructure projects; (8) joint organization and community development; (9) drawings and illustrations; (10) block models; (11) organization design guidelines for buildings and building materials; and (12) landscape guidelines including views, boundary identification, major entrances and exits, service entrances and exits, building sites, vehicular and pedestrian circulation systems, parking, water features, rock formations, gardens, open spaces, and passive or recreational spaces.

4. Review of preliminary plan. The planning committee will present the preliminary plan to the organization’s constituencies, administration, board, and community at large. These groups will review the preliminary plan. After careful review, a combined report will be generated with suggested modifications and justifications for the modifications.

5. Revision of the master plan to obtain consensus and approval. After the preliminary plan review has been completed, the master plan should be revised to include recommended changes from the stakeholders. The revised plan should be published and distributed as a draft master plan for use in the plan approval process. The master plan remains a dynamic and flexible document even after approval.

6. Documentation and dissemination of the master plan. The ad hoc planning advisory committee is transformed into a standing planning advisory committee with the following responsibilities: (1) serve as a conduit for the organization’s community to present issues and suggestions regarding the master plan; (2) review all capital expenditure projects; (3) confirm conformance to the campus plan; (4) expedite the resolution of nonconformance; (5) review, resolve, and recommend plan amendments; and (6) participate in an annual review of the master plan and cyclical master plan revisions.

7. Master plan amendment process. The master plan will need to be amended periodically to stay current with new trends and developments. The standing planning advisory committee should plan to revise the master plan every 5 years. The process is the same as the original process that established the master plan. The standing planning advisory committee will annually review the master plan. If the administration plans a major new initiative that requires modifying the master plan or a structure or utility fails, the committee can request that the master plan be modified. This recommendation would be forwarded to the administration and board for approval.
ects. The SPR may require some, all, or additional requirements to be met.

1.02 Definitions

**Play area.** For the purposes of this document, the term *play area* shall refer to any place or space specifically and primarily intended for recreational use by children, generally between ages 2 and 12.

**Designer.** The design professional is responsible for the assembly of the documents required to implement the intent of the play area design including construction drawings and specifications. The designer must be licensed in the State of Washington to practice design appropriate to the task, including, but not limited to, architects, landscape architects, and civil engineers. The designer may be a volunteer or a paid consultant or be provided by the SPR.

**Design team.** For the purposes of these guidelines, the design team is a group of interested volunteers and/or paid individuals who have committed to participating in the design process by attending working meetings and public meetings and by performing various research and consensus-building tasks, to achieve a common goal of developing or renovating a play area. The group requires some organization and can consist of any interested parties plus the designer.

1.03 References

The SPR adheres to the standards of several nationally recognized organizations, as well as internal documents where the design, construction, and maintenance of play areas are involved. The following documents are hereby incorporated as part of these guidelines:

A. Published Documents:

B. Other specifications may be provided by city staff, during the course of design and design review, including storm drainage, concrete, irrigation, and others that may be deemed necessary for the acceptable completion of the design of the project.

1.04 Quality Control

The SPR System has play areas in all types of settings, some nestled among trees and others surrounded by downtown traffic. All of the play areas in the system, however, must be considered within the greater urban context. The extent of use is generally higher than you might find within other municipal settings, and the large number of facilities within the system dictates that with sometimes limited resources and high use, maintenance attention can at times be less than ideal. The quality ideal that the SPR aims for in acceptable play area design balances function and aesthetics with safety, accessibility, durability, and maintainability. With these considerations in mind, the following quality control measures must be upheld during the process of designing play areas:

A. Designer Selection

The SPR requires that the design of play areas be performed with the guidance of a professional licensed by the State of Washington to practice design within an area of specialty appropriate to the task. Generally, this has meant an architect, landscape architect, or civil engineer must be retained to assume the responsibility for performing the essential tasks of producing and assembling the documentation necessary to design and construct the play area (refer to PART 2—PRODUCTS).

Selection of a designer is typically as follows:
1. Paid consultant—When a group of interested citizens or the SPR cannot produce an individual who meets the required qualifications, a Request for Qualifications or Proposals (RFQ or RFP) may be issued soliciting the services of a paid consultant.
2. Park staff—Qualified park staff support may be provided on certain projects.
3. Volunteer—An interested party meeting the above qualifications may voluntarily provide the necessary services to see the process through.

B. Public Involvement

The City of Seattle has a blanket policy of public involvement for all public works performed on public property. Generally, this requires that notification be made within the geographic neighborhood or potentially impacted area, followed by a comment period and most often a public meeting where comment and discussion can take place. Public notifications and meetings may be required on multiple occasions depending on the scale and complexity of the project, on new development, or on projects proposing considerable changes to the use or character of public property.

C. Internal SPR Review

The SPR has a system in place for reviewing capital improvements of all types. For play areas, it is expected that the PROVIEW Project Review Committees (composed of administrative, program, and professionals) and Technical Review Committee (composed of technical staff and shops representatives) each have an opportunity to review and comment on the direction and progress of the design process. The scale and complexity of the project will usually have a direct bearing on the number and frequency of review sessions required by each review body.

D. Review by Other City Departments

Depending upon whether various criteria are met, other city departments may require an opportunity to review the direction and progress of the design process or require permitting. These departments may include Public Utilities, Transportation, Design Commission, Arts Commission, Landmarks Board, Public Works, or others.

E. Review by Other Agencies

Although infrequently required for play area design, it may become necessary to submit for review or permit with state or federal agencies, particularly where shoreline, riparian, or other ecologically sensitive, regulated natural systems are involved.

F. Adherence to Accepted Standards for Safety, Accessibility, Durability, and Maintainability

PART 2: PRODUCTS

2.01 General

This section will focus on the physical products required by the SPR during the design process.

2.02 Predesign

Prior to the production of visual representations of the project, it is important to produce the following preliminary documentation to aid in the actual design.

A. Design Program

Generally a planning tool, this document outlines the basic intent of the project and defines certain specific boundaries—physical, regulatory, fiscal, and conceptual—as well as time constraints. This document may include the results of citizen surveys. Citizen groups or the SPR may produce this document directly depending upon the primary funding source.

B. Site Analysis

Assuming a project location has been selected and approved by the SPR, the consultant or design professional will produce, with the aid of park staff and citizen neighbors of the park, a comprehensive analysis of the site. At a minimum, this document will identify existing conditions including solar orientation and wind conditions, vegetation, pedestrian and vehicular traffic patterns, use patterns both formal and informal, known improvements such as surface materials, site furniture, and un-
derground utilities. A common scale of measurement appropriate to the task should be used.

### 2.03 Schematic Design

**A. Preliminary Schematics**

Preliminary schematics are rough sketches showing various options based on requirements and parameters set forth in the design program and site analysis, as well as input at public meetings. Rough estimates of cost to construct should be calculated for each scheme. Review of preliminary sketches by the design team should result in revisions that develop a preferred alternative.

**B. Preferred Alternative**

This is typically a color rendering illustrating the alternative that has drawn the consensus of the design team for use in presentation to the public and various reviewers. This drawing should be proportional and to scale (except reproductions), showing all key elements to be included in the finished project.

**C. Cost Estimate**

As the preferred alternative is developed from the preliminary schematics, an accurate estimate of the cost to construct the project must be maintained.

**D. Approved Schematic Design**

The approved schematic design is a graphic representation and cost estimate of the approved project design intent, as reviewed, revised, and accepted. Often the preferred alternative is an elaborate illustration produced for presentation and cannot easily be revised; however, a photocopy with red-lined revisions reflecting the consensus drawn through the review process and an adjusted cost estimate may be accepted as the approved schematic design. If wholesale revisions have not been required, the preferred alternative may still be used for public presentation of the proposed project.

### 2.04 Design Development

Design development is the intermediate stage between schematic design and the construction documents where further research and development of the design begins to identify specific details of the project that may result in necessary changes to the physical appearance, functionality, and cost of construction of a project. Design development is performed by the designer (usually a registered landscape architecture firm) and an artist (if there is a known art component integrated into the design) who produce documentation consisting of measured drawings and details of construction, outline specifications for materials and workmanship, and cost estimates. The design team and the SPR review this documentation to ensure that the approved intent of the project as defined by the design program is adhered to and that all required standards for safety, accessibility, durability, and maintainability are upheld. For smaller, less complex projects, this phase may be waived.

