Campus Recreational Sports Facilities

Planning, Design, and Construction Guidelines

NATIONAL INTRAMURAL-RECREATIONAL SPORTS ASSOCIATION
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CAMPUS RECREATIONAL SPORTS FACILITIES

Planning, Design, and Construction Guidelines

NATIONAL INTRAMURAL-RECREATIONAL SPORTS ASSOCIATION

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The funny thing about a campus recreation facility is that you can't build just one. Yes, you can build a single structure, but even a modest facility is actually a dozen different facilities. It's a playground, a gym, and a resource center. A refuge, an office, a classroom, and an event location. It's a training center, a proving ground, a commons, a lounge, and a tour stop.

Because a good recreation facility is all these things and more to the campus community it serves, designing one is an enormous, time-consuming, complex challenge. But despite the difficulties, colleges and universities continue to build, expand, or renovate recreation facilities at an unprecedented and growing rate. In the fall of 2008, the National Intramural-Recreational Sports Association (NIRSA) collected data from member colleges and universities involved in capital projects that were scheduled for work from 2008 through 2013. The results of the survey have revealed that 174 colleges and universities are currently involved in facility construction, expansion, and renovation projects. Capital projects among NIRSA members totaling almost $4 billion are under way, with an average project expenditure of $20.7 million. The average project expenditure has increased $6.5 million from 2004 (NIRSA, 2008).

The construction boom reflects the growing knowledge among both campus recreation professionals and university administrators that participation in recreational sports programs and activities is a key determinant of college satisfaction, success, recruitment, and retention. Long after the campus tour “wow” factor wears off, students improve their emotional well-being, reduce stress, and learn a great deal about leadership, diversity, and team building by participating in recreational sports. The positive effects of this participation on students’ overall development can be significant and lifelong.

This book takes campus recreation professionals and others through the entire process of building a facility, from the initial planning through design, construction, and move-in. The flowchart at the end of the preface gives an idea of the complexity of constructing, renovating, or adding on to a recreational sports facility and why so many options are available. The time at which an architect or a construction manager is selected or at which funding gets approved for a project varies greatly between institutions according to the construction delivery method chosen for the project. This book is intended as a guide to what the possible construction options are and how one might go about selecting the option that is best suited to the needs of one’s institution.

The book is organized into three parts, beginning with part I, “Initial Facility Planning Process.” Chapter 1 delves into the campus master planning process and discusses steps necessary for a recreation program to position itself, gain priority, and achieve its goals. Planning models (approaches) and techniques are outlined and illustrated in this chapter to help owners meet their program objectives. Chapter 2 discusses the possibilities and feasibility of a recreation facility, including how project goals are translated into a facility design and how a well thought-out plan will lead to a successful project. It covers the need for and the steps involved in a feasibility study to provide justification for the programs and facilities, as well as a vision for the proposed solution. This chapter introduces the vital “first step” in the implementation of new or renovated recreation facilities.

Part II, “Facility Design Process,” begins with chapter 3, which asks the age-old question, Should we renovate old or build new facilities? This decision is a complex process of weighing different agendas, competing priorities, and other important factors; and the chapter explores ways in which the owner can quantitatively analyze a recreational sports facility and help determine which course to take. Once an owner has decided to build a recreation facility, a number of crucial questions arise: How to win support among key campuses constituencies? How much money will be needed? How to raise funds to design and construct it? Whom to solicit for funds? How to convince funding sources that the facility is necessary? What types of funds are available and appropriate? When are the funds needed? These key decisions and coordinated activities are discussed in chapter 4.
Chapter 5 introduces the process of selecting an architectural team and five of the key phases of the architectural design process: schematic design, design development, construction documents, bidding, and construction administration. Chapters 6 and 7 address indoor and outdoor space standards. Because recreational sports facilities appeal to a broad audience, no single governing body provides direction for all aspects of a facility. Depending on the use of each space (for example, use by both collegiate intramural and varsity teams), the level of play should dictate the size of the space. These two chapters provide the reader with resources for developing the appropriate facility specific to each institution’s unique needs. The accompanying Web site provides links to field and court diagrams and specifications (http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/).

Chapters 8 and 9 pertain to the unique specialty areas often found in a recreational sports facility. Chapter 8 explores the various options for indoor and outdoor aquatic facilities that are available to the owner, user, architect and designer, and construction manager; discusses how to determine which option is right for a specific user; and deals with unique considerations that need to be understood for each. Chapter 9 focuses on the site selection, design, and planning issues of indoor climbing wall facilities from initial concept to successful operations.

Part II concludes with chapter 10, “Getting It Right the First Time With FF&E.” While this may seem like a finishing touch, the proper integration of furniture, fixtures, and equipment is extremely beneficial when it happens early in the planning and architectural design process.

The book concludes with part III, “Construction and Move-In.” Chapter 11 is a comprehensive chapter that discusses the delivery methods for various construction options and the stages in the construction process. Depending on the circumstances surrounding any individual project, certain delivery methods may be more or less appropriate, and decisions about which method to use can occur at almost any time in the design process. The pros and cons of the various methods are discussed in this chapter. Chapter 12 puts the icing on the cake: the completion of the project and the move-in and dedication of the new or renovated recreational sports facility. This final phase of the project can be one of the most challenging, especially for the owner and staff. This chapter will help owners, users, architects, designers, and contract managers understand what to expect when anticipating the opening of a new recreational sports facility and how best to make a good and memorable first impression on opening day, as well as how to plan for the dedication and celebration of a new or renovated facility.

Campus Recreational Sports Facilities: Planning, Design, and Construction Guidelines provides much of the information needed to plan, design, and build a recreational sports facility. But will the facility be used? Research has shown that participation in a recreational sports program is correlated with overall college satisfaction and success (NIRSA, 2004). An additional, comprehensive campus recreation program can have a positive impact on retention and a sense of belonging for students, and campus recreational sports facilities and programs are often a key factor in the decision by some students to attend a particular college or university (Hall, 2006). An excellent companion book is NIRSA’s recently published Space Planning Guidelines for Campus Recreational Sport Facilities. This book presents space-per-student facility planning guidelines taking into consideration an institution’s size (small, medium, large, or very large) and facility type (indoor facilities, fitness facilities, outdoor adventure recreation facilities, aquatic facilities, and outdoor facilities and fields). A unique element of the Inventory is that it includes data about what experienced campus recreation directors felt they should have for recreation facility space to meet the needs of their respective campus communities, not just what they do have. The combination of data about current space planning practices with ideal practical data should help right-size future construction projects well before ground is broken.

We hope these publications serve as vital resources in the provision of state-of-the-art facilities to aid in offering the highest-quality programs and services to the end user. Play on!

REFERENCES


This flow chart is a guide to the steps in the facility planning and construction process. Certain steps in the planning process will cost money, and the funding source for each step may have to be approved before the next step can proceed. Seek input from colleagues because the order of the process will vary from institution to institution.
PART I

INITIAL FACILITY PLANNING PROCESS
S
o you want to build a new facility? The plan-
ing process for renovating or constructing
new recreation facilities in higher education has
become more complicated in recent years, not
only for the campus master planner but also for
the recreational sports director. This chapter
discusses many of the issues, challenges, and
problems you need to think about strategically
to position your project for success in this highly
competitive and political environment.

On the typical college or university campus,
especially in the large teaching and research
institutions, many individuals become involved
in the planning, design, and development of a
project. Also, these institutions have established
(created), over a long period of time, certain
policies, procedures, and processes to imple-
ment projects as part of their long-term vision
for the campus. It’s important to understand—to
be more than conversant about—these planning
processes, as well as the campus constituents who
become involved in project development, in order
to position, gain priority, and achieve the goals
for the recreation program. This chapter outlines
and illustrates planning models (approaches) and
techniques that, with adjustments to reflect
the size, nature, and organizational structure
of your institution, will help you meet your
program objectives. It should be mentioned
that decision-making and planning processes
for capital projects, including funding sources,
are significantly different between public and
private institutions. Public institutions have clear
expectations for a strong public mission to serve
their states and are held accountable by taxpayers
and politicians. As a result, planning and fund-
ing decisions are held to public scrutiny. Private
institutions, in contrast, are held accountable by
their governing boards, and their planning and
funding decisions are usually not part of a public
debate.

PLANNING PROCESS
OBJECTIVES

Recreational sports directors and master plann-
ers need to work together to translate the
campus community’s recreation program needs
into appropriate physical structures and spaces
that support the institution’s education mission
and overall master plan. Since every institution
is different and no recreation facility or campus
master plan is the same, the knowledge base or
framework for you and the master planner to use
in order to be effective in your specific environ-
ment, as well as the planning process, will be
unique. The approach outlined in this chapter is
not the only approach to achieving project suc-
cess, but it reflects a perspective based on years
of experience in the planning and construction of
projects. We will consider the challenges, issues,
and problems that a recreational sports director
must bear in mind with respect to a plan for the
recreation program or the decision to build a
facility, and what a master planner thinks about
to help construct the plan and move a project
through to the final process of approval. Your
challenge is to incorporate the various elements of preparation and planning discussed in this chapter into your own institutional planning process for successful project completion. The objectives of the planning process are as follows:

- Provide a historical context for how recreational sports programming and capital planning have become important relative to institutional master planning.
- Develop an appreciation and understanding of the importance of assessment in data-driven decisions and project planning.
- Understand why benchmarking is important in defining the marketplace in higher education.
- Develop an understanding of planning principles for guiding the development of recreation facilities in concert with overall campus planning.
- Appreciate the value of planning consultants and when to use them.
- Explore the complexities of health insurance costs and the integration of campus health and wellness into recreation facilities and programs.
- Gain an introductory understanding of sustainability and universal design.
- Develop an understanding of and appreciation for the integration of a number of economic, political, educational, and strategic issues that can affect your program and facilities planning.
- Develop a general understanding of departmental, institutional, facilities, and master planning processes.

DEPARTMENTAL PLANNING

Several years ago, it was said that it takes an average of 11 years to actually finish a building after you have decided to build one in higher education. So you want to build a facility? You have just made a very complex decision that requires a great deal of planning, increasing your workload for years to come. Now what do you do, besides phoning a few colleagues for advice?

There are two fundamental parts in the planning process; one is departmental and the other institutional. If you are a recreational sports director, the departmental planning can be the most complex part of the planning process because chances are that you have never done a major capital project before and now you are responsible for “getting the ball rolling.” The time you decide to do a major renovation or build a new facility is a time for reflecting, questioning, and evaluating your strategies for success. Who provides the leadership for this project? Where’s the slice in the institution’s resource pie for recreational sports? Is recreation one of the values of the institution? What value does the program have for your university? How do you get recreation to be a high priority within the institution? And, do the direction in which the institution is going and the direction in which recreational sports is going line up? You will be asking yourself these kinds of questions and more.

This initial, cerebral, reflective part of the planning process is abstract in that it involves your understanding of a number of issues and integrating them into a strategic plan. Some of the issues relate to understanding the institution’s mission, priorities, and campus politics; identifying obstacles or barriers to success; networking with colleagues who have an interest in or are supportive of your project; developing a knowledge base about educational outcomes for students involved in recreational sports; and gathering preliminary data about students, faculty, staff, alumni, and community program and space needs. You must have the enthusiastic and unequivocal support of your campus community, superiors, and senior management for the project before this informal planning phase can begin. The office of institutional planning on your campus, that is, the campus master planner, can be very helpful in getting you started on this part of the planning process and involved in the cycle of planning and development of your project. Remember, good planning and your project should not be an “accident of interest” of the state legislature or a major donor. Planning must be a comprehensive, integrated, consultative process within the institution. Good planning does not guarantee complete success; it simply gives you the best opportunity for success for your project.

The following sections address some of the major contexts and strategic issues you must think about and the preliminary work needed to build your case to the administration and campus community for a successful project. Included is a brief review of literature that will get you started in building a research-based case for your facilities, programs, and services.
Historical Context

Recreational sports programs have been an integral part of the out-of-classroom experiences of students in colleges and universities in the United States for more than a century. These programs started because of student interest and developed with the help of campus administrators who recognized the perceived value to students and their institutions. Prior to the 1970s, very few institutions translated student interest in recreation programs into bricks and mortar. Typically, intramural and recreation programs were housed in facilities managed by physical education and athletic departments as a third priority in scheduling. This meant that the campus community as a whole received non–prime-time recreation program hours. A couple of exceptions were the Intramural Sports Building, built in 1928 at the University of Michigan (see figure 1.1), considered the first facility dedicated to student use; and the Intramural Activities Building, built at the University of Washington in 1968, viewed by many as the precursor to the modern campus recreation facilities being built today.

Until the 1970s, virtually all campus recreation programs received nominal funding and did not manage indoor sport facilities, although many campuses had outdoor intramural fields. After the mid-1970s, campus recreation programs evolved into independent administrative units and departments, constructed student recreation facilities, enjoyed unprecedented growth, and took on the management of these facilities (Cohen, 1995, 1996; Noyes, 1996; Turman et al., 2001). This evolution has enhanced the role that campus recreation plays in supporting the learning environment and students’ college experiences.

“In the past, the value of higher education was automatically accepted; even in tight economic times, higher education fared well against other state needs” (Erwin, 1991, p. 2). However, during the late 1980s and early 1990s, this automatic assumption changed dramatically. The dynamic political, economic, and social environment affected funding for higher education. Because of the competing demands for funding, legislatures had been allocating lesser amounts of revenue to higher education. The intense competition from court-ordered mandates to improve prisons, health care, and other human services shifted legislative funding priorities away from higher education. Increased competition within higher education for high-quality students, faculty, and staff, coupled with the economic realities of massive deferred capital improvements and technological infrastructure investments, created a financial crisis in education across the country. The public demanded more accountability from administrators with respect to how colleges and universities spent their money and defined their priorities. This created a fiscally driven, competitive environment affecting both student activities and programs, thus forcing those programs and activities to justify their existence on college campuses (Lamont, 1991; Pascarella & Terenzini, 2005; Todaro, 1993).

Figure 1.1 The Intramural Sports Building at the University of Michigan, considered the first facility dedicated to student use.

The National Intramural-Recreational Sports Association (NIRSA)
The nation’s economy prospered during much of the 1990s and into the early 2000s, in large part due to the “dot com” boom. During this period, state legislative coffers were full, and higher education and local communities received unprecedented funding for capital projects and other initiatives. The events of September 11, 2001, and the dire economic impact that followed made research-based decisions and accountability even more important for justifying project funding from dwindling resources. Public higher education has been on a funding roller coaster driven by the cyclical nature of the business environment and the national economy. Despite the improvement of the economy since 2005, state appropriations as a percentage of higher education's budget have continued to fall since the 1980s (Lyall & Sell, 2006; McPherson & Schapiro, 2003).

The more disturbing trend in colleges and universities, irrespective of a fluctuating economy, is the hybridizing of the American public university. Lyall and Sell (2006) suggest that significant spending for K-12, homeland security, foreign conflict, social services, and so on, combined with an outdated tax structure and a consensus among taxpayers that taxes should not be raised, creates a difficult environment for sustaining public investment in higher education. As a result, these public institutions have had to look for new revenue streams through fund-raising, student tuition, earned revenues, outsourcing, and so on. In other words, these public institutions are starting to look a lot like private ones. Typically, the “new” revenues are targeted for academic initiatives and not for support services. Support services such as recreational sports will continue to endure programmatic and economic challenges. With these realities driving institutional decisions, many colleges and universities still struggle with programmatic and funding priorities to increase student recruitment and retention, enhance the undergraduate experience, contribute to student development, and increase their own economic stability.

Planning and the Process for Planning

Planning is important because it poses three important questions that provide context, vision, and accountability to the project irrespective of the subject matter (e.g., academic, financial, budget, curricular, or physical): Where am I? Where do I want to go? How do I get there? Later sections of the chapter include a more thorough discussion of how the three questions are organized within the planning process. The process for planning is important because it provides policies, procedures, structure, and consistency for consultation and review of projects by the organization to make sure that they fit into the overall master plan and mission of the institution.

Planning Principles

Planning principles are comprehensive and fundamental assumptions about the institution that guide the planning process. For example, the University of Minnesota’s 1996 campus master plan presented four fundamental planning principles to guide the future development of the campus: (1) the principle of creating and maintaining a distinctive and aspiring vision for the physical development of each campus; (2) the principle of enriching the experience of all who come to the campus; (3) the principle of maximizing the value of existing physical assets while responding to emerging or changing physical needs; and (4) the principle of an inclusive, accountable, and timely process for creating and implementing the master plan vision (University of Minnesota, 1996). Although planning principles seldom change, the master plan should be dynamic to respond to changes over time. So, any changes to the plan should be guided by the established planning principles.

Similarly, planning principles for campus recreation facilities are comprehensive and fundamental assumptions that guide future development and should be complementary to and part of your campus’ master planning principles. Planning Principles for College and University Recreation Facilities (Turman, Morrison, & Gonsoulin, 2004) was developed by the National Intramural-Recreational Sports Association (NIRSA) and endorsed by the Society for College and University Planning to provide a national set of principles for recreational sports directors to adapt or incorporate into their respective campuses’ master plans. The planning principles should be used to help directors become involved in the master planning process at their institutions. For example, directors can use Planning Principles for College and University Recreation Facilities to educate their superiors and other key decision makers at the institution about the importance of including recreation in the master planning process by simply talking with them and giving them a copy...
of the publication. It is also important to understand and use the master planning language in the publication. Having conversations with and introducing Planning Principles to the planners and decision makers well before the master planning begins will increase the likelihood that you (and your project) will be included in the process.

As higher education planners become more aware of the impact that new college recreation facilities have on the recruitment and retention of students, quality of student life, educational outcomes, and their campus environments including ecosystems, it is important that planners understand how the development of these facilities can relate to overall campus master planning. The planning principles will assist with future planning and design decisions for indoor and outdoor recreation-related facilities. In a broader context, Planning Principles should serve as a guide in the physical planning process for a livable campus that supports and enhances the academic learning environment.

The National Intramural-Recreational Sports Association has established six planning principles to assist with and serve as a guide in the physical planning process for a livable campus:

1. Establish recreation as one of the pillars of comprehensive campus planning.
2. Create and maintain a vision for the physical development of recreation facilities, a vision that supports the mission and master plan of the institution.
3. Develop a process for designing sustainability into the planning of new, remodeled, or renovated facilities.
4. Instill a genuine sense of community and enrich the experience of all who come to the campus.
5. Foster a safe, secure, and accessible environment.
6. Ensure an inclusive and accountable implementation process (Turman et al., 2004, p. 2).

The text articulating the context of each planning principle in Planning Principles includes language that helps recreational sports professionals understand the framework for planning and converse with a broad audience, including institutional planners, administrators, and decision makers as well as planners, consultants, and architects in the private sector. In addition, recreation professionals should incorporate their master planning thinking into their annual budget and strategic planning processes. This should include a list of major and minor capital projects that have been completed, ongoing projects, and plans for the future. Think of and use these budget, program, capital, and strategic plans as educational, marketing, and public relations tools.

Over the last decade or so there has been a fundamental change in thinking about campus recreation to encompass a broader definition of recreational sports, in the narrow context of higher education, that includes a variety of leisure activities such as walking, gardening, casual bike riding, relaxing, and reading in less formal settings. The planning principles just outlined offer a broad description of leisure and recreation space that includes pedestrian walkways, bicycle paths, hiking trails, lakes, rivers, and green spaces for passive and active leisure activities. This comprehensive definition of leisure or recreation is not new in the larger society, as it has been an integral part of city and community planning for centuries; think of Central Park in New York City or Golden Gate Park in San Francisco. But the broader context of recreation spaces is, for the most part, a relatively new way of thinking about campus master planning in higher education from a leisure and recreation perspective.

Educational Mission and Learning Environment

Recreational sports directors not only need to be knowledgeable about the interests, characteristics, and profile of their students, faculty, staff, alumni, and the broader campus community; they also need a deep understanding of the national research that shows how student involvement in recreation programs, facilities, and services supports the academic mission of the institution and the student learning environment. In addition, they must be knowledgeable about societal health and wellness research and the culture of wellness on their own campuses. There is a plethora of national research on these issues but very little published material on individual campuses. Recreational sports directors need to find the internal data on their campuses and conduct their own research to show that the educational outcomes and health and wellness of the campus community are directly related to involvement in recreational sports. Unfortunately, most recreational sports professionals are administrators, programmers, and managers, not
researchers. However, that is no excuse for not being knowledgeable and acquiring data about these important areas.

**Importance of Assessment**

Since the 1970s, evaluation and assessment of programs, facilities, curricula, and student development and learning outcomes have become increasingly important for understanding institutional environments, making knowledge-based changes, and holding decision makers accountable. Due to new technological advances and sophisticated software, collecting and analyzing data are more efficient and practical than ever before and have become an expectation in most planning efforts. For building a recreation facility in higher education, governing boards and the administration want to know the programmatic demands (or needs) of students, faculty, staff, and alumni and how their existing programs and facilities compare or benchmark against those of other institutions; enhance student learning and development; contribute to student recruitment, retention, and graduation rates; promote health and wellness of the community; and directly support the institution’s mission (Banta, Bradley & Bryant, 1991; Pascarella & Terenzini, 2005). The type and extent of assessment will depend on institutional needs.

**Student Development and Learning**

Over the past several decades, colleges across the country have invested billions of dollars in constructing recreation facilities to maintain their competitiveness in the higher education marketplace without a clear understanding of the impact that these new and renovated facilities have had on the campus environment (Archibald, 1995, 1996; Banta, Bradley & Bryant, 1991; Cohen, 1996; Downs, 2004; Huesman, Brown, Lee, Kellogg & Radcliffe, 2008; Maas, 1998, 1999). Recently, institutional decision making has become more data driven, and decision makers not only want to know what the recreation programmatic needs of the student and campus community are, they also want research-based data on how recreational sports programs, facilities, and services support the institution’s academic mission and directly contribute to student recruitment, retention, academic success, graduation rates, personal development, college satisfaction, community, health and wellness, and other related criteria.

The literature provides some descriptive and anecdotal data relative to intramural sport participation (involvement), satisfaction levels, perceived benefits, and recruitment and retention (Bourgeois et al., 1995; Kanters & Forester, 1997; Kovac & Beck, 1997; Lamont, 1991; Lumpkin & Halstead, 1995; Nesbitt, 1993; Proescher, 1996; Shriberg & Wester, 1994; Smith & Missler, 1994; Turman & Hendel, 2004; Vitorino, 1993) and there is almost no empirical assessment on the impact of pre-construction vs. post-construction of recreation facilities on student involvement and development (Turman, 2000, Turman & Hendel, 2004). Although numerous articles and monographs deal with assessment in higher education related to a number of factors affecting student learning and development, for example, faculty–student interaction, residence hall living, and fraternities and sororities (Astin, 1996a, 1996b; Banta, Bradley, & Bryant, 1991; Banta & Associates, 1993; Bryant, Banta, & Bradley, 1995; Kuh, 1995; Light, 1990; Pascarella & Terenzini, 2005; Turman et al., 2001), there is very little empirical research assessing the impact that recreational sports programs, facilities, and services have in higher education (Erwin, 1991; Upcraft & Schuh, 1996; Turman, 2000; Weese, 1997). However, a recent intercept study by Downs (2004), based on 2,673 student interviews conducted at 16 campuses across the country, showed that “students who participated in recreational sports programs and activities identified recreational sports as one of the key determinants of college satisfaction and success” (page 17). Pascarella and Terenzini (2005) reviewed a number of studies that show student involvement in out-of-classroom activities, such as residential and Greek life, student government, student employment, and intercollegiate athletics, that support a number of learning outcomes. However, the research of Maas (1998, 1999) and Huesman et al. (2008) are the largest studies (N > 5,000) found in the literature that show a positive relationship of student participation in recreational sports facilities to student retention and academic success.

**Faculty, Staff, Alumni, and Community**

Another area of assessment relates to the recreation and wellness needs of faculty and staff. Typically, recreation facilities have been built for students with student monies, and “privileges” or “memberships” have been extended to the
rest of the campus community for a fee. Some examples of opportunities for revenue generation are additional fees for membership in an employee wellness center and for fitness assessments, personal trainers, blood analysis, body mass indexing, health and wellness counseling, injury rehabilitation, classes, seminars, clinics, and any other expressed interest by the users that can be programmed. There is very little, if any, research in the literature on the recreation and wellness needs and interests of the faculty and staff in relation to building new recreation facilities. However, anecdotal evidence suggests that some level of survey data has been collected on this population at most institutions for internal purposes. It is important to assess the faculty and staff to gain a clear understanding of the programmatic and space needs of the entire campus community so that the design and development of programs, and the space that houses them, functionally serve the whole institution. If the institution has a commitment to extend recreation privileges or memberships to its alumni or the surrounding community, it is also important to assess the programmatic interests and needs of those populations.

**Benchmarking**

Benchmarking data have become increasingly important not only for finding out what peer institutions are doing in terms of staffing, salaries, programs, and facilities; such data also helps to define the marketplace and provide important information relative to financial and space parameters or expectations for your project. Collecting comparable data about peer institutions is an ongoing or periodic process that will keep your department on the cutting edge of developments in the field (Turman & Brown, 2002).

The lack of benchmarking data and formal research in the past created “space deficits” in building programs because planners did not have accurate information to right-size facilities to meet projected programmatic needs. A number of institutions, such as the University of Washington (1968), the University of California at Berkeley (1984), UCLA (1982), the University of Minnesota (1993), the University of Texas at Austin (1990), and Texas A&M (1995), built recreation facilities without the benefit of good benchmarking and needs assessment data. As a result, these first- and second-generation facilities tended to be underbuilt. Many institutions are considering building or have recently built new recreation facilities or additions to existing ones because of overcrowding. Not until the past few years have enough data been collected to build a research-based case for renovating old or building new facilities. The recent national study by Downs (2004), titled *The Value of Recreational Sports in Higher Education: Impact on Student Enrollment, Success, and Buying Power*, has helped build the case about the impact of recreational sports facilities, programs, and student success on college campuses. However, because Downs’ research was an intercept study and presents information only about the population studied, it does not provide benchmarking and on-campus data directly related to others’ institutional needs. Additional assessment is required. Therefore, recreational sports directors and master planners are compelled to conduct on-campus, demand-based program and space assessments and benchmarking research to obtain enough data to build a convincing case for new facilities at a particular institution.

**Planning Consultants**

Let’s assume that you have done your homework and understand the historical context of the development of recreation facilities; the process for planning; the principles of planning; and the activities, interests, and programmatic needs of your constituents in the context of your institution’s academic mission and student learning environment. The next step is to assess the need for hiring a planning consultant. The decision of who hires the consultant usually depends on the amount of the contract, as institutions have policies designating the level of signature authority and whether or not a contract must go out for public bidding. Whether the recreation professional should advocate for a particular consultant depends on the institution’s policies, culture, and environment. This can also be a political issue! Sometimes hiring outside consultants for capital planning is not necessary and you are able to get internal approval to move directly to predesign and hire an architect, but this is becoming rarer. Therefore, the planning consultant plays an increasingly important role in helping to mitigate internal and external politics, justifying new facilities and programs, and lowering tension levels that may exist in the campus environment through broad consultation and data collection. Costs for planning consultants depend on the deliverables specified in the Request for Proposal. Typically, the more infor-
Campus Recreational Sports Facilities

A variety of consultants specialize in areas such as aquatic design, programming, signage, electrical, mechanical, and landscaping who may be used throughout the design, development, and construction of a project. However, the most important consultant will probably be the first one hired to get the project off the ground—the planning consultant. The planning consultant typically gathers benchmarking data from other institutions; conducts a feasibility study; performs a program and space needs assessment; surveys the campus community; interviews students, faculty, staff, and administrators; and develops business plans for the financing of the building and future operating budgets for the facility and staff.

Consultants have become increasingly important for building the case for expanded recreation programs and new facilities and services. Although most recreational sports directors have a good idea of their campus community's recreational program needs, it is becoming increasingly difficult to be “a prophet in one's own land.” In other words, the consultants, theoretically, bring a level of objectivity and expertise to the information-gathering process about programmatic demand, space requirements, financial models, construction estimates, and other important information reported to the institutional decision makers that is perceived not to be self-serving. This does not preclude on-campus research such as campus surveys, space allocation and audits, and some benchmarking that should be done by the recreation staff, or on the larger campuses by space management staff, prior to hiring of a consultant. The more information the institutional and recreational staff can collect about their programs, facilities, spaces, and users before hiring a consultant, the greater the reductions in the learning curve and costs for the consultant. It is important to remember that a consultant can never know a campus as well as the recreation staff. As mentioned earlier, a good consultant helps mitigate campus politics by involving other units in the consultative process and providing an “unbiased” report to the institution to enable research-based and data-driven decisions.

A number of firms and individuals offer varying ranges of consulting services across the country. Architecture, landscape architecture, engineering, financial, program planning, design, and other firms that have done a considerable amount of work consulting on recreation facilities projects are associate members of NIRSA, exhibit at its regional and national conferences, and advertise in trade magazines and publications. You should contact the NIRSA national office for more information about these consultants and talk with colleagues who have used them in their projects before making a decision about which firm or individual you would like to hire to help you with your project.

Campus Wellness and Health Insurance Costs

Increased emphasis on leisure activities has become even more important as the poor state of our society’s health and wellness reaches alarming levels despite the common knowledge that physical activity and exercise are healthful. About two-thirds of American adults do not engage in regular exercise, and about one-quarter do no physical activity at all (U.S. Department of Health and Human Services, 2002, p. 11). The ongoing and accumulated research indicating that regular physical activity, personal weight management, and good nutrition mitigate a plethora of health risk factors such as heart disease, diabetes, cardiovascular disease, osteoporosis, and others is compelling. Physical inactivity has contributed significantly to soaring health care and insurance costs, approaching $500 million per year in Minnesota (Minnesota Department of Health, 2002). Nationally, health care spending reached $2.3 trillion in 2007 and was projected to reach $3 trillion in 2011 and $4.2 trillion by 2016 (Catlin et al., 2008; National Coalition on Health Care, 2007). It was estimated (in 2,000 dollars) that national health care costs could be reduced by approximately $29 to $77 billion if inactive adult Americans increased their daily physical activity to moderate or intense (Pratt, Macera, & Wang, 2000).

Reversing this health trend and reducing health care and insurance costs have direct economic benefits to society and higher education. A number of studies have shown a relationship between modifiable health risk factors and reduced health care costs; that is, there is substantial return on investment for dollars spent on health promotions (Anderson, Whitmer, Goetzel, Ozminkowski, Wasserman et al, 2000;
Golaszewski, 2001; Chapman, 2003). So, what the literature says is that leisure and recreation (physical activity and exercise in all forms) are a major part of the delivery system for a healthy and well society or campus community.

The reality of the future is that planning and designing new facilities to address the health and wellness of the campus community require developing relationships and partnerships with academic health centers, sports medicine, physical therapy, nutritional science, epidemiology, kinesiology, student health, employee benefits, and other units in the institution that are involved in promoting health and wellness or have an interest in getting involved. If the recreational sports department has an opportunity to renovate or build new facilities, one of the planning questions is “Should a health and wellness center be incorporated into the building program?” If the answer is yes, then what does that mean programmatically? Who should be involved? How will it get funded? And what is the best strategy for getting the project done? On most campuses, answering these questions is a daunting task because of campus politics, territorialism, funding, academic priorities, state of the local economy, and so on.

As a result of these political, turf, and funding issues, not only on college campuses, but in local, state, and federal governments, campus recreation directors and others face significant barriers in convincing their institutions to build health and wellness facilities to house their programs and initiatives. Because of the alarming rates of obesity in this country, there is movement at the federal level to address healthy lifestyle and disease prevention in society.

For example, Senator Tom Harkin (D, Iowa) reintroduced his Healthy Lifestyles and Prevention (HeLP) America Act on May 18, 2004. The bill seeks to improve the health of Americans and reduce health care costs by reorienting the nation’s health care system toward prevention, wellness, and self-care. On June 28, 2005, Senator Bill Frist (R, Tennessee) reintroduced both the Childhood Obesity Reduction Act (2003) and the Improved Nutrition and Physical Activity (IMPACT) Act (2003), the latter of which aims to establish grants to provide health services for improved nutrition, increased physical activity, and obesity prevention (Bynum, 2005, p. 40). It should be noted that both the Childhood Obesity Reduction and IMPACT acts were never passed, but that at this writing the IMPACT Act was pending in the 111th Congress.

Although this proposed federal legislation is important and highlights the significance of these health issues in society by providing grant funding for programs, E. Jay Bishop, Superintendent of the Rutland Recreation and Parks Department in Vermont, noted that funding programs is good, “but you’re going to have a lot of problems if you don’t have spaces to provide that programming. You’re not creating a way of life, you’re just putting a Band-Aid on the problem” (Bynum, 2005). As a result of Bishop’s work of turning an 80-year-old elementary school into an indoor recreation facility, Representative Bernie Sanders (I, Vermont) introduced House Resolution 2240, the Urban and Rural Disease Prevention Act of 2005, on the floor of Congress. This act proposed over the next five years to provide $750 million in grants to fund the planning, design, development, and construction of community fitness and recreation centers (Bynum, 2005). At this time it does not appear that this will become a
law in its present form, but if it does it will have a significant impact on society. The health and wellness issues at the national level underscore the importance of the role of recreation as a major part of the delivery system for active lifestyles and disease prevention in society and higher education. Campus recreation professionals must include health and wellness thinking in their case building and planning for new and renovated facilities.

**SUSTAINABILITY**

Although sustainability means different things to different people, according to a generally accepted definition “sustainable development involves . . . meeting the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland Report, United Nations, 1987; Carmody, 2006). According to the *American Institute of Architects Handbook*, “sustainability refers to the ability of a society, ecosystem, or any such ongoing system to continue functions into the indefinite future. . . . For architecture, this means design that delivers buildings and communities with lower environmental impacts while enhancing health, productivity, community, and quality of life” (Carmody, 2006). Under these definitions, the concept of sustainability refers to the way we view our environments and ecosystems in relation to preserving them for our children and grandchildren, that is, the way we live our lives in an increasingly small world.

Since the first Earth Day in 1970, society has been making strides in conserving energy, recycling waste, and preserving the environment for future generations. Until recently, this movement has been marginalized and considered out of the mainstream of political thought. It is clear that the use of carbon-based fossil fuels is contributing to global warming, climate changes, and many other environmental problems. Higher education should not be contributing to these problems but mitigating them through education and research, as well as building and landscape design (Simpson, 2003). It would therefore seem obvious that we should include the concept of sustainability and plan for the “greening” of our buildings and landscapes. Green buildings offer many advantages over conventional ones, such as enhanced academic performance and lower energy costs (Browning, 2003).

Currently, sustainability and green design are rapidly becoming accepted as increasing numbers of higher education systems, colleges and universities, municipalities, and state governments are including environmentally friendly policies in
their building codes, ordinances, and laws (Sowell et al., 2003). You should learn enough about this topic to understand sustainable concepts, converse with others, appreciate your responsibility of educating others in your institution, and incorporate sustainability into your building plans. Most of the information in this section of the chapter came from the journal of the Society of College and University Planning, Planning for Higher Education; the entirety of Volume 31, Number 3, was dedicated to this topic. Use the references to research this important concept and applying a model of sustainability on your campus (Waite, 2003). In 2006, NIRSA joined the Sustainability in Higher Education Consortium, which provides additional resources and benefits to its members on this subject.

**Universal Design**

During the participatory planning process that should include broad representation from your campus community, it is likely that applying universal design principles to your facility will be put on the table for consideration by one or more of the representatives. These principles are not currently mandated in facility design under the 1990 Americans with Disabilities Act; they are design principles developed by the Center for Universal Design at North Carolina State University to enhance that federal legislation. These are the seven principles:

1. **Equitable use:** The design is useful and marketable to people with diverse disabilities.
2. **Flexibility in use:** The design accommodates a wide range of individual preferences and abilities.
3. **Simple and intuitive use:** Use of the design is easy to understand, regardless of the user’s experience, knowledge, language skills, or current concentration level.
4. **Perceptual information:** The design communicates necessary information effectively to the user, regardless of ambient conditions or the user’s abilities.
5. **Tolerance of error:** The design minimizes hazards and the adverse consequences of accidental or unintended actions.
6. **Low physical effort:** The design can be used efficiently and comfortably and with a minimum of fatigue.
7. **Size and space for approach and use:** Appropriate size and space is provided for approach, reach, manipulation, and use regardless of the user’s body size, posture, or mobility (retrieved September 29, 2005, from www.universaldesign.org/).

The purpose of these principles is to create a user-friendly approach to the design of facilities and the environment for all people in the broadest context, including culture, language, size, age, weight, race, gender, and physical ability. The professionals who developed these principles are architects, product designers, engineers, researchers, and others who bring a level of credibility to the concept of universal design. The authors suggest that the application of universal design principles for products and environments can be done without “adaptation or specialized design.” Since universal design principles are not mandated under laws like ADA but are recommended in facility and environment design, they are subject to local interpretation depending on who is doing the interpreting. Similar to the situation with the concept of sustainability, even though reasonable people would agree that applying universal design principles to a facility project is a good thing, there is ongoing debate about the additional or incremental project costs for implementing them. Until local, state, or federal legislation is enacted in support of universal design, it is imperative that you understand these principles, communicate with the people involved in disability issues on your campus, and identify problems or concerns up-front so that you create a supportive environment for moving your project forward. More specific information about this topic can be found at www.universaldesign.org/.

**Campus Context and Strategic Positioning**

In planning indoor and outdoor recreation facilities, it is important to understand the institutional mission, long-range strategic goals, and overall campus master plan at your institution. For example, the mission of public universities and colleges typically is related to teaching, research, and outreach; the long-range strategic goals may be to increase the academic quality of the student body by raising admissions standards and to become a top-tier research university. The overall campus master plan should provide a physical...
direction for new buildings, spaces, and land acquisition to house programs to accomplish those strategic goals that reflect the mission of the institution.

**Strategic Relationship to Academic, Social, and Physical Open Spaces**

*Planning Principles for College and University Recreation Facilities* (Turman et al., 2004) provides guidelines for campus master planners and recreational sports directors to use to integrate recreation with academic, social, and physical spaces within the overall master plan and the development of the physical campus. The planning principles recognize that all campus recreation is not centralized, but rather distributed across the campus in various locations, including open spaces. Higher education institutions are dynamic entities, responding to changes in society including distance learning, technology, enrollment management, and recruitment with the changing of students’ education and critical life skills. What are the strategic relationships of campus recreation to academic, social, and physical spaces in the context of these environments? The planning principles should help guide campus master planners and recreational sports directors toward the development of the recreational sports facilities plan, which will probably be different for each institution. How the plan is finally put together will have a significant impact on the quality of campus life. That’s the challenge.

**Integration With Other Campus Programs**

In the past, campus decisions about facility development frequently tended to be reactive decisions in response to existing political, funding, and environmental forces. Institutional priorities changed depending on who the decision makers, legislators, or major funding contributors were at the time. In some cases, planning was done independently or separately from other units. For example, how could residential life build a housing project and not think about parking, transportation, and recreation? Similarly, how could recreational sports build a recreation center and not think about housing, parking, transportation, and food service, as well as other units such as athletics and kinesiology? Though working with other units on campus can be rewarding and challenging, it is often a daunting task—but one that must be done to ensure that the planning effort incorporates the best interests of the overall institution.

A good example of the complexities of integrated campus planning concerns health and wellness. With increasing emphasis on the health and wellness of our campus communities, it is important to ask several questions: Is the institution interested in a wellness center? And if so, who should be involved in the planning of the center? Where should it be located? Who should run it? These are good examples of integrated planning questions. Many units at most campuses are involved in health and wellness programming, such as student health, nutritional science, employee benefits, medicine, sports medicine, physical therapy, occupational therapy, public health, epidemiology, and maybe others.

Building a new recreation center or an addition to an existing building provides an opportunity to ask these broad institutional questions. Because wellness is such a politically charged (territorial) issue on most campuses, the recreational sports director and the campus planner must ask themselves strategically, How does the wellness center question get asked and to whom? Who should provide the leadership? Why should the institution build a wellness center? What is the return on the investment? If the appropriate planning questions are asked from an institutional perspective and other units become involved in the process, it is not hard to envision a building program with elements for athletics, kinesiology, housing, student activities, research, teaching, wellness, and so on. In the end, each institution will develop its own definition of wellness!

As a result, planning campus recreation facilities must not be done solely from a departmental perspective, but from an institutional one. It is important to appreciate and understand that the direction or vision of the recreation department and that of the institution must line up. Clearly, planning goes beyond the number of square feet per person. So the broader planning question is, How does recreation fit into the academic, social, and quality of life on campus? An ethical question is, How should buildings be developed in the context of personal well-being, physical development, and interpersonal relationships? The answers to these questions will clarify the value and contributions of campus recreation to the institution and help define the physical relationships within the overall campus master plan.
Campus and Community Politics

It is important to understand the political environment on campus and in the local community. The recreational sports director and the campus master planner can work together to identify who needs to be “onboard” for moving the project forward and identifying any issues that may need to be addressed to gain the support of the local community, if necessary. With outdoor facilities, which tend to be located on the periphery of campuses, the local community may be concerned about night lighting, noise, parking, crime, site location, or shared use with the neighborhoods. With indoor facilities, there may be concerns on the part of the local business community about unfair business practices and competition, especially with other local, private health clubs.

Many campuses have community relations directors who work with the surrounding neighborhoods, city councils, and municipal planning departments to help resolve local conflicts resulting from the development of campus buildings and grounds. It is important to have someone from that office involved in the planning process to develop a communication plan with the surrounding communities.

Campus politics can be just as problematic as local politics. Typically, numerous projects on campus are waiting to get approval for funding, and the competition among academic and support units can be intense. Recreational sports directors need to be sensitive to other building projects, particularly in the student union, student health, housing, and athletics units, that may affect their funding. Local and campus politics may delay a project or even prevent a project from moving forward. An interesting example was presented at the Society for College and University Planning’s international conference in Washington, DC, in July 2005. Dr. Judith Alpert, Associate Dean of the New York University School of Law, described the development of the school’s new law school complex in New York City. She said that the local community and internal politics of the university were so politically charged that the school had to hire two public relations firms—one to deal with the internal politics and one to deal with the external politics. The consultants were invaluable in communicating the project plans to actively interested groups, delivering a consistent message and bringing concerns back to the project team. Many of the concerns, such as historical preservation, building heights, light and shadow issues, and sight lines from the street and adjacent buildings, could be incorporated into the design of the complex.

INSTITUTIONAL PLANNING PROCESS

Planning takes place every day on every college and university campus. Whether as a well-organized and recognized function within the organizational structure of an institution and implemented around an overall vision for the development of the campus within a “culture of place,” or as a process characterized by a loose federation of single-focus, independent development decisions within a “culture of projects,” planning occurs. The popular adage, “Failing to plan is planning to fail” embodies this tenet that planning occurs, in some fashion, all the time. It further emphasizes the importance of establishing planning as a central function within the decision-making structure of the institution or any organization to assure the realization of its mission, goals and objectives.

An objective of every recreational sports director should be to position recreation as an equal and active partner in the ongoing planning and budgeting process at the institution. If the recreation program does not occupy this position, it will typically come up short during campus budget allocations and especially during periods of limited resources. As financial struggles continue, on an almost unending basis, the program will be required to assume more and more of its costs for maintenance and operations and thereby shrink its budget for staff and program activities. Equal participation in the planning and budgeting process does not mean equal share of the dollars. But almost as importantly, it provides an opportunity, typically missing at many institutions, for the recreational sports director to make the case to the central officers for a fair share of the institution’s resources. Therefore, it is critical that the recreational sports director and the departmental staff understand the institutional planning and development process, the process of preparing and implementing the campus master plan, and the people who manage the processes.

Many campuses have lost the qualities of their “original” design and its unique character or its visionary dream because of the lack of an effective planning process and a focus (concentration) on
developing individual projects without relationship to other parts of the campus. The change in approach can be attributed to a number of factors: (1) ignorance of the campus master plan and the institution’s history; (2) an emphasis on expediency and cost savings that caused a shift toward speed and quantity and away from quality and a lasting image; (3) changes in campus leadership, the loss of institutional memory, and adoption of a short-term vision that deemphasized the planning process; (4) efforts to accommodate the automobile often resulting in piecemeal expansion of parking (the single greatest threat to the quality of the campus environment); (5) views of academic facilities as simple functional buildings as opposed to positive contributions to the overall image of the campus; and (6) shifting of allocated resources and priorities away from the maintenance and development of the physical environment to supporting faculty, staff, and program budgets.

It is interesting to note that a number of the leading teaching and research institutions in the United States, recognizing the deterioration of the campus environment, have invested significant funds and planning time toward recapturing the character and vision of the original campus plan. It’s encouraging to note that Stanford University initiated a master planning effort in the eastern sector of the campus that resulted in its Department of Athletics, Physical Education and Recreation (DAPER) Master Plan (Stanford University Planning Office and SWA Consultant Group, 1995). This project came about because the president of the university directed the campus planners to return to the planning and design philosophy employed by Frederick Law Olmstead in order to reclaim the spirit and vision of the historical campus plan (Lockwood, 1998).

The “unplanned” and, in some cases, the “unchecked” development of athletics facilities on campuses has resulted in the loss of attractive and functional forms that gave many of these campuses their original unique character. The Stanford decision is significant in that it illustrates how an institution can respond to and take advantage of opportunities to reallocate campus resources (land and funds) devoted to sport and athletics, as well as plan development consistent with Olmstead’s principles to bring about positive changes in the environment.

Several years ago, the University of Virginia’s board of regents, upon reviewing construction activities in the health sciences and other campus areas, raised the issue of the abandonment in current projects of the Jeffersonian principles that gave them their world-famous campus lawn. The board directed a change in the planning approach that would produce future development images reflective of the earlier plan and return campus planning and development to a process that adhered to the initial campus planning principles. There are other examples of campuses that are allocating resources to reestablish a harmonious balance between building development, open spaces, and the campus landscape. The University of Minnesota invested significant funds, during a five-year period (1999-2004), to recapture the spirit of the vision in the 1907 Campus Plan created by Cass Gilbert; the idea was to connect the campus mall to the Mississippi River and remodel several buildings and grounds in the old campus National Registered Historic District, as well as other campus areas, consistent with the principles, policies, and guidelines in the 1996 Campus Master Plan.

The following discussion outlines an approach that can help the recreation and sport department create a vision, prepare a plan for its sport and recreation needs, achieve priority positioning during the budgeting cycle, and maintain its vision for the development of sport and recreation within the campus master plan. Fundamental to achieving this approach is a general knowledge of the role of recreation and its relationship to the overall planning process at the institution, as well as whether recreation is designated a land-use or precinct component of the campus master plan (e.g., parking and transportation, buildings, landscape, utilities, housing). This section clarifies the plan and the planning process by defining the relationships and organization of the campus master plan, the precinct plan, the recreation facilities plan, and the implementation process within the context of answering three basic questions: Where am I? Where do I want to go? and How do I get there?

Many enlightened campus decision makers seek improvements as the campus develops and are interested in correcting mistakes of the past to recapture qualities that were lost during “hurry-up” periods, such as the dramatic building construction during the 1960s and ’70s, when it was easy to misinterpret or misrepresent values, goals, and institutional objectives. A new paradigm would place greater emphases on quality of the facility, the space, and the environment.
To quote Perry Chapman, a professional planner and principal at Sasaki Associates, Inc., where he specializes in college campus design, “The campus of the 21st century will distinguish itself by demonstrating how its built environment reflects the climate, landscape and culture of its region.”

The institutional planning and development process is a holistic approach (see figure 1.2) requiring the integration of academic, financial, and physical (facilities) planning into the annual planning, programming, budgeting, and development cycle of colleges and universities. It requires the institution to create policies, procedures, and development schedules to ensure that the various activities occur in the proper sequence and to avoid decisions made in a vacuum. This is important not only to maximize the financial commitment that an institution must make to the process, but also to maintain the life of the planning and development process. The process is collaborative and continuous and requires the proper allocation of people and funds in order to be effective and consistent. It is within the structure of the institutional planning process that the campus master plan is prepared, implemented, and amended.

Frequently, there is confusion between the terms “campus master plan” and “facilities master plan.” In fact, some professionals use these terms interchangeably. The two plans are related but are not the same with respect to the process that produces them or the scope of their influence and impact on the current and future environment of the campus. In fact, the master plan guides the development of the facilities plan. Therefore we will consider the definitions of these two planning activities before looking specifically at the planning process for the development of recreation facilities. These definitions are fundamental to the discussion of the planning process for recreation in this chapter.

The master planning process establishes the framework for the long-term evolution of a college or university based on a “vision for its future.” It builds upon the campus’ people, programs, and existing physical assets, including the natural features, the open spaces, the buildings, and the network for use and movement to and from the campus. The creation of a long-term vision means charting a course into the future based upon the desires, intentions, and expectations of the institution and its constituents. It requires very broad participation on the part of the internal and external communities and strong support from these two communities after determination of what that future should be or what the institution desires it to be. The master plan directs decisions on issues that will inevitably arise as an institution constructs, renovates, or demolishes projects due to growth or change, including the following:

- Capital budget items, major building programs, physical plant improvements
- Landscape and building maintenance
- Obsolete facilities
- Vacant lands
- Real estate acquisitions
- Independently funded projects
- Joint ventures and partnerships with third parties (University of Minnesota, 1996)

The facilities plan is a more defined (detailed) single-purpose document for land and buildings

Figure 1.2 Model institutional planning and development process.
development, including the planning, scheduling, and predesign for buildings or other facilities. Frequently, a campus unit (e.g., health sciences or institute of technology) is interested in preparing its own facilities plan. A later section of this chapter discusses the steps in preparing a comprehensive recreational facilities plan. Some institutions may require that the individual facilities plans be combined to complete a campus-wide facilities plan. This effort, however, is directed by the principles, policies, and guidelines in the campus master plan. In the case of the Twin Cities campus master plan, this effort occurs within and becomes part of the **precinct plan**. Figure 1.3 illustrates this process.

The precinct planning concept allows the master plan to exist as an up-to-date, alive, and relevant decision-making tool. It allows the institution to respond to unanticipated changes in educational programs, the receipt of appropria-

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**Figure 1.3** Master plan’s precinct planning process.
tions from the state for projects that are in conflict with the institution’s schedule, reprioritization of projects to meet more immediate needs or state mandates, funding opportunities from state and federal programs, and unexpected gifts. The campus master plan divides the campus into a series of precincts (e.g., health and residences, sport and recreation, North Mall, West Bank). Precinct planning concepts establish the detailed physical guidelines for the land, buildings, open space, landscape, and infrastructure improvements and propose development for each discrete area within the campus master plan. These concept plans include a series of drawings and policies that are relevant to the precinct. The detailed development within each precinct is directed by a set of design guidelines. These guidelines establish detailed directions for projects across the campus to ensure a consistency of built form and open space relationships. The guidelines address heritage buildings, the built form, and open spaces, especially historic landscapes; and they combine with the precinct plan concepts to form the basis for the future preparation of precinct plans for each area of the campus (University of Minnesota, 1996).

When the precinct plan is completed, it replaces the precinct plan concept in the campus master plan for the precinct. The precinct plan is kept relevant through periodic reconnaissance of the precinct. The campus master plan anticipates that these detailed studies will take place as existing conditions, programs, and events dictate. This is a critical component of the planning process, because the master plan does not involve an attempt to predict what will happen in the future but, more importantly, guides the response to changing conditions that affect the desires and needs of the campus users and programs. The master plan therefore allows room for the institution to make adjustments as it moves toward its vision.

An alternative planning model (though quite similar to the one just described) involves the preparation of a campus master plan document that proposes broadly defined principles and policies supporting the institution's vision but organizes the campus by land-use components (e.g., academic, parking, recreation, housing, physical plant). This model requires the preparation of individual, more detailed subdocuments pursuant to the land-use designations to guide the development of the particular area of the campus. To clarify, under this model the campus master plan contains the general categories of land use as they relate to the campus academic and nonacademic areas. Typically, the Land Use Components in the master plan will require the preparation of more complete and detailed solutions for the assignment and allocation of land uses than in the Precinct Concepts model. Under the Land Use Model, the allocation and assignment of land uses must be resolved within the timeframe for completion of the master plan document. This can cause problems at a later time requiring major adjustments to the plan because anticipated conditions that served as the basis for recommendations did not occur. This is a distinct advantage for the Precinct Concepts Model in that its flexibility will allow delaying a final decision on land use assignments until all of the information and exploration of options is completed, even after the completion of the master plan document. See figures 1.4 and 1.5 for a visual comparison of the two planning models. In both models, the recreational sports director, as the campus expert on sport and recreation, would play a leadership role in the preparation of the recreation component (in one case for the precinct and in the other case for the land-use component of the campus master plan).

In a fashion similar to what occurs with the Twin Cities planning model, these separate, more detailed, land-use plans must be constantly reviewed and amended to support the overall vision of the master plan and to keep the plan alive and effectively moving the institution toward its goals and objectives. There are, of course,
other campus planning models; but to be effective they must also meet this fundamental requirement to accommodate changing conditions and unforeseen events in order to maintain the focus on the desired future.

It should be emphasized again that the amendment of the components in either the precinct plan or the land-use model (e.g., recreation, utilities, buildings, landscapes) should be approved by the institution’s highest authority (e.g., board of regents or board of trustees) as an amendment to the campus master plan. Other models of planning would illustrate the important conceptual differences but close working relationships of these planning components.

The process for preparing a campus master plan or campus facilities plan, although specific and technical, is not as complicated as often described by consultants and practitioners. In 1968, Douglas Sherman, an administrator at the University of Michigan, suggested that the planning process could be narrowed to answering three rather simple but nonetheless difficult questions: Where am I? Where do I want to go? How do I get there?

Such a description of the planning process, of course, is in sharp contrast to the many complex and sophisticated definitions that are currently used in the planning profession. Terms for the process such as environmental scanning, contextual planning, multidirectional planning, scenario planning, situational planning, and micro-planning often frighten the “practical-minded” campus administrator and are viewed by such officials as too cumbersome or difficult to implement. Sometimes these “newly defined” approaches create false starts or lengthen the typical planning project schedule, resulting in higher costs for completion.

The three basic questions can be organized into a simplified planning approach (see figure 1.6) with the purpose of demystifying the planning process. An institution that is able to answer the three questions—because they are difficult to answer and because the responses must be very careful and detailed—may be assured that the planning, design, and construction of facilities will be effective, efficient, complete, and successful.

![Diagram](image-url)
Where Am I?

This question relates to the inventory and audit phase of the planning process. It’s critical to prepare a complete and accurate account of existing facilities (land and buildings) and personnel. If this is not done, the idea that “If you don’t know where you are, you can’t really determine where you want to go” or “know when you get there” will become very real to you. If the information in the inventory is not accurate, the plan, no matter how sophisticated it is and how carefully it may have been prepared, will be an unsatisfactory guide for the future. If the data on faculty, staff, students, and budgets are incorrect, the projection of facilities needs and costs will be a useless and wasteful effort. An accurate and well-organized inventory and audit report is essential to proceeding to the next phase of the three questions approach.

Where Do I Want to Go?

This question often is assumed to be the least difficult of the three because of a failure to understand the complexity and depth of thought required to provide the answer. Accordingly, this is the question that seems to be less fully addressed or to be given the least amount of attention in the planning process. It involves consideration of and decisions about the core values of the institution and its mission and creating a vision for the future. There is a need, however, for more than the typical poetic and eloquent (even imaginative), ambitious boilerplate statements that appear in brochures or handouts prepared for distribution in the president’s office or the institution’s foundation, alumni, public relations, or recruitment offices. Such documents explain the institution’s mission and goals, its role in the lives of the people residing in the region or state, and its impact on the nation and the world.

These documents are usually prepared by the central officers of the institution at the request of the board of regents or trustees. Generally, the president appoints a task force of campus leaders (faculty, staff, students) and external constituents and charges them with preparing a new statement or amending an existing document. The final product is usually a glossy, eye-catching document that is distributed to key legislators, major donors, alumni, or faculty and given by the campus public relations office to anyone interested. After a brief flurry of publicity involving high-level discussions and public reviews, it becomes a handsome document for high-level administrators’ office shelves or the campus library, or a conversation piece for the coffee table. It is seldom used to influence, direct, or test decisions that affect the future development of the institution.

An appropriate response to the question of the future of the institution requires the careful involvement of faculty, staff, students, and the citizens of the state in the preparation of a vision for the campus. Visioning is a technique used to establish future goals for an organization. It provides the broadest possibility for campus and community constituents to determine long-range development parameters for the institution. It also helps to determine the values that the campus community holds for the image and physical character of the campus. The visioning process can be a simple procedure or a more detailed and sophisticated methodology (U.S. Department of Transportation, Federal Highway Administration, Washington, DC, 1996). Figure 1.7 illustrates an efficient and effective visioning process. The process will yield a framework for what an institution desires to become and align the best of a series of alternatives into a future actions format.

A participatory photographic approach (developed and introduced by Hammel, Green, and Abrahamson, a Minneapolis architecture, engineering, and planning firm that was conducting a campus master planning study) is an incisive and effective technique to engage campus constituents (faculty, staff, students, alumni, neighborhoods, and so on) in surveying the campus environment and documenting the full range of qualities that contribute, positively or negatively,
to their experiences. It is a powerful technique to use to engage a campus and community constituents in exploring the campus environment and commenting on the basis of knowledge (visual) and emotional (spiritual) experience. It will reveal consensus about valued places and buildings and visual or functional problems. This information can help campus leaders develop a deeper knowledge of the social and physical qualities of the campus that are valued by the internal and external communities. Findings can be used to understand the continuum of academics, work, and recreation among students, staff, faculty and external community representatives and to inform the process and principles that will guide the development and implementation of the campus master plan. Take the following steps to implement this approach:

1. Invite a select number of faculty, staff, students, and outside constituents to participate in the process.
2. Explain the purpose, the objectives, and the process, and propose a schedule for completing the exercise. It typically requires the commitment of a week but never should be scheduled for more than two weeks.
3. Distribute disposable cameras and commentary notepads, instructing the participants to photograph the places, people, activities, and problems that should be addressed in the campus master plan (e.g., housing, recreation, transportation, parking, way-finding, maintenance). Encourage participants to take as many photos as they desire, but insist that they write why the photo was taken and how it will inform the preparation of the campus master plan.
4. Collect cameras and commentary notepads.
5. Develop film and paste appropriate prints to the notes on the comment sheets.
6. Organize a meeting of the participants and other interested persons to discuss the photos and comments and how they will assist the preparation of the campus master plan.
7. Discuss the information with the campus planning advisory committee or similar committees appointed to develop and manage (maintain) the campus master plan.
8. Present the summary of findings and recommendations to campus leadership.

The participatory process may also be used to update and maintain the master plan as an effective instrument to guide changes on the campus. It would be important, however, to evaluate the process for changes and amend the list of participants with new campus community members in future efforts.

Only institutions that have successfully created a “culture of place” as the environment for planning and operational activities can continually change and evolve during periods of unusual and unexpected events.

**How Do I Get There?**

Answering this question requires the development of strategies and actions that the institution must take to achieve its goals and objectives and to meet its mission-oriented vision. Too often there is a desire or a rush to get to this phase of the process before the first two questions have been answered adequately. However, if you know where you are and where you want to go, it’s a matter of obtaining and carefully allocating (strategizing) your resources and then taking actions consistent with your mission, goals, and objectives.

It cannot be overemphasized that the planning process is far more important than the plan (Hewitt, Stebbins, & Wheeler, 1978). In fact, the day the planning document comes “off the press,” obsolescence begins to creep in. Changes can and will occur that were not anticipated during the preparation of the plan. It is the planning process that keeps the plan dynamic and alive, because only the planning process can accommodate unforeseen changes and events or desires. Therefore, it’s critical that an institution, even the smallest-sized campus, establish an ongoing institutional planning process to maintain the physical environment at the appropriate, supportive level that is consistent with the academic plan and, in this case, the recreational needs of campus programs and constituents. A successful plan and planning process require broad and widespread participation of the campus community, internally and externally. During the past two decades, recreation has increased significantly in its importance to campus users. It follows that the leaders of campus recreation and sport programs must play an increasing and more influential
role in the planning process if the institution is committed to meeting the needs and desires of its faculty, staff, students, and campus visitors.

When the master plan is completed, there will be a high level of understanding of the plan among the faculty and staff, student representatives, and the external community participants. However, as time passes and the normal attrition occurs through resignations and retirements, especially among the key leadership positions, the campus is left with fewer people (an exception would be a planning staff) who have an in-depth understanding of the plan. This is frequently the case at large institutions where the turnover of faculty and staff can be high during certain periods. At such times the plan is often misrepresented, is misused, or is not used to inform decisions, and as time passes such decisions will veer away from the vision conveyed in the plan. In light of the costs (consultants, faculty, staff and committee time) of preparing the master plan, it’s important that the institution achieve a reasonable return on its investment. The following are ways of ensuring that the document will be relevant and a useful guide for the long term.

1. The plan must become a formal part of the institution’s ongoing budgeting and development cycle.

2. The plan should be clear and precise in its organization and should set forth policies, principles, guidelines, and directives in an easily understandable way.

3. The plan must accommodate changes to meet needs and respond to pressures on the institution (must be amendable). This will allow it to remain alive and dynamic over the long term.

4. An Annual Conformance Report, prepared by the president, describing how the institution has or has not complied with the campus master plan is required by the highest authority (e.g., board of regents or trustees) of the institution. It is not necessary to get the board of regents or trustees involved in the frequent review of projects for compliance or adjustments for compliance. Their action is needed when the plan must be amended, and this can take place during their review of the annual compliance report. It’s important to emphasize and repeat that the recreation component is part of the campus master plan. Therefore, the approval process for the campus master plan incorporates any changes or additions needed to keep recreation plans up-to-date. There may be a time when the board of regents or the highest authority for the institution will be asked to approve a change only to the recreation component of the plan. In this situation, the leadership of sport and recreation activities would lead the preparation of the recommended change(s) and participate in the presentation to the decision makers.

**Approval of the Plan**

Some institutions (e.g., private urban campuses) must comply with land development regulations under the authority of local municipalities. Others, like the University of Minnesota, are fortunate to have more direct control over the development of their land and buildings. On many of these campuses, though, the lack of a formal decision-making process can lead to the same results as when the institution must operate under local municipal regulatory agencies. When this occurs, it weakens the impact of the master plan as the instrument that forms the basis for and directs land-use and building development decisions. Therefore, the master plan must be given the highest formal recognition within the governing structure of the institution. To establish an effective implementation approach, certain administrative policies should be approved. (1) The plan should be formally adopted by the highest authority; (2) it should be stipulated that all development must conform with the master plan; (3) responsibility for the plan should be assigned to the president of the institution, who may in turn delegate authority to staff; (4) precinct plan studies should be initiated when significant projects are anticipated or a campus-wide or local problem needs to be investigated and recommendations need to be presented to the administration; (5) completed precinct plans (or land-use component plans) should be approved by the highest authority for inclusion or for replacement of existing plans; (6) projects must adhere to design guidelines; and (7) development should take place only when the campus leadership (president, provost, chancellor, etc.) indicates that the project is in conformance with the master plan (Campus Master Planning Office, University of Minnesota, 1997).

The organizational structure recommended in this chapter may seem arduous, overly involved,
and expensive to some administrators. However, the costs to an institution that fails to create a compliance structure are far greater than the costs for staff and time needed to execute the recommended implementation requirements. An approved campus master plan can be a tremendous asset and a time-saving tool because projects that are in compliance with the master plan can be expeditiously approved. As Richard Dober, Senior Consultant at Dober, Lidsky, Craig and Associates, Inc., a firm specializing in campus and facility planning, states, “The best features of the history and traditions of the campus layout and architecture should be respected. Campuses and what they do are venerable and should never be treated as the playgrounds for egotistical trustees, deans, or architects.”

**PROCESS OF COMPREHENSIVE RECREATIONAL PLANNING FOR FACILITIES**

Recreational resources play a far more important role in the recruitment and retention of students and faculty than is generally recognized by institutions today. The emphasis on health and wellness becomes part of the decision package when students, especially graduate students, and the professional staff and younger faculty are being recruited by the institution. A lack of adequate sport, recreation, and fitness facilities and programs to meet desires for recreational opportunities can become the basis for the decision of a faculty or staff recruit not to accept an offer or of a potential student to enroll at another institution. The author considers all open spaces potential places for some type of recreation, either active or passive. Furthermore, outdoor recreation spaces contribute to a “sense of place” and belonging on the part of the campus user. Much of the tradition of a campus is directly linked to its open spaces. Therefore, planning for recreational opportunities is an important task that all institutions must undertake, and the needs of the program must become part of the institution’s annual planning and budgeting cycle. As explained in the definition of a facilities plan on page 17, a campus unit may wish to prepare a detailed plan for its facilities needs. The sport and recreation department may need to prepare such a plan for its own use (e.g., capital campaign, preparation for a state legislative request, expansion of programs). The funding for this planning effort would be provided by the sport and recreation department, and its preparation must be guided by the principles, policies, and guidelines in the campus master plan.

Figure 1.8 illustrates a nine-step process for preparing a comprehensive recreational facilities plan that will meet the needs of a college or university. The process will work whether the planning model is a campus master plan organized around precincts or supported by land-use designations. The process involves sequential phases that build on each other; a systematic assessment of conditions, issues, needs, and site possibilities; and an understanding of how they come together in a physical setting. It requires an understanding of how recreation relates to the strategic initiatives and objectives of the institution and the priorities that recreation is given in the planning and budgeting cycle.

This approach, developed to operate within the governing structure of the University of Minnesota, of course can be modified and should be adjusted in order to be consistent with the organizational structure and decision-making process of the particular institution. This is a critical requirement for effective employment of the concepts discussed in this chapter, because colleges and universities differ in critical areas of academic, research, outreach, administration, faculty, staff, and student composition. The planning approach should be modified to accommodate the structural components and governing relationships of the institution undertaking the effort to develop a successful plan.

**Step 1: Organization of Planning Effort**

Another term used to refer to this step is the **tactical plan**, the development of strategies, policies, and procedures with regard to how the planning process will be conducted, who will be involved, the budget, and what the time frame will be. Typically, the president of the institution or another high-level authority appoints a planning advisory committee composed of the director of recreation, director of student affairs, faculty, members of central administration, and students and provides them with a carefully worded charge of responsibilities and the name of the committee chair. In-house planning staff (or persons respon-
Step 1: Organization of planning effort

Step 2: Define purpose and objectives

Step 3: Development of data:
- Inventory facilities staff
- Use of space
- Quality of space

Step 4: Staff, land, and facility requirements

Step 5: Development strategies

Step 6: Alternative plans:
- Plan A
- Plan B
- Plan C

Step 7: Recommendations

Step 8: Review and approval

Step 9: Plan of action

Figure 1.8  Process of comprehensive recreation planning for facilities.

This step involves the identification of key issues that must be taken into consideration to organize the planning framework that will address existing and emerging recreational program needs. The importance of identifying sport or recreational issues and clearly laying out their implications in relation to the development of facilities is based on the premise that effective sport and recreation programs are an integral part of an institution, sustaining its broad mission objectives. As stated earlier, sport and recreation play an important role in the recruitment and retention of students, staff, and faculty and in establishing their future loyalty to the institution as alumni and supporters of its programs.

Step 2: Define Purpose and Objectives

Although the appointment letter to the committee should include the primary purpose and objec-

tive for initiating the planning effort based on the institution’s mission and vision, the committee's first assignment is to prepare a clear and more detailed statement of the purpose and objectives of preparing the plan. Developing this statement requires a broad assessment of the recreational desires and needs of the campus community. The committee must assess the capability of in-house staff to support the project in order to determine the need for outside consultants and must establish a general budget for completing the preparation of the plan. The statement of purpose and objectives and the budget require the review and approval of the president and the central officers.

Step 3: Development of Data

This step relates to the first question (“Where am I?”) in the simplified approach to planning. An inventory of recreation facilities and an audit of the quantity and quality of these facilities as well as usage by all campus constituents must be conducted. Similarly, an inventory of the faculty
and staff and an evaluation of the quality of teaching and research must be compiled. A comprehensive inventory of program and facility needs should be prepared by each constituent group within the department, containing graphics and written descriptions as well as a listing of required program adjacencies and support infrastructure. A campus-wide strategy for recreational sports should be developed that will provide the context for comprehensively exploring the needs of the campus community, consider campus-wide constraints and opportunities, and clarify sport priorities.

A carefully executed space utilization study must be prepared. Recreational needs must be measured in terms of space and usage information, applied against standards and guidelines (campus, national, or both) and data gathered from comparable institutions (benchmarking). The committee must determine whether this very specialized, technical report can be prepared by the planning staff or whether the expertise of space programming and management consultants is needed.

Finally, a report on the learning environment and campus citizenship should be prepared by the faculty and researchers in the department of recreation or physical education or by institutional researchers. This report is critical to understanding the core values, the support for recreation, and the implementation possibilities of the plan.

Step 4: Staff, Land, and Facility Requirements

The careful and accurate preparation of information in the previous step will ensure the proper projection and determination of the staff, land, and facilities required to serve the recreational needs of the institution. An important tool during this step is the application of standards and guidelines, adopted (approved) by the institution, to determine the amount of land and number of facilities needed to meet the objectives of the recreation program on the campus. The question “Where do I want to go?” is answered in this step of the planning process. The real value of recreation to the institution and a vision of its future will determine the amount of support (especially financial) that will be made available to hire personnel, purchase land, build facilities, and maintain programs.

Step 5: Development Strategies

With appropriate consultants (if needed) onboard to assist the committee and the staff, development strategies can be prepared for review by the president and the central officers. Various approaches and concepts must be explored and evaluated to determine how to best provide the land and facilities required to support the recreation program. For example, the committee must determine where rental, remodeling, renovation, additions, or new construction will be appropriate to meet campus facilities needs, as well as potential sites for new development. The following are site selection criteria for recreational development (Campus Master Planning Office, 1999):

1. Conformance with the campus master plan. The use of a site conforms to the principles, policies, and guidelines for the precinct in the master plan.
2. Accessibility by pedestrians, buses, and automobiles. Users must be able to reach recreation sites with reasonable convenience through a combination of walking, bicycling, and transit by automobile and bus. Access routes should be understandable and clearly identified.
3. Parking. Where access is by automobile, parking should be available. Can participants be provided with adequate spaces and in reasonable proximity to the recreation program?
4. Availability. If the site is owned by the institution, the option to use it for recreation must be confirmed. If it is land to be acquired or leased, the feasibility and timing of doing so need to be tested and confirmed.
5. Compatibility with surrounding area. The impact of using a site for recreational purposes needs to be tested in relation to adjoining property uses and activities. This is most important if the site is near or adjacent to noninstitutional owners.
6. Suitability for the program. The site must be able to accommodate the operational requirements of the activities envisioned for it.
7. Development costs. Costs related to size, shape, topography, utilities, condition, and special character are within the established budget for the project.
Step 6: Alternative Plans

The completion of development strategies will facilitate the preparation (presumably by consultants and planning staff) of a set of alternative plans for review and recommendations by the committee. These detailed plans with associated costs will allow the committee to evaluate and select options that are within the budget parameters and the specific goals and objectives approved in step 2.

Step 7: Recommendations

From among the various plans prepared in step 6, the committee selects its final recommendations for review and approval by the central officers. To do this it is necessary to assess the costs and expected results of each plan under review, as well as to determine how each plan matches the goals and objectives, in order to select the plans that will be further documented and presented to the administration for its approval.

Step 8: Review and Approval

The appropriate reviews and consultation with internal and external campus constituents and final approval by the central officers, ensuring that the plan is consistent with the campus master plan, are needed in order for the committee to complete the final step in the facilities planning process. The institution may choose to take this phase of the plan to the board of regents for information and advisory purposes before the committee undertakes step 9.

Step 9: Plan of Action

This is the final step. With the approval of the proposed recreation facilities plan by central administration, the committee prepares a “plan of action,” outlining a series of actions that the institution must take to fully implement the facilities plan. The action plan may include the establishment of funding phases, for example, as it is unlikely that total funding of the plan will be provided when it is completed. Funding usually comes from many sources and at different times (e.g., state appropriations, capital campaigns, student fees). A general phasing schedule for project construction is needed to accommodate existing programs and other campus projects.

The action plan should be clear, concise, and directive, laying out specific priorities, recommendations, schedules, costs, and the assignment of responsibilities. It should also include alternatives to facilitate changing conditions and priorities.

PLAN IMPLEMENTATION

The plan for recreation facilities is only as effective as its execution by the campus decision makers. Unfortunately, many campus plans become promotional documents for capital fund drives but are rarely used to guide decisions on the physical development of the campus. In order for a plan to be an effective planning tool, an institution must establish a process for its implementation. The process must reflect the governance structure of the institution and the complexity of change it needs to address. Integral to the delivery of projects in the recreational plan is the need to be in conformance with the institution’s campus master plan. The acknowledgement on the part of recreational leaders that their needs are among the overall requirements of the campus master plan, consistent with the campus vision, will ensure more serious institutional support of their projects. Frequently, a smaller advisory committee (departmental administrators, faculty, and students) is appointed to provide continuous management of the plan. The committee keeps its ears and eyes attuned to the needs and changes that will keep the plan alive and in alignment with the campus master plan. The committee should recommend modifications or updating when conditions dictate in order to keep the plan current and the program competitive with its peers.