### 2.05 Construction Documents

Project scale and complexity will define the level of detail required in preparing construction documents; however, the following provides a complete example:

**A. Construction Documents**

Construction documents are measured scale drawings produced on an appropriate title block that provides all of the detail necessary to construct the project as proposed, revised, and approved through design development. The drawings must be clear and concise, with plan views separated by trade as appropriate (i.e., existing conditions and demolition, layout, grading and drainage, irrigation, planting, play equipment, and site furniture). Separate drawing sheets should be used to identify specific details to be used in construction. The details should be organized in a logical manner by trades as indicated above.

**B. Specifications**

The SPR uses a CSI-based, five-digit specification system consisting of 16 divisions. Division 0 and 1 are the primary and general requirements; Divisions 2 through 16 are technical specifications. The level of written specification required will depend on the size, complexity, and implementation mechanism being used to construct the work. Below are some examples:

1. **City of Seattle Department of Finance Public Bid.** For projects bid through the
Planning and Development Division, the primary City Contract language (Division Zero or “boilerplate” will be provided by the SPR, as will the basic framework of the General Requirements (Division 1). It is the Designer’s responsibility to provide all technical specifications.

2. **Department of Neighborhoods (DON) Contract.** These contracts are used by Citizen Groups operating under contract with the Department of Neighborhoods through the Neighborhood Matching Grant Fund, and the SPR requires that approved technical specifications be attached as an addendum to the DON contract.

3. **Volunteer Construction.** Volunteer construction is typically used in the installation of landscaping and play equipment. In the case of landscaping, the SPR will provide technical specifications to be used. In the case of play equipment, the manufacturer’s installation instructions and specifications, as well as the reference documents named above in Paragraph 1.03, shall guide the work.

**C. Inspection Plan**

The inspection plan identifies primary construction systems requiring inspection. Examples are concrete formwork prior to pour, pressure testing irrigation lines prior to backfill, and safety inspection of play equipment.

**D. Cost Estimate**

A cost estimate is an accurate cost estimate broken down by trades and identifying each separate construction system within each trade, showing quantity, unit price, and total system cost. Trade categories should show a subtotal. Contractor markups can be shown per line item or as a multiplier to the subtotal. Unit price can be expressed as a line unit or broken down by labor, equipment, and materials.

**E. Schedule**

A reasonable critical path schedule based on the trade and construction system breakdown used in the estimate should be prepared to complete the construction document phase. Identify all major milestones and incorporate the inspection plan. Identify clearly the division of labor anticipated for projects that include multiple implementation mechanisms, for example, physical participation by citizen volunteers, donated contractor work, manufacturer-certified installers, and bid work.

**Attention:**

The following two YouTube presentations will further provide clear examples of what the planning process entails. It will be an excellent review of this chapter thus far.

The first presentation can be find at https://www.youtube.com/watch?v=UYqTmNYJDA and view an overview of planning facilities. The YouTube presentation is entitled “Sports and Recreation Parks: Southern California Design Spotlight”.

The second YouTube presentation to view is entitled “Facility planning Process and Layout” go to https://www.youtube.com/watch?v=T-G7zh2Uz08 entitled “Facility planning Process and Layout”.
Implementation of Plan

After the master plan has been approved as a guideline for the organization’s future planning, it is important to remember that the master plan is a guide for the entire organization. It is not a specific plan for a particular structure. Once approval and funding have been gained for a specific structure, then the developmental process begins for that structure. The common components of a development process for a single structure or complex include research; regional analysis; site analysis; program; functional analysis; combined site, function, land use; refinement and site plan/overall design; construction documents; bidding; construction; and review.

Design Team

The design team (see Figure 1.4) is composed of the project planning committee, architect(s), engineers, facility consultant(s), interior designer(s), construction manager, acoustical consultant(s), and turf management specialist(s). Generally, the architectural firm the organization selects employs engineers (e.g., civil, electrical, mechanical, and structural), interior designers, acoustical consultants, and turf management specialists. The organization often hires a facility consultant to work with the program committee and architect. However, in some cases, the architectural firm as part of the design team may employ the facility consultant.

A facility consultant can provide numerous services. If the consultant is part of the owner’s team rather than the architectural team, this individual should serve as a liaison between the project planning committee and the architect. It is important to understand that the majority of architects an organization employs have little or no experience in designing these types of facilities. It would be preferable to select an architectural firm familiar with these types of facilities. If this is not possible, then the facility consultant becomes very important to the process.

Selecting an Architectural Firm

The selection of an architectural team should be based solely on the reputation and experience of the company and a formal review process. Once a project is approved, an advertisement (a request for qualifications [RFQ]) should be placed in the news media seeking qualifications of interested architectural firms for the specific project. Later, a
letter should be sent to specific firms who qualify inviting them to submit proposals.

**Tips for Drafting the Request for Proposal**

The request for proposal, or RFP, is composed of the following components: (1) Prepare an RFP and communicate to a broad list of applicants to ascertain their qualifications and experience for this particular type of project (Noyes & Skolnicki, 2001; Sawyer, 2009, 2013). (2) Draft an evaluation sheet for the selection committee to use to determine who is qualified. (3) Based on responses to the RFQ, select no more than 20 firms to which to send the RFP. (4) Draft a second evaluation sheet to narrow the pool to three to five finalists for the selection committee. (5) Provide the applicants adequate time to prepare a proposal—between three and four weeks, or longer if holidays are involved. (6) Request the firms include in their proposals the following: a list of recently completed projects (last 10 years), the estimated budgeted costs and actual costs for each project, and in-house professionals available to work on the project. (7) The owner needs to provide the applicants with adequate background for the project. (8) The finalists will participate in an interview process.

**Prior to the Interview**

Prior to interviewing the finalists, the program committee, facility consultant, and administration representatives should travel to at least two facilities built by each firm and review the final result of their efforts. The travelers need to speak with the facility manager and users and ask about the best features and the worst features of the facility. What would they do differently? After completing the tours, they should draft a number of questions to ask the architect during the interview.

**The Interview**

After the field of applicants is narrowed to three to five, the firms should be interviewed. Each firm should demonstrate its competence and philosophy in the following areas (modified from the American Institute of Architects (AIA) suggestions):

- Client’s role in the design process
- Number and type of consultants required
- Design or build versus conventional design versus fast-track process
- Extent of engineering services
- Construction supervision
- Number of sets of plans or specifications to be provided
- Construction cost
- Factors that may influence construction
- Time schedule and target dates for completion
- Architectural fee and payment schedule
- Development of a budget

**Criteria for Selection**

The successful firm should be open and flexible with the program committee and facility consultant experienced with this type of project and able to demonstrate that they have completed facilities within the budget developed (Noyes & Skolnicki, 2001; Sawyer, 2009, 2013). The firm should be able to demonstrate awareness, a user-friendly process, past success with other similar projects, and past fees as related to similar projects. Finally, the firm should be willing to provide accessibility to the architects and engineers during the planning and building phases.

**Research for Facility Development**

In its research, the planning committee should be concerned with (1) knowing and understanding the current and future needs and desires of the people who are involved in and/or affected by the proposed project and (2) knowing everything reasonably possible about the project function and/or activity and the space requirements.

**Designers Design for People**

At least four groups of people may need to be involved in the research and eventually be satisfied, including clients (e.g., board of directors), users, affected neighbors and/or public, managers and operators, and possibly others. Each of the relevant groups must be identified and its needs, concerns, and desires understood. Conflicts will almost certainly exist between the various groups. Understanding these problems in advance may make resolving them during the design phase possible.
**Maintenance and Operations**

Maintenance and operational needs, small but significant, must be clearly understood. They can make a project successful or doom it to future failure. The following are specific items to consider:

1. **Maintenance**
   - Will maintenance be conducted by in-house labor or by contract?
   - Is special equipment used or needed (e.g., riding lawn mowers)?
   - Do maintenance staff require or prefer certain standard equipment (e.g., motors, lights, showerheads, pumps, etc.)?
   - How capable is staff to maintain sophisticated equipment?
   - What are maintenance space requirements, such as equipment clearance around motors and pumps, so routine maintenance can be performed?
   - Are there any special fire protection requirements?
   - What special storage requirements are needed for flammables and chemicals?