SUMMARY

The purpose of this chapter has been to describe and emphasize the important role that recreation plays in higher education and to outline processes and techniques for planning and implementing recreational projects. It cannot be too strongly stressed that an understanding of the planning processes and of the preparation of a recreation plan is critical to achieving the physical development goals of a department. People involved in directing and planning recreation programs and facilities must have a broad knowledge of recreation that goes beyond organizing games and managing play activities; they must understand
how recreation contributes to the overall learning and the delivery of educational programs on the college and university campus. They must understand the priority given to recreation by the institution’s leaders and its board of regents, directors, or trustees. They also must understand the values that the campus community, both internal and external, places upon recreation and where recreation is positioned in the ranking for funding both short-term and long-term projects—and they must employ strategies to improve rankings when necessary. The organizational structure and the political process that provide funding for programs and projects must be clearly appreciated within the context of the institutional planning process. Finally, the director of recreation must understand and appreciate the working relationships of all those who are involved in planning, designing, executing, and managing projects and their expectations of the director of the recreation program in project planning and development.

An underlying theme in this discussion of master planning is that the plan is never completed. Many campus master plans carry a time line (5-year plan to 10-year plan), implying that the plan will either complete or guide the development of the campus for a particular period of time. Such plans will lead to great disappointment and frustration. Although it is not possible to predict exactly what will happen tomorrow, one can certainly predict that there will be changes tomorrow. Therefore it is absolutely essential that every plan operate under a process that constantly amends the plan as dictated by changing conditions and requirements. Finally, if the campus plan is not challenging to implement, does not stretch the imagination of what can be achieved in the future, and is not a bit controversial, the plan simply represents a more or less fixed, comfortable level of expectations and easy implementation and lacks the boldness that would spur innovation and creativity to meet the needs of the campus of the future.

**DEFINITION OF TERMS**

**benchmarking**—The process of collecting data not only to find out what peer institutions are doing in terms of staffing, salaries, programs, and facilities, but also to help define the marketplace and provide important information relative to financial and space parameters or expectations for a project.

**built form**—Any building, structure, or landscape created or modified by the actions of humans. The term is often used interchangeably with the term “built environment.”

**design guidelines**—Guidelines established for projects across the campus to ensure a consistency of built form and open space relationships. The guidelines address heritage buildings, the built form, and open spaces, especially historic landscapes, and they combine with the precinct plan concepts to form the basis for future preparation of precinct plans for each area of the campus.

**facilities plan**—A highly defined (detailed) single-purpose document for land development or the planning, scheduling, and predesign for buildings or other facilities. This effort, however, is directed by the principles, policies, and guidelines in the campus master plan.

**institutional planning and development process**—A holistic approach requiring the integration of academic, financial, and physical (facilities) planning into the annual planning, programming, budgeting, and development cycle of colleges and universities. It requires the institution to develop policies, procedures, and schedules to ensure that the various activities occur in the proper sequence and to avoid decisions made in a vacuum.

**inventory and audit report**—A complete and accurate account of existing facilities (land and buildings) and personnel.

**Jeffersonian principles**—Principles developed by Thomas Jefferson to guide the development of the University of Virginia and, subsequently, used as a model by other colleges and universities. A key feature of Jefferson’s campus planning approach was the creation of the “Academical Village,” which provided a balanced and integrated education and physical environment that combined living and learning experiences for faculty and students. Campus buildings were constructed in a U-shaped form, connected by gardens and organized around a large open space (lawn) that would serve as a place for the exchange and exploration of ideas.

**leisure and recreation space**—Space as viewed in accordance with a fundamental change in thinking about campus recreation, which includes a broader definition of recreational sports in the narrow context of higher education. In this definition, recreational sports
encompasses a variety of leisure activities such as walking, gardening, casual bike riding, relaxing, and reading in less formal settings. Recreation space includes pedestrian walkways, bicycle paths, hiking trails, lakes, rivers, and green spaces for passive and active leisure activities.

**master planning process**—A process that establishes the framework for the long-term evolution of a college or university based on a “vision for its future.” It builds upon the institution’s people, programs, and existing physical assets, including natural features, open spaces, buildings, and the network for use and movement to and from the property boundaries.

**Olmstead’s principles**—Ideas of Frederick Law Olmsted; the primary principle for campus planning required a clearly defined, integrated pattern of educational units, housing, and open space (lawn) with a dignified campus entrance that would be developed, over time, in an orderly manner. The plan required sensitivity to the beauty of the natural environment and what the geography dictated, thereby producing a proper relationship among building construction, landscaping, and open space.

**participatory photographic approach**—An incisive and effective technique for engaging campus constituents (faculty, staff, students, alumni, neighborhoods, etc.) in surveying the campus environment and documenting the full range of qualities that contribute, positively or negatively, to their experiences. Use of this technique is a powerful way to engage campus and community constituents in exploring the campus environment and commenting from knowledge-based (visual) and emotional (spiritual) experience.

**planning consultant**—A professional who typically gathers benchmarking data from other institutions; conducts feasibility studies; performs program and space needs assessments; surveys the campus community; interviews students, faculty, staff, and administrators; and develops business plans for the financing of the building and future operating budget for the facility and staff.

**planning principles**—Principles that provide a guideline for campus master planners and recreational sports directors to integrate recreation with academic, social, and physical spaces into the overall master plan and the development of the physical campus.

**precinct plan**—A plan that establishes detailed physical guidelines for the land, buildings, open space, landscape, and infrastructure improvements and proposed development for each discrete area within the campus master plan.

**space utilization study**—An analysis performed to quantify the amount of recreation space and usage applied against campus or national standards and guidelines (or both), including data gathered from comparable (benchmark) institutions.

**sustainability**—“The ability of a society, ecosystem, or any such ongoing system to continue functions into the indefinite future . . . . For architecture, this means design that delivers buildings and communities with lower environmental impacts while enhancing health, productivity, community, and quality of life”; put another way, “sustainable development involves . . . meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

**tactical plan**—The development of strategies, policies, and procedures regarding how the planning process will be carried out, the persons to be involved, the budget, and the time frame.

**universal design**—“A user-friendly approach to design in the living environment where people of any culture, age, size, weight, race, gender and ability can experience an environment that promotes their health, safety and welfare in the future” (retrieved September 29, 2005, from www.universaldesign.org/).

## REFERENCES


Rowe, J.D. (1978). The Oregon experiment in practice: An examination and evaluation of systematic user involvement in the planning and design of campus facilities. Presentation to Society for College and University Planning.


**RELATED JOURNALS AND PERIODICALS**

*Architect’s Journal*
*Architectural Record*
*Architectural Review*
*Architecture*
*Athletic Business*
*Athletic Management*
*Building and Environment*
*Building Design and Construction*
*Facilities and Event Management*
*Facilities Design and Management*
*Facilities Manager*
*International Review of Sport Sociology*
*Journal of College Student Development*
<table>
<thead>
<tr>
<th>Journal of Society for College and University Planning</th>
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<tr>
<td>Journal of Sport Management</td>
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<td>Journal of Sport and Social Issues</td>
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<td>Landscape Architecture</td>
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<td>Parks and Recreation</td>
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<td>Sports Business Journal</td>
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</table>
Creating a center for recreation, health, and wellness can be a rewarding adventure when the process is a collaboration of committed stakeholders and skilled professionals. This chapter describes the roles of all those involved, the ways in which project goals are translated into a facility design, and the process through which a well-thought-out plan will lead to a successful project. The chapter is about the beginning of the project process and the fact that early decisions have more impact on the quality of the end product than more detailed decisions made later. Setting the course toward a common goal is essential.

DEFINING FEASIBILITY

As sport and recreation programs grow in popularity, the demands on college and university sport and recreation facilities become more specialized, rigorous, and diverse. Existing facilities may need to be renovated to adapt to a wider range of users and related activities. New or expanded facilities may need to be added. However, the renovation of existing facilities or the construction of new facilities requires a major commitment of time, resources, and money. A key part of this commitment is the decision-making process. The following are questions that are commonly discussed at the conception of a recreational facility project:

- How do we evaluate existing programs?
- How do we determine new programs?
- What special features do we need to provide for the next generation of users?
- How do we predict the right capacities?
- How do we allocate an appropriate budget for construction and operations?
- How do we get the most return for dollar allocated?
- How do we intelligently guide the decision-making process and make the best planning choices for the long-term use of our facilities?

One can answer these questions through the use of a professionally prepared feasibility or planning study. This type of study provides a report, written or graphic or both, that identifies the goals, objectives, needs, and requirements for a proposed facility. It is the culmination of a structured decision-making process that often includes an assessment of current programs; utilization data; and a comparison of peer programs, anticipated demand, recommended facilities, implementation options, probable costs, and other important factors. The feasibility study should provide a justification for the programs and facilities as well as a vision for the proposed solution. It is a valuable tool and a vital “first step” in the implementation of new or renovated facilities. An architect or sport and recreation design consultant can work with the planners in accomplishing such a study.
WHO’S WHO: ADMINISTRATORS, STAKEHOLDERS, AND THE CONSULTANT TEAM

The process of planning, programming, designing, and constructing a recreation facility requires a creative collaboration between a college or university and a team of consultants. The successful feasibility study is the result of collaboration among college administrators, stakeholders, and the consultant team.

Administrators may include the office of the president, business and finance officers, campus planner or architect, and facilities management. Stakeholders are those who have an interest in the recreation center program: recreation center staff, student affairs, and of course students themselves. These university representatives will work as a committee throughout the feasibility and planning process and often continue on through the design and construction processes. Committee members must understand the commitment of time and energy required to participate in the process. The work of the committee is coordinated by a project manager, usually a member of the facilities staff. The project manager serves as the “point person” for all communications between the college or university and the consultant team. The project manager also coordinates the project schedule, facilitates committee meetings, and reports to the senior administration.

For the feasibility process, the client may retain a special consultant for programming and an architectural and engineer team for facility design. Or, an architect who specializes in sport and recreation facilities can provide both programming and design expertise. Overall, the client has the vision and the resources to create the recreation facility center that is needed; the architect has the experience, the facility design skills, and the technical expertise to implement the project.

In addition to programming and design, the consultant team may provide expertise in the following aspects of the process:

- Market analysis—focus group interviews, statistical surveys of target groups, demographic...
analyses, and **benchmarking** with the college's peer institutions. Market analysis may include investigation of current and projected usage patterns.

- Architectural programming—space allocations, strategic adjacencies, performance requirements for critical spaces (acoustics, lighting levels, thermal requirements, and so on). Programming may include descriptions of furniture and equipment that have a direct bearing on the function of a space, for example, lockers, exercise equipment, or bleachers.
- Site analysis—comparison of site alternatives with regard to their market responsiveness, impact on the facility program, political acceptability, and cost implications.
- Financial analysis—modeling of financial variables such as projected revenues, capital costs, operating costs, and financing strategies.
- Economic impact analysis—projections of benefits, strategic values, and costs to the institution and the surrounding communities, as well as tangible impacts such as quality of life, market perception, and competitive position.
- Operations and maintenance—analysis of energy consumption, staffing projections, expansion of the institution's utility grid, and ongoing maintenance.

This information can be generated to guide the architect in creating design solutions. The same information can be used as criteria in evaluating design alternatives and can lead the client to an informed decision on the preferred alternative.

Some colleges and universities may choose to undertake some or all of these analytical tasks with in-house staff if the project is less complex or if the expertise exists in-house.

The architect brings to the project team consultants with expertise in specific technical aspects of the project. Most project teams include consultants in mechanical, electrical, and structural engineering. Other consultants commonly involved are recreation specialist, pool consultant, climbing wall consultant, acoustician, audiovisual and technology consultant, turf consultant, civil or geotechnical engineer, and food service consultant. An architect with experience in recreation facilities will be familiar with consultants who have been involved successfully in these types of facilities.

It is important to realize that building a project in today's environment is a complex undertaking. One of the most important aspects of the relationship between client and architect is the understanding of each other's responsibilities. The American Institute of Architects (AIA) provides information on what architects do and the process of selecting and hiring an architect. See the publication "You and Your Architect" at the AIA Web site (www.aia.org/pub_highlight1). The college or university should clearly differentiate between the work that will be done by in-house staff and the scope of services to be provided by the consultant team. For example, defining the mission and goals for the recreation center will probably be done in-house. Program requirements will be determined in-house with the assistance of the programming consultant or architect and will be compiled by the architect. Design options will be generated by the architect and will be reviewed and evaluated by the college or university client.

The architect should outline services to be provided by the architect, along with an estimated schedule of when each service will be complete. This schedule should be regularly updated. The college or university must take part in the planning process, and the college's deadlines and decisions should be reflected in the architect's schedule. In some cases it may be that too little is known about the project to establish a definitive set of services prior to a planning study. In that case, the architect's initial services can be project definition, evaluation, and planning, with further services to be determined later.

As already stated, a single person should be empowered to represent the institution at planning sessions and meetings, and that person's scope of authority should be understood by all involved. It cannot be stressed enough that multiplicity of spokespersons for owner input causes problems later.

### THE FEASIBILITY STUDY PROCESS

The process should identify and define the problem and needs, establish the goals and objectives, and then develop a work plan that includes methodology, findings, and recommendations. While the decision-making process may vary for different types of facilities, we suggest the following basic planning methodology for determining facility needs.
Though these two climbing walls are very different, they were designed with that specific facility’s goals, needs, and objectives in mind.

Photos courtesy of WTW Architects.
Mission and Goals

Most colleges and universities have mission statements that concisely communicate the particular purpose or raison d’être (reason for being) of the institution. The activities and operations of the institution, no matter how extensive and diverse, must fit within the global definition of the mission statement. Similarly, institutions have vision statements that define how the institution sees itself or convey the institution’s ideal image of itself.

The first strategic step in any planning process is to determine the mission of the particular project. A college or university must define what it wants to accomplish—where it wants to be—before it decides how to get there. The following is a sample mission statement:

The mission of the XYZ Student Recreation Center is to provide quality, recreational, wellness, and athletic programs and opportunities for the campus community that will be educational, social, and fun. XYZ University demonstrates its commitment to excellence by utilizing resources that promote ethical and healthy lifestyle choices.

An outline of defined goals can supplement the mission statement. The defined goals can be more specific than the mission statement and perhaps provide a more pragmatic set of objectives.

In 1996, the National Intramural-Recreation Sports Association (NIRSA) delineated the following seven primary goals of recreational sports programs:

1. To provide participation in a variety of activities that satisfy the diverse needs of students, faculty, and staff members; where appropriate guests, alumni, and public participants can become involved.

2. To provide value to participants by helping individuals develop and maintain a positive self-image, stronger social interactive skills, enhanced physical fitness, and good mental health.

3. To enhance college and university student and faculty recruitment and retention initiatives.

4. To coordinate the use of campus recreation facilities in cooperation with other administrative units such as athletics, physical education, and student activities.

5. To provide extracurricular education opportunities through participation in recreational sports and the provision of relevant leadership positions.

6. To contribute positively to institutional relations through significant and high-quality recreational sports programming.

7. To cooperate with academic units, focusing on the development of a recreational sports curriculum and accompanying laboratory experiences.

Defining the mission and goals for a recreation center is an important and critical first step in setting the direction for a college or university and its decision-making process. It takes time, collaboration, and considerable thought to develop a well-articulated mission statement and set of goals. These goals will certainly vary depending on the specific purpose, aspirations, and vision of the organization. However, once the mission and goals are defined, they become a valuable tool for the planning process and the benchmark by which all subsequent decision making can be validated.

Existing Facilities Assessment

Since planning for sport and recreation programs includes an assessment of how much space is currently available and how much will be needed, any plans or drawings of the existing building must be made available to the architect at the outset of the study. If plans are not available, the architect surveys and measures the facilities and creates new plans. The consultant team assesses both the quantity and the quality of existing facilities. The use and area of each space are quantified. The condition of the building—including the roof, structure, building envelope, mechanical, electrical systems, plumbing, and fire protection along with audiovisual, telecommunications, and other technology systems—is evaluated. Building codes and standards will most likely have changed since the building was built. So the existing building is measured against current regulations for life safety, accessibility, and energy consumption. Finally, how each program space meets current needs is assessed. The existing facilities assessment needs to paint an accurate picture to determine the magnitude of upgrading of any existing facilities and determine a project scope for renovations and additions to a recreation facility.
Needs Assessment
The consultant team in close collaboration with in-house staff undertakes the following activities:

- **Conducting focus group work sessions with key user groups to understand qualitative and perceived needs.** Staff identify several different groups who use the facility on a regular basis. Work sessions are conducted with each focus group to discuss what they like and don’t like about the current facility and to explore new programs or activities they would like to see in a new or improved facility. The meetings should be brainstorming sessions that will provide individual insights into the needs of the facility. This input is considered qualitative information because it represents the personal opinion of a relatively small number of individuals.

- **Conducting a campus-wide survey to assess the quantitative needs of students, faculty, and staff.** A useful method for assessing needs is to conduct a survey of users. The survey should reach a broad cross section of the campus community in order to yield solid quantitative data. A well-conducted survey helps to accurately define the needs of the customer market base of the facility. Most surveys today are electronic (not written) and are conducted online so that they can be easily distributed and returned. See figure 2.1. A planning or marketing consultant can analyze the survey results and interpret the market-based needs of the facility.

- **Assessing the utilization of facilities and determining the probable demand for proposed new programs and activities.** Utilization of current facilities can be documented through the assembling of participation and demand records for existing programs. If accurate participation records have been kept for existing programs and activities, these data should be readily available. Requests for activities that are currently not offered can be assembled to obtain data to document the demand for new programs and the facilities to support them. This information can be combined with national sport and recreational trends data to provide a defined perspective on the long-term needs and future development of the facility.

- **Evaluating site services, existing traffic patterns, land-use adjacencies, access, and overall site utilization.** See figure 2.2. Campus site plans are assembled that show existing buildings, roadways, parking areas, walkways, topography, vegetation, and so on. Utility plans should be included that show existing water, sewer, gas, electrical power, and data distribution. Campus guidelines and standards may have information on storm water management, soil erosion and sedimentation control, signage, site amenities, and lighting. Site limitations identified in zoning ordinances, easements, restrictions, special uses, and other building regulations should be reviewed. Subsurface investigation of underground utilities and soil conditions may need to be a part of the study to provide an understanding of the full impact of the site work. Plans that show properties adjacent to the campus and the campus’s position in the surrounding community are helpful. “Town and gown” issues (issues of interest to both the community and the institution) could arise, particularly if construction will occur on the edge of campus adjacent to residential districts.

The architect develops building footprint options and figure-ground studies to respond to the opportunities and challenges of the site or sites being considered by the client. These site design options take into account building orientation, direction of wind, interior and exterior views, sustainable design, synergy between indoor and outdoor programs, outdoor ball fields and recreation areas, parking, and future expansion. Site design goals should be established to assist in determining the location and site development of the recreation facility. These goals should be aligned with the campus master plan and should maximize the site to its potential.

Benchmarking
A visit to similar recreation facilities will provide a valuable perspective about peer operations and competing programs. If benchmarking trips are difficult, video conferences can be arranged. Professional associations such as NIRSA and Athletic Businesses can offer a national perspective on some of the best practices and new trends in sport and recreation facilities. The value of a benchmarking trip can be maximized if the visit is made to a peer institution—one that is similar in size, has comparable student body composition, and is in the same National Collegiate Athletic Association division. A cross section of the project committee should make the trip with members of the consultant team.
Administrators, recreation staff, and facility planners will all benefit from the visit, from dialogue with peers, or both.

**Programming**

On the basis of an understanding of the project mission and goals, the existing facilities assessment, the needs assessment, and insight gained in the benchmarking process, the team compiles a project program.

The consultant team can compile a functional program that documents specific requirements to be satisfied by a successful design solution. Each space in the proposed recreation center is listed: square-foot floor area, any special height requirements, ventilation, electrical power, data, and finishes. A total **gross building area** is projected...
based on the **net building area** (the sum of the areas of all occupied spaces). See table 2.1.

This is the time to begin to establish the desired level of quality in materials, finishes, and building systems and equipment. While these factors can be modified during the design process, it is important for the architect to have an initial sense of the institution's expectations in terms of overall level of quality of the facility.

The program includes a description of exterior site improvements such as exterior signs, lighting, gardens, or terraces. In the case of recreation

### Table 2.1 Student Recreation Center Program

<table>
<thead>
<tr>
<th>Group 1: Aquatics</th>
<th>Existing (8-11-06)</th>
<th>Feasibility study proposal (11-11-05)</th>
<th>Schematic design (12-13-06)</th>
<th>Proposed features</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 Indoor lap pool (including deck)</td>
<td>3,449</td>
<td>3,449</td>
<td>5,000</td>
<td>Lap pool and aerobic classes</td>
</tr>
<tr>
<td>1.2 Steam sauna room</td>
<td>204</td>
<td>204</td>
<td>225</td>
<td></td>
</tr>
<tr>
<td>1.3 Whirlpool</td>
<td>290</td>
<td>290</td>
<td>165</td>
<td></td>
</tr>
<tr>
<td>1.4 Women's locker room</td>
<td>–</td>
<td>560</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1.5 Men's locker room</td>
<td>–</td>
<td>560</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>1.6 Basement pool (equip)</td>
<td>4,060</td>
<td>4,060</td>
<td>4,060</td>
<td></td>
</tr>
<tr>
<td>1.7 Seating and viewing area</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>1.8 Lifeguard room</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>1.9 Office</td>
<td>–</td>
<td>306</td>
<td>237</td>
<td></td>
</tr>
<tr>
<td>1.10 Outdoor leisure pool (including deck)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td><strong>Total group 1: Aquatics</strong></td>
<td><strong>8,003</strong></td>
<td><strong>9,123</strong></td>
<td><strong>9,450</strong></td>
<td></td>
</tr>
<tr>
<td>Group 2: Support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Women's locker room</td>
<td>1,076</td>
<td>1,076</td>
<td>1,027</td>
<td>Existing to remain</td>
</tr>
<tr>
<td>2.2 Men's locker room</td>
<td>910</td>
<td>910</td>
<td>882</td>
<td>Existing to remain</td>
</tr>
<tr>
<td>2.3 Storage</td>
<td>309</td>
<td>309</td>
<td>787</td>
<td></td>
</tr>
<tr>
<td>2.4 Mechanical</td>
<td>423</td>
<td>423</td>
<td>1,661</td>
<td></td>
</tr>
<tr>
<td>2.5 Reception and control desk</td>
<td>–</td>
<td>306</td>
<td>237</td>
<td></td>
</tr>
<tr>
<td>2.6 Lounge and lobby</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>2.7 Equipment and checkout</td>
<td>–</td>
<td>234</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>2.8 Custodial lounge</td>
<td>–</td>
<td>–</td>
<td>146</td>
<td></td>
</tr>
<tr>
<td>2.9 Public men's toilet room</td>
<td>–</td>
<td>–</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>2.10 Public women's toilet room</td>
<td>–</td>
<td>–</td>
<td>189</td>
<td></td>
</tr>
<tr>
<td>2.11 Atrium</td>
<td>–</td>
<td>2,360</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>2.12 Outdoor plaza</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td>Locate on north side of addition</td>
</tr>
<tr>
<td>2.13 Electrical and data</td>
<td>–</td>
<td>–</td>
<td>325</td>
<td></td>
</tr>
<tr>
<td>2.14 Staff Locker Room</td>
<td>–</td>
<td>–</td>
<td>333</td>
<td></td>
</tr>
<tr>
<td><strong>Total group 2: Support</strong></td>
<td><strong>2,718</strong></td>
<td><strong>5,618</strong></td>
<td><strong>5,707</strong></td>
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</tr>
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(continued)
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<thead>
<tr>
<th>Group 3: Recreation</th>
<th>Existing (8-11-06)</th>
<th>Feasibility study proposal (11-11-05)</th>
<th>Schematic design (12-13-06)</th>
<th>Proposed features</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2 Exercise Studio</td>
<td>644</td>
<td>1,436</td>
<td>1,566</td>
<td>1 room</td>
</tr>
<tr>
<td>3.3 Racquetball court #1</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>Relocate existing</td>
</tr>
<tr>
<td>3.4 Racquetball court #2</td>
<td>800</td>
<td>800</td>
<td>800</td>
<td>Relocate existing</td>
</tr>
<tr>
<td>3.5 Racquetball court #3</td>
<td>800</td>
<td>800</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>3.6 Game room</td>
<td>653</td>
<td>920</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Total group 3: Recreation</td>
<td>3,697</td>
<td>4,756</td>
<td>3,166</td>
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<thead>
<tr>
<th>Group 4: Food service</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Student commons (café)</td>
<td>1,543</td>
<td>1,770</td>
<td>2,000</td>
<td>Food concept to be determined</td>
</tr>
<tr>
<td>4.2 Kitchen</td>
<td>–</td>
<td>240</td>
<td>350</td>
<td></td>
</tr>
<tr>
<td>4.3 Storage</td>
<td>308</td>
<td>360</td>
<td>270</td>
<td></td>
</tr>
<tr>
<td>4.4 Trash room</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>4.5 Toilet rooms</td>
<td>–</td>
<td>–</td>
<td>306</td>
<td></td>
</tr>
<tr>
<td>Total group 4: Food service</td>
<td>1,851</td>
<td>2,370</td>
<td>2,926</td>
<td></td>
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<table>
<thead>
<tr>
<th>Group 5: Fitness area</th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>5.1 Fitness area</td>
<td>4,307</td>
<td>3,738</td>
<td>–</td>
<td>Adjacent to control desk, if possible</td>
</tr>
<tr>
<td>5.11 Cardiovascular</td>
<td>–</td>
<td>2,019</td>
<td>3,000</td>
<td></td>
</tr>
<tr>
<td>5.12 Selectorized</td>
<td>–</td>
<td>–</td>
<td>2,500</td>
<td></td>
</tr>
<tr>
<td>5.13 Free weight</td>
<td>–</td>
<td>–</td>
<td>2,600</td>
<td></td>
</tr>
<tr>
<td>5.14 Stretching area</td>
<td>–</td>
<td>–</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td>Total group 5: Fitness area</td>
<td>4,307</td>
<td>5,757</td>
<td>9,100</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Group 6: Gymnasium</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 Multipurpose gym 1</td>
<td>4,860</td>
<td>4,860</td>
<td>4,880</td>
<td>Renovate existing for indoor hockey, soccer, volleyball, and dodgeball</td>
</tr>
<tr>
<td>6.2 Gym 2</td>
<td>–</td>
<td>4,173</td>
<td>4,187</td>
<td>Renovate existing for basketball and volleyball</td>
</tr>
<tr>
<td>6.3 Elevated track (3 lane)</td>
<td>–</td>
<td>2,920</td>
<td>3,890</td>
<td></td>
</tr>
<tr>
<td>6.4 Gym storage</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Total group 6: Gymnasium</td>
<td>4,860</td>
<td>11,953</td>
<td>12,957</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group 7: Climbing wall</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1 Climbing wall</td>
<td>–</td>
<td>960</td>
<td>840</td>
<td></td>
</tr>
<tr>
<td>7.2 Storage closet</td>
<td>–</td>
<td>–</td>
<td>160</td>
<td></td>
</tr>
<tr>
<td>Total group 7: Climbing wall</td>
<td>0</td>
<td>960</td>
<td>1,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Existing (8-11-06)</td>
<td>Feasibility study proposal (11-11-05)</td>
<td>Schematic design (12-13-06)</td>
<td>Proposed features</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>--------------------</td>
<td>----------------------------------------</td>
<td>-------------------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td><strong>Group 8: Offices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.1 Administration offices</td>
<td>834</td>
<td>804</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>8.11 Recreation director</td>
<td>–</td>
<td>–</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>8.12 Administrative assistant</td>
<td>–</td>
<td>–</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>8.13 Work area (2 stations)</td>
<td>–</td>
<td>–</td>
<td>153</td>
<td></td>
</tr>
<tr>
<td>8.14 Intramural office</td>
<td>342</td>
<td>845</td>
<td>162</td>
<td></td>
</tr>
<tr>
<td>8.15 Outdoor programs office</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>8.2 Conference room</td>
<td>–</td>
<td>–</td>
<td>138</td>
<td></td>
</tr>
<tr>
<td>8.3 Storage</td>
<td>–</td>
<td>–</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>8.4 Break room</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td><strong>Total group 8: Offices</strong></td>
<td>1,176</td>
<td>1,649</td>
<td>851</td>
<td></td>
</tr>
<tr>
<td><strong>Group 9: Wellness center to be determined</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.1 Waiting room</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.2 Reception</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.3 Health services offices</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.4 Treatment room</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.5 Counselor offices</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.6 Resource library</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.7 Conference room</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.8 Kitchen and nutrition lab</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.9 Changing rooms</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>9.10 Storage files</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td><strong>Total group 9: Wellness center</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td><strong>Group 10: Physical education to be determined</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.1 Classrooms</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>10.2 Offices</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>10.3 Storage</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td><strong>Total group 10: Physical education</strong></td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td><strong>Net square footage</strong></td>
<td>26,612</td>
<td>42,186</td>
<td>45,157</td>
<td></td>
</tr>
<tr>
<td><strong>Gross factor 20%</strong></td>
<td>31,934</td>
<td>50,623</td>
<td>49,801</td>
<td></td>
</tr>
<tr>
<td><strong>Total building area</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
centers, the program for exterior improvements will likely include detailed descriptions of playing fields, outdoor courts, and spectator areas.

The design of the proposed recreation center will respond to how the building is operated and managed, so it is essential that issues such as staffing and management procedures be resolved before the design process commences. One of the most common drivers of a recreation facility project is flexibility and the need for expansion to provide more space for more programs. The college or university needs to assess the increase in operational costs such as staffing, security, energy consumption, and transportation and parking. While the architect is estimating building construction costs, the college should prepare a pro forma business plan.

The project schedule should be revisited during programming in response to critical milestones (such as semesters or board of regents meeting dates). Other factors such as project financing may influence the schedule and impose constraints. A date for completion of the project should be targeted at this time.

### Conceptual Planning and Budgeting

On the basis of the client-approved program, the architect prepares a number of design concepts for the recreation center. The client, represented by the committee of stakeholders, evaluates the strengths and weaknesses of each design concept. The exchange of ideas is crucial to the design process. The committee and the architect should discuss design alternatives thoroughly in order to clarify the objectives of the project and to take advantage of opportunities and minimize constraints. See figures 2.3 and 2.4.

Many campuses benefit from having short-range and long-range campus master plans that serve to guide the orderly physical development.

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**Figure 2.3** North–south plan concept.

Drawing courtesy of WTW Architects.
Feasibility: What Are the Possibilities?

of the campus in alignment with the institution’s **strategic plan**. The strategic plan, in turn, is the action plan tool that serves to further the institution’s mission. For example, a university’s strategic plan could say, “Enhance recreational and social opportunities in the core campus to improve the quality of life for the campus community, increase applications for enrollment, and improve retention.” In response, the master plan could say, “Demolish the XYZ building to clear a site to construct a 50,000 square foot (SF) recreation center for fitness programs, recreational activities, and intramural sports.”

The recreation center should be integrated with the master plan, which considers campus-wide issues such as outdoor space and landscaping, pedestrian and vehicle movement, campus density, and view corridors. The master plan may also include guidelines for aesthetics, building scale, and exterior materials. A related study is a utility master plan, which addresses the strategic expansion of the utility services infrastructure.

If the recreation center is a renovation or expansion of an existing facility, the campus master plan may guide the siting and massing of an addition and the relocation of building entrances or loading and receiving areas.

Institutions without master plans may want to retain the architect to prepare a **precinct plan** for the district around the proposed recreation center. A precinct plan is a “mini” master plan that addresses campus planning issues in a predetermined district of a campus. A precinct is usually a programmatically unified district, such as an athletics area, a graduate school quad, or a transportation hub. Siting a building without a master plan or consideration of campus-wide issues may lead to costly mistakes or the obstruction of future, yet unknown, options for campus development.

The architect assigns an estimate of probable construction cost to each of the **conceptual design** alternatives. Since design is conceptual at this point, not all cost factors are known. A 15% to 20% cost **contingency** should be assigned.
depending on the consultant’s estimating methodology. Note that the architect estimates building construction or “hard” costs. The college or university must calculate the total project cost, the sum of “hard” and “soft” costs. Soft costs include architectural and engineering fees, furniture, equipment, survey, and geotechnical costs. Some institutions assign the cost of extending central utilities (steam, chilled water, power, data) to the project. It is not unusual for soft costs to be 30% of the hard cost including contingencies. So, the total project cost could be \([\text{construction cost estimate} \times 120\%] \times 130\%\).

The client should select one design concept, with possible variations, as the preferred scheme. Note that at this point the design is conceptual and very preliminary. The complete design process, usually referred to as basic architectural services, is described in chapter 5. It is at this point that the budget and project scope should be aligned. There should be consensus among all client stakeholders—particularly the university administration and trustees—that resources exist for designing and building the preferred design option. This is a critical step in enabling the process to move forward. See figures 2.5 and 2.6.

Figure 2.5  Aerial view: concept 1.
Drawing courtesy of WTW Architects.

Figure 2.6  Aerial view: concept 2.
Drawing courtesy of WTW Architects.
Final Planning Report

The consultant team prepares a final planning or feasibility report. The report should document the preferred conceptual design and budget and the rationale that led to it.

1. Mission and Strategic Goals and Objectives
2. Methodology
3. Existing Facilities Assessment
4. Needs Assessment
5. Benchmarking
6. Programming
7. Conceptual Plan
8. Budget
9. Recommendations
10. Next Steps

If desired, the architect can be directed to create illustrations of the project to be used for public relations or fund-raising (see figures 2.7 and 2.8).

NEXT STEPS

There may be a hiatus following the completion of the feasibility study for fund-raising or further consensus building. The consultant team selected for the feasibility process may or may not be retained for the design of the facility. This decision may depend on the policies of the institution, state requirements for design service procurement for public universities, or the perceived quality of the feasibility process. Note that an extended hiatus could allow for changes in the personnel who participated in the process and a weakening of the consensus commitment to the conclusions of the study. The schedule of the project will have an impact on the feasibility study report. Parts of the study may need further validation and updating to account for changes.

Figure 2.7  Cut-away view (axonometric and rendering).
Drawing courtesy of WTW Architects.
that may affect the program, design, and budget of the facility.

**SUMMARY**

In summary, the following are the benefits of a planning or feasibility study:

- The planning study process brings consensus, a unified vision, and a defined scope.
- The planning process provides a solid foundation and justification for the project.
- The planning report communicates this vision to other parties who may not have been directly involved with the planning process.
- The planning report is often a valuable tool in fund-raising efforts.
- The planning report documents specific goals, objectives, and requirements.

Planning and designing facilities to successfully accommodate new directions in recreational sports is an important endeavor. It is a critical and challenging process that requires informed and strategic decision making. An architect with planning and design experience in recreational sports can provide valuable professional guidance and assistance in moving ideas from the dream phase to reality. An informed and vigorous partnership between an institution and a consultant team will result in a dynamically successful project, exceeding everyone’s expectations.

**DEFINITION OF TERMS**

**architect**—A professional engaged in designing buildings, open areas, communities, and other constructions and environments.

**benchmarking**—A standard or reference by which others can be measured or judged; in facility planning, data or information on a given topic from a peer institution that can inform decisions on a similar topic at the home institution.

**campus master plan**—A plan of a campus showing proposed physical changes to buildings and grounds. The changes are in response to a college or university’s strategic plan or budget cycle. Changes are usually projected in time frames such as 5 years, 10 years, or 20 years.

**conceptual design**—A building and site design generated during a feasibility study. It is conceptual, and is the first response to the owner’s program as well as the constraints and opportunities of a specific site.

**contingency**—In project planning, a budget amount for project costs not yet known because of the early phase of design, usually measured as a percentage of an estimate of construction cost.

**design**—The act or process of planning a building, open area, community, or other construction to satisfy an owner’s requirements as defined by a program and a budget.
engineer—A professional engaged in designing building or environmental systems; in building design, in collaboration with an architect.

feasibility study—An analysis of an owner’s program and testing of conceptual solutions usually on alternative sites; often the first step in the design process.

focus group—In a building design process, a group of owner’s staff representing one program area who establish program requirements and review design solutions, for example, food service staff or security staff.

gross building area—The sum of the floor plan areas of a building measured to the outside of the outside walls.

hub—In campus or urban planning, a focus of activities or a crossroads of pedestrian pathways.

mission statement—A statement of an institution's purpose or reasons for existence.

net building area—The programmed plan area of a building, that is, the area assigned for use by the building occupants. The following areas are not included in net but are included in gross: circulation space (corridors, stairs, elevators), mechanical rooms, toilet rooms, walls, and partitions.

precinct plan—A “mini” master plan for a portion or district of a campus; usually a programmatically unified area, for example, an athletics area, a graduate school quad, or a transportation hub.

programming—The act or process of compiling the owner’s requirements for a project; in a building project, quantifying the area, volume, and characteristics of each space in a proposed building. A program is the resulting document.

strategic plan—A documented framework for achieving a college or university’s desired future based on its mission. A strategic plan could include such topics as the growth or retraction of colleges or departments, changes in staff allocation, real estate acquisitions or sell-offs, and building developments.

topography—The detailed mapping or charting of the features of an area or district usually by means of surveying.
PART II

FACILITY DESIGN PROCESS
With campus facilities like athletic and recreation centers, deciding whether to renovate or build anew is a complex process of weighing different agendas, competing priorities, and other important factors. The decision can speak volumes about an institution’s strategic direction, even its most cherished traditions. This chapter explores ways in which one can quantitatively analyze a recreation or athletic center and help determine which course—renovating an existing facility, renovating and adding onto an existing facility, or building a completely new facility—makes the most sense, based on programmatic needs and budgets as well as intangibles like the emotional connection of students, alumni, and the wider collegiate community to a particular structure.