2. **Operations**
   - Security—Is it needed? If so, what type (patrol, electronic, entrance only, dogs, by whom)? If patrolled, how—by foot, car, motorcycle, horse, bike, or boat?
   - Hours of operation—Is night lighting required?
   - Trash pickup—In-house? Contract? Kind of equipment used?
   - Deliveries—Food, supplies, etc. When are separate entrances and exits needed?
   - Communications system—Speakers, phone, radio, bell system, public address system?
   - Peak use—How is it handled? Restrict use or provide overflow capacity?

3. **Special Programs**
   - Will there be any? If so, what kind (e.g., concerts at noon, employee training, visitor information and/or education, arts and crafts shows, special exhibits)?
   - Any special space requirements for programs? Lighting? Service areas? Other utilities?

**Facilities and Their Requirements**

Most facilities have specific site requirements. Technical data must be gathered on all the proposed facilities. At a minimum, the following must be known:

- Size (actual dimensions plus any buffer spaces or required accessory space)
- Grade requirements (i.e., maximum and minimum heights)
- Special construction requirements (e.g., aquatic centers, tennis courts, or ice hockey rinks)
- Utility needs (i.e., type and amount).

**Predevelopment Review**

Along with the master planning process, a thorough review of facility needs should be completed for a proposed new or renovated facility. This review should be completed before an architect or consultant is brought on board. This can save time and money, as well as ensures that the structure will fit the proposed program. It is important to develop a checklist at the beginning, not the end, of the planning process. This will help focus and guide the dream and planning process.


As the planning committee develops the overall master plan for the new and/or renovated facility, the following list of items needs to be considered during the planning process. Not all items may be appropriate for the project being undertaken.

**Circulation**

- Types: Vehicle (cars, trucks, buses, maintenance, etc.), pedestrians (persons with disabilities, different teams), participants (different teams, players, coaches, officials,
etc.), main entry, secondary entries, control and security points, and so forth.

- Roadway: Type of vehicles (trucks, cars, buses, etc.), quantity of traffic (conduct survey), type of roadway system (single or two directional), roadway width (vehicle size and number of lanes), surface systems (materials); protection devices (bollards, guardrails, etc.), and so forth.

- Parking: Type of vehicles (trucks, cars, buses, etc.), quantity of vehicles, sizes (length and width) of vehicles, drainage (surface or subsurface, water collection/detention areas), snow removal (storage areas), protection devices (bollards, guardrails, tire bumpers, etc.)

- Walkways: Type of use (pedestrian and/or vehicle), walkway widths, surface system (materials), elevation changes (walks, ramps, stairs, and lifts), railings.

Activity Areas

- Landscaping: Type of surfaces (e.g., grass), type of plantings (ground cover, shrubs, plantings, etc.), and so forth.

- Game Standards: Applicable association regulations for each sport.

- Activity Configuration: Areas (separate or combined activity), orientation, flexibility, and so forth.

- Surfaces: Type (natural, synthetic, or combination), grading and drainage (surface and subsurface), and so forth.

Sports Areas

- Diamonds: Type of sport(s), type (game and/or practice), size, quantity, and so forth.

- Courts: Type of sport(s), type (game and/or practice), size, quantity, and so forth.

- Fields: Type of sport(s), type (game and/or practice), size, quantity, and so forth.

- Ranges: Type of sport(s), type (game and/or practice), size, quantity, and so forth.

Structures

- Tickets: Type (fixed or portable), surfaces for portable types (pads), utilities, quantity of units (location on site), and so forth.

- Security: Type (fixed or portable), surfaces for portable types (pads), utilities, quantity of units (location on-site).

- Medical Treatment: Type (fixed portable), surfaces for portable types (pads), utilities, quantity of units (location on-site), and so forth.

- Storage: Type (fixed or portable), surfaces for portable types (pads), utilities, quantity of units (location on-site), type of storage (equipment and tools), and so forth.

- Communications: Type (fixed or portable), utilities (supplemental), quantity of units (location on-site), type of systems, and so forth.

- Concessions: Type (fixed or portable, owner or vendor-supplied), surfaces for portable types (tent pads, trailer pads, etc.), utilities, quantity of units (location on-site), and so forth.

- Seating: Type (standing and/or seats), persons (spectators, teams, officials, etc.), natural (beams, sloped areas, etc.), artificial (prefabricated bleachers, type of seat, guardrails, etc.), and so forth.

Signage

- Vehicle: Type (direction, information, safety, etc.).

- Pedestrian: Type (direction, information, safety, etc.).

- Activity: (by sport, area, etc.).

- Scoreboard: activity (single or combined use), type (manual or electronic), size, and so forth.

Barriers

- Vehicle: Type (sound, visual, safety, etc.), natural (plantings, berms, depressed areas, etc.), artificial (walls, fencing, railings, etc.).

- Person: Type (sound, visual, safety, etc.), natural (plantings, berms, depressed areas, etc.), artificial (walls, fencing, railings, etc.), and so forth.
- Security: Type (gates, juxtaposition, or open).

**Utilities**
- Power: Site lighting (pedestrian and vehicle), activity lighting, structures (tickets, security, storage, communications, concessions, etc.), and so forth.
- Water: Irrigation, sanitary, drinking fountains (hot and cold), and so forth.
- Sanitary: Type of units (fixed or portable).
- Storm Drainage: Type (surface and subsurface).
- Communications: Scoreboards, team sidelines to observation booth, public address for game, telephones for public and private use, broadcasting for television and radio, portable communications for security personnel, emergency, and so forth.

**Administrative Areas**
- Number of offices
- Size of offices
- Contents

**Lobby/Entrance**
- Peak traffic rate entering and exiting
- Energy conservation
- Door size
- Lobby size
- Seating arrangements
- Public restrooms
- Floor surfaces
- Lighting
- ADA requirements
- Ticket booth
- Concessions

**Control Area**
- Number of patrons at peak periods
- Number of staff at peak loads
- Computers, cash registers, automated check-in
- Towel service
- Locker registration
- TV surveillance
- Light controls
- Door monitor system/panel
- Fire annunciator panel
- Public address system
- Emergency alarm system/panel
- Equipment issue/return/storage, equipment to be stored, storage cabinets, separate issue and return functions, peak load considerations, staffing
- Building directory
- Phone system

**Laundry**
- Projected volume/required staffing
- Number and size of washers
- Number and size of extractor units
- Number and size of dryer units—gas or electric
- Sorting and folding area
- Floor drains
- Soiled linen area
- Carts
- Linear feet of linen storage shelving and cabinets required
- HVAC considerations
- Office, desk, computer

**Dependent Care**

**Child and Adult Care Areas**
- Number of children
- Number of aging adults
- State requirements
- Number of staff
- Adjacent play areas in and out
- Adjacent toilet facilities
- Audio and visual accommodations
- Office, desk, computer
- Storage and storage cabinets
- Indoor and outdoor play spaces

**Pro Shop**
- Display windows
- Adjustable wall display system
- Adjustable display shelving
- Adjustable display lighting
- Office
- Control area, computer, cash register, visual surveillance
- Door alarm system to catch shoplifters
### Food Service
- Juice bar
- Vending
- Seating area
- Small kitchen with microwave, range, dishwasher, hot water booster, garbage disposal, range hood, refrigeration, sink, and counter space
- Health requirements
- Tiled floor with drains

### Locker Room Spaces
#### Wet and Dry Areas
- Number of lockers
- Type of lockers and locker system
- Tile floor with drains
- Grooming area: number of sinks, mirrors, hair dryers, soap dispensers, towel dispensers, waste receptacles, nonslip floor, water-resistant electrical receptacles
- Accessibility area
- Family changing areas
- Benches or stools—fixed or movable
- HVAC considerations
- Swimming suit drying system
- Permanent lockers
- Dressing booths

### Restrooms
- Health code requirements
- Accessible area
- Family changing areas
- Nonslip floor
- Floor drains
- Mechanical exhaust
- Diaper changing areas
- Toilet partitions
- Disposable seat covers
- Sanitary napkin dispensers and disposals
- Vandal-proof partitions
- Corrosion-resistant fittings
- Automatic flush

### Showers
- Number of people to accommodate at peak loads
- Individual showers
- Hose bibb
- Soap dispensers
- Soap dishes
- Accessible accommodations
- Nonslip floor
- Floor drains
- Corrosion-resistant fittings
- Waterproof membrane as required
- HVAC considerations

### Shower Drying Areas
- Number of people
- Floor drains
- Towel racks or hooks
- Nonslip floor surface

### Spa Spaces
#### Steam room
- Number of people
- Steam convector units with cover plates—electric or gas
- Waterproof membranes
- Observation window
- Emergency call button
- Remote temperature control
- Floor drains
- Tiled room
- Mechanical exhaust
- Shower in steam room
- Corrosion-resistant fittings
- Lighting
- Hose bibb
- Unisex or separate facilities

### Sauna
- Number of people
- Exterior shower adjacent the sauna
- Waterproof membranes
- Observation window
- Emergency call button
- Remote temperature control
- Floor drains
- Redwood interior, all boards screwed into frame
- Mechanical exhaust
- Protective covering over rocks
- Corrosion-resistant fittings
- Lighting
- Hose bibb
- Unisex or separate facilities
**Tanning room**
- Number of units
- Type of units
- Adjacent to a changing area
- Washup or grooming area

**Massage room**
- Number of massage tables
- Heat lamps
- Towel, cleaning, and disinfectant storage cabinets

**Other Miscellaneous Areas**
- Janitorial spaces and break areas
- General storage
- Classrooms
- Maintenance area
- Mechanical areas
- Elevators and elevator equipment spaces
- Hallways
- Stairwells

**Indoor Activity/Spaces Physical Fitness Spaces**

**Strength training area**
- Number of mechanized weight machines
- Electrical needs
- Flooring considerations
- Mirrors
- Audio and visual accommodations
- Control center
- Desk and computer
- Storage space and cabinets
- Clocks
- Peak load considerations
- HVAC considerations
- Platforms

**Free weight area**
- Benches
- Weight racks
- Dumbbells and racks
- Weight platforms
- Chalk holders and chalk
- Floor considerations
- Control area
- Desk and computer
- Mirrors
- HVAC considerations
- Audio and visual considerations
- Peak load considerations

**Fitness testing**
- Treadmill
- Exercise bike
- Monitoring equipment
- Desk and bed
- Storage cabinets
- Sink and counter space
- Computer
- Telephone
- Tackboard
- Special electrical or HVAC requirements

**Cardiorespiratory area**
- Treadmills
- Bicycles
- Rowing machines
- Stair climbers
- Arm ergometers
- Wall weight racks
- Dumbbells
- Floor surface
- Audio and visual accommodations
- Desk and computer
- Storage
- HVAC considerations
- Peak load considerations

**Aquatics Center**

**Swimming Pool**
- Competition pool
- Teaching pool
- Handicapped pool
- Diving well
- Diving boards
- Diving platform
- Underwater windows
- Underwater sound
- Filtration and sanitation
- Vacuum
- Lane lines
- Bulkheads
- Movable floors
- Lifeguard stands
- HVAC considerations
- Lighting
- Accessible pool lift
• Whirlpool for divers
• Spectator seating
• Rescue equipment
• Grab rails and ladders
• Acoustic treatment
• Wall graphics
• Starting platforms
• Timing devices, scoreboard, diving scoring, public address system
• Deck space and drainage
• Corrosion-resistant fittings
• Emergency telephone or call button
• Storage
• Control center, desks, computers
• Office, desks, computers
• Telephones
• Automated pool chemical control
• Tile or no tile
• Pumps and auxiliary pumps
• Heater and auxiliary heater
• Main drains
• Access to pipes

Gymnasium/multipurpose space
• Activities to be accommodated
• Peak number of people
• Floor and wall inserts required
• Lighting requirements
• Folding partitions or dividing curtains—motorized or manual
• Baskets and backstops—portable or permanent, motorized or manual
• Batting cages
• Golf cages
• Scoreboards
• Seating—portable or permanent
• Wall pads
• Flooring considerations
• Wall graphics
• Drinking fountains
• Public address system
• Large storage area, roll-up doors
• Public restrooms
• Concessions
• Portable stage
• Press box
• Press (media) room
• Built-in audio and visual hookups
• Computer hookups
• Ceiling and wall-mounted projection screens
• Video monitoring
• Loading dock with roll-up door
• Adjacent meeting areas
• Adjacent locker rooms
• Large janitorial space
• Adjacent training room
• Climbing wall area
• Indoor jumping and throwing areas

Running track (indoor)
• Laps per turn
• Elevated or floor level
• Number of lanes
• Type of surface
• Adjacent strength training, cardiovascular areas
• Radius at turns
• Banked curves
• Automated banking
• Lane markers
• Pacer lights

Dance areas
• Number of participants at peak loads
• Audio accommodations
• Acoustics
• Ballet barres
• Mirrors
• Dance floor
• Storage
• HVAC considerations
• Emergency telephone or call button

Handball/racquetball/squash courts
• Number of courts
• Competition courts
• Spectator seating
• Instructor observation area
• Type of wall and ceiling system
• Type of floor system
• Glass or solid walls
• Remote lighting
• Striping
• Other activities: wall soccer, wallyball, dancercise, etc.
• Lighting
• Securing valuables
Program

Program, as used here, is the organization of the information needed for planning a project to provide an appropriate facility to meet the needs of the affected people (client, users, neighbors, and staff). Program needs should include a list of activities, facility needs for each activity listed, number of participants in each activity during peak periods, size of each facility ranging from minimum to ideal, and a description of the relationship between activities and facilities (i.e., Can certain activities coexist with other activities at the same time in one facility?). There must be involvement from the program staff when this part of the design is being considered.

Functional Analysis

Functional analysis is the process of analyzing and organizing the information provided in programming and relationships by translating that analysis into graphic symbols. It establishes the preferred or ideal physical relationships of all the components of a project. The process commonly consists of four parts: space diagrams, relationship charts and/or diagrams, bubble diagrams, and land use concepts. All of the elements contained in the activity/program must be considered and their desired functional and physical relationships accommodated.

Combined Site, Function, and Land Use

Two issues are key to land use: people’s needs and site constraints. At this point, the various constraints and opportunities the site presents must become integrated with people’s needs. It is also the time when the reality of the site constraints may require changes in the program. This step combines the site analysis with the functional analysis. If changes are made in the program, the changes must be incorporated throughout the functional analysis phase. This step in the site design process is where analysis of the site data is most completely utilized.

If the site selected is too small, the following options should be considered:

- Physical modification of the site. This may be the least desirable option because it is almost always undesirable from an envi-
vironmental standpoint. It frequently is not aesthetically pleasing, and it is usually expensive.

- Expand the site if adjacent land is available. This is frequently not possible and can be expensive.
- Change to another site. This can be expensive, and alternate sites may not be available.
- Cancel the project. This is not usually desirable or possible.
- Creatively look at new ways of solving the problem.

The location is the most difficult choice. It is always difficult to abandon the proven acceptable way of designing and operating facilities. When successful, however, it often leads to outstanding, innovative solutions.

**Refinement and Site Plan/Overall Design**

After the land use step has been completed, the planning committee needs to refine the focus of the building project before it moves to the site plan/overall design step. After the refinement is complete, then and only then should the planners consider site planning and overall design. A site plan shows the entire existing and proposed site features superimposed on a topographic base map at an appropriate scale. It functions as the coordinating plan that ensures that all the project parts fit together. This is the point in the site design process where imagination and creativity are really important. In addition, this plan is almost always the feature part of any presentation to the client and other interested parties. Finally, accompanying the site plan will be a number of drawings, including utilities (e.g., water sources, sewer lines, and electricity/communication lines), grading and drainage, circulation, scale drawings, relationships, and three-dimensional aspects.

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**Final Review Checklist before Finalizing the Construction Plan**


A checklist has been prepared to aid those responsible for planning facilities for athletics, physical education, health, and recreation. The application of this checklist may prevent unfortunate and costly errors.