We organize our discussion of this topic under three broad headings:

- Why Would You Choose to Renovate?
- When Would You Choose to Renovate?
- How Would You Choose to Renovate?

We hope that one of the most useful aspects of this chapter will be the “scorecard,” a quick, easy-to-do predesign assessment that we believe can be a helpful tool in assessing why, when, and how to renovate. There is no “right” answer. The answer to “Why?” will vary depending on your institution, and may relate to the culture and history of the school and the building, the location within your campus, and the physical state of the building itself. These are all important. But to provide a rationale that goes beyond the emotional or qualitative factors, under the heading “When?” we include a scorecard that will enable you to assess each building component and put that assessment into financial perspective. The result is an objective view of how much your renovation will cost compared to the cost of new construction. Finally, if the factors point toward reuse of your existing building, the discussion of “How?” provides examples of several different architectural prototypes, each of which has its own advantages and potential results.

Let’s start by defining two important terms. By “recreation center” we mean a recreation complex intended for the general student and campus community that contains a wide variety of exercise and wellness equipment and programs. By “athletic center” we mean a building or complex largely for the use of the school’s intercollegiate athletes and coaching staff and the associated spectator events. In order to avoid confusion, we refer throughout the chapter to “Rec” and “Athletic” centers, defined in these ways, with the first letter of each capitalized.

### WHY WOULD YOU CHOOSE TO RENOVATE?

- Intangible elements like architecture and institutional mystique can play a role.
- Prospective students are more demanding than ever.
- Rec centers are part of the larger “student life” equation.
This is the most qualitative of our categories—and thus perhaps the most challenging. Every college and university campus has a specific character composed of both tangible and intangible elements. The tangible elements are the institution's geography—its size, location, and climate, as well as the location of adjacent facilities such as playing fields, number of buildings, academic programs, faculty rosters, and student profiles. The intangible elements are the mystique that has accumulated over the years—the style of the buildings, the way the landscape changes throughout the year, the many generations of memories that have been built up and are closely guarded. Furthermore, what are the institutional goals, for the Rec program especially? Colleges are competing more and more for the best and brightest. Within your institution's set of competing institutions, what are the expectations of students and their parents as to the condition of Rec centers? Do they expect top-end luxury, similar to that of the kind of private health club they probably knew as grade school or high school students? Or do they have a nostalgic sense for the spartan look of rough, sealed concrete floors and wire-basket lockers? This is an ethos that remains strong on some older campuses, like those in the Ivy League.

Buildings on the campus contribute to that character in a very real way by forming the most obvious and identifiable aspect of the visual environment. Some buildings are deeply embedded in the culture and traditions of an institution. Many existing Rec centers are centrally located because they go back many decades and were always sited for student convenience. By contrast, Athletic facilities can be located on more peripheral sites, but can also serve to anchor a whole new precinct should an institution decide to place them outside of the center of campus. Historically these two facilities might have been combined, but a more recent trend is to split them apart, especially at larger institutions where team sports are big money makers. Thus Athletic facilities become their own sort of campus precinct while Rec centers are thought of as part of the larger student quality of life equation, often remaining at the center of campus and thought of as a sort of satellite to the campus center or student union building.

Some are worth reusing simply by virtue of location. Others may not have special significance or location value but may still be worth consideration due to the building's current use, size, structure, and fit for the new recreation program. In other cases, the virtue of sustainability and "recycling" is a powerful enough reason to take a closer look at renovation. Indeed, the U.S. Green Buildings Council, which certifies the LEED (Leadership in Energy and Environmental Design) program, recognizes the inherently sustainable act of renovating an existing building instead of starting from scratch in its LEED Existing Building (EB) program. Because it does not involve full exterior demolition, new foundation, and new building envelope, renovation has substantial positive environmental implications.

Buildings are not just bricks and mortar: They are the repositories of memory and tradition—nowhere more so than on college campuses. Furthermore, they are assets that any institution wants to use to the fullest extent possible, for the benefit of students, faculty, staff, alumni, and the surrounding community.

Culture and Tradition

Students and alumni do get emotionally attached to places on their college campuses. For alumni, such places trigger memories of those relatively carefree days of youth. Many alumni athletes cherish the old gymnasium buildings that were built during the first half of the twentieth century. These buildings were often the only indoor sport venue on the campus in those days, so all students who participated in any sport used them. Important relationships and friendships developed in these buildings. Students bonded by working, sweating, and competing together. Other activities such as convocation and commencement may have taken place in the building, invoking other memories. Football game spectators may have walked by a particular building every week; it became the backdrop for many sporting events. Such buildings may be very deeply ingrained in the traditions of the school and its alumni.

These were often very lovely structures that were consistent with the larger dominant architectural style present on a campus—Georgian, Gothic, Romanesque, and so on. Often with lofty ceilings, beautiful arched windows, intricate brick details, wide staircases and hallways, and first-class interior finishes, these edifices set the original campus ambience. Although they can be out-of-date in terms of today's technology (mechanical, electric, and plumbing [MEP] systems technology), code requirements, and
To Renovate or Build From Scratch

students’ expectations, they may possess charm and beauty that significantly contribute to the overall campus feeling. Sometimes they simply embody the institution for so many alumni that fund-raising for their renovation can result in sizable donations that make a significant impact on resources. History shows that wealthy donors like having their names attached to Rec centers, given that these tend to be in prime campus locations and form important memories across the collegiate community. The support of these alumni, both emotional and financial, is one good reason to strongly consider rehabilitation of a building.

Town and Gown Issues

Also on an architecture and design level, a Rec center might lie within a town’s historic district. In places like Princeton (New Jersey), Cambridge (Massachusetts), and New Haven (Connecticut), the institution cannot afford to fight its host community on issues like preservation. Often good town and gown relations rely on the college’s compliance with local preservation laws and guidelines. Both town and gown have vested interests in preserving this cherished civic atmosphere. Other town and gown considerations include whether to grant access to the facility to the larger community, for example to a nearby high school that might lack its own pool or gymnasmium. Colleges located in especially rural locations might have the only top-notch recreation facilities in a particular region, and often administrators will allow local police, fire, and ROTC groups to use the facilities as a means of community outreach.

Location

Most campuses have a “sweet spot” or “100% location” for any particular building—the perfect place on campus for a specific use. In the case of a Rec center, there are several considerations. Sometimes centrality is the key; the best location is in the center of campus where students, faculty, and administrators will be most likely to incorporate a visit into their weekly or daily routines. This may mean a location on the central “green” or “quad” or at the crossroads between academic and residential precincts.

Sometimes the Rec center can be used to establish a new area of campus; like an anchor store at a shopping mall, it can be a destination that helps to enliven a “remote” part of the campus. It is on campus peripheries that most developable land exists; furthermore, the fairly large footprints, parking, and outdoor field requirements that are commonly part of the Rec or Athletic center program can often be satisfied only in these peripheral locations.

Another consideration is proximity to existing Rec and Athletic facilities. At some institutions it is desirable to locate all Athletic and Rec facilities, both buildings and outdoor fields, in one part of the campus. This strategy may help in the sharing of support spaces, parking, and staff. The zone for these facilities may be central or peripheral to the rest of the school.

At other colleges, the Rec center is purposely located away from the Athletic facilities in order to distinguish recreation from athletics, to encourage all campus constituents to use it, and to avoid associating it with an exclusive group of “athletes.” Sometimes this concept evolves into a campus center idea, in which the Rec center and the campus center or student union physically merge into one.

Differences Between Rec and Athletic Centers

Also factoring into the equation are the divergent cultures of the Rec center and the Athletic center. Even though the general public and indeed many students, faculty, and alumni might mentally place them in the same category, in fact Rec centers and Athletic centers are very different places. Rec centers are about easy access, lifestyle fitness, and not incidentally, socializing among students. The Rec center is a place to see and be seen. It’s a place for casual interaction, “hanging out.”

The Athletic center is a bit more businesslike. Many colleges rely on intercollegiate sport as a money maker. Coaches, staff, nutritionists, and athletes share the space. The quality and ambience of the center and locker rooms can be a recruitment tool for top athletic talent. These athletes in turn spend many hours a day at the Athletic center, meeting with coaches, attending team meetings, performing weightlifting and other physical training, going to sports medicine and physical therapy sessions, and receiving academic counseling. They usually have lunch and sometimes other meals on-site. This is a completely different kind of hanging out. Nonetheless, this population of student athletes is small—about 5% of the total student population at most large institutions.
In all cases, the Rec center is a large-footprint building that requires a fairly large site. If it includes a swimming pool, there are additional site requirements in terms of soil conditions and water table. If high-occupancy events such as concerts, meetings, graduation, or even banquets are anticipated uses of the building, proximity to large parking lots or garages becomes important. Outdoor green space such as fields or quads can be important if programming will include outdoor sports or exercise classes.

Given the importance of the location of a Rec center within the campus, sometimes an existing building happens to be located in exactly the right place. If the existing structure is an athletic facility, an older recreation building, or any large-volume facility, it might be a viable candidate for renovation largely because of its relative position on the campus. Conversely, there may be buildings that seem to be obvious good choices for conversion into a Rec center, but if they are not optimally situated, they may be discarded as viable candidates.

**Programmatic Suitability**

Rec centers have specific physical requirements that are dependent on the program of spaces and activities. The owner should develop a program before or during the site analysis phase in order to reconcile scope, budget, and quality but also in order to understand the building’s overall size and constituent elements.

Activity spaces for Rec centers are generally more flexible than those for Athletic centers. However, there are certain rules of thumb that influence dimensions. Chapter 6 on indoor facilities discusses dimension standards.

In assessing the suitability of a given building for renovation, accommodating the gym is the most common threshold factor. If the building includes an existing gymnasium, the owner may choose to work with that as a starting point and either add more structural bays or another entire gym space or accept the existing size constraints and focus renovation dollars on other facets of the space or on other program areas. If there is no existing gym, the next best thing is another large volume unencumbered by columns.

**Indoor Elevated Jogging Track**

An indoor jogging track is often a desirable program element in Rec centers. Usually it is elevated and within the volume of the gymnasium. The feasibility of adding the track to an existing gym is worth noting. The jogging track is structurally supported either by suspension from above or by columns below (see case study on University of New Hampshire later in the chapter). In order to physically fit the track into the space, one must consider the width of the track (determined by number of lanes and lane width), the radius of the corner turns, clearance around the activity courts below, and space needed for structure. Unless the roof is fire protected, varying local codes will dictate what distance the track floor must be from the roof structure; thus the height of the existing volume may be a limiting factor.

Adding a column-supported track is sometimes infeasible due to construction disruption of the gymnasium floor, expense, and simply the physical space necessary for the column footprints beyond courts and runoff areas.

Adding a suspended track is also difficult because the original structure may not be designed for the extra live and lateral loads imposed by the track. The track may also trigger new access and egress requirements now that occupied space will be added to an upper floor level, or now that the track itself constitutes an entirely new level of the building. If a jogging track is a high-priority program element, the feasibility of adding it to a renovation candidate may be the deciding factor.

**Indoor Swimming Pools**

Natatoria are often programmed as part of Rec centers. Like gymnasiums, natatoria may be of many different sizes, but they require large clear-span structures. In addition, swimming pools have specific requirements for soil conditions and foundation systems, as well as spatial relationships with equipment rooms and locker rooms. There are also special air-handling aspects for indoor swimming pools to ensure proper ambient air temperature, humidity, and ventilation. Furthermore, every material in the pool setting must be carefully considered for resistance to the corrosive environment created by the airborne chemicals and high humidity level. Structural members must be designed or treated to prevent rusting and eventual decay and failure. These unique features make it very unlikely that an existing building can be transformed into a natatorium for less cost than building new. If the other desired program elements can be adequately developed within existing space, the natatorium piece might be a sensible addition or future phase.
If it is determined that a natatorium is not suitable for renovation because of its wide, clear space configuration, it can be rehabilitated into other uses such as weights and fitness (W&F) or racquetball courts.

**Existing Program Spaces**

A plethora of other program spaces are popular in Rec centers, each with its own range of acceptable dimensions, storage, and support space requirements. These may include multipurpose exercise rooms for dance, yoga, spinning, martial arts, aerobics, and step and Pilates classes; W&F areas; squash, racquetball, or handball courts; multipurpose activity courts (MACs) with dasher boards for indoor roller hockey and other sports; climbing walls; game rooms and lounges; and food service areas. Because of the flexibility of their respective sizes and configurations—floor areas, shapes, and clear heights—these programs can be accommodated fairly easily within renovated space. The exceptions are squash and racquetball courts, which have specific mandated sizes. Some programs can conveniently replace other programs that have fallen out of favor but whose physical spaces remain. Racquetball courts can be reused for multipurpose exercise; a climbing wall area, if planned with an exit strategy in mind, may be reused for lounge space or even an exercise room. There are still important “fit” considerations such as structural loading issues, especially for free weights areas, as well as acoustical, electrical, mechanical, access, egress, and code issues. The extent to which the desired program elements “fit as is” will be a big determinant of renovation cost.

**Impact of Title IX**

Title IX had a profound impact on Athletic centers by mandating equal spending between men’s and women’s facilities. This has been especially important to athletics (intercollegiate) programs, but there has also been a “trickle-down” effect. Athletics programs, granted funding for new facilities, have often moved out of older buildings that can be ripe for reuse as Rec centers.

**Sustainability**

Today’s students are increasingly aware of the need to conserve the earth’s resources, and at many institutions of higher education they are making an impact by demanding that new building projects achieve high levels of sustainable design. Taken further, sustainability means reusing materials: using materials with recycled content, salvaging building elements and deploying them again, and ensuring that materials can be reused after the life of the building.

What better way to accomplish this than by recycling an entire building? Renovating a building instead of starting from scratch can be a very environmentally responsible decision. Increasingly, evidence suggests that renovation and infill of existing facilities in urban and suburban environments has far more sustainability than further encroachment into greenfields and exurban areas. Even if, in the way we measure building costs, the cost of renovation is high, in the greater scheme of embedded energy costs and long-term costs to the overall environment, renovation may be the least expensive option. For some, this is the overriding concern and needs no further justification. Choosing to renovate and add instead of building new may yield other attractive and tangible benefits, such as the preservation of land for buffers, playing fields, or future potential building sites.

**WHEN WOULD YOU CHOOSE TO RENOVATE?**

- If the location is right
- If the program fits
- If the building systems can be made to work
- If the cost is acceptable

A lower renovation cost does not always mean that it makes sense to take this path. If there is at least one good reason why renovation should be considered for a particular case, the next step is to assess whether or not it makes financial sense: when renovation is, in fact, the appropriate strategy as measured by first cost.

**Financial Justification**

One way to make this assessment is based on comparing the cost of a theoretical new building with the cost of renovation. Overall “project cost” consists of two major categories: **hard costs** and **soft costs**. Hard costs are also known as construction costs and usually constitute 70% to 75% of the total project cost. They include only
the cost of the building, both labor and material. Soft costs make up the other 25% to 30% of the total project cost, and include consultant fees (architects, engineers, program or construction managers, attorneys), permit and approval fees, insurance, land acquisition, loose FF&E (furniture, fixtures, and equipment not provided by the contractor), and moving costs. Soft costs may be less for renovation since there are no land acquisition costs involved. However, it’s best not to focus on soft costs when making a renovation or build decision. Rely instead on comparisons of hard costs, because these are the most susceptible to fluctuation and sudden change.

Renovation projects inherently involve dealing with many unknown variables that may increase costs, schedule, and design uncertainties. The cost savings of a renovation versus building new can quickly turn into increased financial exposure. The following are some of the risks associated with renovation that require more up-front investigation:

- There may be unanticipated MEP and structural faults.
- The building may not comply with current codes, including Americans with Disabilities Act and seismic codes; buildings built from the 1930s through the 1970s are probably not up to today’s codes.
- Hazardous material removal or abatement may be necessary.
- What if the final product is less than ideal? A compromise solution makes the best use of the existing conditions, but is not what you would choose if starting anew, in terms of:
  - spatial adjacencies, floor plan layout, functionality;
  - mechanical systems such as heating, air-conditioning, ventilation;
  - window placement, type, quality;
  - exterior wall and roof type, visual appeal, R-value (ability to insulate); and
  - acoustical characteristics.
- There may be code-related extra costs due to interpretations of building codes by local officials.
- Temporary facilities may be needed. If a building is to be renovated, it usually can’t be used as renovation is taking place. When a new facility is planned on a different site, the existing facility can be used until the new one is finished, and the older building can be considered for other—even non-athletic or non-recreational—purposes.

Knowing these potential drawbacks, if an owner still believes there may be a benefit to renovation, often he or she needs to establish both substantial financial savings and compelling benefits to the institution in terms of the facility’s character, location, and overall contribution to the institution’s quality of life.

The Scorecard

By comparing the construction cost of a new Rec center to the construction cost of a specific renovation project, the owner can gauge the possible financial savings or exposure. One way to make this comparison is by using a scorecard that arrays the basic elements of a building and shows their relative costs. The main advantage of the scorecard is that it allows a seat-of-the-pants study of a building’s potential for renovation without the need for a costly and detailed building study. While owners might eventually want to bring in consultants to do more detailed investigation, the scorecard allows them to come up with a gauge of a potential building project that they can then take to their administration as a rationale for undertaking more in-depth consultant work.

Column A: Building Components

The scorecard is purposefully abbreviated (table 3.1). For example, if one were in an actual feasibility study or in schematics or design development, one would use the standard 16-category system of the Construction Specifications Institute (CSI). But for our purposes, we’ve reduced the categories to five:

1. **Site improvements**: demolition, site preparation, excavation, parking lots, roads, walks, landscaping, site utilities
2. **Superstructure**: footings, foundations, retaining walls, basement walls, moisture protection, grade beams, slabs on grade, structural slabs and decks, structural frame and fireproofing, structural load-bearing walls, expansion and construction joints, balconies, ramps, catwalks
3. **Exterior closure**: exterior walls, doors, and windows; insulation and vapor barriers; caulking, parapets; louvers and
4. **Interior:** interior partitions and toilet partitions; balustrades; doors and frames; interior window walls; finishes for floors, walls, and ceilings; mirrors; entrance mats; millwork; lockers; built-in specialties such as signage, toilet accessories, ladders, turnstiles, and gym divider curtains; stairs; elevators; escalators

5. **MEP:** plumbing (including rainwater drainage); heating, ventilating, and air-conditioning; fire protection; controls; electrical service and distribution; lighting and power; telecommunications; security and alarm systems; public address systems; lightning protection; emergency light and power

The five categories represent design elements that are easily understood by owners and design professionals. This cost breakdown is similar to what many general contractors and cost estimators use during a design phase to estimate a building cost but differs from what they typically use for more detailed estimates. The more detailed estimates are based on the CSI 16-category breakdown that corresponds to building trades and material procurement. For example, concrete is one of the 16 categories. It would be very difficult to estimate what percent of the total concrete work needs replacement. You would need to think about the concrete in the foundations, floor slabs, grandstands, swimming pool, and sidewalks all at the same time. The advantage of using the five-category design elements system is that it works even at a cursory level of detail, without extensive studies or professional consultation. Of course, the more detailed and accurate the input, the more accurate the results; but the system works to an acceptable level of accuracy for early planning level decisions.

Column A shows what portion of the total cost of new construction is typically attributed to each of the five building systems. Factors such as footprint area, site conditions, number of stories, number of special program spaces (such as swimming pool, Multiple Activity Court [MAC], climbing wall), and general level of quality will influence the estimate. Use the midpoint of the ranges for a good-quality two-story Rec center that has either a climbing wall or a MAC but no swimming pool. If your facility varies from this baseline, adjust the numbers within the ranges to get an idea of how a new building’s costs would be arrayed. The total must add up to 100.

### Column B: Percent Needed For Renovation

Column B represents the percent of each building system’s cost that the owner believes will be spent in the renovation project (see table 3.2). Think of it this way: You’re essentially looking at the number in column A and then asking yourself, “What percentage of this figure would I have to spend in this particular category to renovate in comparison to building anew?” For example, I'm going to spend 10% of my total on site work if it’s a completely new building; but, if it's just a renovation, I figure I’m going to spend only about a quarter of that figure—the site’s already pretty clean, so I just need to add some ADA access elements and a bit of landscaping. So this “one-quarter” estimate is expressed numerically as a percentage (.25), and all you need to do is multiply the figure in the first column by .25 to get the final number. Let’s look at the table below:

<table>
<thead>
<tr>
<th>Building systems</th>
<th>Column A</th>
<th>Column B</th>
<th>Column C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% this constitutes of new construction</td>
<td>% of column A needed for renovation</td>
<td>Column A multiplied by column B = score</td>
</tr>
<tr>
<td>1. Site improvements</td>
<td>10</td>
<td>2.5</td>
<td>0.25</td>
</tr>
<tr>
<td>2. Superstructure</td>
<td>20</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>3. Exterior closure</td>
<td>25</td>
<td>6.25</td>
<td>1.25</td>
</tr>
<tr>
<td>4. Interior</td>
<td>15</td>
<td>3.75</td>
<td>0.75</td>
</tr>
<tr>
<td>5. Mechanical, electrical, plumbing</td>
<td>30</td>
<td>7.5</td>
<td>1.5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
<td><strong>25</strong></td>
<td><strong>5</strong></td>
</tr>
</tbody>
</table>

Table 3.1 Column A Building Components
get your score of 2.5. Don’t worry if columns B and C don’t add up to 100 as in column A; they’re not necessarily supposed to.

Here is a hypothetical example. The owner is a prestigious northeastern private university with a Rec center at the very heart of the old historic part of campus. Furthermore, the building sits within the host city’s historical district, so any changes to its exterior will have to be approved by multiple layers, not just within the university but also by the city. The building has tremendous sentimental value for alumni, particularly alumni of one of the university’s professional schools, who are a major source of high net worth donations to the university. So the university undertakes a study using the scorecard and finds that a complete renovation would cost about 33% of the cost of a new building.

Here the “intangible” of the architectural and sentimental value of the building definitely comes into play. But so does the imperative for having the most updated facility and one that is competitive with those of the other universities in this elite category.

The methods of arriving at these numbers will vary widely. For initial planning purposes, the owner may combine his program needs with a walk-through assessment by the facility manager or someone very knowledgeable about the existing conditions of the building. He may conclude that the exterior walls are in good condition but that the roof needs replacement. He may estimate that the cost of the exterior closure renovation will be about 40% that of new construction. In this case, 40 would be entered as .40 in this column at row 3.

### Column C: Renovation Cost as Percent of New

In our hypothetical example, the cost of the renovation project is predicted to be 33% of the cost of the total new construction option as shown in table 3.3. Typically, when the renovation cost is below 70% of the new construction cost, the renovation is financially justified. At 33%, this renovation project would confer a considerable cost savings. When this factor is contemplated

<table>
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</tr>
<tr>
<td>Superstructure</td>
<td>20</td>
<td>.30</td>
<td>6</td>
</tr>
<tr>
<td>Exterior closure</td>
<td>25</td>
<td>.40</td>
<td>10</td>
</tr>
<tr>
<td>Interior</td>
<td>15</td>
<td>.40</td>
<td>6</td>
</tr>
<tr>
<td>Mechanical, electrical, plumbing</td>
<td>30</td>
<td>.30</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td></td>
<td>33</td>
</tr>
</tbody>
</table>

### Table 3.2 Column B Percent Needed for Renovation

<table>
<thead>
<tr>
<th>Building systems</th>
<th>Column A</th>
<th>% this constitutes of new construction</th>
<th>Column B</th>
<th>% of column A needed for renovation</th>
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<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
along with the initial thinking about why the original building is a renovation candidate, the conclusion is very likely to be that in this case the when factor is strong and renovation is the right approach. If the scorecard results are close to 70, further investigation may be warranted before the renovation idea is discarded, if the why factor is very strong.

**Further Analysis**

The simple approach used in the preceding example may be appropriate for initial planning decisions. The next step should be a more thorough exploration of the existing conditions, the new program and conceptual design, and the impact of likely code-related improvements and energy-saving opportunities. If the scorecard result is 33 as in the example, the owner should feel confident about engaging a design professional to conduct a feasibility study. This study would consist of

- detailed investigation of existing conditions,
- development of a full program,
- development of a concept design, and
- development of a conceptual estimate of project cost.

With this work completed, the scorecard could be used again to confirm that the cost of renovation is still anticipated to be well under 70% of the cost of new construction.

If the initial pass with the scorecard yields more ambiguous results, say a score of 65, the owner may feel uncomfortable making a decision about new versus renovation based solely on this test. In this case, the further analysis already described (the feasibility study) will be critical to the accurate assessment of financial impact. Even if the second pass with the scorecard shows a score of 70, if the information is thorough and reliable it may still be appropriate to renovate, especially if the 70% means that a sizable savings is likely.

The decision often boils down to the size of the project and as a result the size of the potential savings. If the 30% savings is $2,000,000, it may not be a reward worth the risk, because unknown conditions could possibly eat up much of that $2,000,000. However, if the 30% savings is $30,000,000, the risk–reward balance point may move higher, since a $30,000,000 savings, even if it dwindled to $20,000,000 at the end of the day, may be enough value to make the risk of renovation worthwhile. The size of the project must always inform the decision. After all, on many campuses that $20 million savings could represent a completely new academic or administrative building.

Another good reason for the further analysis is that some factors elude the simplistic approach, such as building code compliance, energy conservation, and adherence to accessibility codes. Each of these may not be a readily evident component of the work but may still end up adding substantial cost to construction. Contingency funds should be set aside to deal with these upgrades, but some early consultation can help the owner understand the magnitude of their impact.

As the true financial picture of the cost of renovation is developed, code compliance plays a confusing and sometimes burdensome role in determining where construction dollars are to be spent. For a building renovation project, it is important for the owner and design professional to really understand the impact of code-mandated renovations to a facility. The design professional should be an architect with Rec center experience who conducts a study of the existing building in terms of general building code compliance. If the architect deems it prudent, he or she should then recommend that the owner engage specialists to assess specific aspects of code related to particular aspects of the potential renovation.

**Code Compliance**

A number of codes are applicable to any given renovation project. Building codes, fire prevention and life and safety codes, energy codes, and accessibility codes, as well as locally authored historical, zoning, or environmental codes, provide an almost overwhelming body of regulation that renovation projects may be subjected to. Owners should seek design professional help in evaluating the impacts of codes. In some cases a team of design professionals may be required to fully address a large, complex project or a large, complex group of applicable codes. This can include professionals such as structural engineers; electrical engineers; heating, ventilating, and air-conditioning (HVAC) engineers; plumbing engineers; and fire protection engineers. There are even specialty “code consultants” who provide services limited to helping facility owners and design professionals understand the applicable
codes, sometimes with specialties in building, land-use, or environmental codes.

Most current building codes adopted by municipal authorities generally are based on one of three “model” codes: the Building Official Codes Administrators International, Inc. (BOCA), the International Conference of Building Officials (ICBO), and the Southern Building Code Congress International, Inc. (SBCCI). These were written by three different authorities, which in turn joined efforts to produce a single combined code, the International Building Code (IBC) published in 2000. As municipal authorities update the code-of-effect in their respective jurisdictions, the tendency has been to adopt an IBC-based code, either outright or with local or state amendments. This has provided a growing code consistency across the United States, enabling design professionals to readily understand the basic provisions of the building code in effect for a given project and streamlined interpretation of building code requirements. While the IBC has provided a growing uniform code consistency, it has not provided all the answers to every building question or addressed conflicts with other codes.

Given the many types of codes affecting a project, it is often the case that conflicts or inconsistencies in requirements arise either between or within codes. Sometimes code inconsistencies provide “loopholes” allowing avoidance of costly or otherwise difficult code restrictions. Use caution in order to avoid exploiting such loopholes. Future elimination of code loopholes can end up saddling the renovation project with future compliance burdens and added costs. The architect and code specialists should assess the value and risk associated with any strategy aimed at taking advantage of these inconsistencies.

**Interpreting Codes**

One of the first exercises the design professional must undertake in a renovation project is to access all of the applicable codes and understand their relationships and their conflicts. Typically within a given group of codes, the most restrictive provision for each issue will govern. That is, if a building code allows a building to be 60 ft high and the zoning code allows a building to be 40 ft high, the zoning code is the more restrictive and will be the limiting code for this issue. Where conflicts between codes do exist, the design professional should advise the owner as to impacts of possible approaches to addressing the conflicting codes, involving code authorities for acceptance before proceeding into later stages of design. Not every code conflict requires resolution before design is started. Sometimes the conflicts are minor and do not substantially affect the final costs.

Existing buildings are sometimes “grandfathered,” meaning that they are assumed to be acceptable to code authorities as is, having complied with the codes when they were built. This is true as long as the building is essentially unchanged as far as the code is concerned, meaning that code building area limits, height, occupant loads, occupancy type, and egress are not changed. The exception is a facility under citation for violation of code of some type, usually related to egress (EXITING).

If the project involves an addition, the existing facility will probably need to be brought into full compliance with the current codes. This is especially true if the completed renovation exceeds 50% of the value of the previous building; in this case you will probably have to recode the entire building.

In every case it is ultimately up to the code authority, usually a building official, to make the final binding determination as to the code compliance requirements. Existing facilities can have features or construction that do not comply with current codes, and it is the building official’s role to determine what is acceptable. That said, it is possible for a code issue to be so complex as to be outside of the building official’s experience. In this case a building official can require other expert building officials or expert design professionals to provide opinions or certifications on various issues. Examples include peer review processes to verify the correctness of engineering (particularly structural engineering) and computer-based fire modeling. If the building official requires such expert services, it is typically at the facility owner’s expense and as such adds to the project’s cost.

**Code Impact on Renovation Costs**

After becoming familiar with the applicable codes and how they relate to each other, the design professional should review the existing facility’s construction, layout, and critical code features such as corridors and stairways, utilizing field investigation and any documentation from the original construction. In some cases, investigative demolition may be required to ascertain how floors or walls were really constructed and
whether they meet the code requirements. Investigative demolition can be quite invasive, but can also be fairly discrete if locations for investigation are carefully chosen.

The costs of investigative demolition can be substantial, depending upon how much is required, when work can be performed, and a host of other conditions related to the work. Design professionals typically do not provide investigative demolition services and usually charge additional design service fees for their involvement.

**Beware Scope Creep**

The 30% rule of thumb for determining when it's appropriate to renovate may not reflect unknown conditions that can exist. Once an understanding of the existing facility's code features is reached, the proposed scope of new work should be tested for fit against the existing construction. New or adjusted program spaces and the related fit-up will begin to define what portions of the building can stay and what must be changed. All changes should be reviewed against code requirements for egress, fire separations, building area limitations, energy use, seismic performance, and the like. This process can be quite involved or quite simple, depending upon the scope of work and on whether it is a partial removal or a complete gut. But not undertaking the process can lead to scope creep, uncontrolled changes in the scope of a project. Often a variety of design approaches to a renovation can be produced, resulting in very different scopes of work related to codes and related costs.

It is very important to understand the full impact of the various codes for each approach. Simple ideas can become very costly construction problems, affecting areas of the existing building that one previously assumed would be untouched. Simple ideas such as column removal or new floor openings for double-height spaces can trigger seismic evaluations and code-mandated upgrades that can reach throughout the entire building. Similarly, inconsistent approaches between systems within a proposed design can lead to unintended construction costs. If a complete replacement of the HVAC system is desired but the removal of existing ceilings and walls is to be limited to keeping the facility "grandfathered," it is very likely that corridor walls will be penetrated, new vertical shafts through floors will be required, or portions of existing construction will have to be removed to access existing ductwork or piping for renovations. This can push a project into full compliance requirements and significant added cost.

**Energy Conservation**

Codes have slowly been adding energy conservation requirements. Most codes have been written to address new construction, with limited comment on existing construction. Typically, new work must conform to current codes, and existing construction need not be improved. Some states, however, have amended the model codes to include provisions for addressing existing buildings more directly; these amendments allow performance-based modeling of the thermal envelope (exterior walls and roofs) to permit averaging of wall and roof R-values to obtain compliance without the need to upgrade the entire building. Similarly, electrical use for lighting, operating services (elevators), or HVAC is regulated, with existing buildings given limited attention in some jurisdictions. The design professional should review the applicable codes and regulations and develop approaches to energy conservation.

The true operating costs of the renovated facility should be considered hand in hand with code energy conservation requirements. Where codes may not require upgrading of the thermal envelope exterior closure including walls, windows, and roof, it may be in the owner's long-range interest to enhance wall and roof R-values while the construction work is in progress. The added initial construction costs can sometimes have a short payback period with properly selected systems. As part of the feasibility study, the design professional can provide life cycle cost analyses.

**Accessibility Codes**

Accessibility codes can be some of the most difficult codes with which to conform. The requirements are cut-and-dried, with little or no "wiggle room"—you either meet the dimensional criteria or you don't. To complicate the issue, the Americans with Disabilities Act (ADA) overlays a set of requirements that are not enforced by code officials but by the judicial system, the courts. The most relevant section of the ADA for renovation is Title III, Accessibility Guidelines, known as ADAAG. The ADAAG provides the requirements for eliminating discrimination in the built environment.

Local authorities, typically at the state level, adopt a model accessibility code either as is or
with amendments. Some states have gone farther and written unique codes closely paralleling a model code or the ADAAG. Some of these unique state codes have been given status equivalent to that of the ADAAG by the U.S. Department of Justice. Thus the codes serve two purposes, both as discrimination lawsuit protection and as prescriptive code requirements.

The ADA provides generalized thresholds for when improvements to accessibility must be made. Codes as adopted by states often go farther, providing specific financial thresholds related to building value or project costs. Most major renovation projects will be required to fully comply with accessibility codes. While full compliance may be viewed as a hardship, the reality is that it improves safety for all users and accessibility for program use, equipment moving, and maintenance.

In relation to the cost of renovation, a quick review of accessibility of the existing facility should reveal the upgrades that most likely will be required. It may be useful to meet with the local authority that has jurisdiction (the access board in many locales) to get a good reading of the kinds of compliance they will expect and the kinds of exceptions they will be willing to make.

### Addition

What often seems a straightforward solution, simply adding a new program piece next to an existing building, almost always comes with the inevitable “Where do we stop?” Understanding this up-front is critical in determining the full scope of the project and can even lead to extra benefits to the building as well as for the end user.

The addition will require the same building systems, such as mechanical, electrical, communications, and security, that are already in place in the existing building. From an operation standpoint, one will most likely want the addition and the existing building to function together as a single cohesive facility. Using and tying into existing infrastructure such as mechanical systems will require careful analysis and engineering as to load capacities and routing of systems from their source within the existing building. Deficient building systems that won’t handle the new load of the addition may require replacement in whole that will improve conditions in the existing building, but at a cost.

Apart from the building systems considerations, the new addition will likely connect to some other space in the building, be it a corridor or a lobby. Beyond what will be required by local codes to bring the addition and possibly even the building as a whole into compliance is the aesthetic factor. The addition will have a new look and feel, and it will no doubt be desirable for the original building, and in particular the adjoining spaces, to have the same feeling. Inevitably a portion of adjacent spaces will need systems are affected. This may include systemic upgrades due to code compliance issues.

- **Transformation:** This is a total change of use, requiring major overhaul of most spaces and systems.

The following discussion illustrates how each of these three types of renovations can result in Rec centers that not only meet the program needs, but also feel new, operate smoothly, are cost-effective, and contribute to the campus. In most cases, selecting renovation enables the school to preserve a beloved building, make the most of what already exists, and keep valuable real estate sites available for highest and best use, which may be fields, parking, buffer, or another type of building.

### HOW WOULD YOU CHOOSE TO RENOVATE?

- **Enlarging the building**
- **Rehabbing thoroughly**
- **A complete transformation of use**

Once you have determined that your potential renovation project is appropriate based on location, program fit, and cost justification, how do you strategize a design approach to meet your goals and objectives? In broad terms, there are three levels of renovation to choose from. In order of impact, these are the levels:

- **Addition:** Most of the new program goes into a new addition, but some systems or elements of the existing building get updated, expanded, or repaired as part of the project.
- **Rehabilitation:** The existing building is substantially reworked to accommodate the program, but the basic building use remains the same. Building elements are updated, repaired, or replaced to varying degrees, but virtually all...
To Renovate or Build From Scratch

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to be demolished to make connections that would otherwise be hidden in ceilings and walls. While these connections will help justify the need to upgrade the affected areas, others will be more difficult to justify. Budget allowances should be included as early as possible for this “extra” work. These allowances can either be carried at considerably lower cost per square foot than the rest of the project or be included as lump sum costs for specific items such as paint and new floor and ceiling finishes, display cases, special graphics, or even furniture.

The increase in new usable floor area from the addition may affect codes, triggering other construction separation requirements such as double-wall construction, smoke barriers, or increased wall construction ratings that could include fire shutters and limitation in size of interior windows with views into other spaces. New connections may also require that doors be closed all the time or be equipped with magnetic hold-opens that shut during an emergency.

An addition not only provides for the needed program but also, if considered in all its possibilities, can provide a new face for an otherwise tired, unattractive building. It can also be a catalyst to rejuvenate the recreation program and, if considered in full, quite possibly transform student life on campus. Depending on the degree, the addition can be a “shot in the arm” at relatively low cost compared to a completely new facility or can transform the entire program within the existing building, even though those spaces have not been touched. An addition can actually come in varying depths: a large activity block such as a gym or pool; a 30 to 40 ft (9.1-12.2 m) support strip to accommodate offices and locker rooms; a narrow connecting corridor or exterior arcade that wraps an entire side of a building; or simply a new skin on a prominent façade.

Rehabilitation

A building selected for rehabilitation should have good infrastructure and the support spaces needed to make the primary activity spaces and adjacency requirements work. The renovation usually revolves around larger, double-height spaces within the building that are underutilized or do not meet current needs. Good candidate spaces are those free of columns and other fixed obstacles. An undersized pool can be turned into a W&F area or a multipurpose space. The outdated basketball court is a candidate for MAC or a multipurpose dance and aerobics space. Underutilized racquetball courts can be used for offices, team meetings, or lockers or can be multipurpose.

These “larger” spaces do come with limitations, which are usually structural, as such spaces were originally designed to span specific needs. For example, a racquetball court normally has intermediate bearing wall construction between courts at the given 20 ft (6.1 m) width, making conversion to an international squash court with a 21 ft (6.4 m) width requirement problematic. Likewise, these walls likely have associated footings, and a conversion of the space with new structural loading will have to anticipate and accommodate this below-ground “hidden” condition. Similarly, there are requirements beyond the given envelope that are specific to sport activities and layout of spaces, such as gymnastics jumping pits and spaces for track and field events in a field house. Even simple details associated with coring floors for tennis and volleyball sleeves between given structural conditions require careful attention to ensure that the right number and configuration of courts can be achieved. The Massachusetts Institute of Technology, for example, wanted to relocate a long jump–triple jump pit in a field house on an upper level (above an ice hockey rink), but given the structural floor framing plan it was not feasible to rework the structural floor slab to accommodate the dimension required for the pit. Hanging equipment from existing roof structures such as divider curtains, scoreboards, sound systems, or lighting may require additional structural supports (see University of New Hampshire case study).

Transformation

Typically a building transformation or “gut renovation” reflects a substantial change in the use of the primary space and the original intended use for which the building was designed. The basic criterion for determining whether a building is a good candidate is its infrastructure—good “bones.” That is, the structure and exterior shell are sound, but the current internal workings and specific configurations do not meet the needs of the desired program. For Rec centers, the primary space is a gymnasium, a swimming pool, or both. These areas require long clear structural spans and therefore big-volume spaces. These structural attributes have the most potential for this highly invasive type of renovation.
In order to plan a transformation, one imagines that the main volume of the existing building has been emptied out. What’s left is a big empty box, like an airport hanger. It may appear that there are limitless opportunities to fit the program into such a large open space, but 30% to 40% of it will be filled with the infrastructure necessary to make the building operate and the actual activity spaces function as needed. This infrastructure includes mechanical rooms, vertical chases, corridors and stairs, and support functions like public toilets and storage rooms. It is important to ensure that the net usable areas plus 30% to 40% will fit into the space.

The age of the building will be a significant factor in a gut renovation due to different construction types and use of materials. The shell has unique characteristics that were designed and engineered for a previous use. Likewise, brick and stone (vs. steel) may limit new openings for windows and doors. Locations where major utilities enter and leave the building, such as major wet mechanical rooms for steam, water, and power, will likely remain as givens and will have to be planned around.

Unknowns under the building such as tie rods, rock, and water could affect the project significantly, especially if new foundations or piping is required within the existing footprint. For example, some plumbing pipe needs to have a positive pitch, and the pitch could be significant given the typical size of this sort of footprint. If there is rock to contend with just below the floor slab, the effort and cost of trenching through could be substantial. The potential problems with renovation for a pool are more obvious. If the desired deck level is to match the slab on grade, a good understanding of conditions below the slab is critical since the pool itself could extend down 14 ft (4.5 m) with springboard diving and considerably more with a tower. Infill of the shell with walls or floors (or both) will likely require columns or bearing walls and thus foundation and footing considerations through the floor slabs and around the existing building footings and foundations.

**SUMMARY**

In this chapter we have attempted, under three broad headings, to discuss the why, when, and how of additions and renovations to Rec and Athletic facilities.

Under the “Why” heading, we discussed the factors that one must consider to determine whether or not a building is sufficiently valued to justify the costs incurred in an addition or renovation. Under the “When” heading, we developed a simple and easy-to-use system of quantifying the projected costs of an addition or renovation compared to the cost of building a new structure from scratch. We believe that this system will allow architects and facilities directors to have real, “solid numbers” when they meet with building committees or university administrators to discuss the pros and cons of renovating or building anew. Finally, under the “How” heading, we outlined specific criteria and presented examples of actually undertaking an addition or renovation project. To conclude the chapter, we present case studies within our experience that illustrate the various approaches.

Rec and Athletic centers serve critical functions at institutions of higher learning. On a philosophical level they promote the classical ideal of the trained mind and the trained body. On a more practical level, they represent an important recruitment amenity as colleges face more and more competition for the best and brightest students. We hope this chapter will be useful to our colleagues and collaborators within the academic architecture and facilities management professions.
This case study deals with the decision to build a new state-of-the-art fitness addition to Harrington Auditorium on the Worcester Polytechnic Institute (WPI) campus, as well as the decision to adapt a landmark older building, Alumni Gymnasium, to a strictly academic, nonathletic use. The buildings are adjacent to each other and occupy a central location on campus.

When the projects were being considered, the WPI population had grown to over 3,500 undergraduate and graduate students and 220 full-time faculty members. The existing facilities no longer met the physical education, recreational, and athletic needs of the larger WPI community. The admission of women in the late 1960s and an increased awareness of physical fitness in general also created a greater demand for improved and expanded facilities.

Alumni Gym was built in 1916 to accommodate the athletic needs of a men’s university of less than 500 students. In the 1950s, an addition (the connector building) was built to provide a bowling alley, locker rooms, and offices. Harrington Auditorium was built in 1968 as a multipurpose auditorium for social events and to provide for an expanding athletic program.

Alumni Gym had changed very little since its construction. It included a pool, a gym, a running track, offices, laundry, and the fitness and weight center. The building had many deficiencies that would need to be addressed if the building were to be renovated for athletic or recreation use, including the following:

- **Space.** The pool, gym, and running track were significantly smaller than required to meet the National Collegiate Athletic Association (NCAA) minimum requirements or user demand. Alumni Gym could not be modified to accommodate these spaces.

- **Structural systems.** The structural system for Alumni Gym was in good shape and included masonry bearing walls, post and timber framing of the floor slabs, and steel trusses supporting a wood roof deck.

- **MEP systems.** The MEP systems were outdated, nearing the end of their useful life. The fire protection system was nonexistent.

- **Connection.** The connection of Alumni Gym to Harrington Auditorium was through a maze of corridors and a change in level. The construction of new recreation facilities west or north of Harrington Auditorium would physically isolate these spaces even more from Alumni Gym.

- **Code.** The building did not meet current code requirements for egress, handicap access, fire protection, earthquake resistance, and public toilet facilities.

- **Historic status.** Alumni Gym is on the registry of historic buildings. The building could not be demolished, and the exterior of the building could not be modified without the approval of the Historic Commission.

On the basis of these concerns, the design team recommended that the program in Alumni Gym be relocated and that Alumni Gym be renovated for academic or another use. Harrington Auditorium was 37 years old and was in reasonably good condition.
In addition to the multipurpose auditorium, performance space, and gym, Harrington included two squash courts, a handball court, a conference room, space for training and rehabilitation, a wrestling room, lockers, and ROTC facilities. Investigations revealed the following:

- **Space.** The lockers and squash courts at the basement level were not large enough to meet the needs of WPI's recreation and athletic program and minimum standards.
- **Structural systems.** The structural system was in good shape; it consisted of a concrete- and steel-framed system with long-span steel girders supporting the roof over the multipurpose auditorium, performance space, and gym.
- **MEP systems.** The HVAC systems were well maintained but included 11 heating and ventilating supply units that appeared to be at or near the end of their useful life. The facility was not air-conditioned, and there was no automatic sprinkler system. The Simplex fire alarm system had been recently upgraded.
- **Code.** Code issues included ADA-compliant elevator size and access and the presence of asbestos in floor tiles and steel truss fireproofing.
- **Benchmarks.** Peer institutions had built new facilities to meet current and future demands.
  - More than 75% of similar-sized institutions
    - had a performance gymnasium and a recreational gymnasium with suspended running track;
    - had a natatorium that met or exceeded NCAA swimming and diving regulations and standards (only 14% had a 50 m pool);
    - and
    - had seen declining student, faculty, and staff locker room use over the past five years.
  - More than 95% of similar-sized institutions had reported an increase in student usage of weights, fitness, and group exercise programs (65% were planning to expand facilities in the next three years).
  - **Users.** More than 95% of the students, faculty, and alumni surveyed at WPI said that a new Rec center would have a positive impact on recruitment and retention.
  - More than 75% of the students, faculty, and alumni responded that they would use a new Rec center more often and for longer periods of time.
  - More than 75% of the WPI community responded with strong support for the following:
    - Improved natatorium (size and quality)
    - Improved locker room and support facilities that would meet the needs of both male and female users
    - Improved and expanded weights, fitness, and group exercise facilities
    - Squash and racquetball courts that would meet current standards
    - Improved and longer indoor running/jogging track
    - Improved and increased number of outdoor playing fields for recreation, intramurals, and club sports

On the basis of Harrington's central location, the favorable condition of existing MEP systems, and the suitability of the major spaces for continued or adapted program use, it was determined that further analysis of this building was warranted in order to confirm the feasibility of renovation and addition to accommodate the full program desired.

After exploring goals and objectives and performing campus analysis, as well as examining program needs, budget constraints, and campus life, the project team developed criteria as a way to narrow the site options. The conclusion from the study was that the optimal location for the new Rec center was at the site of the existing athletic, recreational, and campus center facilities.

A quick “scorecard” analysis of Harrington showed that about 50% to 70% of the cost of an equivalent new building could be saved by renovation. Even at 50%, this savings was substantial enough to warrant taking the next step, a more detailed study of building systems and code compliance, to develop a more accurate estimate of the risk of renovation.

Further analysis of Harrington building systems revealed the following:

- The structural system of long-span steel girders supporting the roof over the performance gym was adequate.
- Structural systems of concrete and steel frame were generally good.
- The HVAC systems were generally well maintained, but a majority of heating and ventilating supply units were nearing the end of their useful life.
- No air-conditioning existed.
The proposed site plan shows the new recreation center addition to Harrington Auditorium (in black).
Drawing courtesy of Sasaki Associates.

Perspective of the finished complex.
Drawing courtesy of Sasaki Associates.

- No automatic sprinkler system existed.
- The fire alarm system had been recently upgraded.
- Code analysis confirmed that accessibility was not adequate at some locations and that the elevator cab was too small. Hazardous materials were identified in floor tiles and in fireproofing of steel trusses.

A second pass at the scorecard confirmed that the savings would be in the 50% range or slightly under, but still well above the 30% threshold at which renovation is usually not worthwhile. As a result, WPI decided to pursue the concept of renovation and addition to Harrington Auditorium. At present WPI is in the fund-raising stage for this addition to Harrington Auditorium.
Often a landmark recreation building undergoes an adaptive reuse to some academic or other usage. This case deals with an athletic facility, a hockey rink, that was converted into a Rec center.

The conversion of the Snively Ice Hockey Arena into the Hamel Recreation Center included inserting into the existing arched space two MACs, a three-court gym, four racquet courts, an international squash court, a 7,500 square foot (SF) (700 m²) fitness and weights center, and an equipment issue room. The design solution took advantage of the underutilized volume of Snively Arena and the sound structure of the building shell by inserting an upper level that contains three basketball courts. The middle level, which shares its main lobby with the adjacent new ice arena, includes the entrance security desk, lounge, classroom, club rooms, offices, and an elevated jogging track above the MACs. Two multipurpose rooms for aerobics, dance, martial arts, and fencing, plus the Rec center lockers, are tucked beneath the common lobby and grandstands of the arena.
Plan showing the renovated original building and new addition on the right.
Drawing courtesy of Sasaki Associates.
This historic gut renovation is an example of dealing with multiple client and historic district restraints while finishing a project on an aggressive fast-track schedule.

Bounded on one side by the Cambridge Green and on the other by the Harvard Law School campus, the Hemenway Gym is adjacent to historic Harvard buildings such as H.H. Richardson’s Austin Hall.

While not the university’s main athletic facility, this building nonetheless holds important memories for many generations of Harvard students. The program called for maintaining the existing number of squash courts and the upper-level gymnasium while adding state-of-the-art exercise equipment and workout studios. The project necessitated a complete gut renovation and reorganization of the interior, and also had to conform to the limitations of the city’s historic district, which had review of all exterior changes. Harvard also insisted that the project be completed in only four months and only during the summer.

The key imperative was reorganizing the interior space and making it navigable and efficient. It was also to be filled with natural light.

(a) Exterior before and (b) interior before.
© Robert Benson/Robert Benson Photography

Interior after.
© Robert Benson/Robert Benson Photography
The original claustrophobic layout was replaced with gallery levels connected by a main organizing stairway, allowing patrons to get a sense of the entire facility immediately upon entering and affording supervision of all major spaces from the main entrance control desk. After much discussion with the Historical Commission, three small windows were added to the east façade, bringing sunlight into multiple levels, including the previously dark lower levels.

Green features, besides the emphasis on natural light, include double-glazed replacement windows, operable windows with shades in the gym, a sophisticated light level control system in the gym, donation of used equipment to charity, use of recycled maple from squash court walls for stair treads, and recycling of a high percentage of construction waste. To achieve ADA accessibility, an elevator was inconspicuously added within the existing volume of the building.

The project was completed for the beginning of the September 2005 term, and use by students, faculty, and staff is high.
DEFINITION OF TERMS

athletic center—An exercise and fitness facility intended for the use of the school’s intercollegiate athletes and coaching staff of varsity sports teams.

exurban—Rural areas outside of the major metropolitan areas, often land that is still in agricultural use.

footprint area—A building’s perimeter; that is the exact area that the building occupies relative to the land on which it is built.

greenfields—Related to exurban, this is land that is largely undeveloped and tends to be either on the periphery of urban areas or in exurban areas. It can either be open fields or land used for agriculture. Its opposite are “brownfields,” generally urban land that has been used for decades for industrial uses.

hard costs—The actual “bricks-and-mortar” costs paid to construct a building, includes most of its “built-in” components such as HVAC and plumbing. Architects often describe hard costs to laymen as follows: “It’s everything that would not fall out if you turned a building upside down and shook it.”

LEED Existing Building (EB)—A category of building under the United States Green Building Council’s LEED (Leadership in Energy and Environmental Design) ratings program. “EB” refers to an existing building. So under this system, renovated buildings are given ratings based on their sustainability profiles. Categories include, among others, “Bronze, Silver, Gold, and Platinum,” Platinum being the highest rating.

recreation center—A facility intended as a place of exercise and fitness for the general student population, as opposed to more specialized athletic facilities intended for use by members of an institution’s varsity sports teams.

R-value—A measure of thermal resistance used to compare insulating values of building enclosures.

scope creep—A process whereby the scope of a project is increased because of certain conditions in the building discovered after the project begins; thus, for example, a hidden structural issue requires intervention by structural engineers and thus the “scope” of the project has increased.

scorecard—For the purposes of this chapter, a point system developed by Sasaki Associates to aid in making decisions about whether to renovate a recreation center or build from scratch.

soft costs—The other costs related to a project including architects and other consultant fees, as well as furniture, fixtures and equipment.
Once an owner has decided to build a recreation facility, a number of crucial questions arise: How to win support among key campus constituencies? How much money will be needed? How to raise funds to design and construct it? Whom to solicit for funds? How to convince funding sources that the facility is necessary? What types of funds are available and appropriate? When are the funds needed?

Many key decisions and coordinated activities need to occur to successfully fund a recreation facility, whether new, expanded, or renovated. It's critical to find answers to these questions before attempting a capital improvement program.

Ideally, before deciding that a facility is indeed needed, the owner has already conducted needs assessment, programming, and conceptual design efforts as described in chapter 2. A successful fund-raising campaign will hinge on having a strong, believable case statement as to why the facility is needed, where it should be located, and the types of spaces it will contain. The needs assessment, programming, and conceptual design phases are critical in preparing that case statement. The case statement is utilized to present the potential facility improvements to prospective donors, foundations, and other funding sources.

CASE STATEMENT FOR THE BUILDING

Before initiating a fund-raising campaign, the owner needs to be aware of potential opponents, who will be discussed in more detail in the next section. Some of their common questions are “You have a great existing facility—why do you need a new one?”; “Is the existing facility really outdated?”; “Have you actually outgrown it?” Even advocates will require reassurance that building a new recreation facility is a prudent decision. In order to counter the opponents and convince the potential advocates, one must clearly demonstrate the need for a new or improved recreation center.

The existing facility may in fact be outdated. It may be a combined athletic and student recreation facility that no longer meets programmatic needs. Student population may have increased. Or a new facility may be necessary to remain competitive with peer institutions. Good answers to the potential opponents’ questions, along with supporting information, can help advance the fund-raising effort.

Owners should keep in mind that state-of-the-art facilities serve more than just recreational needs and provide more than just weight
equipment and basketball courts. They also serve as social buildings that contain gathering spaces as well as athletic spaces. Properly designed and constructed, they can be stress relievers, inviting and exciting.

The most convincing argument for building a new facility is one that demonstrates how meeting varied user needs will support the institution's mission and enhance the student environment. The case must be successfully made that the facility will improve the quality of the student experience, promote a healthy lifestyle, provide an alternative and healthy social outlet, relieve stress, and enhance wellness.

**Sample Case Statements**

**The College Center**
One of the most exciting things on our horizon, and the most visible, is the College Center project, a $22 million renovation and addition to Sutcliffe Hall and the Crounse Academic Center.

**Sutcliffe Hall**
The renovation and expansion of Sutcliffe Hall will result in a modern 122,000 square foot (SF) fitness, recreation, and athletic facility: 62,700 square feet (SF) in new construction and 59,300 square feet (SF) in renovated space. In addition to providing a thoroughly modern look to a building that traces its origins to 1913, the new Sutcliffe Hall will put Center on par with its competition. Moreover, it will provide Center students with an inviting facility for their social and physical growth and wellness activities.

**Crounse Academic Center**
The historical flavor associated with Old Center and Carnegie will be brought into the renovation and new construction planned for the Crounse Academic Center. Housing classrooms and faculty offices, as well as the Grace Doherty Library, the Crounse Academic Center is at the heart of a Center student's academic experience. Its renovation and expansion will create a 100,000 square foot (SF) state-of-the-art educational facility: 30,000 square feet (SF) of new space and 70,000 square feet (SF) of renovated space. The College Center is the largest construction project on campus since the Norton Center was built in 1973.
Also, and perhaps most important, the various constituencies must be convinced that the new building will be critical in recruiting and retaining students in an increasingly competitive environment. Campus tours for prospective students often end at recreation facilities so that students’ last impression when they leave the campus is, “They have a fabulous recreation center where I can hang out. That’s where I’m going to go to school!”

An owner must honestly assess how this facility will improve the institution’s competitive edge against other schools. To do that requires comparing the current facility with those of regional schools and peer institutions. Do competing institutions have recreation facilities that could lure away students?

What are the goals and objectives for the building? It’s important to define precisely what is to be included in the building, that is, the spaces necessary to make the recreation program the best and most competitive it can be. Such spaces typically include weight and fitness areas, wellness suites, multiactivity court spaces, aquatics, and, as already mentioned, gathering spaces.

If this is to be part of a larger capital improvement program, what percentage will it encompass? What is its relative importance? How did it come to the top of the list versus everything else? The owner must answer these questions persuasively for others to justify supporting the facility over other needs on campus, whether they be landscaping, parking, academics, or housing.

Once those questions are answered, the owner should develop presentations that support the case to administration, boards, and students. Carefully thought-out, well-prepared, and convincing presentations are essential tools for fund-raising—often multiple presentations that use a different style for each audience in order to appropriately address the various groups. However, the presentations should contain consistent information. They must address the case statement and why the facility is important to the institution and its mission.

The products of the needs assessment, programming, and conceptual design phase will help answer questions and build excitement. These products include a rendering, or picture, of what the facility will look like; a site plan, or drawing showing where the facility will be located; floor plans showing the spaces the facility will contain; and a cost model explaining generally the costs to design, build, and operate the facility. Finally, the presentations will promote the new recreation facility’s positive impact on the school’s competitive position.

However, two schools of thought exist on whether or not to show a rendering during the referendum process. One school of thought advocates proceeding through fund-raising without a rendering so that constituents don’t reject...
a referendum based on not liking a particular design. The other recommends using the rendering, site plan, floor plans, and other conceptual design elements to provide adequate information on which to base a decision—a strategy that usually tends to be more successful.

ADVOCATES AND OPPONENTS OF STUDENT RECREATION CENTER PROJECTS

It's critical to build widespread support for the new recreation facility. Why? Because one person alone can't convince the necessary funding sources—whoever, whatever, or wherever they may be—that a recreation facility is needed. Working together, however, key people and key core groups can achieve that goal.

Building a case that will elicit far-reaching support for the project requires understanding campus constituencies and the issues that interest them. It also requires understanding opponents and their concerns. First, let's consider the key people and groups who must be onboard to achieve a successful fund-raising effort.

Advocates

Support for a recreation facility should come not only from recreation staff but also from administration, student representatives, and governing boards. The following sections discuss these groups in more detail, their dominant issues, and the roles they can play in the fund-raising process.

Administration

New student recreation facilities can affect numerous administrators, from the institution's president on down. The president—on the firing line daily and accountable for achieving the institution's mission and objectives—must be convinced that the project dovetails with that mission and advances those objectives. The president is often a key advocate for the project and instrumental in raising funds.

The vice president of student affairs or student life strives to maintain and improve the quality of student life, and a new recreation facility helps achieve that goal. This individual will be instrumental in obtaining support from other members of the executive committee. He or she can also promote student interest and involvement, as the student government typically reports to student affairs.

The vice president of business normally handles the financial side, analyzing bonding capacity or required debt service. This person also may oversee design, construction, operation, and maintenance of campus facilities. The vice president of business must buy in to the project to make the campaign successful, so it is imperative to establish a good relationship from the beginning.

Recreation facilities typically aid the vice president of admissions by enhancing recruitment and satisfaction. Viewed by students as "fun" buildings rather than academic structures, recreation facilities give the vice president for admissions a marketable competitive advantage.

The vice presidents for advancement, development, and alumni relations can also play instrumental roles in the fund-raising process, depending on the funding mechanism. These individuals will likely be responsible for soliciting donations from alumni and other private or corporate donors.

Campus Recreation Staff

The people who will actually operate the facility are essential supporters. The director of campus recreation must be onboard early in the programming process to help define facility needs. For existing recreation facilities, the director must elicit observations and concerns from the recreation facility maintenance staff during the planning and programming process, since new facilities are often needed because old buildings are worn out and need to be updated or modernized. The maintenance staff can provide valuable information that can help justify the need for the new facility, renovation, or addition. They can also identify issues to help the new facility avoid problems and operate efficiently.

Recreation facilities tend to employ a large number of student workers. For instance, the University of Missouri's recreational center employs over 300 students, furnishing some $1 million in annual student-worker salaries. Consequently, while student fees often pay for a facility's capital costs and operation, work-study programs provide some students a return on their investment.

Campus recreation staff support is also important. Weight fitness, aquatics, wellness, and
intramural directors’ enthusiasm for the proposed facility, as well as that of other associates, will transfer to the students with whom they interact and can help advance the project.

**Student Representatives**

Gaining support from student representatives is imperative whether or not student fees are being used to fund the facility. To these representatives a recreation facility can be a necessary and exciting venue, and they can convey the need and the excitement to other students. But which student representatives need to be enlisted?

Normally the student government association (SGA) is heavily involved in the process, particularly if student fees help fund the facility. The SGA president will likely want to be in the forefront of promoting the facility, which can be viewed as a legacy to his or her term as student government leader. Thus it’s important to have the SGA president involved from the beginning.

Often the SGA vice president will be the successor president and thus critical to developing student support. In fact, the vice president or president-elect can serve as a strong student advocate for the building, particularly when student fees are involved in the fund-raising effort—fees that will take effect prior to or during his or her term. The vice president’s support for a student referendum can help produce a successful vote.

Sport clubs—for lacrosse, cricket, volleyball, swimming, racquetball, and other sports—constitute a growing aspect of campus life and make wide use of recreation facilities. Sport clubs fill a broad need among the general student body and are frequently seeking venues in which to play, practice, hold team meetings, and host team events. As a result, it’s important to enlist the support of club team captains, who can help build enthusiasm for the project among their teammates.

Fraternities, sororities, and residence halls also make heavy use of recreation facilities for intramural competitions. Since a new facility will allow these constituencies more court time and space, these groups also are important supporters and users of the new building. Their leaders should be courted so they will lobby their groups for support.

It might seem that athletes—who may use athletic rather than recreation facilities—have a smaller vested interest in a new recreational center compared to other groups, but that isn’t necessarily the case. A new recreation facility will give athletes new venues in which to work out, practice, and play. Also, if the institution has a combined athletic and recreation facility and space has gotten tight, removing the recreational component from the athletic facility will alleviate congestion in the athletes’ building and free up more space for them. Consequently, athletes generally support these buildings. Frequently the athletic directors and coaches encourage this support, as they see the overall benefit to the school, the students, varsity recruitment efforts, and the athletic program itself.

Finally, first- and second-year students can be crucial supporters of a new recreation facility as they most likely will be the facility’s first users. Juniors and seniors typically have less interest since many will be gone before the facility is completed. But getting freshmen and sophomores excited about a new facility helps build the groundswell needed to pass a referendum.

**Governing Boards**

The campus board of trustees, board of curators, or board of directors—and particularly its chairperson, to whom others look for direction—must enthusiastically support the project in order for it to succeed. Important too is the buildings and grounds subcommittee, which likely will participate in the process from the needs assessments through construction and present the project to the board for approval. Thus its members must appreciate the need for the new recreational center and be willing to request capital funds. Other governing board subcommittees, such as tuition and financial subcommittees, are also important.

Such boards and subcommittees look at the total cost of education, including tuition and fees, and are held accountable. Since tuition as well as residence hall fees, student life fees, and other fees could rise as a result of a new facility, the responsible funding subcommittees must be brought onboard and convinced of the need for and benefit of the facility to the university as a whole.

When state funding is sought, the state’s higher education board must be convinced of the project’s merit. This board prioritizes state funds distribution and generally gives preference to academic buildings, residence halls, and libraries. Thus a very strong case needs to be built with that board to realize success.
The Opponents

Usually three basic groups compose the opposition: deans of academic departments, faculty, and some students—though academicians can often become staunch allies if involved early.

Deans of academic departments and faculty share a similar concern: They may believe that a recreation facility is not part of the institution’s overall educational mission and that its construction will divert funds from buildings directly related to that mission—academic buildings, libraries, and perhaps residence halls.

Student opposition arises particularly when student fees are to be used to pay for the building. Some students suspect that a minority, or at most a small majority, of students will use the building. Therefore, they consider it unfair to levy a fee on the entire student body.

As discussed earlier, the case statement must answer these concerns, as well as promote the building to advocates.

UNDERSTANDING THE TOTAL COSTS OF A STUDENT RECREATION CENTER

It is crucial to understand up-front what the total project cost model includes—both in hard costs and in soft costs.

Hard costs include all construction costs, that is, bricks, mortar, and materials as well as fees paid to the general contractor and subcontractors for demolition, site work, and new construction or renovation. Construction costs normally represent about 70% to 80% of the total project cost.

Soft costs include professional fees; furniture, fixtures, and equipment; a contingency fund; escalation; financing fees; operating and maintenance costs; and, in some cases, campus administrative charges, such as salaries of those administrators overseeing the project. Total soft costs typically range about 20% to 30% of the total project cost. In other words, soft costs include everything that is not bricks and mortar.

Professional Fees

Professional fees for facility programmers, planners, architects, engineers, and other consultants are separate from the construction cost and can range from 7% to 12% of total costs.

Furniture, Fixtures, and Equipment

Some furniture, fixtures, and equipment may be brought to a new recreational center from an existing facility. Still, much will probably be new. Weight machines, basketballs, basketball standards, nets for racket sports, towels, and stationary bicycles are only a few of the items that may need to be purchased. Funding should
be available for these items as well as for the physical facility itself.

**Contingency Fund**

Project contingency also should be included, as some changes generally occur during construction. The contingency fund, typically 5% of construction value, should be held aside and available during construction for minor revisions and coordination issues. Also, personnel changes or changes in direction for the building as desired by the institution sometimes cause design and construction changes. These, too, can lead to cost increases.

**Escalation**

Escalation costs must also be built into the overall project funding. Several factors could cause overall costs to increase, although a common one is the funding timing. If the institution must wait until the funding process is complete before beginning design or construction, then construction, material, and equipment costs could rise significantly between the initial conceptual cost estimation and implementation.

Even though consultants will have taken escalation into account in their planning process, it is not uncommon for conditions to change over the course of the project. Also, if plans dictate building the facility in phases, costs could escalate even more before later phases are constructed.

Events around the globe can also affect costs. For example, in 2005, two extremely damaging hurricanes struck the United States' Gulf Coast. Massive repair and reconstruction there resulted in a marked rise in demand for construction services and in the associated costs of construction materials everywhere. Material prices also are now being affected by increased demand in expanding countries in Asia and the Middle East.

The best way to respond to such phenomena is to review escalation factors each year and update them annually to reflect current market conditions.

**Financing Costs**

When a freestanding student recreation facility is to be built, the carrying costs of debt service should be included in the cost model. In other words, if a $20 million building is to be added using bonds as a funds source, and this is the only bond issue in force, the vice president of business may direct that all underwriting fees and up-front finance costs be included in the cost model.

However, if, say, the institution is underwriting $100 million in bonds for campus construction of which a $20 million recreational building comprises only a portion, then those financing costs may be absorbed into the overall cost structure. Underwriting fees can range from 1.5% to 3% of the amount being bonded. These costs and fees are usually determined by the investment banking firm that issues the bonds.

**Operation and Maintenance**

It is imperative to develop a comprehensive cost model for fully equipping, operating, and staffing the building from day one. Building a facility that is unable to open due to shortage of funds will alienate governing boards and make selling the need for the next new building much more difficult.

Operation and maintenance costs include staffing, routine and periodic maintenance, and repairs as needed. Certain items will have to be replaced, shortages will occur, and paint and finishes will have to be updated periodically. Some equipment will have to be replaced every three to five years. Regardless of how the project is financed, operational expenses will need to be offset in some way.

Who on campus will take ultimate responsibility for the building? Will recreational services run it? Will it be under the direction of the vice president of student affairs or student life? The vice president of business? Whoever will be responsible for operation and maintenance costs should be involved in cost decisions.

The cost to staff the new center will also have to be determined. This often constitutes a large portion of the cost model, because moving from a small facility or a shared facility to a larger one increases staffing needs—which many campuses don't know how to gauge. For example, an expanded aquatics component in the new building could require 20 lifeguards when previously only 10 were needed.

The new facility may bring totally different operational, maintenance, and staffing dynamics and costs that campus administrators may find daunting to estimate. Often it is best to have the architect put an operational specialist on the design team to help estimate those costs.
FUNDING: AVAILABLE SOURCES

An institution, whether public or private, must have a leader for fund-raising, one strong person spearheading the effort. It can be the president, the vice president of advancement, or a student government leader. Whoever that person is, he or she needs to be educated on the benefits of the new facility and to be the project’s biggest advocate. This individual must thoroughly understand the case statement and be able to sell the project and its ability to advance the university’s mission.

Where can capital resources be found? A number of sources may be available: bonds or borrowing by the institution, donations, naming rights, partnership opportunities, student fees, and state funds. While state funding is normally available only to public institutions, the other fund sources are available to both public and private colleges and universities. Frequently, more than one source is tapped.

Donations

An experienced, committed spokesperson—adept at convincing people to donate—is crucial to soliciting donations.

Further, while most college graduates receive occasional letters from their alma mater requesting funds, many public institutions still have not developed a strong expertise in development, except in their athletic departments. However, like their private counterparts, they are learning that in today’s environment all university functions have to hone their fund-raising skills as state funds become more difficult to obtain. Donations are one way to raise money without increasing the bonding load.

To determine donation potential, universities typically conduct a capital campaign feasibility study of potential-donor wealth before engaging in a fund-raising campaign. Such a study allows the institution to prequalify possible donors for net worth, including board members and alumni. Forbes lists—of the best public and private companies, wealthiest people, and so on—and Securities and Exchange Commission filings are helpful tools for learning more about possible donors. These sources can provide information such as which alumni are officers in public companies, which sit on what boards, who has what net worth, who is highly leveraged, and the like.

It is important to establish a core group of donors, and then essential to involve them in the early stages of the project. The better this group understands the case statement and the goals, objectives, and needs for the building, the more successful the solicitation effort will be. Beginning with a silent phase very early in the project development—that is, while the concept and preliminary design activity are under way—is frequently a successful strategy. Ideally the institution can enlist the top 10 donors and raise 50% to 60% of the funds during this period, so that when it goes public it is well on its way to a successful capital campaign.

Substantial lead gifts—often in the form of challenge grants—are frequently very effective. Many corporations and foundations, as well as...
some individuals, are amenable to challenge grants (e.g., “We will give $1 million if you raise $1 million from other sources”). The old rule—80% of money comes from 20% of donors—holds true here as well.

One general rule of development is to ask for twice as much as the donor can give. Donors are not offended and will often back down to the number the institution thought they would give in the first place.

**Facility Naming Rights**

Naming opportunities can be created during design. To create naming opportunities it is necessary to identify organizations and individuals that may want to donate key spaces and bring them onboard early during the conceptual process.

Multiple naming gifts are common. The overall recreation facility can be named for a large donor while spaces within the building named for other donors. Also, where feasible, the institution can capitalize on donor affiliations for certain sports. For example, if a potential donor is a swimmer, he or she can be educated on the important role the pool will play in the new facility; a runner can be solicited to sponsor the indoor track. Even office spaces and locker rooms can be named for donors.

However, naming opportunities should remain realistic and appropriate. The value established must correlate to the construction value plus furniture, fixtures, and equipment, that is, the total project cost.

**Student Fees**

In recent years, student fees have become the major funding source for public university recreational projects as state funding has declined. Fees are also a major source of funds for private institutions. If enacted, a student fee becomes the underwriting basis for bonding capacity for the building. This method of fund-raising typically applies to campuses ranging upward in size from 10,000 students to 12,000 students, but has been used at campuses with as few as 7,000 students.

Institutions generally assess student fees in one of three ways:

1. The school’s administration assesses the fees arbitrarily. While this is rarely done, the 6,000-student University of Dayton (Ohio), a private institution, is an exception. When the university needed a new student recreation center, administrators evaluated the economics and funding options and determined that a student fee increase

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### Centre College, Danville, KY

Donors who make gifts of significant size are invited to consider a naming opportunity for The College Centre at Centre College in Danville, Kentucky. There are hundreds of naming opportunities for new, renovated, and existing space all over the Centre College campus. Gifts ranging from $5,000 to $1,000,000 will name features from study carrels to new gymnasiums and everything in between.

### Capital Improvements Fund Naming Opportunities

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### Case Study

Centre College, Danville, KY

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was the best choice. University administrators increased student activity fees by $175 per semester, knowing, however, from student focus group research, that they had student support for the facility and the fee increase.

2. The SGA can vote to assess student fees if allowed to do so by SGA governing laws and operating charter. Aside from the administration's assessing the fee, this is the easiest way to do it, as only a small group of people need to reach consensus. When The Ohio State University wanted to build a new recreation facility in 1997, the SGA considered the project so important that its members approved the student fee increase without going to a student referendum.

3. Finally and most commonly, the student body can hold a referendum to vote on assessing the fees.

Obtaining student support for fees doesn't just happen. It takes careful planning and action. It also requires the involvement of many elements within the university or college. The presentations that are created as the case statement is being prepared will be an essential part of the campaign.

Administration Involvement

While the institution's administration must be willing to support the concept of the building, it must also support assessment of fees. In general, administrators are willing to assess such fees because recreational buildings help attract and retain students as well as enhance students' quality of life while on campus.