**General**

1. A clear-cut statement has been prepared on the nature and scope of the program, and the special requirements for space, equipment, fixtures, and facilities have been dictated by the activities to be conducted.
2. The facility has been planned to meet the total requirements of the program, as well as the special needs of those who are to be served.
3. The plans and specifications have been checked by all governmental agencies (city, county, and state) whose approval is required by law.
4. Plans for areas and facilities conform to state and local regulations and to accepted standards and practices.
5. The areas and facilities planned make possible the programs that serve the interests and needs of all the people.
6. Every available source of property or funds has been explored, evaluated, and used whenever appropriate.
7. All interested persons and organizations concerned with the facility have had an opportunity to share in its planning (professional educators, users, consultants, administrators, engineers, architects, program specialists, building managers, and builder)—a team approach.
8. The facility will fulfill the maximum demands of the program. The program has not been curtailed to fit the facility.
9. The facility has been functionally planned to meet the present and anticipated needs of specific programs, situations, and publics.
10. Future additions are included in present plans to permit economy of construction.

11. All classrooms and offices are isolated from background noise.

12. Ample numbers and ample-sized storage areas are built in flush with walls at all teach stations.

13. No center mullions or thresholds are on storage room doorways.

14. All passageways are free of obstructions; fixtures are recessed.

15. Storage areas are well ventilated, dry, and cool.

16. Buildings, specific areas, and facilities are clearly identified.

17. Locker rooms are arranged for ease of supervision.

18. Offices, teaching stations, and service facilities are properly interrelated.

19. Special needs of persons with disabilities are met, including a ramp into the building at a major entrance.

20. All “dead space” is used.

21. The building is compatible in design and comparable in quality and accommodation to other campus structures.

22. Storage rooms are accessible to the play area.

23. Workrooms, conference rooms, and staff and administrative offices are interrelated.

24. Shower and dressing facilities are provided for professional staff members and are conveniently located.

25. Thought and attention has been given to making facilities and equipment as durable and vandal-proof as possible.

26. Low-cost maintenance features have been considered.

27. This facility is a part of a well-integrated Master Plan.

28. All areas, courts, facilities, equipment, climate control, security, and so forth conform rigidly to detailed standards and specifications.

29. Shelves are recessed and mirrors and supplies are in appropriate places in restrooms and dressing rooms.

30. Dressing space between locker rows is adjusted to the size and age of students.

31. Drinking fountains are placed conveniently in locker room areas or immediate adjacent areas.

32. Special attention is given to provision for locking service windows and counter, supply bins, carts, shelves, and racks.

33. Provision is made for repair, maintenance, replacement, and off-season storage of equipment and uniforms.

34. A well-defined program for laundering and cleaning towels, uniforms, and equipment is included in the plan.

35. Noncorrosive metal is used in dressing, drying, and shower areas, except for enameled lockers.

36. Antipanic hardware is used where required by fire regulations.

37. Properly placed house bibbs and drains are sufficient in size and quantity to permit flushing the entire area with a water hose.

38. A water-resistant covered base is used under the locker base and floor mat and where the floor and wall join.

39. Chalkboards and/or tackboards with map tracks are located in appropriate places in dressing rooms, hallways, and classrooms.

40. Bookshelves are provided in the toilet area.

41. Space and equipment are planned in accordance with the types and number of enrollees.

42. Basement rooms undesirable for dressing, drying, and showering are not planned for those purposes.

43. Spectator seating (permanent) in areas that are basically instructional is kept at a minimum. Rollaway bleachers are used primarily. Balcony seating is considered as a possibility.

44. Well-lighted and effectively displayed trophy cases enhance the interest and beauty of the lobby.

45. The space under the stairs is used for storage.
46. Department heads' offices are located near the central administrative office, which includes a well-planned conference room.

47. Workrooms are located near the central office and serve as a repository for departmental materials and records.

48. Conference area includes a cloakroom, lavatory, and toilet.

49. In addition to regular secretarial offices established in the central and department chairpersons' offices, a special room to house a secretarial pool for staff members is provided.

50. Staff dressing facilities are provided. These facilities also may serve game officials.

51. The community and/or neighborhood has a “round table” for planning.

52. All those (persons and agencies) who should be a party to planning and development are invited and actively engaged in the planning process.

53. Space and area relationships are important. They have been considered carefully.

54. Both long-range and immediate plans have been made.

55. The body comfort of the child, a major factor in securing maximum learning, has been considered in the plans.

56. Plans for quiet areas have been made.

57. In the planning, consideration has been given to the need for adequate recreational areas and facilities, both near and distant from the homes of people.

58. Consoles for security, information, and checkout have been ideally located.

59. Every effort has been exercised to eliminate hazards.

60. The installation of low-hanging door closers, light fixtures, signs, and other objects in traffic areas has been avoided.

61. Warning signals—both visible and audible—are included in the plans.

62. Ramps have a slope equal to or greater than a 1-ft. rise in 12-ft.

63. Minimum landings for ramps are 5 ft. x 5 ft., extend at least 1 ft. beyond the swinging arc of a door, have at least a 6-ft. clearance at the bottom, and have level platforms at 30-ft. intervals on every turn.

64. Adequate locker and dressing spaces are provided.

65. The design of dressing, drying, and shower areas reduces foot traffic to a minimum and establishes clean, dry aisles for bare feet.

66. Teaching stations are related properly to service facilities.

67. Toilet facilities are adequate in number. They are located to serve all groups for which provisions are made.

68. Mail services—outgoing and incoming—are included in the plans.

69. Hallways, ramps, doorways, and elevators are designed to permit equipment to be moved easily and quickly.

70. A keying design suited to administrative and instructional needs is planned.

71. Toilets used by large groups have circulating (in and out) entrances and exits.

72. All surfaces in racquetball, handball, and squash courts are flush.

73. At least one racquetball, handball, or squash court has a tempered glass back wall and sidewall.

74. All vents in racquetball, handball, and squash courts are located in the back one third of the ceiling.

75. Standard-sized doors are used on racquetball, handball, and squash courts.

76. All aspects of safety are planned carefully for the weight areas.

77. Racks are provided for all loose plates, dumbbells, and barbells in weight areas.

78. Special attention is paid to acoustical treatment in weight areas.

79. Ample walk areas for traffic flow are planned around lifting areas in weight rooms.

80. Concessions areas are planned for and built flush with existing walls.

81. Adequate numbers of concession areas are planned.

82. Concessions stand cash-handling methods have been planned carefully.

83. Storage and maintenance have been planned for concessions areas.

84. Classrooms are planned by instructors, students, and maintenance staff.
85. Classrooms are planned for the number of users and the styles of teaching to be used in the room.
86. Careful attention has been paid to storage areas in classrooms.
87. Faculty offices should be private and secured.
88. Storage areas and windows are planned in faculty offices.
89. Laboratories need to be planned for both teaching and research use.
90. Ample space and subdivisions within laboratories are planned carefully.

Climate Control
1. Provisions have been made throughout the building for climate control: heating, ventilating, and refrigerated cooling.
2. Special ventilation is provided for locker, dressing, shower, drying, and toilet rooms.
3. Heating plans permit both area and individual room control.
4. Research areas where small animals are kept and where chemicals are used have been provided with special ventilating equipment.
5. The heating and ventilating of the wrestling gymnasium has been given special attention.
6. All air diffusers adequately diffuse the air.
7. Storage area ventilation is planned carefully.
8. Humidity and ventilation are balanced properly in racquetball, handball, and squash courts.
9. Thermostats are located out of the general users’ reach and/or are secured.
10. The total energy concept has been investigated.

Electrical
1. Shielded, vaporproof lights are used in moisture-prevalent areas.
2. Lights in strategic areas are key controlled.
3. Lighting intensity conforms to approved standards.
4. Adequate numbers of electrical outlets are placed strategically.
5. Gymnasium and auditorium lights are controlled by dimmer units.
6. Locker room lights are mounted above the space between lockers.
7. Natural light is controlled properly for purposes of visual aids and to avoid glare.
8. Electrical outlet plates are installed 3 ft above the floor unless special use dictates other locations.
9. Controls for light switches and projection equipment are located suitably and are interrelated.
10. All lights are shielded. Special protection is provided in gymnasium, court areas, and shower rooms.
11. All lights must be easily accessible for maintenance.
12. The use of metal halide and high-pressure sodium lighting has been investigated.
13. All areas have been wired for television cable and computer hookups.
14. Indirect lighting has been used wherever possible.
15. All teaching areas are equipped with a mounted camera, 25-ft. color monitor, and tape deck securely built in flush with the existing walls.