The level of student fees that can be assessed will depend on the institution's bonding capacity—which is critical for administrators to know. An institution needs to make sure that its balance sheet and endowment base are good and that it is showing a good return on investment. A public university, however, also must consider the state's debt capacity, since bonds are typically handled through the state.

If a student fee already exists, administrators should create a workable strategy for assessing the new fee. Since most fees have sunset clauses, administrators must determine if an existing fee can be raised to a higher level or whether they should wait until the existing fee expires to institute the new fee. One alternative: taking the vote now but instituting the fee later. If the new fee will be larger than the one currently in effect, a vote now will allow that to be seen as an incremental raise, increasing the fee by the difference between the current fee and the new fee, rather than as an addition of a fee to a zero base. For example, an underlying $25 fee in effect now retires in five years. Funding the recreation facility will require instituting a $100 fee when the existing fee expires. The new fee can be promoted as a $75 increment over the current $25 fee rather than a $100 fee increase.

The institution's administration should not try to push the project too hard, however, as that could result in a student backlash, since students tend to reject fees if they feel they're being forced to accept them. Administrators need to guide the student involvement, give advice, and show the benefit of the building but not lead too strongly. The students must make the decision.

Campus-Wide Survey

When entertaining a student referendum, administrators frequently conduct a campus-wide prevote survey to determine level of support and amounts of achievable funding and then develop a strategy.

The survey should be developed based upon interviews with students, campus stakeholders, and administrators. These interviews help establish a dialogue that will help administrators understand how to word the questions and what information needs to be collected and analyzed from the survey. The survey should focus on campus demographics usage patterns and preferences on the part of students, faculty, and staff; desired activities; and frequency of use. Generally about 850 to 1,500 surveys are mailed to a cross section of the campus population, equaling approximately 1% to 2% of the campus enrollment. With a common 7% to 12% return rate, a 95% accuracy level can be achieved, allowing the administration to understand with some certainty how students feel about the building and imposition of a fee to pay for it.

Typical questions are “Would you vote in favor of a $25 student fee increase?” “A $50 fee increase?” “A $75 fee increase?” This type of question allows the institution to understand the student threshold for acceptance of the project.

The survey can also help identify who the building’s users will be and help the lobbying effort respond to student needs and wants. If survey results are favorable, they can help counter opponents’ contention that only a minority
or small majority of students will actually use the facility.

**Passing a Referendum**

The SGA needs to determine with administrators whether to hold the referendum in conjunction with SGA elections or to hold it separately as a single-issue vote. Regardless of when it is held, the SGA has to actively support and campaign for the new facility in order to have a successful vote.

More students will turn out to vote when the referendum is combined with a SGA election rather than presented as a single issue. Therefore, holding a combined election is not necessarily a good strategy. The larger number of students turning out for a SGA election will include the contingent mentioned earlier that believes that too few students will use the facility to justify assessment of an across-the-board student fee. A better strategy often is to hold a special election specifically for the referendum, as this will draw fewer “no” votes and allow a greater chance for success.

Preparing for the referendum will require a grassroots effort. To initiate this, administrators and SGA members should host a presentation about the facility for student representatives: fraternities, sororities, residence halls, sport clubs, intramural sports, and athletics. Presenters need to build excitement as they sell these representatives on the benefits the new facility will bring to the campus so that the student representatives can then go to their groups and build support. Presenters need to be upbeat and prepared with answers to questions students are likely to ask: How much will it cost? Where will it be located? What facilities will it include? When will it open? The presentations prepared during development of the case statement will be very helpful in answering these questions.

If more ammunition is required, bringing in the president of a comparable institution or the SGA president of a comparable institution, who can attest to the quantitative benefits such a facility brought his or her institution, might help convince skeptical students.

**State Funding**

While state appropriations were the major funding source for recreation facilities up through the late 1980s for public institutions, since then state budgets have tightened, and competition from other campus projects—such as academic and research facilities, residence halls, and libraries—has increased. As a result, obtaining state funding for recreation centers—or for any facility—has become more and more difficult.

To seek state funding, the institution must justify the project to state committees. Internally the big issue often is whether campus administrators are willing to give priority to recreation facilities over other needs. Faculty typically do not support recreation facilities when they are in competition with academic and research facilities.

The governing board also must actively lobby for money, targeting the state commission on higher education and legislators. In order for the effort to obtain state funding to be successful, everyone has to be onboard.

**Partnership Opportunities**

Another funding opportunity gaining momentum is partnering with other entities to build or operate (or both build and operate) a recreation facility. This applies mostly to smaller campuses in remote locations. Frequently, the partners bring little capital funding to the table, but they do provide operating revenue. Partners may include hospitals or health care providers, as well as local communities or cities that need a recreation center for their own use but can't afford one.

Wartburg College in Waverly, Iowa, is a prime example. At Wartburg, the city, college, and hospital joined together to develop a state-of-the-art recreational and athletic center that otherwise would not have been feasible.

To be successful the partners must share similar missions and goals and take into account each other's hours of operation, use patterns, and demographics. For instance, college students generally like to work out from late afternoon to midnight, while teenagers prefer early morning and lunchtime and faculty members midday. Partners must understand the implications of potential usage overlap—for example, whether they want elementary or high school students using the facility while college students or faculty are using it.

Thus, partners need to address use times and styles when doing their initial planning so that the facility meets varying constituent needs. Often this can be accomplished through the scheduling of different hours for different user groups or the designation of separate facilities for specific
groups within the same building. The Wartburg College facility, for example, features separate public and campus entrances, with all users required to show identification to enter.

In smaller communities where many people are personally acquainted, most express little concern over these issues. But it is still best to discuss them up-front to give the partnering arrangement its best opportunity for success.

When multiple users are involved, the campus should have the controlling interest, as it likely will have the most invested in the facility and thus the most to lose if the partnership doesn’t work well. Further, the campus users are generally on-site daily, operating the facility and giving priority to student needs.

Supplemental Operation and Maintenance Funding

Once the facility is opened, several proven methods can be employed to raise funds for operational and maintenance expenses.

Frequently universities lease space within recreation facilities to vendors whose services and products complement the institution’s recreational and social goals. Juice bars, snack shops, and even self-service laundries can boost the facility’s usefulness as well as bring in additional funding. Health care providers may be interested in doing wellness assessments at the facility. In some centers, massage therapy is offered as a for-fee service.

Exercise classes also can earn supplemental operating revenues. For-fee dance aerobics, spinning, kick boxing, or Pilates classes can increase the building’s revenues. Such classes might require hiring special instructors but can still pay for themselves with appropriate pricing structures. In addition, a Pilates class might attract students who otherwise wouldn’t use the recreation facility, thus increasing the facility’s usage and furthering institutional goals for student wellness.

Funding Schedule

It is important to determine a fund-raising schedule so that the capital program is fully funded on a timely basis.

How fast will donations arrive compared with the project schedule? If they arrive concurrently with it and in the same amounts as incurred during design and construction, the institution will be very fortunate. Likewise, if student fee collection begins immediately after the vote or
in the next semester, and fee-generated funds and project capital costs accrue concurrently, the institution will be quite fortunate.

However, things often do not happen this way. Donations frequently arrive after costs begin accruing, and student fee collection lags. As a result, interim funding mechanisms must be found. For example, at the University of Missouri, the new recreation facility held its grand opening on January 17; at 12:01 a.m. and on January 18, the fee went into effect. Thus the campus had to arrange short-term financing to pay for design and construction costs until the fee revenues were collected.

SUMMARY
Is a new recreation facility affordable? While numerous methods exist for successfully funding recreation facilities, all require careful justification, planning, and implementation—as well as significant effort and energy. However, if owners do their homework and build the necessary consensus, they can obtain the needed funding, further their mission, and enjoy success. That homework includes developing a forthright needs assessment, programming, and conceptual design, which will lead to a persuasive case statement.

Marketing the need to various campus constituencies—including opponents—requires justifying the facility on solid bases that support the institution’s mission and goals, such as creating community spaces that build social interaction and collaboration, advancing student wellness, aiding student recruitment and retention, and competing effectively against rival institutions for enrollment and support. It also means vying successfully against other pressing and competing campus needs.

The owner needs to identify and analyze the attitudes of those campus constituencies, perhaps with the aid of market research such as focus groups or surveys. From board members and key administrators to faculty, students, and alumni—all need to be onboard to make a project come to fruition, which takes focused coordination and planning.

Students are often a key component, particularly if the facility is to be funded in part by student fees. Fostering a successful referendum requires justifying the facility to student leaders, who can carry the message to their groups to help win support. Governing boards, faculty, potential corporate donors, likely community partners, and state education commissions and legislators (when public funds are sought) must
all be educated as to the need and the costs and won over.

Owners need to be aware that those costs extend beyond just bricks and mortars, taking into account professional fees, furniture and fixtures, escalation, financing costs, additional staffing needs, and more.

Funds to finance all elements can come from varied sources: student fees, donations, naming rights, state coffers, partnerships, and others. While the process of winning approval and funding a new recreation facility requires significant effort, resources, time, and energy, its success can advance the institution and create a lasting legacy for those who helped with the cause.

**DEFINITION OF TERMS**

**advancement**—Solicitation of financial support.

**bonding**—Selling bonds to help finance a construction project.

**capital campaign feasibility study**—Study conducted by the university to determine potential donors’ level of wealth and the potential to receive donations from them.

**capital improvement program**—Program in which new facilities are constructed or existing facilities are renovated, expanded, or both.

**case statement**—A detailed statement of why a facility is needed, where it should be located, and the types of spaces it will contain.

**challenge grant**—Funding in which a donor promises to give a certain amount of money if the institution can raise an equal amount from other sources.

**conceptual design phase**—Initial design phase for a project. Products of this phase include a preliminary construction cost estimate for the project as well as a rendering, or picture, of how the facility will look on the site.

**development**—Solicitation of financial support.

**floor plan**—Two-dimensional drawing showing location and size of various spaces within a building.

**hard costs**—The costs to construct a facility. These include materials as well as fees paid to the general contractor and subcontractors.

**lead gift**—Generally a large donation (at least $1 million) that will give the capital campaign credibility and lead others to donate.

**naming rights**—The right to have a facility or a portion of a facility named after a donor or the donor’s designee.

**needs assessment**—A systematic analysis of existing facility conditions and requirements to reach facility goals.

**programming**—Process in which architects and planners work with institution personnel to determine the types, sizes, and general organizational relationship of spaces within a facility; generally occurs in a project’s initial design stages.

**rendering**—Near-photo-quality illustration depicting what a facility will look like when constructed. Architects prepare such drawings at the conclusion of the project’s conceptual design phase.

**site plan**—Two-dimensional drawing showing where a facility will be located. It generally indicates the facility’s relationship to other buildings and activities on-site.

**soft costs**—Professional consultant fees; the cost to purchase and install furniture, fixtures, and equipment; contingency fund; escalation; charge-back expenses from the university; financing fees; bond-underwriting costs; and operating and maintenance costs for the constructed facility.
A successful campus recreation project involves three key groups: the owner, the architect, and the general contractor. Owners of award-winning recreation facilities cite the design and construction team time and time again as the top reason for a project's success. Therefore, it is important for owners to select an experienced architect who can provide leadership, understand their culture, integrate their perspective, promote their business goals, and maintain their purpose. Identifying the best architectural team for a recreation facility project requires considerable thought and preliminary planning with regard to how one wants to work with the team. This chapter describes the process of selecting the architectural team and five of the key phases of the architectural design process: schematic design, design development, construction documents, bidding, and construction administration.

HIRING AN ARCHITECT

Architect–owner relationships must be long lasting, as these are long-term projects. Since the typical architect–owner team works together for a minimum of three to five years, centralizing the decision-making process through use of a collaborative approach brings intrinsic value to the project and provides for a successful ongoing relationship with ultimately a successful building. Most owners today, both public and private, select architects on the basis of a list of criteria that reflect the owner's values. Using what is often referred to as a qualification-based selection process, owners compare architects by analyzing their qualifications in five key areas, called the 5 Ps: product (which in the case of architecture is a service), place, people, promotion, and price (American Institute of Architects & Demkin, 2001, pp. 29-33). These are factors that should be considered throughout the selection process as an owner evaluates competing teams.

- **Product (service):** Has the architect designed similar project types? What is the firm's position with regard to design quality and functionality of its buildings? How can the architect help you make good choices and add value to your project? It is important to remember that an architect is providing a service. As a means of providing that service, the architect provides both drawn and written information to convey ideas. In a traditional role, an architect never actually builds anything, only designs.

- **Place:** Has the firm worked in your state or city, and do the team members understand the local building codes? Is the firm located in close proximity to the project? The physical location of the architectural firm's and general contractor's offices may or may not be relevant to a given owner.

- **People:** How is the architectural firm organized? Examine the qualifications of the team members directly responsible for the project. Understand their delivery, types of services (as an example, do they offer interior design services or programming services), and ideas for your project. Which team member will have the ultimate responsibility for decisions and recommendations? Who will be the architect's single point of contact? Have the members of the team worked
together on previous projects? What do references say about the firm and its staff?

- **Promotion:** How an architectural firm or general contractor promotes itself is a reflection of the firm’s core values. Do owners who have worked with the firm previously believe that the designer achieved the needs and goals (cost, schedule, appearance, and so on) expressed for the project? Has the firm won awards or published papers, or have members given conference presentations that are relevant to this type of work and illustrate their expertise? This may or may not be important to a given owner.

- **Price:** With a qualification-based process, price is usually negotiated with the chosen firm after the selection process. Keep in mind that the difference in fees among architectural firms is minimal compared to the cost of construction and the long-term cost of operating a building. Most agencies find that selecting a firm based on qualifications instead of fees keeps them focused on the bigger picture: securing the greatest value in services.

All owners should consider these 5 P’s in the selection process either before or after issuing a Request for Qualifications.

Under a qualification-based process, architects strive to understand something about an owner’s values in relation to a particular project and shape their qualifications to reflect those values.

**FORMAL SELECTION PROCESS**

The owner initiates the formal selection process by soliciting a Request for Qualifications (RFQ) from architectural firms for designing and observing the construction of a facility. Typically an RFQ gives the architect general information about the project. Examples of items that may be included are the anticipated rooms or activities to be housed in the building, the budget, the schedule, the list of services that the architect will provide, and site information. An RFQ may also include a sample owner–architect contract. In most public universities, the RFQ announcement must be made public and is generally posted on Web sites of the university, state agencies, or both. Private universities, however, may elect to invite selected prequalified firms to submit their credentials. In either case, owners may want to prepare a preliminary long list of candidates from their own research. Methods for gathering intelligent data about architectural firms that have completed similar work include reading industry publications, contacting industry trade associations like the National Intramural-Recreational Sports Association for lists of architectural firms that are associate member companies or lists of conference exhibitors and speakers, asking for references from peer institutions, and searching the Internet.

In evaluating the qualifications of architectural teams, owners should consider whether these teams are bringing the right prime consultants and secondary consultants to the table. Do these parties have an existing relationship? Have they previously worked together in designing similar projects? Owners should look at the extended “family” within the alliance team structure to ensure that they have a good basis for managing the project and performance levels.

An architect’s RFQ response, frequently called a Statement of Qualifications, will give more detailed and project-specific information than can typically be obtained in preliminary research. Questions and responses relate specifically to your project rather than simply to the overall credentials of the firm. The response will also identify consultants for the architectural and engineering (A/E) team. Some of the evaluation criteria most commonly solicited in an RFQ are the following:

- **Office size and location:** Can the firm handle a project of this type, size, and scope? What are the firm’s current workload and capacity? Does the firm have the ability to expand its office if necessary? What is the firm’s proximity to the site?

- **Key personnel of design team and consultants:** What are the background, abilities, and experience of the key personnel? How long have they worked with the firm? How many similar projects have they completed? Have they worked together on previous projects?

- **General firm experience:** Does the firm have experience in a range of project types? How is the firm structured? Has it completed projects of similar size? What services does the firm provide? What are the history and financial stability of the firm?

- **Specific firm experience:** Does the firm have experience in similar projects or related projects of similar value? How recent is this experience? Does the firm have experience work-
ing with your university system or individual campus? Does it have experience designing environmentally friendly buildings (if this criterion is important)?

- **Design ability:** What are the firm’s design approach and philosophy? Has the firm won any design awards? Do the representative project examples submitted by the firm meet your expectation of design quality? What is the firm’s process for integrating institutional standards into design? Can it design to the existing campus style?

- **Project management:** How is the team organized? Who will be the primary point of contact with you? What tools does the firm use to manage a project? What are the roles and responsibilities of each key team member (including consultants)? What are the firm’s quality control methods?

- **Budget and schedule:** What cost control and schedule control methods does the firm use? What cost estimating methods does it use for the design and construction phases? What is its track record of completing projects on time and within budget?

- **Construction observation:** What is the firm’s plan for on-site construction observation? How does it trouble-shoot construction problems, handle Requests for Information (RFIs), and submittals of selected materials and products from the contractors? Does it have experience with your preferred construction delivery method?

The owner usually assembles a selection committee to evaluate the responses received from the solicitation for architectural services. The selection committee may include building users and a variety of other stakeholders, including representatives from the city council, park and recreation board, board of regents, finance and administration, campus planning, and facilities or physical plant departments, among others. Often members of the selection committee are given a score sheet to help them rank firms on a variety of criteria (see figure 5.1).

Once the selection committee has reviewed all Statements of Qualifications it has received, it “short-lists” a handful of architectural firms (usually three to five on average) by identifying those most qualified for a particular recreation project. The firms on this short list are then called in to make a presentation and to interview for the assignment. Each firm presents credentials. As a matter of practice, most architectural firms bring to this presentation design firm representatives, including the principal, project manager, and project designer, in addition to the chosen prime consultants, and any key secondary consultants critical to the recreation project. Occasionally an architect may elect to provide sketches showing some conceptual thinking about the project. This is a controversial practice within the architectural profession as there is no payment for their ideas. In any case, it is important that architects convey their understanding of the project and some of the challenges that it will present.

The selection committee may again use a score sheet to rank firms before making its final selection. After the owner has reviewed all the pros and cons of working with each firm, a contract is awarded to the winning firm.

### KEY STAFF OF AN ARCHITECTURAL FIRM

While titles and positions may vary, several basic roles are performed within architectural firms. Sometimes, depending on the project size and scope, one person may fill all roles. For large projects, however, a firm involves more than one person. It is helpful for owners to understand the architect’s key team members and their roles in a recreation project. Owners should understand the firm’s organization and management style in order to decide whether its style suits their needs. Professional affiliations are designations that might be noted in addition to individual roles. For example, an architect licensed in at least one state may be a member of the American Institute of Architects and carry the initials AIA after his or her name. If he or she has elected not to join this organization, they may represent their registration by the initials, RA or Registered Architect after their name. An interior designer who is registered in at least one state may be a member of the American Society of Interior Designers (ASID) or International Interior Design Association (IIDA). The following are roles typically performed by the members of an architectural firm.

- **Principal in charge:** A principal is someone who has attained a senior management level within the architectural firm. The principal in charge (PIC), then, is the senior management
### Figure 5.1  Architectural and engineering Request for Qualifications sample evaluation worksheet.
Selecting an Architect and Understanding Team Roles

A member of the team who is responsible for overseeing the big-picture development of the project. In some firms, the PIC also may be the project manager, overseeing all the major discussions and decisions affecting the project.

- **Project manager:** The project manager is the day-to-day contact for the project and the individual who manages the firm’s progress regarding schedule, cost controls, and quality. This person manages owner expectations, ensures that objectives are accomplished and contractual obligations are fulfilled, and provides owner service.

- **Project architect:** Within a firm, the project architect is responsible for coordination and detailed direction of the in-house production staff; structural, mechanical, and electrical engineering consultants; and other specialty consultants such as acoustical, audiovisual, and food service.

- **Project designer:** The project designer is responsible for establishing the design concepts and detailed design considerations for the project once a program is established. The project designer then serves as design consultant to the project manager and the production staff to verify the implementation of previously established design concepts.

**CONSULTANTS: PART OF THE ARCHITECTURAL TEAM**

According to the complexity of the project and the established requirements, most architectural teams will include the following consultants: a structural engineer; a MEP (mechanical, electrical, and plumbing) consultant; a civil engineer; a landscape architect; a data and telephone specialist; an audiovisual and acoustical designer; specialty programming consultants (such as aquatics); a cost consultant; a constructability advisor; and a code compliance expert (see figure 5.2). The architectural firm chooses its consultants based on the core competencies of the firms, the quality of their work, and the existing relationships among the parties involved.

The architect relies on the MEP engineers to produce coordinated design drawings and specifications for heating, cooling, plumbing, fire protection, and electrical uses for the facility. The structural engineer, on the other hand, is responsible for the design of the structural framework and is truly an extension of the architectural team. All entities work together to design systems that lead to building a structurally sound facility—one that has all the internal systems necessary for operation and is also aesthetically pleasing. Generally, MEP engineers, structural engineers, and civil engineers are considered primary consultants, although this may depend on the owner’s specific requirements.

Depending on the type of recreation facility being designed, the architect may need additional consultants in order for the project to be a success. A natatorium may call for an aquatics designer; a recreation facility might need a specialist to design and engineer a climbing wall. Therefore, on the basis of the facility’s use, secondary consultants may play a major or a minor role in the process.

Well-qualified, dependable secondary consultants are extremely important to produce a successful design and the necessary construction. We have already mentioned a few of the secondary consultant disciplines; the following list includes more of the experts in specialties that may fall under the architectural firm’s contract:

- **Acoustical consultants:** Assist in room design, including special geometry and finishes to accomplish acoustical goals such as privacy, minimum reverberation, and noise control.

- **Aquatic designers:** Contribute the plan of any pool or water feature, including the water filtration, piping design, and sanitation systems.

- **Audiovisual and multimedia designers:** Drive the planning and final documentation of sound and audiovisual systems for various inputs, including recorded and cable music, television, and microphones.

- **Civil engineers:** Control the grading of the soil, paving, and utilities for the building.

- **Cost consultants:** Present cost estimates of the construction expenditures for materials and labor and the general contractor’s costs as well as anticipate the impact of market changes or the period of design.

- **Data and telephone experts:** Supply the data and telephone cabling and infrastructure specifications and drawings.

- **Graphics firms:** Design two-dimensional signage and images for a building interior or exterior.

- **Interior designers:** Recommend design of interior space, including color, finishes, and furniture.
**STEPS IN THE ARCHITECTURAL PROCESS**

The architectural process is a series of steps that take the owner’s goals and program and synthesize them into a design. This is an ongoing process that moves from a conceptual level to a detailed level and ultimately provides construction documents that can be used by the general contractor to build the project. Though the process is

- **Landscape architects**: Manage the design, selection, and placement of plant materials and the irrigation system for the facility.
- **Lighting consultants**: Enhance the function and appearance of a space through lighting design.
- **Programming consultants**: Organize the descriptions of functional requirements.
- **Security specialists**: Provide the design of closed-circuit television monitoring as well as other security systems.
expressed in steps, it is not completely linear but generally provides for a process of analysis, synthesis, appraisal, and decision making in each phase. Overall, the owner and architect provide the framework for describing the work to be done in the architectural process and will break out the design services in the following phases:

1. **Programming:** Although typically not a basic service, programming must occur prior to the beginning of any architectural work. Owners may have the skills to do the programming, or they may hire an expert in programming to provide this service before the beginning of design work. Programming is one of the most critical phases of the design process, as during this phase the team agrees to overriding goals, the project size, the elements or rooms to be accommodated, and schedule. This is when both the project and construction budgets are confirmed. It is during this phase that all participants agree to the viability of these parameters.

2. **Schematic design:** The scope of the project is established during the schematic design phase. On the basis of the owner’s approved program, the architect develops concepts that establish the project’s size, general character, and building systems. Systems may include the mechanical system that the building will use for heat and cooling or the system used to prevent flooding from storm water. Frequently the architect and engineer run life cycle cost analyses to determine the payback period for a particular system prior to selecting one.

   The owner and architect synthesize the concepts into one design that meets the project needs. Deliverables in schematic design typically consist of a site plan, floor plans, and elevations that illustrate the general massing and character of the project. Sometimes the deliverables also include outline specifications, building sections, perspective sketches, study models, and computer models. A preliminary code review should be done to establish the overall building requirements for life safety and occupancy. Finally, a comparison of the project area to the program and a statement of probable construction cost are developed based on the schematic design documents. The schematic design phase typically represents approximately 15% of the architect’s basic services. New types of drawing software are requiring an increasing amount of work in the early phases of the project which is causing traditional contract percentages to fluctuate.

3. **Design development:** The design development phase is used to resolve details of the design with the owner and set the quality of the project. On the basis of the approved schematic design documents, the architectural team develops design drawings that identify key components of the project scope and resolves design issues. The design team develops coordinated descriptions of all aspects of the design, down to each room and surface, and involves all disciplines. The architects and engineers meet with the owner to review and approve these details. Design development documents include updated and more detailed versions of the schematic design documents but also include wall sections, interior elevations and millwork (cabinetry) details, preliminary interior and exterior finishes, reflected ceiling plans, and typical details of the overall exterior envelope (walls and roof) of the project. Preliminary structural framing plans and details are completed, along with MEP and fire protection plans. Outline specifications are updated into a preliminary specification, providing more detail about accepted materials and systems. Once again, the statement of probable construction cost is updated and compared to the schematic design estimate. This phase typically represents about 20% of the basic services of the design team. During this entire process, the owner and architect work hand in hand collaborating on the final decisions for the overall design of the recreation center.

4. **Contract documents:** When the design development drawings are approved, they form the basis for the construction documents. These documents, when coupled with the agreement between the owner and the general contractor, set forth the detailed requirements for construction and are intended for the general contractor to use to build the recreation center. During this phase, most of the design work is completed, and the focus is directed at documenting the design details for use by the general contractor. The owner reviews the construction documents with the design team to resolve any outstanding design issues and approve the final scope of the recreation center. Final specifications are produced, and the instructions to the general contractor for bidding and the contract for construction are assembled. Due to the intense level of detailing and coordination required, the work in the construction documents phase represents about 40% of the design team’s basic services.

5. **Bid and negotiate phase:** The architect assists the owner in issuing construction documents
to general contractors for bidding. During the bidding process, the design team services also consist of answering questions from general contractors and subcontractors in the form of addenda and conducting preconstruction meetings to help the bidders become familiar with the project. Together; the construction documents, including the drawings, specifications, and addenda, are called the bidding documents. Addenda modify the construction documents and provide equal information to all bidders, as well as further revising the design to make it clear for the potential general contractors. Upon receipt of bids, the architect can assist the owner with evaluation of those bids against the budget and review of the contractor’s qualifications to determine which general contractor is most responsive to the owner’s needs.

With increasing frequency, bidding is done prior to completion of the contract documents. In this case, the general contractor bids documents that are in progress with an agreed-upon contingency for the work that is not yet shown. Sometimes portions of the project are drawn and bid while the remainder is being drawn. For instance, underground utilities may be bid while the roof is still being designed. The goal of this process is to save time. These portions are called bid packages, and the process is sometimes referred to as fast track.

6. Construction administration: During the construction phase, the architect serves as the construction administrator and observes the construction for general conformity to the construction documents. These documents, which include signed and sealed drawings and specifications, are part of the legal contract between the owner and the general contractor. During construction the architect’s role shifts when he or she becomes the interpreter of the contract documents. The architect is serving not as the owner’s direct agent but in a quasi-judicial capacity, showing partiality to neither the owner nor the general contractor. At other times during the construction phase, the architect acts as the owner’s representative and agent (American Institute of Architects & Demkin, 2001, p. 603). Changes to the design can still occur during construction, and these changes must be documented in the construction documents through a Request for Proposal (in the event that the change will modify the cost or time of the project) or through an architect’s supplemental instructions.

The design process is unique to each project. The AIA has developed standards for the work of the design team along with standard contracts (AIA documents) that integrate the responsibility of the architect, owner, and general contractor; these contracts are the standard used in the United States. The Architect’s Handbook of Professional Practice, published by the AIA, is an excellent resource to use to learn more about the details of the design process. That said, institutions that build frequently, such as cities and universities, often have their own contract forms.

**SUMMARY**

A winning team for a successful recreation facility is composed of three key parts: the owner, the architect, and the general contractor. Two critical elements of team performance that will enhance the recreation center’s outcome are the collaborative efforts exhibited by all parties and the architect’s personal qualifications and experience with similar project types. Collaboration and teamwork can best be achieved when the roles and responsibilities of each party are clearly defined and through facilitation of a process whereby each party understands the owner’s expectations. With this in mind, owners can select a winning architectural team that will deliver a successful recreation project. With use of a qualification-based selection process and evaluation of the 5 Ps (product, place, people, promotion, and price) relative to the owner’s needs, an architectural team can be selected that will complement the owner’s skills and provide the proper services for the project.

**DEFINITION OF TERMS**

A/E or AE—Architectural and engineering.

AIA documents—Documents, prepared by the American Institute of Architects, that bring nationwide consistency and predictability to the construction process and can easily be modified to accommodate individual project demands. These documents can be obtained by an architect.

American Institute of Architects (AIA)—The professional organization for architects. In order to be a member, an architect must be licensed or registered in at least one state in the United States. Not all registered architects elect to become American Institute of Architects members.
architect—An individual licensed to practice the architectural profession in a state. Architects are licensed by states and not nationally.

ASID—American Society of Interior Designers.

basic services—Defined by American Institute of Architects documents as schematic design, design development, contract documents, bidding and negotiating, and construction administration. An architect can offer a wide variety of other services as well, which may be considered additional services under the American Institute of Architects agreements.

bidding documents—The contract documents, including any addenda issued prior to receipt of bids.

computer model—A three-dimensional drawing created on a computer using a software package designed for this purpose.

constructability—The ease with which a particular design can be built. To determine constructability one considers such factors as the sequence in which materials will be put in place, the locations of cranes for lifting and the distances of the reach, and the type of weather anticipated during various phases of construction.

construction administration—The duties and responsibilities of the architect during the construction phase.

construction budget—The cost of actual construction or the amount of money paid to the contractor for the building; does not include architectural fees, contingencies, and so on.

contract documents—The contract between the owner and contractor; including requirements for the construction of the project: conditions of the contract (general, supplementary, and other conditions), drawings, specifications, and addenda issued prior to execution of the contract.

design development documents—Drawings and other documents that fix and describe the size and character of the entire project regarding architectural, structural, mechanical, and electrical systems; materials; and such other elements as appropriate.

detailing—Drawings that show how materials and geometry come together and instruct the contractor how to build particular junctures in a building.

fast track—A process in which certain portions of the architect’s design services overlap with construction activities with the intention of expediting the owner’s early occupancy of all or a portion of the project.

general contractor—The firm that has entered into a contract with an owner to construct the project described in the contract documents. The general contractor typically contracts with a number of subcontractors who specialize in various trades.

life cycle cost—The capital and operational cost of a construction item or system during the estimated useful life of the building.

massing—The three-dimensional form of a building: the height, width, and depth along with roof shapes.

owner—A person or entity that retains services for design and contracts for construction or furniture, furnishings, and equipment; so called because this person or entity typically owns or is the lessee of the building site or project premises.

principal in charge—A principal is a senior manager within the architectural or engineering firm. The principal in charge (PIC) is responsible for overseeing the overall development of the project. In some firms, the PIC also may have other roles such as design or project management.

programming—The preliminary scope of a building, including the rooms to be accommodated, their size, the project and construction budget, and the schedule for the design and construction.

project architect—The individual responsible for coordination of in-house production staff and consultants.

project budget—The total cost of a project including costs outside of the construction. For example, the project budget includes the construction budget as well as the cost of furniture, equipment, materials testing services, architectural and engineering services, land, and any other costs that the owner may have to bear in the process of design, construction, and moving into a building.

project designer—(1) In an architect’s office, the individual responsible for establishing the overall direction of the architectural design of a given project; (2) in a consultant’s office, the individual responsible for the design of a specific portion of a project, such as structural, mechanical, electrical, sanitary, civil, acoustical, and food service elements.
**project manager**—The individual designated by the principal in charge to manage the firm’s services related to a given project; the term is frequently used interchangeably with *project architect*. Normally these services include administrative responsibilities as well as technical responsibilities.

**registered architect (RA)**—A title used by an individual who is licensed to practice architecture in at least one state in the United States.

**Request for Information (RFI)**—A document that a contractor issues to ask the architect for a clarification or for additional information.

**schematic design documents**—Drawings and other documents conceptually illustrating the scale and relationship of project components.

**schematic design phase**—The phase of the architect’s services in which the architect consults with the owner to ascertain the requirements of the project and prepares schematic design documents for approval by the owner. These consist of drawings and other documents illustrating the scale and relationship of the project components.

**specifications**—Written information on the products and materials to be used on the project. Specifications also list the standards for these products, describe the manner in which products must be installed, and itemize any excess material to be turned over to the owner (attic stock), as well as listing any warranties that will be required.

**subcontractor**—A subcontractor works for the general contractor in building a certain portion of the construction, or trade, in which they specialize. For example, one subcontractor might install wood floors. The subcontractor only has a contractual relationship with the general contractor but not with the owner.

**REFERENCE**

The planning of a campus recreation center is a process unique to each institution. The process, although informed by standards, is most importantly a product of each institution's market conditions and strategic objectives. It is important to note that after a project is built it becomes a strategic asset for the school. Therefore, all of the project's objectives must be expressed in specific terms that demonstrate their relevance to furthering the school's mission, reinforcing campus values, responding to institutional commitments and responsibilities, and improving the school's competitive position in the market.

In the development of a campus recreation center, the owner and facility planner must access a broad body of knowledge including the standards of disparate sport governing bodies. Unlike the development of sports-related facilities that are guided by such organizations as the National Collegiate Athletic Association (NCAA), National Federation of State High School Associations (NFHS), or American College of Sports Medicine (ACSM), the campus recreation industry does not have a single, consistent clearinghouse for standards. Therefore it is up to the planner to filter the requirements outlined by these organizations (NCAA, NFHS, and ACSM) and other sport-specific governing bodies (see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/) to develop the appropriate facility specific to each institution's unique needs.

In order to identify each institution's unique needs, the planner must have a detailed understanding of the institution's enrollment, mission, location, and unique market position, as well as its specific role in the community and among alumni. In order to effectively plan a facility, one must also understand a recreation department's relationship with athletics, student life, and auxiliary services. These factors, in addition to the quantitative assessment of student demands (typically accessed through existing usage patterns and a needs assessment survey), allow the planner to develop a program of architectural requirements in order to provide a facility that contributes to the institution's success.

Further, the overall goal of this planning guide is to integrate the mission and goals of the owner with the knowledge and expertise of a planning specialist. Each individual brings a unique expertise and knowledge base to a recreation project, but in order to develop a facility to meet an institution's unique needs, all parties must come to the table speaking the same language.

Many owners are intimidated by the technical language of planning professionals, while many industry professionals do not take the time to understand what is unique about a particular college or university. Therefore, all members of the design team must come together with a basic common knowledge of the concepts necessary to develop a project that exceeds the goals of all parties involved. The glossary at the end of the chapter defines terms from the perspectives of both the owner and the planning professionals.

DEFINING THE USER

The first factor in determining which standards are applicable to your specific facility is the question of the user. If a recreation facility or space will be shared with a collegiate athletic team, then
NCAA standards must be followed. If a facility will be shared with a sport club, then the standards of the governing body of that sport must be followed. When a facility is developed to support intramural sport programs, high school standards are generally followed. When the facility will be used solely for casual recreation and fitness, the standards become more malleable to cater directly to the specific user group. Most institutions utilize a mix of these various standards. Therefore, it is essential during the early stages of the planning process to identify each user group and prioritize how each space will cater to the needs of each group, and ultimately which standard shall take precedence.

**Collegiate Athletics**

Intercollegiate athletics involves college athletic teams that represent their institution through competition with and against other colleges and universities. It is governed by the NCAA and the National Association of Intercollegiate Athletics (NAIA). For the purposes of this book, we refer to the standards set by the NCAA, which maintains committees to write and interpret playing rules in 14 sports: football, water polo, volleyball, soccer, basketball, ice hockey, rifle, skiing, swimming and diving, wrestling, baseball, lacrosse, softball, and track and field.

**Sport Clubs**

Club sports or sport clubs are for students who are not varsity-level competitors or who want to compete in a sport not offered by the college, but still want to compete against teams from other campuses. Club sports include traditional and nontraditional activities such as volleyball, soccer, lacrosse, tennis, rugby, cycling, martial arts, rodeo, ultimate disc, badminton, crew, and sailing. Coaches or leaders are often unpaid volunteers or students themselves. Teams or groups hold regular practices and often compete in an organized league with other collegiate sport club teams. Currently, the National Intramural-Recreational Sports Association (NIRSA) offers national championships in volleyball, soccer, and tennis.

**Intramural**

Intramural sports involve athletic leagues or tournaments for other campus teams. These activities are offered through recreational sports departments to all students—and in many cases faculty and staff—as physical and social activity. Intramural participants range in athletic experience from novice to expert, but the focus of the program is typically on participation and fun. Therefore, intramural competition standards are quite flexible, with a strong focus on having enough space to allow all interested parties to play. The majority of intramural participants competed in athletics during middle school or high school; therefore, NFHS standards are typically followed in the development of intramural facilities.