Walls
1. Movable and folding partitions are power operated and controlled by keyed switches.
2. Wall plates are located where needed and are attached firmly.
3. Hooks and rings for nets are placed (and recessed in walls) according to court locations and net heights.
4. Materials that clean easily and are impervious to moisture are used where moisture is prevalent.
5. Showerheads are placed at different heights—4 ft. (elementary) to 7 ft. (university)—for each school level.
6. Protective matting is placed permanently on the walls in the wrestling room,
at the ends of basketball courts, and in other areas where such protection is needed.

7. Adequate numbers of drinking fountains are provided. They are properly placed (recessed in wall).

8. The lower 8 ft. of wall surface in activity areas is glazed and planned for ease of maintenance.

9. All corners in locker rooms are rounded.

10. At least two adjacent walls in dance and weight areas should have full-length mirrors.

11. Walls should be treated acoustically 15 ft. and above.

12. Walls are reinforced structurally where equipment is to be mounted.

13. Flat wall space is planned for rebounding areas.

14. Walls should be flat with no juts or protruding columns.

15. Pastel colors are used on the walls.

16. Windows should be kept to a minimum in activity areas.

### Ceilings

1. Overhead support apparatus is secured to beams that are engineered to withstand stress.

2. The ceiling height is adequate for the activities to be housed.

3. Acoustical materials impervious to moisture are used in moisture-prevalent areas.

4. Skylights in gymnasiums, being impractical, are seldom used because of problems in waterproofing roofs and controlling sunrays.

5. All ceilings except those in storage areas are acoustically treated with sound-absorbent materials.

6. Ceilings should be painted an off-white.

### Floors

1. Floor plates are placed where needed and are flush mounted.

2. Floor design and materials conform to recommended standards and specifications.

3. Lines and markings are painted in floors before sealing is completed (when synthetic tape is not used).

4. A cove base (around lockers and where wall and floor meet) of the same water-resistant material that is used on the floor is used in all dressing and shower rooms.

5. Abrasive, nonskid, slip-resistant flooring that is impervious to moisture is provided on all areas where water is used (laundry room; swimming pools; shower, dressing, and drying rooms).

6. Floor drains are located properly, and the slope of the floor is adequate for rapid drainage.

7. Hardwood floors are used in racquetball, handball, and squash courts.

8. Maintenance storage is located in areas with synthetic floors.

9. Floors should be treated acoustically when possible.

10. Hardwood floors should be used in dance areas.

### Retrofitting or Replacing Facilities

The practice of buying-using-discarding has become an unacceptable practice today. This not only applies to paper, aluminum cans, and glass, but to facilities as well (CEFP, 1985). Due to the high cost of new construction, upper level administration, whether it be in the private sector, at a university, municipal agency, or in a public school system, has the responsibility of making the wisest use of existing buildings. In meeting this obligation, it is necessary for administrators, with input from knowledgeable resource persons, to consider the feasibility of either renovating or retrofitting an existing building, or of constructing a new facility.

By definition, the renovation of an existing facility is the rehabilitation of the physical features of that building, including the rearrangement of spaces within the structure. Retrofitting, on the other hand, is the addition of new systems, items, features, materials, and/or equipment to a facility which were not installed at the time the building was constructed. These changes may be minor, or
they could be significant to the point of changing the primary function of the facility.

To accurately ascertain whether renovation, retrofitting, or new construction is the most prudent alternative, administrators have a myriad of factors to consider. One of the more important is the effect that the construction process has relative to ongoing programs. Consideration must be given to program modifications and adaptations that may occur during the construction process. A close scrutiny of the advantages and disadvantages of both the present and the possibility of a new building should be undertaken. The following is an adequate representation of the factors to consider:

### Cost Considerations

- What is the cost of new construction to provide comparable space?
- What is the cost of construction needed to bring the existing facility up to compliance with safety codes/accessibility?
- Does the cost of renovation or retrofitting exceed 50% of the cost of new construction?
- Will the increased cost of maintaining an older building justify renovation instead of constructing a new facility?
- Could the existing facility be sold or leased to a private entity to help defray the cost of new construction?
- If the amount of construction time becomes critical, which method, renovation or new construction, could be completed in the least amount of time?

### Site Considerations

- Is a site available, and how effectively does the site meet the agency’s immediate and long-range goals?
- Is the location of the present structure easily accessible?
- Is the parking adequate at the present site?
- How efficient is the sewer and storm water control?
- How is the soil-bearing performance of the present site?
- What is the general condition of the grounds?
- Is there sufficient area for all program activities?
- Are vehicular drives well located for safe ingress and egress?
- Are the existing utilities on or near the site adequate to provide the needed services?

### Architectural and Structural Considerations

A certified architect and engineer should be sought to determine the following structural factors:

- Is the present facility aesthetically appealing and structurally sound?
- Does the existing facility meet current and long-range program goals, and if not, would renovation or retrofitting realistically elevate the facility to acceptable standards?
- What is the availability of utilities?
- How energy efficient is the present facility? Does it meet all updated energy codes?
- Are there signs of deterioration of footings, foundations, or piers?
- Are structural members adequate and in serviceable conditions?
- Is the exterior masonry sound? Are there structural cracks, water damage, or defective mortar?
- What is the condition of the roof and roofing surfaces, roof drains, and skylights?
- What is the condition of flashing, gutters, and downspouts?
- What are the conditions of doors and windows?
- What are the conditions of door hardware and panic devices?
- What are the locations, numbers, types, and condition of plumbing fixtures?
- What is the condition and capacity of the present water supply, sewage lines, and drainage systems?
- Is the present HVAC System adequate and energy efficient? Does it meet updated codes?
- What is the condition and adequacy of lighting and power distribution systems?
- Do the existing light fixtures provide adequate illumination in all areas?
- Are stairways, circulation patterns, and exits safe and adequate in number?
- What is the present condition of fire alarms and inter-communication systems?

**Educational Considerations**
- Is the building now meeting the agency’s program?
- What is the current inventory of rooms and their sizes?
- Are laboratories adequately served by all required utilities?
- Is the library adequate to house the required book collection and to provide media and related services?
- Are food service facilities adequate to meet present and projected needs?
- Are physical education, recreation, and athletic areas usable or capable of being retrofitted if required?

**Community Considerations**
- Will the renovation of the building be consistent with present zoning requirements and policies?
- What are the plans for the area served by the program as projected by city or area planning agencies?
- Is the building on or eligible for placement on the National Register of Historic Places?
- Will a new facility constitute a political problem with businesses in the private sector?

Before deciding on the wisdom of renovation, retrofitting, remodeling, or replacing, factors concerning the existing and proposed facilities should be evaluated in detail, both individually and collectively. It also would be beneficial for administrators to project a reasonable life expectancy of the facility, taking into account factors such as:
- Increased or decreased populations served by the programs within the facility
- Growth and development of areas surrounding the facility
- The potential reorganization, community re-zoning, or consolidation of schools in the district

**Construction Documents**

Construction documents control the actual constructed results and consist of two separate parts: working drawings and specifications, the written companion to the working drawings. Upon completion of the working drawings and specifications, the project is bid and, if the bids are satisfactory, the contract is awarded.

**Working Drawings**

All working drawings must be clear, concise, and understandable to the people who are going to construct the building. Only as much detail as is necessary to build the project should be included. More detail might give the client more control but will definitely cost more money for design and will result in higher bids. All pieces must be clearly presented in a manner that will allow accurate building.

All construction drawings must be accurate, clearly labeled, and dimensioned. If in doubt as to the need for a label or a dimension, include it! Normally, written numbers on the plan take precedence over field-scaled distances.

A useful tool in outlining the numbers and kinds of construction drawings is a plan control list. Each drawing expected to be needed is listed by description. This enables the designer(s) to coordinate work and ensures that all aspects of the project are included.

With the completed list of plans, an estimate of time required to complete the working drawing and the necessary scheduling of work assignments can be carried out. This plan control document will probably be revised during the preparation of drawings. In its final form, it will become the drawing index listing for Sheet 2 of the working drawings package.
The more detailed and elaborate the working drawings are, the higher the cost of preparing them and, very frequently, the higher the cost of building the project. A rule of thumb: The smaller the job, the fewer the construction documents. Small contractors do not like excessive control and paperwork. They frequently will not bid on projects with elaborate specifications, and if they do, they bid high. Frequently, too much control will cause bids to be higher but does not result in an increase in quality.