**Fitness and Wellness**

Activity spaces developed for the fitness and wellness user represent the largest growth area in recreational sports. Fitness and wellness activities typically include aerobics, dance, kick boxing, yoga, Pilates, spinning, and strengthening and conditioning. The number of participants and “rules of the game” are not restrictive, so the size of each facility is dependent on the expected pool of participants and the style of instruction preferred by the management team. Beyond the size of these activity spaces, general standards do exist for facility and environmental conditions and are specified in detail through the ACSM.

Obviously, the standards for recreation facilities vary widely depending on the specific user groups the facility must cater to. Therefore, a planner must work with the college to define and prioritize the user groups for each activity space before developing recommendations for a new facility.

**GENERAL INDOOR PLANNING STANDARDS AND CONSIDERATIONS**

According to the database of over 70 campus recreation centers compiled by Brailsford & Dunlavey (B&D), one of the nation’s leading university recreation facility planners, the average new university facility has about 10 square feet (SF) of recreation space per student based on total enrollment. However, campus-wide (total of all recreation facilities), colleges offer 10 to 12 square feet (SF) (0.92-1.1 m²) of recreation space per student. Within these general parameters, wide fluctuations can occur depending on the size of the institution; the amount of facility space
that may be shared with athletics, student life, or academic programs; the institution's location and mission; and the role of the institution within the community.

The first item to consider is the overall size of the institution, specifically the enrollment. A school with a small population does not achieve the efficiencies of scale that a midsized college can. Therefore, the demand for space can be deceiving. Other factors to consider are that small private colleges have a higher rate of participation in athletics and recreation than large public institutions and therefore require a higher allocation of gross square feet (GSF) per student. In addition, efficiencies of scale are typically not met until a university has 5,000 students or more. For example, a campus recreation center typically would have a minimum of three basketball courts, a pool, a weight and fitness center, multipurpose rooms, and support and administrative space. A basic recreation-only facility such as this would average 50,000 SF (4,645 m²) before enrollment is even considered. Therefore, an institution must have at least 5,000 students before the 10 SF rule would apply.

The second factor to consider is the relationship between recreation and athletics at a particular institution. If the departments have agreements to share any facilities in a new development, then the size of a facility will increase. This increase occurs because competition facilities under NCAA regulations typically have larger dimensional requirements than standard intramural facilities. Furthermore, the associated spectator requirements, separate entrances, additional support, and administrative facilities will require additional space and create inefficiencies within the organization of the facility. Finally, facilities shared with athletics will affect the recreational user through decreased hours of operation, so there may be a need for additional spaces within the same facility to meet the recreational user's needs.

The third factor to consider in evaluating demand of overall square footage of a facility is the institution's type, goals and objectives and mission. This relates to everything from location to the demographics of a college or university. Typically, rural institutions have a higher percentage of full-time students and a higher percentage of students living on campus; therefore, they have greater need to provide their student population with programs and activities outside of class. In addition, urban institutions have a number of factors that limit facility size. Urban institutions traditionally have catered to part-time and commuter students. These students typically spend less time on campus and have lower participation rates in recreation facilities. In addition, real estate at urban institutions can be cost prohibitive, limiting the amount of land and number of facilities dedicated to recreation.

Finally, the role the college plays in the community is an important factor in facility size and program offerings. In many small communities, the college is the center of cultural, social, and recreational opportunities. As a result, faculty, staff, alumni, and the general community rely on the institution to provide facilities to support these needs. When a facility is also planned to support the community's needs, certain standards apply: 1 to 1.5 GSF (0.09-0.14 m²) should be added for each employee of the university, and 5 to 7.5 SF (0.46-0.70 m²) should be added per alumnus or alumna or community member (based on memberships assumed). As always, these standards should be used during the early stages of planning and should be investigated further through detailed market analysis tools such as focus groups and surveys to determine each group's interest in the facility and its frequency of participation.

Although 10 SF (0.92 m²) per student is viewed by many as an industry standard, it is important to recognize the limits and nuances of this standard. Campus recreation departments and planners should understand the implications of each institution's unique characteristics, including enrollment, mission, type, location, departmental relationships, and the role of the college within the community, before initiating the process of planning an indoor recreation facility.

**Usage Patterns**

Once the planner and recreation department have established the priorities of the user groups and identified the unique aspects of the college's mission and market, the next step is to delve more deeply into the usage patterns of the student body. This analysis of usage patterns is typically conducted through an assessment of existing usage as well as through the projection of usage that is likely to occur within a new facility. The latter is gleaned through a student needs assessment survey. The survey will allow the planner and institution to develop statistically reliable data outlining students' general usage patterns as
well as detailed projections for various activities throughout the day.

**FACILITY ZONES**

During the early planning stages, it is important to define the user groups and their access requirements for each space within the facility. Access area is typically divided into zones; this allows the design professionals to organize the building for clearly defined access and way-finding for discrete user groups. Usually access is divided into four zones: the free zone, the spectator zone, the activity zone, and the support zone. All programmable space within a recreation center should be assigned to one of these four zones to simplify the access requirements, adjacencies, and usages. Clear zoning of a facility allows the facility to remain open while specific areas may be closed or may have limited access.

The free zone should include all spaces that are open to the public with access directly from the main entrance of the facility. This zone is typically 10% to 15% of the overall size of the facility and includes a reception desk, offices, and retail components such as a pro shop or juice bar. This space may be greatly expanded if the institution is interested in providing more student life space. In this case, the free zone may actually serve as a satellite student center with social and study lounges, expanded food offerings, and passive recreation spaces. On some campuses the free zone remains open after the activity spaces are closed to accommodate this type of passive social interaction.

The activity zone, typically accessed directly from the free zone and having visual connection from the entrance, includes all spaces that require admission to the facility but are open to all members of the facility. This zone makes up approximately 75% of the overall size of the facility and includes weight and fitness areas, basketball courts, multiactivity courts, racquetball courts, and other open recreation spaces. These spaces are generally managed by recreational sports staff and remain open during all facility hours.

The support zone, which can be accessed from either the free zone or the activity zone, includes limited-access spaces such as locker rooms, laundry, training facilities, and storage. This zone typically represents 10% to 15% of the overall square footage of the building. As with many of the other spaces, this zone could grow significantly if the facility is shared with athletics, because additional locker rooms, team rooms, and training areas, all with direct access to the specific competition venue, will be required.

The spectator zone, which is accessed directly from the free zone, is included only in facilities shared with athletics. This zone typically contains spaces that allow viewing of specific events without allowing access to the field of play, activity, or support spaces. The amount of space allocated to this zone varies according to the number and types of spectator venues present within the facility.

It is essential during the planning and programming phases to outline all spaces and classify them based on their access requirements. The free, activity, support, and spectator zone classifications allow the owner and designer to clearly understand the access requirements for each space and to simplify the organization of the building during design. Clear zoning of the building early in the planning process will allow users to easily understand the building upon entering.

**BUILDING EFFICIENCY**

It is essential to plan and budget not only for the activity spaces in the building but also for circulation, mechanical, structural, and other nonoccupiable space. A building’s efficiency factor is calculated as the ratio of net assignable area to gross building area; the latter consists of net assignable area plus primary and secondary circulation space, mechanical areas, structural elements, and other nonoccupiable spaces such as walls and janitorial closets. The categorization of specific spaces should follow ASTM standard classifications for building floor area measurements. On average, approximately 10% of a building’s gross area will be used for circulation while about 15% will be composed of mechanical and structural systems and other nonoccupiable areas. These rules of thumb for use by the planning team were developed from substantial review of completed projects and a series of design analyses, but they are merely a starting point when one is projecting a building’s gross square footage during programming. Thus, the “base case” assumption for a new recreation building’s achievable efficiency factor is 75%. The base case efficiency factor should be applied to buildings of approximately 75,000 net assignable square feet (SF) (7,000 m²) located on a flat, unrestrained site and including no unusual program
elements such as a spectator arena, excess or redundant central plant requirements, or complex building zoning requirements. Deviations from this paradigm will hinder achievable building efficiency, as detailed in table 6.1.

**Small-Space Calculation**

The typical recreation center program is dominated by spaces larger than 1,000 SF (92.9 m²). Spaces less than 1,000 SF—such as offices, classrooms, storage areas, and the like—do not usually exceed 7.5% of the net assignable area. To the extent that small spaces do account for more than 7.5% of the net assignable area, building efficiency will be reduced due to the larger quantity of wall and secondary circulation spaces required. As a rule of thumb, every percentage point above 7.5% allocated to small areas reduces the efficiency factor by 0.2%. For example, if small spaces account for 8.5% of the building, the efficiency factor is reduced from 75% to 74.8%.

**Site’s Length/Width Ratio**

Recreation centers tend to be most efficient when organized around a single, central circulation core that accommodates both horizontal movement between program elements and vertical movement between levels. If the site is long and narrow relative to the required building footprint area and if program elements must be extended along a horizontal circulation spine, a loss of efficiency of 1% can be expected. This effect is multiplied if the site is so long and narrow that program elements themselves must be extended lengthwise along the spine. This scenario causes the loss of an additional 0.5% to 1% in building efficiency.

**Spectator Requirements**

Building codes apply requirements for public rest rooms and special egress from places of assembly, which include spectator seating areas. Buildings with such elements must provide corridors and vestibules of greater number, width, and capacity than buildings without them. Each major spectator space in a recreation center can be expected to reduce the overall efficiency by 0.5%.

**Multiple Entrances and Zones**

If a building’s functional requirements dictate that separate zones must be established to restrict user access from one to another, efficiency is lost because of the inevitable increase in circulation space that results. Each major case of replicated primary circulation routes or entrances, extensive secondary circulation patterns within zones, and connectors between zones or buildings can cause a loss of efficiency of 1%.

**Building Size and Complexity**

Although larger program elements tend to improve building efficiency by increasing the ratio of assignable space to structure, a high quantity

### Table 6.1  Building Efficiency Calculator for a Recreation Facility: Base Case Target Efficiency Factor 75.0%

<table>
<thead>
<tr>
<th>Adjustment category</th>
<th>Adjustment</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Quantity of small elements</td>
<td>-2.3%</td>
<td>The quantity of small spaces materially exceeds the base case model condition.</td>
</tr>
<tr>
<td>2. Site length/width ratio</td>
<td>0.0%</td>
<td>No adjustment required.</td>
</tr>
<tr>
<td>3. Spectator requirements</td>
<td>0.0%</td>
<td>No adjustment required.</td>
</tr>
<tr>
<td>4. Multiple entrances and zones</td>
<td>0.0%</td>
<td>No adjustment required.</td>
</tr>
<tr>
<td>5. Building size and complexity</td>
<td>0.0%</td>
<td>No adjustment required.</td>
</tr>
<tr>
<td>6. Site topography and size</td>
<td>0.5%</td>
<td>The site is ideally suited for the development of a very compact circulation scheme.</td>
</tr>
<tr>
<td>7. Central plant requirements</td>
<td>0.0%</td>
<td>No adjustment required.</td>
</tr>
<tr>
<td>8. Owner value judgments</td>
<td>1.0%</td>
<td>The maximum positive adjustment has been assumed due to budget constraints.</td>
</tr>
</tbody>
</table>

Adjusted target efficiency factor = 74.2%.
of program elements will reduce efficiency by reducing that same ratio and by requiring additional circulation to reach the additional elements. Recreation centers with multiple gymnasiums or other major activity areas will suffer a loss in efficiency of approximately 1% for each replicated major element. Generally, buildings with a net assignable area greater than 100,000 SF (9,290 m²) will suffer from this problem.

Site Topography and Size

A site with a particularly steep slope, or a particularly small site relative to the building area, can greatly increase vertical circulation features and require extensive structural and mechanical systems to support and serve the building’s different levels. Such sites may cause a loss of efficiency of as much as 2%. A perfectly flat site with excess footprint capacity would provide opportunities to improve building efficiency moderately.

Central Plant Requirements

If excessive mechanical capacity, such as central plant facilities serving adjacent buildings or future phases, is included in the project, building efficiency can be reduced by as much as 2%. Likewise, buildings whose mechanical systems operate from an off-site central plant will have efficiency increased by as much as 2%.

Owner Value Judgments

The owner’s level of commitment to achieving efficiency may dictate that certain spaces or elements, such as lobbies and wide corridors, can be minimized or eliminated from the design. In such cases, building efficiency may be improved by as much as 2%. Conversely, if an owner desires a particularly commodious or gracious building, if extensive free zone circulation is required, or if extensive nonassignable program elements such as a centrally organizing courtyard or public art are required, building efficiency could be reduced by as much as 5%.

Recreation centers are typically a very efficient building type, with an average efficiency of 75%. This standard efficiency factor is widely accepted among recreation planners, but as with all standards, it is merely a starting point. The efficiency of a facility is affected by quantity of small spaces, dimensions and topography of the site, spectator requirements, quantity of zones and entrances, building complexity, central plant requirements, and discretion of the owner.

DETAILED INDOOR FACILITY STANDARDS

Now that we have defined the general building planning standards for campus recreation facilities, we must dig into the details of what truly make a recreation center such a vital campus environment—the individual activity spaces. As already outlined, for each activity space within a recreation center there are one or more sources or governing bodies that define the particular standards for fields of play. But for simplicity, the following detailed descriptions focus on the basic planning standards for a recreation-only facility and refer to the difference in standards between the club sports and intercollegiate athletics. These sections outline requirements for each space, including dimensions, square footage and height requirements, adjacencies, and specialized architectural and mechanical requirements.

Strength and Conditioning

Strength and conditioning spaces are the area within a recreation facility that includes all free weights, Selectorized weights, and cardiovascular machines. The B&D database shows that just slightly less than 1 SF (0.09 m²) per student for strength and conditioning space is typical in new recreation facilities. This space generally makes up 10% to 15% of the overall size of the facility. This 1 SF-per-student rule presents some of the same constraints and qualifications as the 10 SF-per-student guideline for the entire facility, including enrollment and demographics. In addition, one should consider whether the facility will be shared with athletics, faculty, staff, alumni, and community members, which would increase the demand for this space significantly.

Strength and conditioning facilities also have a minimum basic set of equipment, which typically includes these components:

- One Selectorized circuit, including stations for each of the following muscle groups: gluteus, hamstrings, calves, chest, upper back, lower back, shoulders, triceps, biceps, and abdomen
- A basic mix of free weights including supine and incline bench, Smith machine, cable
A variety of cardiovascular machines including treadmills, stair machines, bicycles, rowing, and cross trainer (quantity equal to combined free and Selectorized machines)

- A small stretching area

It is essential to size the strength and conditioning area to accommodate the appropriate number and mix of free weights, Selectorized equipment, and cardiovascular equipment. Free weights stations typically require 60 SF (5.6 m²) per station, with obvious variations for size and type of equipment. Selectorized machines require 50 SF (4.6 m²) per machine, while cardiovascular machines—which have grown in size by 25% over the past 10 years—require 65 SF (6 m²) per machine. There should be a balance of strength (free weights and Selectorized equipment) and cardiovascular equipment, and the arrangement should be such that users can easily transition from one piece of equipment to another.

The space designed for strength and conditioning should be open to allow sight lines for efficient supervision of the space. The ceiling should be at least 12 ft (0.3 m) high, with lighting levels of at least 50 foot-candles (ft-c) at the floor surface. The floor coverings can include antistatic carpet with antifungal and antibacterial agents, rubber-based resilient flooring, or both. The mechanical system should be sized to accommodate temperatures of 68° to 72° F with 60% or less humidity and 8 to 12 air changes per hour.

It is important to note that the demand for strength and conditioning equipment has almost doubled over the past 10 years and that standards for future facilities are projected only to increase. Whereas 0.8 SF (0.07 m²) was the standard allocation per student in 1995, the demand has increased to 1.25 SF (0.12 m²) per student at many colleges and universities. This growth trend can be attributed to the higher ratio of women to men at colleges and universities, where women show greater recreation usage patterns than men, as well as women’s greater participation in athletics and their familiarity with strength and conditioning equipment.
conditioning equipment since Title IX. Finally, the increased usage and availability of strength and conditioning equipment in high schools have led to a more active and experienced user at the collegiate level.

**Multipurpose Rooms**

The amount of total multipurpose or group exercise room space for a facility can be estimated at 0.5 SF (0.05 m²) per student, or approximately 5% to 8% of the overall facility size, with similar adjustments required as for strength and conditioning space. The type and quantity of group exercise rooms are affected by the type of group exercise classes, sport clubs, and martial arts to be accommodated, as well as the university’s enrollment by gender. Multipurpose rooms are typically sized to accommodate different sizes and types of classes. For spinning classes, 20 SF (1.9 m²) per participant is ideal. For aerobics (without floor equipment), the room should be sized to approximately 50 SF (4.6 m²) per user. In the case of martial arts, the multipurpose room should be sized to approximately 125 SF (11.6 m²) per participant. And finally, if the intent is to use the facility for club sports or other athletic activities such as wrestling, karate, judo, or fencing, the specific dimensions required by each sport should be used.

As with strength and conditioning, group exercise space has seen a significant increase in popularity and usage over the past 10 years. The demand for group exercise space has almost tripled since B&D began surveying students in 1993. This increase can be attributed to the expanded number of offerings such as **mind-body fitness**, and spinning and the specialized spaces that they require, as well as to the growth and diversity of martial arts offerings. In addition, the unique equipment requirements for group fitness classes have increased the square footage requirement for each participant, and this has led to lower room efficiency rates.

The rooms designed for group exercise should allow visual access to and from the space while offering privacy to participants through frosted glass or solid-surface wall at least 36 in. (0.9 m)
high. At least two walls should also provide 6 ft (1.8 m) mirrors raised 6 in. (15 cm) off the floor. Ceilings should be at least 12 ft (3.7 m) high, with lighting levels of at least 50 ft-c at the floor surface. The floor surface should be a resilient wood with a subfloor system that provides adequate impact absorption. The mechanical system should be sized to accommodate temperatures of 66° to 70° F with 60% or less humidity and 8 to 12 air changes per hour.

**Natatorium**

The natatorium is perhaps the single biggest variable in any recreational facility development. Swimming pools are the most expensive per square foot among the spaces typically included in a recreation center and are the most frequently shared with athletics. The first question is whether or not to include a swimming pool of any type within a facility. The second question is who the user groups are. The final question is how large the pool should be. If the facility is to be a competitive NCAA venue, choices range from an Olympic-sized pool with diving well to the minimum competition-size pool, six lanes and 25 yd (22.9 m) long (see table 6.2). Chapter 8, “Aquatic Facilities,” covers the detailed planning standards for natatorium space.

If the primary user is the recreational lap swimmer, the requirements are much less strict. The size of the facility will once again be based on the projected users and the types of activities the institution would like to accommodate. Many recreation programs include a six-lane, 25 yd (22.9 m) pool for intramural swimming and water polo competitions and to accommodate recreational lap swimmers. Approximately five swimmers can be accommodated comfortably in an 8 ft (2.4 m) lane. The minimum standards for water depth are 4 ft (1.2 m) at the starting end and no less than 3.5 ft (1 m) along the course, although for liability reasons the depth requirement is constantly increasing to minimize injuries during competition.

To accommodate children and people with special needs, the requirements change again. Small children require a more shallow depth of around 3 ft (0.9 m) for informal play and swim lessons, and many facilities offer zero-depth entry. Informal recreational pools may have these shallower depths as well as play features such as slides and casual lounging areas.

Indoor pools should have a minimum 10 ft (3 m) perimeter deck around the water surface and 15 ft (4.6 m) at diving boards and starting blocks. The ceiling clearance should be a minimum of 15 ft to the structure; there are additional considerations for diving platforms beyond 1 m. Lighting levels should include at least 50 ft-c at the floor surface. The water temperature should be between 78° and 86° F depending on the user groups; competitive swimmers require cooler temperatures, and diving and informal swimming require warmer temperatures. The air temperature should be 80° F minimum and should be at least 2° higher than the water temperature with 60% or less humidity and four to six air changes per hour.

**Gymnasium**

The gymnasium space is perhaps the most recognizable activity space in a recreation center. It is the heart of the intramural program and typically possesses the largest volume of space within the facility. Gymnasium spaces in a recreation center usually constitute approximately one-third of the overall size of a facility, with an average of six basketball courts per facility. The design and organization of indoor court space within a

<table>
<thead>
<tr>
<th>Pool configuration</th>
<th>Water dimensions</th>
<th>Area</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 m pool, “Olympic”</td>
<td>164 ft × 75 ft</td>
<td>18,900</td>
<td>50 m pool (164 × 75)</td>
</tr>
<tr>
<td>35 m stretch pool</td>
<td>120 ft × 75 ft</td>
<td>14,500</td>
<td>40 yd stretch (120 × 75)</td>
</tr>
<tr>
<td>25 m × 25 yd</td>
<td>82 ft × 75 ft</td>
<td>10,700</td>
<td>25 m × 25 yd NCAA competitive pool (82 × 75)</td>
</tr>
<tr>
<td>25 yd, 8 lanes</td>
<td>75 ft × 66 ft</td>
<td>9,100</td>
<td>25 yd (8 lanes) (75 × 66)</td>
</tr>
<tr>
<td>25 yd, 6 lanes</td>
<td>75 ft × 50 ft</td>
<td>7,500</td>
<td>25 yd (6 lanes) (75 × 50)</td>
</tr>
<tr>
<td>Diving well</td>
<td>32 ft × 75 ft</td>
<td>5,700</td>
<td></td>
</tr>
</tbody>
</table>

Assumes 8 ft lanes with extra 1 ft for each outside lane; assumes 10 ft deck at perimeter; assumes 15 ft deck at diving and starting blocks; bulk head adds 4 ft to water dimension.
recreation center are much different than for an athletic competition facility. The focus of a recreation facility is of course the participant, not the spectator as in competition facilities; therefore, more space can be allocated to the playing surface, allowing for a more efficient design.

The selection of a basketball court size for a campus recreation facility is dependent on a number of factors. First, will the varsity basketball teams be using the space for practice or for competitions? If so, the facility should be sized to the required college court of 94 ft by 50 ft (29 by 15 m). If collegiate-sized courts are not required, then the optimal high school court of 84 ft by 50 ft (26 by 15 m) can be used. This is appropriate for intramural and recreational student users who are accustomed to the high school dimensions; in addition, this size allows for flexibility for summer camps geared toward high school athletes. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for basketball dimensions.

It is important to note that recreational basketball court dimensions are quite flexible, and a few institutions have purposely built smaller courts to accommodate more informal basketball games. If a court is less than 74 ft (23 m) long, it should be divided by two lines, each parallel to, and 40 ft (12 m) from, the farther end line.

Recreation centers typically provide a multipurpose gym by organizing two to six courts in parallel along the sidelines. This allows for convenient supervision of an open gym and of intramural events. The recommended safety zone between an end line and the wall is a minimum of 6 ft (1.8 m), while 12 ft (3.7 m) is ideal. The safety zone between parallel courts is a minimum of 3 ft (0.9 m), while 10 ft (3 m) is ideal. Multicourt gyms should have ceiling-mounted divider curtains between courts to allow multiple activities to occur with minimal conflict. See table 6.3 for a gymnasium size chart.

The use of a multicourt gym becomes even more efficient when the facility is used for smaller
court sports such as volleyball or badminton. Volleyball courts measure 29 ft, 6 in. by 59 ft (9 by 18 m) and can be accommodated at three courts for every two basketball courts, while two badminton courts measuring 20 ft by 44 ft (6 by 13 m) can be accommodated per basketball court. See the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for volleyball and badminton dimensions.

A recreation center’s gymnasium space should be designed for visual connectivity to other activity spaces while containing the equipment within the space. Ceiling heights should be at least 25 ft (7.6 m), although NCAA volleyball requires 41 ft (12 m). Lighting levels of at least 50 ft-c should be present at the floor surface. The floor should be a hardwood surface (typically maple) with a sleeper system—or sprung floor—for impact absorption. The mechanical system should be sized to accommodate temperatures of 68° to 72° F with 60% or less humidity and 8 to 12 air changes per hour.

Spectator seating for the gymnasium space once again depends greatly on the usage of the space. For a dedicated recreation center space, spectator seating is generally accommodated along the perimeter of the multcourt gym in the form of casual carpeted seating that also can be used for stretching, or bleachers that can be recessed for standard usage and pulled out for intramural championships. Spectator seating should be sized on the basis of projected usage at 6 SF (0.56 m²) per seat.

### Multipurpose Activity Court

A multipurpose activity court (MAC) is a combination court designed to accommodate indoor soccer and floor hockey. Its typical size is 8,000 to 10,000 SF (743-929 m²). This type of gymnasium often has a solid surface or rubberized floor to resist the impact of the hockey equipment. These spaces typically offer an unobstructed ceiling height of 25 ft (7.6 m), with masonry walls up to 14 ft (4 m) or dasher board (clear plastic wall system) up to 11 ft, 6 in. (3.5 m) for pucks and soccer balls. A 10 ft (3 m) safety zone behind the goals and 6 ft (1.8 m) safety zones on the sides are typical. The space has the same mechanical and lighting requirements as the standard gymnasium space. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for indoor soccer dimensions.

### Indoor Track

An indoor recreational jogging track is typically accommodated within the volume of a multcourt gymnasium. The minimum track length should be 10 laps to a mile (which can be accommodated within a four-court gym); eight laps to a mile (which can be accommodated within a five-court gym) is the standard. The track should include three to four lanes, approximately 4 ft (1.2 m) wide, to accommodate both fast and slow lanes. The track turns should be a minimum of 30 ft

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**Table 6.3  Gymnasium size chart**

<table>
<thead>
<tr>
<th>Gymnasium configuration</th>
<th>Gymnasium size (square feet)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Ideal</td>
<td>Moderate</td>
</tr>
<tr>
<td>One court @ 84 × 50</td>
<td>6,864</td>
<td>6,448</td>
</tr>
<tr>
<td>One court @ 74 × 50</td>
<td>6,204</td>
<td>5,828</td>
</tr>
<tr>
<td>One court @ 74 × 42</td>
<td>5,452</td>
<td>5,076</td>
</tr>
<tr>
<td>Two courts @ 84 × 50</td>
<td>12,896</td>
<td>12,480</td>
</tr>
<tr>
<td>Two courts @ 74 × 50</td>
<td>11,656</td>
<td>11,280</td>
</tr>
<tr>
<td>Two courts @ 74 × 42</td>
<td>10,152</td>
<td>9,776</td>
</tr>
<tr>
<td>Three courts @ 84 × 50</td>
<td>18,928</td>
<td>18,512</td>
</tr>
<tr>
<td>Three courts @ 74 × 50</td>
<td>17,108</td>
<td>16,732</td>
</tr>
<tr>
<td>Three courts @ 74 × 42</td>
<td>14,852</td>
<td>14,476</td>
</tr>
<tr>
<td>Four courts @ 84 × 50</td>
<td>24,960</td>
<td>24,544</td>
</tr>
<tr>
<td>Four courts @ 74 × 50</td>
<td>22,560</td>
<td>22,184</td>
</tr>
<tr>
<td>Four courts @ 74 × 42</td>
<td>19,552</td>
<td>19,176</td>
</tr>
</tbody>
</table>
9 m) outside radius and 20 ft (6 m) inside radius, with banking to be minimized. The indoor track surface should be made of a composite synthetic material at least 3/8 in. (1 cm) thick to provide for cushioned jogging. Clearance above the track should be at least 10 ft (3 m) high with lighting levels of at least 50 ft-c at the floor surface. The mechanical system should be sized to accommodate temperatures of 68° to 72° F with 60% or less humidity and 8 to 12 air changes per hour.

**Rock Climbing Wall**

Outdoor and adventure sports have seen an impressive growth in interest over the past 10 years, which has had an impact on the new recreation facilities built during this time. Over 70% of all new campus recreation centers built in the past 10 years have included a climbing wall.

There are many types of walls and climbing features, including natural and artificial handholds, bouldering walls, and self-belaying ropes. Regardless of the type or height of the wall, the standard of approximately 10 linear ft (3 m) of wall surface per participant is ideal. In addition to the 10 linear ft of wall, it is important to plan for a landing area of 100 square feet (SF) (10 ft × 10 ft) for each climber. Chapter 9, “Climbing Wall Facility Planning,” includes detailed planning standards for rock climbing space.

Safety is the primary concern with these spaces, so proper training and supervision are required at all times for participants. The space should be staffed by no less than two positions, and the area must be zoned so that the space can be closed off completely when supervision is not available.

**Racquetball, Handball, and Squash Courts**

Although not as popular as they were in the 1970s and 1980s, racquetball and squash courts remain a consistent component in recreation centers. New facilities average six racquetball courts (24 by 40 ft [7.3 by 12 m]) and one squash court (21 by 32 ft [6.4 by 9.8]), or approximately 5% of the facility. The demand for these facilities, as with all activity spaces, can range greatly depending on the institution's market conditions and demographics. Please see the appendix and [http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/](http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/) for handball and racquetball dimensions.

A racquetball court can be converted into an international singles squash court. The width of the floor, front wall, back wall, and corresponding lines of the standard international singles squash court must be decreased from 21 ft to 20 ft (6.4 to 6 m), and the width of the short line must be decreased from 10 ft, 6 in. to 10 ft (3.2 to 3 m). Many court systems dealers offer movable wall systems to allow racquetball courts to be converted to squash courts via a manual or automatic movable back wall on a track system.

During construction, the court layouts are typically framed in stud walls or concrete masonry units, but a specialized court manufacturer must install the court system. Court systems typically include the wall systems, standard wood flooring, glass back walls, and storage boxes.

Enclosed sport courts in contemporary recreational centers typically include at least one transparent wall to provide easy visibility and a more open environment. The ceiling height should be 20 ft (6 m) for racquetball and 16 ft (4.9 m) for squash, with lighting levels of at least 50 ft-c at the floor surface. The mechanical system should be sized to accommodate temperatures of 60° to 68° F with 60% or less humidity and 8 to 12 air changes per hour.

**Locker Rooms**

The locker room facilities make up about 7% of a recreation facility, or about half of the spaces allocated for support zone functions. The locker room typically consists of a changing area and a wet area. In facilities with a pool, the user must enter the pool deck directly from the wet area of the locker room. According to B&D's database of existing facilities, recreation centers average one locker for every 15 students. The typical breakdown is two half-height lockers for every one full-height locker. For planning purposes, 3.5 SF (0.33 m²) should be allocated for every half-height locker and 7 SF (0.65 m²) for every full-height locker, and the total space including wet area should be sized at 10 to 20 SF (0.9-1.86 m²) per user.

The locker room areas should be located so that they are convenient to both the free zone and the activity zone, encouraging people to use the locker facility prior to entering the activity zone. The ceiling height should be a minimum of 10 ft (3 m), with lighting levels of at least 50 ft-c at the floor surface. The mechanical system should be sized to accommodate temperatures of 72° to 78° F, with 60% or less humidity and 8 to 12 air changes per hour.
changes per hour in dry areas and 20 to 30 air changes per hour in wet areas.

As with all recreation facilities, indoor activity spaces have a range of users and accordingly a range of standards to respond to. It is important to understand all the general planning standards as well as the detailed dimensional requirements in order to plan and design a facility that meets the particular institution’s specific facility and user requirements.

SUMMARY

Standards for athletic and recreation facilities range greatly on the basis of the user group and the associated governing body requirements. It is essential for an owner or planner to understand the unique characteristics of the specific college or university in order to develop a facility plan that best serves its constituents and its mission. Once you have defined and prioritized the needs and users of your recreation department, the facility planning standards and detailed space requirements included in this chapter will allow you to develop a comprehensive facility plan that is uniquely designed to reinforce campus values, that responds to institutional commitments and responsibilities, and that improves the school’s competitive position in the market.

DEFINITION OF TERMS

Owner Speak

goals and objectives—Detailed targets set by an institution or department, typically intended to help meet the mission.

mind–body fitness—Category of group exercises focusing on strength, flexibility, and relaxation; activities such as yoga, Pilates, and tai chi chuan are typical.

mission—The business with which an institution or department is charged.

programming—The development of student activities, in this case by the recreation department.

recreation—Refreshment of one’s mind or body after work through activity that amuses or stimulates; play.

wellness—The condition of good physical and mental health, especially when maintained by proper diet, exercise, and habits.

Planner, Architect, Contractor Speak

demographic—University student, faculty, staff, and alumni population characteristics. Important data points for recreation planning include student population distributions by age, class, place of current residence, permanent residence, school division, and financial aid. For employees, population distributions are provided for age, employment classification, and zip code. Alumni demographics include year of graduation and current mailing zip code.

detailed space requirements—The portion of the program of architectural requirements that provides the technical data for each space to be included within the building. The descriptions should include the function, location, occupancy dimensions, and specific architectural and engineering requirements for each space.

efficiency factor—The ratio of net assignable area to gross building area, the latter of which consists of net assignable area plus primary and secondary circulation space, mechanical areas, structural elements, and other nonoccupiable spaces such as walls and janitorial closets.

focus groups—A market analysis tool used to engage various groups of university constituents in a casual dialogue about campus priorities and their opinions on existing facilities.

gross square feet (GSF)—The total square footage of a building, including net assignable area plus primary and secondary circulation space, mechanical areas, structural elements, and other nonoccupiable spaces such as walls and janitorial closets.

market analysis—The projection of demand characteristics for a recreation facility through detailed review of enrollment, schedules, peer institutions, and other university-specific conditions.

needs assessment survey—A survey, typically electronic, administered during the early planning phases as a highly effective market analysis tool used to determine utilization patterns.

net assignable area—Space specific to a program or activity as defined by the owner.

nonassignable program element—Project spaces not specified within the program outline, typically including circulation or service spaces that are driven by each unique building
design or local building code. These spaces include entry, public toilets, stairs, hallways, and so on.

**program of architectural requirements**—The document used to convey the owner's requirements for the recreational center to the architect, which should include project objective, design philosophy, location and site requirements, outline program, development budget, functional relationships, detailed space requirements, and outline specifications.
Planning, developing, and implementing a wonderful outdoor recreation experience is not as easy as it used to be. Users are highly demanding; cultural diversity requires differing venues; ground space and project funding are limited; and deadlines loom as though there were no tomorrow.

To help in the planning and designing of beneficial and desirable outdoor facilities, this chapter explores many influences on recreational users and the outdoor spaces they seek. Discussions cover a broad range of outdoor recreation needs in today’s collegiate environment and explore the needs and wants of future users. We also discuss evaluation of potential partnerships, program requirements, and administrative considerations affecting on-campus or near-campus recreation programs. An in-depth analysis of the planning and design aspects for these facilities, site considerations, topography, orientations, fields, courts, trails, and their support facilities will provide a general understanding of the recommended process for achieving a successful outdoor recreation facility. We strongly suggest that an institution considering constructing an outdoor facility retain the services of a landscape architect early in the evaluation process to provide valuable guidance and expertise from initial programming through to implementation of the facility. So, go ahead. It’s a nice day. Get outside and play!

OUTDOOR PROGRAM ELEMENTS

For most collegiate recreation participants, anything goes. As the following random partial list of activities displays, the broad diversity of outdoor recreation programs offered in the collegiate environment today is amazing. Excitement, energy, and unique activities reign supreme.

- Beach volleyball
- Tennis
- Softball
- Flag football
- Blongo ball
- Croquet
- Bocce ball
- Home run derby
- Frisbee golf
- Kickball
- Soccer
- Free throws
- Hot shots
- Basketball
- Baseball
- Pickleball
- Dodgeball
- Floor hockey
- Water polo
- Swim meets
- Ultimate Frisbee
- Volleyball
- Whiffleball
- Archery
- Badminton
- Golf
- Broomball
- Biking
- Bike hike
- Hiking
- Biathlon
- Triathlon
- Field hockey
- Horseshoes
- Scavenger hunt
- Tug-of-war

COLLEGE AND UNIVERSITY RECREATION PROGRAMS

Today’s user of indoor collegiate recreation facilities has seen an enormous expansion of program opportunities and recreation facility space. Owing to this expansion, combined with the growing
interest in outdoor activities, users seek and receive better and more comprehensive outdoor facilities. Recreation directors meet these needs in one of three ways: with student-only recreation programs, internal partnerships, and external partnerships.

Student-only recreation programs take place in on-campus or near-campus facilities used almost exclusively by students. Most of these programs include drop-in recreation, organized recreation, intramurals, sport clubs, and outdoor adventure programs. The outdoor components of the program as a whole (fields, pitches, support buildings, etc.) serve users of each of these programs, with the primary focus being the student. This structure is typically easier to manage than a partnership since there are fewer unique user groups to work with and fewer schedules to work around.

Internal partnerships are often formed with athletic or academic programs. The constituency may include band, cheer, or camp programs; dance; or other similarly diverse partners. As in any partnership, it is vitally important that all parties clearly convey their outdoor space needs early in the architectural programming process. This early evaluation allows consideration of the best joint-use opportunities and provides the best chance for avoidance of conflicts.