The construction drawings must be reviewed by the maintenance staff to (1) ensure compatibility of parts with existing facilities, (2) see whether the project can be effectively maintained at reasonable cost, and (3) determine whether alternative materials or design modifications would reduce the costs and/or simplify maintenance. A detailed cost estimate is almost always necessary at this point in the design process. If costs estimated for the time of construction are too high, then the project may have to be reduced in scope and/or redesigned. Be certain that lifetime operations and maintenance costs are also considered in the estimate.

The construction drawings should include the following: demolition and site preparation, utilities, landscape and site improvements, structural, architectural, mechanical/HVAC, mechanical/plumbing, mechanical/fire protection, and electrical/telecommunications.

### Specifications

The written portion of the construction documents comes in three parts: bidding and contract requirements (including the bid documents)—Division 0; general requirements—Division 1; and construction specifications—Divisions 2–16.

This part of the design process is often most disliked by designers because of the massive detail required. It is, however, of the utmost importance in ensuring that the design is actually built according to the way it was envisioned.

Specifications should be organized in the 16-division format developed by the Construction Specifications Institute as follows (AIA, 2009):

<table>
<thead>
<tr>
<th>Division</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division 0:</td>
<td>Bidding requirements, contract forms, and conditions of the contract</td>
</tr>
<tr>
<td>Division 1:</td>
<td>General requirements/special conditions</td>
</tr>
<tr>
<td>Division 2:</td>
<td>Site work</td>
</tr>
<tr>
<td>Division 3:</td>
<td>Concrete</td>
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<td>Division 4:</td>
<td>Masonry</td>
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<td>Division 5:</td>
<td>Metals</td>
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<tr>
<td>Division 6:</td>
<td>Wood and plastic</td>
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<td>Mechanical (HVAC)</td>
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<tr>
<td>Division 15B:</td>
<td>Mechanical (plumbing)</td>
</tr>
<tr>
<td>Division 16:</td>
<td>Electrical</td>
</tr>
</tbody>
</table>

### General Notes

- Include everything in the specifications that you want to see in the final constructed product.
- Make sure that Division 1 includes the contractor providing “as-built” drawings, catalogue cuts, and, where appropriate, an operation manual and training of operating and maintenance staff.
- Include only information necessary to the specific project—especially if it is a small one. As with plans, small contractors do not like and frequently do not understand long, involved specifications; therefore, they will not bid or may increase their bids accordingly. The heavier, thicker, and more complicated the specifications are, the higher the bid.
- Conversely, the less detail you have in the specifications, the greater the opportunity for misunderstandings between the owner and the contractor.
- All phases of specifications are readily adaptable to computerization and/or word processing. Much time can be saved if “canned” specifications are used, thus speeding up this tedious but crucial task. Computerization will probably lead to standardization of details and format.
Schematic Design Phase

In the schematic design phase, the architect prepares schematic design documents that consist of drawings and other documents illustrating the scale and relationship of project components. These are based on the mutually agreed-upon program with the owner, the schedule, and the construction budget requirements and they are submitted to the owner for approval.

The products from this first phase of the project consist of the following: renderings (architect’s conception of the building) and models, floor plans and elevations, narrative (a description of the project with sufficient detail to allow an initial review by the organization), outline specifications (e.g., exterior materials, interior finishes, mechanical and electrical systems, identification of significant discrepancies between the project requirements and the budget), and cost estimates.

The project management issues for this phase consist of cost and budget, program expansion, schedule slippage, design review, quality assurance, use of design and estimating contingencies, code compliance, and building committee(s).

Design Development Phase

Based on schematic design documents and any adjustments the owner authorizes in the program, schedule, or construction budget, the architect prepares further design development documents for approval by the owner. These consist of drawings and other documents to fix and describe the size and character of the project as to architectural, structural, mechanical, and electrical systems, materials, and other appropriate elements.

The products for this phase include drawings (site and landscape, utilities, structural, architectural, mechanical, electrical, and special equipment), narrative, specifications, and cost estimates.

The project management issues for this phase consist of cost and budget, scope creep (common elements previously eliminated from the project that reappear in design development), design review, technical review (specific reviews initiated by the owner to ensure the organization’s guidelines for design and construction are being complied with), and use of design contingencies.

Construction Approaches

Lump-Sum Contract

The traditional approach is commonly known as the lump-sum contract. In this method, a general contractor is selected based on the lowest bid. The general contractor is responsible for selecting all subcontractors and all construction materials. It is not advisable to enter into this type of contractual relationship because the general contractor has too much control of the profit and loss for a job.

Pros. This is a simple, traditional approach with a defined project scope, suitable for small or straightforward projects, and fiduciary architect/engineer (A/E) and nonfiduciary general contractor roles are clear.

Cons. The builder has no input in design; the price is uncertain until bids are received; it is the slowest project delivery; there is no control over subcontractor selection; an adversarial relationship could exist among the A/E, owner, and contractor. It is prone to cost growth through changes and claims; there is a high incidence of litigation.

Construction Manager

Many public projects employ a construction manager to oversee the progress of the construction through all phases. This method allows for multiple bids, such as one for mechanical, another for electrical, and another for general construction of the structure.

Pros. There is builder selection flexibility, pre-construction services, a faster delivery schedule, early budget input and control, and change flexibility. Money is saved with controlled purchasing, optimal trade contractor selection through competitive bidding, and effective minority- and women-owned business enterprises procurement.

Cons. The owner assumes contractual cost and schedule risk, and there is no single point of contract accountability. The owner must manage more contracts, and the price is not guaranteed. Potential additional design costs and potential claims exist.

Design and Build

The next approach is design and build. This method places the responsibility for completing
the project on the architect and builder who work for the same company. This option sets a fixed price, encourages interaction, and eliminates additional costs arising from design changes. A variation of design and build is called fast tracking. It is used in large projects in which contracts are let incrementally or sequentially so that the construction time may be reduced. This variation may not be allowed in public projects due to federal or state mandates.

**Pros.** There is a single point of responsibility for design and construction; it offers the fastest schedule for delivery and allows for early identification of guaranteed costs.

**Cons.** There can be loss of owner control, quality, or both and loss of checks and balances. Contractors’ profits may be excessive, and competitive bid design and build selection with guaranteed maximum price is problematic.

**Design/Build/Finance/Leaseback**

Another approach is design/build/finance/leaseback. This approach encompasses all the design associated with the construction project as well as obtaining funding and securing a location for the project. Furthermore, this approach also includes operations and maintenance support after the building is occupied for a specific time frame. The financially challenged owner will find this approach more acceptable. The owner will lease the facility for a specific number of years and will own the facility at the end of the term.

**Pros.** This approach offers a lease commitment versus a capital expense and an early lease cost determination. There is single-source management of the entire program and risk assumption, lease, financing, and ownership flexibility, and it avoids long-term capital ownership commitment.

**Cons.** Potential interest rates are a risk. There is diminished owner control and potential for higher operating costs. Future facility control is limited, and residual value is reduced or eliminated.

**Construction Document Phase**

Based on the approved design development documents and further adjustments in the scope or quality of the project or in the construction budget authorized by the owner, the architect prepares construction documents for the owner’s approval. These consist of drawings and specifications that set forth in detail the requirements for the construction of the project.

Construction documents (developed by the AIA and the Associated General Contractors of America) consist of the following: invitation to bid, instructions to bidders, information available to bidders, bid forms and attachments, bid security forms, construction agreement, performance bond, payment bond, certificates, contract conditions (i.e., general conditions and supplementary conditions), specifications (Divisions 1–16), drawings, addendum(s), and contract modifications.

The program management issues for the phase consist of code compliance, scope creep, schedule slippage, design review, technical review, quality assurance, use of design and estimating contingencies, design contract interpretation and enforcement, bidding and construction strategy (i.e., a lump-sum bid for all components or multiple bids for general contractor, mechanical, electrical, and add-ons or reductions), cost overruns or underruns, design-bid-build (i.e., project designed by
an architectural firm and bid out to construction firms to build), design and build, and a variation of design and build called fast tracking.

All designers must keep current on the latest product information available in their field of expertise. When the plans and specifications are completed, the project is ready for bid.

**Bidding**

Bids are opened in front of witnesses, usually the contractors or their representative(s), and an attorney (normally required by a government agency). The bidding process includes (a) bidding and advertising, (b) opening and reviewing bids, and (c) awarding the contract. The bid documents include invitation to bid, instructions to bidders, the bid form, other sample bidding and contract forms, and the proposed documents (e.g., drawings and specifications).

**Bidding and Advertising**

Bidding is the process of receiving competitive prices for the construction of the project. A bid form should be provided to ensure that all bids are prepared in the same manner for easy comparison. The bids can be received in many ways. The most common are the following:

- Lump sum (one overall price)
- Lump sum with alternatives (either additions or deletions)
- Unit prices

All bids on large projects should be accompanied by some type of performance bond, ensuring that the contractor will perform the work as designed at the price bid in the time specified. This ensures that bidders are sincere in their prices.

The time and place of the receipt of the sealed bids must be clearly shown on all bid packages. No late bids can be received without compromising the entire bidding process.

**Small Projects (Up to $25,000)**

A bid of this size can normally be handled informally. The process of calling a selected list of local contractors will usually be sufficient and will probably result in obtaining the best price.

**Larger Projects (Over $25,000)**

A formal bid process is usually necessary to ensure fairness, accuracy, and a competitive result. The process starts with advertising for bids. Advertising frequently is initiated prior to completing the plans with an effective date for picking up the completed plans and specifications. The larger, more complex the project is, the wider the range of advertising necessary. Governmental agencies usually have minimum advertising standards. They advertise in the legal advertisement section of the local paper and papers in larger nearby cities and in professional construction journal(s). In addition, designers or clients frequently have a list of contractors who have successfully built past projects and/or who have indicated an interest in bidding on future projects.

As a minimum, the advertisement should consist of the following:

- A description of the project and kind of work required
- The date and place plans can be picked up
- The cost of plans and specifications (usually only sufficient to cover printing costs)
- The bid date and time
- Client identification

The approximate value of the project is sometimes included; however, some designers and clients do not wish to give out this information. With complex projects, it is desirable to schedule a pre-bid conference to explain the design and bidding process to prospective bidders. During the bidding period, one or more prospective bidders frequently raise questions. If the questions require design modifications or clarifications, they must be answered in writing in the form of an addendum to all holders of plans.

**Opening and Reviewing of Bids**

The designers or their representatives are usually present at the bid opening. After the bids are opened and read, it is necessary to analyze them and decide to whom the contract is to be awarded. The technical analysis is usually by the designers who consider whether the bid is complete, the prices are reasonable, and the contractor is able to do the work. A recommendation is then made. The legal analysis by the attorney is conducted concur-
rently with examining whether bonds are attached, all necessary signatures are included, and all required information is provided.

**Award of Contract**

Assuming favorable analysis by all involved and that the bids are acceptable to the client, the contract will be awarded. Most contracts are awarded to the lowest qualified bidder. Sometimes, however, the low bidder is not large enough or does not have the expertise to do the work required. Occasionally some bids are improperly prepared. In these situations, they may be rejected and the next lowest qualified bidder will be awarded the contract, or the project is rebid. This can lead to problems with the disqualified bids or bidders and is why an attorney should be present.

**Payments**

**Drawdown.** Who pays what and when? The key to a successful construction project is timely payments. Normally there is an agreed-upon payment schedule based on the submission of proper invoices for work completed and materials used from the contractor to the owner. This is generally done on a weekly basis.

**Progress payments.** The owner agrees to make progress payments to the contractor percentage of work completed. The payment requests are submitted based upon the amount of work completed on a line item from a preapproved schedule of values.

**Retainage.** This is the portion of the construction contract amount that the owner typically holds back until all elements of the work are satisfactorily completed. This amount is established in the beginning of a project and is normally specified in the contract as a percentage.

**Construction Phases**

The architect should visit the site at least twice monthly at appropriate intervals during the construction stage and make the owner generally familiar with the progress and quality of the work in writing. The architect has other responsibilities, including certifying the payments presented to the owner.

The construction step of a project goes through several phases. The number of phases depends upon the scope of the project and the contracting agency. Two general guidelines govern the construction step: (1) the larger the project, the more steps required, and (2) governmental projects usually have more contractual controls. At least some, and perhaps all, of the following steps will be required during construction.

**Pre-Construction Conference**

A meeting should be held between the contracting agency and the contractor(s) prior to the commencement of construction to review the contract items and make sure there is an understanding of how the job is to be undertaken.

**Construction**

The actual construction begins this phase, which could take as long as five years, depending on the scope of the project. However, construction can generally be completed in 18 to 24 months on an average project.

**Change Orders**

Change orders are defined as official documents requested by either the contractor or the contracting agency that change the approved contract documents. These changes usually include an adjustment of the bid price and a benefit to the contractor. It is better to avoid all change orders. Where this is not possible, be prepared to pay a premium price and to accept delays in contract completion.

The owner (or construction manager) needs to do the following to manage change orders:

- Evaluate the proposed change for impact on the construction budget and schedule
- Determine whether the proposed change is cost effective
- Secure independent estimates of verified change order requests and recommend approval levels
- Challenge the validity of change order pricing by the contractor
- Prepare a proper change order agreement
- Make changes to the project budget and schedule
- Maintain a log of all change orders approved
Pre-Final Inspection and Preparation of Punch List

The initial review of a completed construction project is called a pre-final inspection. This inspection should have the affected parties’ decision makers present including the owner or his or her representative, the architect, the contractor(s), and any subcontractors. At this time, it is also desirable to have the facility operation supervisor present. During this review, a “punch list” is prepared of any work the contractor needs to complete prior to a final inspection. All items that are not completed or are not completed according to specifications should be included on the list. The punch list is then agreed upon and signed by all affected parties. The contractor must then correct and/or finish all the items on the list. When the punch list is completed, it is time to call for a final inspection.

As-Built Drawings and Catalogue Cuts

As-built drawings and catalogue cuts are the drawings prepared by the contractor showing how the project was actually built. These drawings will be of great value to the operations and maintenance staff. They must know exactly what facilities were actually built and their locations to be able to maintain the project effectively.

Catalogue cuts are printed information that the manufacturers supply on materials and equipment used in the project construction. This material is necessary so that the operating staff will be able to learn about the material and equipment. In addition, it is needed for locating necessary replacement parts. It must also be included in working drawings and specifications of future renovations and/or expansion of the project.

Preparation of an Operations Manual

An operations manual contains written instructions on how to operate and maintain special equipment. The minimum data should include how to start up, how to shut down, inspection(s) time intervals and what should be inspected, schedule of required maintenance, safety precautions, and whom to contact for specialized repair assistance.

Training on How to Operate the Project

This contract item is usually included only for larger projects that are unfamiliar to the people who will operate them.

Final Inspection

The final inspection should concentrate on items not found acceptable during previous inspections. The same review team that made the pre-final inspection should be assembled for the final inspection.

Acceptance of Completed Project

Assuming all the work has been completed as shown on the plans and described in the specifications, the project should be accepted and turned over to the owner or operator. Furthermore, if the contractor has posted a performance bond guaranteeing the work, it should be released by the contracting agency.

If at all possible, avoid partial acceptances. Sometimes it is necessary to take over a part or parts of a project prior to completing the entire project. If this becomes necessary, the contractor will have the opportunity to blame future problems and/or delays on having to work around the people using the project.

Maintenance Period

When living plants are involved, many contractors have a maintenance period included after the acceptance of the project. This can last anywhere from 30 days or more for lawns to 90 days for flowers and, frequently, one full growing season for ground cover, vines, shrubs, and trees.

Bond Period

Most government projects and some larger projects require the contractor to post not only a performance bond but also a one-year (or some other specified period) warranty on the quality of the work. Usually the bond requires the contractor to replace or repair any defective or damaged items during the time covered by the bond. Typical items are leaking roofs, infiltration of groundwater into sewer lines, puddling of water in parking lots or tennis courts, and so forth.
Bond Inspection and Final Acceptance

At the end of the bond period, the original final inspection team holds another inspection. Prior to release of the bond, any problems that have been uncovered during this inspection must be rectified at no cost to the contracting agency. It is important to note that when the bond is released, the contractor no longer has any responsibility to the project.

Review

The project has been completed and turned over to the client. Does the project do what it was designed to from the standpoint of the (a) client, (b) user, (c) affected neighbors and/or public, (d) manager and operator, and (e) design team? There are two basic kinds of information to be gathered: information on people and information on physical conditions.