External partnerships with off-campus entities and business or community enterprises are frequently more diverse and more complex. There is greater opportunity for a cultural clash between the different constituents, which amplifies the need for clear and concise communication. In these partnerships it is common to engage in written agreements depicting the specific needs for each party. These agreements range from simple letters of understanding to the complex 28E Agreement, which is an agreement with one or more public or private agencies for joint or cooperative action.

External partnerships for outdoor facilities may include the following:

- Community YMCAs and Jewish Community Centers (JCCs)
- Local parks and recreation organizations
- Private developers
- Community sport groups
- For-profit enterprises

IDENTIFYING THE NEED

During planning for outdoor collegiate recreation facilities, an understanding of current college student trends is critical to providing appropriate recreation opportunities for the college students of tomorrow. This planning principle is clearly evident in several sports that have experienced a consistent rate of growth over the past few decades, such as soccer, lacrosse, and cricket. By understanding the current demands of today’s youth, one can achieve appropriate recreation planning for these same individuals as they enter the collegiate realm as young adults. In addition to analyzing recreation trends among college students today, it is important to understand the current demand for particular types of recreation within the specific geographic region of the institution. Geographic location and climate may influence the type and quantity of recreation fields for some institutions.

Understanding the student demographics of the institution is equally important. For instance, colleges and universities with larger ratios of traditional to nontraditional students generally have an increased demand for outdoor recreation opportunities. Cultural diversity of the student body can also influence the type of outdoor recreation facilities needed. Once the types of facilities needed by the students have been established, users or partners of the facility other than students need to be identified. These may include faculty, staff, friends of the college or university, club sports, athletic departments, or the community. Identification of these potential users will establish several parameters for the facility and influence the specific design considerations.

One also needs to consider the differences between intramural recreation, club sports, and varsity sports when establishing the program for an outdoor facility. The frequency, duration, and intensity of facility use for each of these levels of play vary and should be carefully analyzed before the final program is established in order to avoid overbuilding or underbuilding. Several local and regional factors affect use and frequency of use. For example, climate has a significant impact on outdoor court use; basketball is typically offered on almost every campus across the United States, but tennis is more prevalent in the middle to southern regions. How does an institution know if a facility should be provided and how many facilities are needed? Unlike local park and recreation departments, colleges and universities do not have population service standards. Need is based on perceived demand. Identifying the need, number of facilities, and available development resources is a challenge for many departments.
Standards for outdoor recreation facilities vary depending on the level of competition. For colleges and universities, the National Collegiate Athletic Association (NCAA) is the regulatory body that sets standards for competitive facilities. However, most recreation departments require facilities that meet the needs of students, faculty, and staff and are less stringent on regulations. (See the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for a listing of sports and Web sites for the governing bodies.) During the planning phases, the recreation department staff needs to identify the specific user groups and plan accordingly. A joint planning venture between the athletic and recreation departments is a recommended strategy. The recreation department can offer insight into the number of facilities needed to meet the demands of the university students, staff, and faculty. The athletic department can help identify the numbers of courts required for conference, regional, or tournament play. Developing a cohesive partnership can help bring clarity to the standard of play and the number of facilities needed. If in doubt, utilize the NCAA standards on the development of all court facilities.

In many locations, partnering with a local school district or a park and recreation department provides an opportunity for all parties to share costs of the development or the long-term operations and maintenance of the facility. However, each potential partnership must be examined on an individual basis.

**SITE CONSIDERATIONS**

Depending on the size of the institution and the identified need for outdoor recreation facilities, the site selection process can be a daunting task. Completing a comprehensive analysis of all potential sites for facilities is extremely important early in the design process. Specific site considerations such as existing topography, soil conditions, vegetation, natural drainage systems, wetlands, vehicular and pedestrian access and linkages to campus and the community, proximity of major utilities, adjacent land uses and property owners, and available land area for future growth are all important factors to be evaluated during the site selection process. Appropriate evaluation of these and other considerations for potential sites can have a profound impact on the character, initial investment, annual maintenance costs, and overall success of outdoor recreation facilities over time.

The existing topography of potential sites is one of the most important considerations. Generally outdoor recreation facilities, specifically fields and courts, require large areas of relatively flat land. Potential sites with significant topographic variation will require more earthwork or grading to develop flat areas than sites with less topographic variation. Appropriate analysis of topography can provide a significant earthwork cost savings during construction and provide a more accessible facility.

The existing soil of potential sites is also critical to the long-term success of the field once it is constructed. A professionally prepared geotechnical exploration report of the site soils is highly recommended prior to selection of a site. The results will enable informed decisions during the design process related to soil amendments, over-excavations and soil importation, soil permeability, and compaction requirements. Completing a geotechnical exploration report prior to site selection may prevent selection of sites with undesirable soil profiles and could potentially save thousands of dollars in the construction costs of rectifying poor soil conditions.

Analysis of existing vegetation, an understanding of existing drainage systems, and delineation of existing wetlands on potential sites are important to determine possible impacts that the new construction may have on the ecology, water quality, wildlife, and environment as a whole on the local, regional, and global scale.

Traditionally, recreation fields have been an acceptable land use for areas within the 100-year floodplain. However, careful consideration should be given to evaluating field availability, playability, and maintenance impacts due to periodic flood events if recreation fields are constructed within the 100-year floodplain.

In general, chemical fertilizers and pesticides of some type are needed to maintain a healthy stand of natural turf for recreation purposes. The types and amounts of these chemical applications can vary depending on the geographic location, climate, soil conditions, and frequency and duration of use of the field. Determination of the proper type and amount of these applications by a turf grass professional will reduce the annual maintenance costs, minimize chemical leaching into groundwater supplies and aquifers, and reduce runoff into natural drainage systems. Analyzing the existing drainage patterns on a
potential site enables the location and design of recreation fields to prevent water supply contamination from fertilizers and pesticides. Appropriate evaluation of these natural features can promote environmentally responsible decision making during the site selection process, minimize the environmental footprint of a recreation field, enhance field conditions over time, and potentially reduce the cost of construction and maintenance.

Analysis of vehicular and pedestrian access and linkages to outdoor recreation facilities from the campus and the community, coupled with an understanding of the transportation options available to users, is important during the site selection process. This essentially determines the mode in which users will access the outdoor recreation facilities and the type of support elements that need to be included as part of the facility. Institutions fortunate enough to have outdoor recreation facilities directly adjacent to campus and the main residence district may encourage users to access the site through a series of trails and pedestrian linkages. Institutions with outdoor recreation facilities constructed on sites away from campus may have larger parking requirements to allow users to drive to the facility. A general understanding of vehicular and pedestrian access to the site could potentially minimize costly off-site improvements to provide this access. In addition to off-site access, internal circulation patterns need to be analyzed to provide understanding of how users will access the program elements within the facility.

The proximity of major utilities to potential sites is another important factor to consider during the site selection process. Given the large land area required to construct outdoor recreation facilities, the desire to group program elements together to reduce maintenance costs, and the available land area of established institutions, sites for construction can sometimes be located away from campus and considerable distances from major utilities.

Recreation fields typically have some type of irrigation system. If the site conditions do not allow construction of a well or detention/retention lake, a domestic water source will be needed. The amount of irrigation water for a facility can vary depending on the number of irrigated fields, frequency and duration of play on the fields, geographic location of the institution, species of turf grass, and climate. The domestic water utility will also provide a potable water source for users and the service support buildings for the fields. Sanitary sewer utility may be required to service the support buildings as well. Electrical utility is generally required for security lighting, potential field lighting, and service for support buildings. Other utility needs to evaluate during site selection may include chilled water, steam, telephone, cable, and fiber optics. Proper analysis of the proximity of utilities to potential sites can greatly reduce the costs of off-site improvements to bring utility services to the selected site.

One needs to consider the adjacent land uses and property owners during site selection in order to evaluate the appropriateness of outdoor recreation elements in the greater context of the area. One should identify the opportunity for future land acquisitions and expansion of the outdoor recreation facilities as the institution's needs may warrant. Developing an understanding of the institution's future student enrollment projections and demographics can aid in predicting the future need for additional land to expand the facilities. This process of forecasting will enable informed decisions focused not just on the current needs, but also on future needs and trends.

**FIELD DESIGN CONSIDERATIONS**

Recreation fields range in specific design, from natural turf fields on relatively flat land area, graded to sheet drain into an above-ground natural or man-made drainage system, to high-performance natural or synthetic turf fields graded essentially flat with an internal underground drainage system, irrigation system, rigorous maintenance program, permanent or temporary field markings, and lighting. Completing a comprehensive evaluation of the recreation field's needs, coupled with the maintenance capacities of the institution, will provide a general understanding as to the appropriate type or types of fields to construct. In the following we briefly describe benefits and drawbacks to natural turf fields and synthetic turf fields and also provide a basis for determining the appropriate type of field(s) to construct in order to fulfill the recreation needs of an institution.

**Natural Turf**

A healthy and well-maintained natural turf field can provide a playing surface unmatched by
most synthetic turf fields. However, understanding the maintenance resources, knowledge, and capabilities of the institution is one of the most important factors in determining the type of field to be constructed. The ultimate success of any natural turf field over time is largely dependent on the consistent maintenance program for that field. Natural turf fields that will experience frequent usage over extended periods and have little time for recovery are generally constructed and maintained differently than fields that experience moderate usage and have adequate time for recovery. Several elements can be incorporated in the design of a natural turf field that will enhance performance under extreme conditions, including high-performance sports turf seed mixes, irrigation systems, soil amendments, and internal or subsurface drainage systems.

Natural turf fields that experience intense and frequent usage can benefit greatly from installation of irrigation systems that will improve the recovery between usages. Amended soils with subsurface drainage tiles, with or engineered sand seam interceptor systems and subsurface drainage tiles, can also enhance the quality of natural turf fields by increasing the percolation rate of rainwater and irrigation water through the soil profile. This increase in the percolation rate will essentially dry the surface of the playing field more quickly than will be the case for fields without these systems. This can prove to be extremely beneficial during times of intense field usage, such as tournaments or intramural play that coincide with heavy rain events. Through the prevention of excessively saturated soil conditions or standing water at the playing surface during times of intense field usage, damage to the field will be minimized, recovery time of the field will be greatly reduced, and recreation programs will experience fewer game postponements, delays, and cancellations.

Maintenance requirements of natural turf fields can include regular mowing, irrigating, applying fertilizer and pesticide, core aerating, dethatching, weeding, topdressing, overseeding, and other practices specific to the type of turf grass selected. Turf grass professionals can provide valuable input to aid in the selection of the appropriate type of turf grass for a specific field usage, as well as guidance in the proper maintenance program for the field. It is highly recommended that planners seek out the knowledge of a turf grass professional during the design process before selecting the type of natural turf field to be constructed.

**Synthetic Turf**

Although natural turf fields have traditionally been preferred for recreation purposes, recent advancements of synthetic infill turf systems have resulted in a safe, clean, cost-effective alternative for fields that will experience frequent usage, have little or no time for recovery between usages, and experience intense usage in wet conditions. While many different users, specifically soccer players, prefer natural over synthetic turf fields, several synthetic infill turf systems have been approved by the Fédération Internationale de Football Association (FIFA) and other governing bodies.

While construction details of synthetic infill turf systems may vary slightly from manufacturer to manufacturer, the general concept is to create a synthetic turf playing surface composed of a sand and rubber infill layer on top of a turf fiber mat with a base of fine aggregate; a sub-base of coarse aggregate; and a bottom layer of fabric, geo grid, or impermeable liner. A series of perforated drain tiles are installed between this layer and the subbase and then connected to a collector pipe system that outlets into a storm sewer pipe or daylights into an above-ground drainage system. The major benefit is the rapid percolation rate of the turf. Because all natural soil is eliminated from the subsurface of the field, synthetic infill turf systems are able to percolate rainwater through the turf, rubber, sand, and aggregate layers and directly into the perforated tiles much more quickly than natural turf systems with soils. This allows the playing surface to remain relatively dry even during rain events. Other benefits of synthetic turf fields include permanent field markings, essentially unlimited use when combined with field lighting, and reduced maintenance requirements.

One common misconception about synthetic turf fields is that no maintenance is required after installation. While maintenance requirements of synthetic turf fields are significantly less than for natural turf fields, periodic maintenance such as grooming, replacement of infill material, and cleaning of synthetic turf is required. Potential drawbacks of synthetic infill systems include static electricity buildup, increased air temperatures at the playing surface due to heat reflectance of the rubber infill material, and replacement costs associated with damaged areas of synthetic turf. Generally the life expectancy of most synthetic infill turf systems can vary from 5 to 15 years depending on the frequency and
duration of use. Replacement essentially consists of removing the sand and rubber infill material and synthetic turf fiber mat, recompacting and fine-grading the subbase drainage aggregate material, and then placing a new turf fiber mat with sand and rubber infill material.

**Lighting**

The ability to utilize an outdoor recreation facility after dark enables an institution to program more activities on specific recreation fields or courts and thus provide more recreation opportunities to more users with less required land area. Field and court lighting makes this increase possible. Several elements need to be evaluated if field or court lighting is being considered. The location of the facility in relation to adjacent land uses such as residential neighborhoods and parks needs to be evaluated to avoid excessive, undesired, or in some situations illegal light spillage onto adjacent properties. It is also important to consider the type of lighting desired. Do the lighting levels need to be just high enough to illuminate the playing surface for safety or egress purposes after a late afternoon or early evening of play? Or do they need to be high enough to enable people to play competition games in the dark? Is the intention to videotape or televise games?—if so, the appropriate lighting levels will need to be provided. Many lighting manufacturers can provide multiple settings within a field or court lighting system to achieve different lighting levels. It is highly recommended that an institution considering field or court lighting at an outdoor recreation facility retain the services of a certified lighting designer to provide guidance through the planning and implementation process.

**Soccer**

Soccer fields typically require 1.5 to 2.0 acres (0.6-0.8 ha) of land for the pitch or field-of-play boundary and an additional 0.75 to 2.0 acres (0.3-0.8 ha) of land for team and coach areas, playing field clear zones, surface water drainage, spectator seating, and associated support elements. The required land area for these support elements can vary depending on the size and number of fields, anticipated spectator needs, user mode of transportation to the facility, and the type of support elements desired. The specific dimensions and design of a collegiate recreation soccer field can vary depending on available land area, total quantity of needed fields, desired level of play, number of players per team, male versus female users, and available maintenance capacities of the institution. Generally the minimum size of a collegiate recreation soccer field is 210 ft (64 m) wide by 345 ft (105 m) long, and the maximum size is 240 ft (73 m) wide by 360 ft (110 m) long. A regulation goal consists of two vertical posts spaced 24 ft (7.3 m) apart, joined at the top with a crossbar located 8 ft (2.4 m) from the ground. The posts and crossbars are a maximum of 5 in. (12.7 cm) wide and are generally round. These goals may be permanent or temporary and movable. An advantage of temporary movable goals is the ability to shift fields within a designated land area as the center of the field begins to show signs of wear and abuse from high frequency of play. A disadvantage is that temporary goals typically need to be secured with weight devices or in-ground sleeves for durability and safety, which requires additional maintenance resources. The dimensions of the soccer pitch and specific markings may vary slightly depending on the determined soccer pitch size and desired level of play. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for soccer dimensions.

**Lacrosse**

Lacrosse fields require approximately 1.5 acres (0.6 ha) of land for the field-of-play boundary and an additional 0.5 to 1.5 acres (0.2-0.6 ha) of land for team and coach areas, playing field clear zones, surface water drainage, spectator seating, and associated support elements. Lacrosse fields typically fit within the boundary lines of a soccer pitch, and the sharing of field space is recommended if land area does not allow sport-specific fields for recreation purposes and if individual program schedules are flexible in the event of coinciding seasons of play.

Generally a collegiate recreation lacrosse field ranges from 180 ft (55 m) wide by 330 ft (100 m) long to 210 ft (64 m) wide by 420 ft (128 m) long, depending on the use of the field for men’s or women’s teams (or both) and the desired level of play. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for lacrosse dimensions.
**Rugby**

Rugby fields generally require 1.75 to 2.00 acres (0.7-0.8 ha) of land for the field-of-play boundary and an additional 0.75 to 2.0 acres (0.3-0.8 ha) of land for team and coach areas, playing field clear zones, surface water drainage, spectator seating, and associated support elements. Rugby is played on a rectangular-shaped field similar in size to a soccer field, with dimensions of approximately 225 ft (69 m) wide by 330 ft (100 m) long. Because of this size and shape, the sharing of field space is recommended with soccer fields, flag football fields, or lacrosse fields if land area does not allow sport-specific fields for recreation purposes and if individual program schedules are flexible in the event of coinciding seasons of play.

Located at the center of the pitch along the goal lines are the goalposts. These goalposts have an H-shaped structure with two 30 ft (9 m) vertical upright poles spaced 18 ft, 6 in. (5.6 m) apart and a connecting horizontal crossbar positioned 10 ft (3 m) above the ground. The uprights and crossbars are aligned parallel to the vertical plane above the goal lines. The desired level of play or specific club, league, or organizational preferences can influence the dimensions of rugby fields and should be carefully considered when the most appropriate field size for an institution is being determined. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for rugby dimensions.

**Flag Football**

Flag football fields generally require 0.75 to 1.25 acres (0.3-0.5 ha) of land for the field-of-play boundary and an additional 0.25 to 1.0 acres (0.1-0.4 ha) of land for team and coach areas, playing field clear zones, surface water drainage, spectator seating, and associated support elements. Flag football fields can typically fit within the boundary lines of a soccer pitch, and sharing of field space is recommended if land area does not allow sport-specific fields for recreation purposes and if individual program schedules are flexible in the event of coinciding seasons of play.

A collegiate recreation flag football field is typically 120 ft (37 m) wide by 300 ft (91 m) long, including the end zones. Unlike the 100 yd (91 m) between end zones on tackle football fields, end zones on flag football fields have only 80 yd (73 m) between them. These field dimensions can vary depending on available land area and the desired level of play. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for flag football dimensions.

**Cricket**

Playing areas for cricket typically require 1.0 to 1.5 acres (0.4-0.6 ha) of land for the pitch and associated infield and outfield areas and an additional 0.5 to 1.0 acres (0.2-0.4 ha) of land for team and coach areas, playing field clear zones, surface water drainage, spectator seating, and associated support elements. Cricket fields can typically fit within the boundary lines of a soccer pitch, and sharing of field space is recommended if land area does not allow sport-specific fields for recreation purposes and if individual program schedules are flexible in the event of coinciding seasons of play.

The rectangular dimensions of a cricket pitch are approximately 10 ft (3 m) wide by 66 ft (20 m) long for a turf pitch and 6 ft (1.8 m) wide by 58 ft (17.6 m) long for a non-turf or synthetic pitch. These field dimensions can vary depending on available land area and the desired level of play. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for cricket dimensions.

**Field Hockey**

Field hockey fields generally require 1.25 to 1.75 acres (0.5-0.7 ha) of land for the field-of-play boundary and an additional 0.5 to 1.0 acres (0.2-0.4 ha) of land for team and coach areas, playing field clear zones, surface water drainage, spectator seating, and associated support elements. Field hockey fields can typically fit within the boundary lines of a soccer pitch, and sharing of field space is recommended if land area does not allow sport-specific fields for recreation purposes and if individual program schedules are flexible in the event of coinciding seasons of play.

Generally a collegiate recreation field hockey field is 180 ft (55 m) wide by 300 ft (91 m) long. These field dimensions can vary depending on available land area and the desired level of play. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for field hockey dimensions.
Baseball

Baseball fields typically require 2.0 to 4.0 acres (0.8-1.6 ha) of land for the field-of-play boundary and an additional 1.5 to 3.0 acres (0.6-1.2 ha) of land for team and coach areas, warm-up areas, playing field clear zones, surface water drainage, spectator seating, and associated support elements. The specific dimensions and design of a collegiate recreation baseball diamond can vary depending on available land area, total quantity of needed fields, desired level of play, available maintenance capacities of the institution, and the identification of any potential field sharing with other programs.

The size of a collegiate recreation baseball diamond can range from 250 to 330 ft (76 to 100 m) from the apex of home plate to the foul poles, from 275 to 375 ft (84 to 114 m) from the apex of home plate to both the right and the left center field home run fences, and from 300 to 400 ft (91 to 122 m) from the apex of home plate to the center field home run fence.

The orientation of a baseball diamond needs to be carefully considered during the planning process to evaluate the north–south and east–west geographic location of the institution or solar orientation, any prevailing winds, natural and man-made features that may affect the game, and most importantly the safety of hitters, catchers, pitchers, other players, and spectators.

A baseball diamond consists of an infield and an outfield area. The perimeter of the infield area, the boxes (batter’s, catcher’s, and umpire’s boxes), the pitcher’s mound, the on-deck batters’ warm-up circles, and base lines are a skinned surface with a sand subbase, compacted clay and fine limestone aggregate at the surface, and an engineered subsurface drainage system to prevent saturated conditions at the playing surface. The interior area of the infield, as well as the outfield area, is a high-performance turf surface.

The arc of the skinned infield area can have a radius from 90 to 100 ft (27 to 30.5 m) depending on the level of play. The center point of the infield arc is located at the front center control point of the pitcher’s plate. The infield arc is located between the first and third base lines.

Team dugouts, approximately 8 ft wide (2.4 m) and 30 ft (9 m) long, are located on either side of the infield, parallel to and offset from the base lines a minimum of 60 ft (18 m). A backstop is located a minimum of 60 ft from the rear apex of home plate, can vary in height from 12 to 20 ft (3.7 to 6 m), and may or may not have an angled hood at the top to reduce the potential of foul balls leaving the field of play. The length of the taller backstop fencing can vary from diamond to diamond; however, if spectator seating is anticipated behind the backstop, extending the backstop to the edge of the team dugouts is recommended. The fencing outside the team dugouts along the sides of the outfield and the home run fence along the perimeter of the outfield can vary from 4 to 8 ft (1.2 to 2.4 m) in height depending on the desired level of play.

The outfield of the baseball diamond consists of natural or synthetic turf. If intense field usage is anticipated, an engineered internal subsurface drainage system is recommended for natural turf fields to avoid saturated field conditions and soil compaction problems over the life of the field. A warning track, consisting of a limestone material, similar to that of the skinned infield areas and having a width of approximately 10 ft (3 m), is constructed at the perimeter of the outfield, parallel to the entire length of the home run fence. The exact size and configuration of a baseball field’s outfield can vary based on specific program desires, available land area, and other uses that the diamond, specifically the turf outfield, may need to accommodate. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for baseball dimensions.

Softball

Softball fields typically require 1.75 to 2.75 acres (0.7-1.1 ha) of land for the field-of-play boundary and an additional 1.5 to 3.0 acres (0.6-1.2 ha) of land for team and coach areas, warm-up areas, playing field clear zones, surface water drainage, spectator seating, and associated support elements. The specific dimensions and design of a collegiate recreation softball diamond can vary depending on available land area, total quantity of needed fields, desired level of play, available maintenance capacities of the institution, and the identification of any potential field sharing with other programs.

Generally the minimum size of a collegiate recreation softball diamond is 150 ft (46 m) and the maximum size is 315 ft (96 m), a distance measured from the rear apex of home plate to the home run fence. A softball diamond consists of an infield and an outfield area. The infield is an arc area skinned with a sand subbase and a
compacted clay and fine limestone aggregate at the surface with an engineered subsurface drainage system to prevent saturated conditions at the playing surface.

The planning principles related to the appropriate orientation of a softball diamond are similar to those for baseball fields. Refer to the field orientation guidelines in the baseball section of this chapter for more information.

The arc of the skinned infield area can have a radius from 55 to 75 ft (16.7 to 23 m) depending on the level of play. The center point of the infield arc is located at the front center control point of the pitcher’s plate. The infield arc is located between the first and third base lines.

Team dugouts, approximately 8 ft wide (2.4 m) and 30 ft (9 m) long, are located on either side of the infield, parallel to and offset from the base lines a minimum of 25 ft (7.6 m). A backstop is located a minimum of 25 ft from the rear apex of home plate, can vary in height from 12 to 20 ft (3.7 to 6 m), and may or may not have an angled hood at the top to reduce the potential of foul balls leaving the field of play. The length of the taller backstop fencing can vary from 4 to 8 ft (1.2 to 2.4 m) in height depending on the level of play.

The outfield of the softball diamond consists of natural or synthetic turf. If intense field usage is anticipated, an engineered internal subsurface drainage system is recommended for a natural turf field to avoid saturated field conditions and soil compaction problems over the life of the field. A warning track, consisting of a limestone material, similar to that for the skinned infield areas and having a width of approximately 10 ft (3 m), is constructed at the perimeter of the outfield, parallel to the entire length of the home run fence. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportFacilities/ for softball dimensions.

The outfield of a softball field can also function as a flag football field.

Photo courtesy of The Ohio State University Department of Recreational Sports.

COURT DESIGN CONSIDERATIONS

Courts, compared to fields, typically require a higher level of control on the surface, which is integral to the level and quality of play. Whether play is on a grass, clay, or hard surface court, surface stability and consistency are absolute musts. To control the quality of the surface, a higher level of construction is required to offset
natural environmental impacts or tendencies. Isolating the surface from freeze-thaw, expansive soils, or water encroachment is important to sustaining a quality playing surface. Properly understanding and managing topography, hydrology, and soil structure are critical to the overall success of a court system. Isolating the playing surface and providing a sound base are paramount. The greatest tendency for failure in court surfacing results from a poorly compacted base with water encroachment. Both of these issues can be managed during construction if they are considered during planning. During the planning process for court development, a clear understanding of topography and soil conditions is highly recommended. A topographical survey and a geotechnical report at the beginning of the design process provide the design team with a clear understanding of the existing site conditions both at and below grade. A good soils report will provide an understanding of the existing soil types and potential hydrology issues and will include recommendations on the proposed structural makeup of the court surfacing system.

Differential settlement is a major concern when one is planning for and constructing court facilities. When reviewing potential sites, try to limit the development of courts in an area that would require a substantial amount of fill material. In some cases, over-excavation and more structurally sound fill material may be necessary to offset poor soil conditions or grade issues. Reinforced pavement systems including posttension concrete may be required to ensure the integrity of the surface material. Most site challenges can be managed and overcome. Good planning can limit the unforeseen site challenges.

Once the general location and number of courts have been identified, several considerations will affect the layout or design of the facility. Access and vehicular and bicycle parking are important design considerations. Students, faculty, and staff will utilize the facility, and providing an adequate amount of parking is critical. Utilize the local zoning ordinance for assistance with required parking stalls. Providing access for people with disabilities is extremely important. Planners should utilize the Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) to assist in planning for game courts. Environmental considerations, including soil conditions and heat, cold, and wind, should also be carefully evaluated. It is recommended that planners obtain a geotechnical report, which will provide information regarding the soil type and recommended construction considerations to mitigate any potentially poor soil conditions. A large failure of courts is typically due to bad soils or the inability to effectively manage moisture underneath the court. Areas with inclement weather should be evaluated; additional landscape treatments or canopies and wind protection (or both) may be appropriate to shield users from the elements.

It is highly recommended that institutions retain the services of a wetlands and protected species specialist and obtain copies of available historical or archeological records pertaining to the specific site or sites under consideration prior to selecting a site for outdoor recreation facilities. This will provide a comprehensive understanding of the existing environmental conditions of the site and identify any culturally significant assets the site may have that would need to be considered during the planning and development of the site. This will avoid expending unnecessary resources during the early planning stages of a project if the site selected will not accommodate the established recreation program for the facility due to environmental or archeological limitations.

**Tennis**

Tennis courts are standard in dimension. A single tennis court requires 7,200 square feet (SF) (670 m²) with an additional 3,600 square feet (SF) (335 m²) for perimeter circulation and grading. This number will vary based on site constraints and available land. Two side-by-side courts require 12,960 square feet (SF) (1,205 m²) of land with an additional 19,500 square feet (SF) (1,180 m²) for perimeter circulation and grading. Typically courts are organized in pods of twos, threes, or fours. Grouping the courts together in greater numbers provides a cost savings in both the form of development cost and acreage. However, this may not be optimal for coaching and playing satisfaction. When planning for the layout of the courts if they will be used by athletics, planners should consult with the college or university tennis coach and discuss the pros and cons for alignment. The cost savings should be weighed against the quality of play and the ability to view the play and to coach the participant. Additional supporting amenities including spectator seating, vehicular parking, vehicular and pedestrian access, rest rooms, concessions, player access, and emergency and maintenance access are all
considerations for the layout of the facility, as they will require both space and a level of programming. The required land area for these support elements can vary depending on the size and number of courts, anticipated spectator needs, user mode of transportation to the facility, and the types of support elements desired.

As already mentioned, available surfacing systems vary from grass to red and green clay to hard courts. For the selection of a surface material, performance, resistance, comfort, and maintenance are typical design considerations. In the United States, most college and universities are constructing asphalt or concrete courts with a sealer and a coat of special paint. The paint provides color and has a specific mixture of sand that will modify the speed of play according to the anticipated level of play.

Fencing options also vary, ranging from galvanized systems to vinyl-coated systems. Cost, maintenance, and aesthetics are all design considerations. When selecting the fence type, planners should first evaluate the need for a backboard, wind netting, location, size, number of gates, and fence height. The standard fence height is typically 10 to 12 ft (3.7 m). Gating systems within the fence should be designed to provide managed access for players and maintenance and emergency access.

The tennis nets and post system can be a permanent or a semipermanent installation. Semipermanent systems allow the tennis court to be used for floor hockey or other activities to provide for a more versatile sporting space.

Tennis serving backboards, made of materials ranging from wood to steel, come in a variety of sizes and are constructed in many ways. Durability and sound-deadening materials are typical considerations in planning for a backboard. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for tennis dimensions.

Basketball
Basketball courts can be developed in a variety of sizes, from mini-courts to half-courts to full-length courts. In general terms, mini-courts and half-courts require approximately 1,800 square feet (SF) (165 m²) and an additional 2,160 square feet (SF) (200 m²) for perimeter circulation and grading. This number will vary based on site constraints and available land (see diagram of mini- and half-courts). A full-length court at high school and college regulation size requires 5,640 square feet (SF) (525 m²) and an additional 2,820 square feet (SF) (260 m²) for perimeter circulation and grading. Supporting amenities including spectator seating, vehicular and bike access and parking, shade structures, and access to water should be considered in the identification of a site for court development. Other design considerations may include the proximity to student and faculty housing, lighting, and emergency and maintenance access.

Surfacing systems range from hard court to cushioned court systems. Most public basketball courts are constructed hard court systems that use asphalt or concrete. Soil condition and grade are major site considerations; most sport pavement systems fail because of improper compaction prior to court installation.

Basketball poles, backboards, and hoops are available in a variety of systems from adjustable to stationary. Durability and flexibility are becoming more prevalent in adjustable and nonadjustable
systems, and they are a primary concern when the court is to be placed in a public setting. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for basketball dimensions.

**Beach Volleyball**

Beach volleyball courts are a standard playing size, but the perimeter area around the playing court can vary. The courts are 30 ft by 60 ft (9.1 by 18 m) with a perimeter of approximately 10 ft (3 m). These dimensions require a minimum of 4,000 square feet (SF) (370 m²). For planning purposes, an additional 2,000 square feet (SF) (185 m²) should be provided for perimeter circulation and grading.

Locating beach volleyball courts should entail a number of design considerations, including topography, drainage, soil types, and wind buffering. A well-drained, wind-protected location is recommended. Orienting the courts north–south is also recommended unless there are prevailing winds; in this case the court should be aligned perpendicular to the winds. Other beach volleyball court recommendations include a minimum sand depth of 18 in. (46 cm), masonry-type or a similar sand (subject to site-specific wind conditions), subsurface drainage system, and minimum wood post size of 6 in. by 8 in. (15 by 20 cm) by 14 ft (4.3 m) high. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for volleyball dimensions.

**Bocce Ball**

Bocce ball courts do not have standard dimensions. They can vary in length and width but are approximately 12 ft by 60 ft (3.7 by 18 m). The maximum size of a single bocce ball court requires approximately 1,300 square feet (SF) (120 m²). For planning purposes, an additional 600 square feet (SF) (55 m²) for perimeter circulation and grading may be required. The side boards surrounding the outside of the court should be approximately 1 ft, 6 in. (0.5 m) tall. The recommended surfacing is a clean masonry sand with a compacted subgrade. Providing a well-drained site with shade and seating is an important design consideration in planning. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for bocce ball dimensions.

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Beach volleyball courts have many design considerations, such as topography, drainage, soil types, and wind buffering. Photo courtesy of The Ohio State University Department of Recreational Sports.
Badminton

Badminton courts are standard in dimensions, 20 ft by 44 ft (6 by 13.4 m), requiring 880 square feet (SF) (82 m²) of land. For planning purposes, an additional 440 square feet (SF) (41 m²) for perimeter circulation and grading is needed. This number will vary based on site constraints and land availability. Outdoor badminton facilities are typically grass or paved surfaces. Planners should provide a location that is moderately sheltered from prevailing winds. Shelter and seating are also amenities that are well suited to court development. Please see the appendix and http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/ for badminton dimensions.

SIDEWALKS AND TRAILS

A comprehensive pedestrian circulation system utilizing both sidewalks and trails is an integral part of the campus environment serving students, faculty, staff, and visitors. Sidewalks and trails can be utilized for transit, exploration, learning, socializing, and recreation for system users at their own leisure. A well-planned circulation system provides multiple safe and accessible recreational opportunities to persons with varying levels of physical abilities. Developing a well-connected network of sidewalks and trails within the context of the campus and the community will ensure a stronger sense of place and a more cohesive campus environment.

Trends

While planning for a pedestrian circulation system, staff and design professionals need to work closely with regional, local, and campus leaders to plan for a more comprehensive trail system that goes beyond simply providing circulation within the facility and links the facility to city-wide, county-wide, state-wide, and even regional or national trail systems. The circulation system can afford important connections to both on- and off-campus destinations. A well-planned system can also provide a diverse experience to trail users taking various types of trails throughout the campus and the surrounding community. Focused planning for an integral pedestrian circulation system utilizing both trails and sidewalks will bring balance, flexibility, and diversity to the campus network.

Standards and Regulations

A diverse campus circulation system utilizes a variety of pathway types. Pathways vary from narrow sidewalks between buildings to major pedestrian gateway corridors, and from shared-road bicycle corridors to independent multiuse trails. In discussing this complex circulation system, we organize the pedestrian system into two areas of focus: sidewalk and trails.

Shared Corridors

Shared road corridors are signed (numbered and mapped) bicycle routes designating suggested on-street bikeway routes in which bicyclists and vehicles share the same travel lanes. Bicycle lanes are signed and striped on-street bike routes on either or both sides of the street, one way in the same direction as the vehicular traffic on the respective side of the street and separate from the vehicular travel lanes. Side paths are multiuse pathways, paralleling roadways, within a street on one side of the roadway. A narrower pathway or sidewalk on both sides of the roadway within the street right-of-way is optional to provide pedestrian access on either side of the roadway.

Sidewalks and trails, much like the rest of the built environment, are governed by local, state, and national standards and guidelines. Before planning efforts begin, the design team should review local, state, and national design guidelines regarding sidewalk and trail development. The following are resources for national standards or guidelines:

- American Association of State Highway and Transportation Officials (AASHTO): Provides guidelines for public right-of-way, including the Share the Road trail classification.

Design Considerations

Several design considerations enter into planning for sidewalks and trails. Before design begins, one must develop an understanding of who will use the pathway and what primary role the pathway serves. A defined trail and the issue of whether its primary role is for recreation or transit is an example. Commuters tend to travel at higher speeds than recreation bike travelers, and speed will influence trail widths, radius, and degree of
slope recommended on a trail alignment. The higher the speeds allowed, the larger the turning radii must be. In contrast, if recreation is the primary purpose of the trail users, a meandering trail is potentially more appropriate. Other design considerations include grade or slope of the trail, cross slope of the trail, environmental conditions, safety and security, trail head or access locations, trail rest stations, bicycle parking, directional and way-finding signage, and educational and interpretive signage.

**Construction**

Pathway surfacing varies depending on the type of use, frequency of use, and location. Concrete is the typical surface of choice for sidewalks. Concrete or asphalt (or both) is typically used for trail development. There are many other choices of surfacing based on affordability, aesthetics, and accessibility desires for the particular trail system.

**SUPPORT BUILDINGS AND FACILITIES**

Being outside is wonderful unless one is overly cold or wet or exposed to danger. Proper support facilities enhance outdoor experience by providing storage for gear, shelter from the elements, and refuge during a storm. Sound planning for outdoor venues will likely always include some component of indoor facilities or suitably protected outdoor emergency shelters. Proper planning allows people to fully enjoy spaces that have been created in the out-of-doors.

Location, location, location! Support facilities should be positioned in places where they create benefit for the fields and pitches. Properly created buildings and canopies shade, protect, and fully support outdoor spaces and functions. Storage areas should be located as near as possible to places where the stored materials will be used. Routes of travel (sidewalks, pathways, etc.) between the support buildings and the fields of play should be clear and “concise.” Users will appreciate a highly functioning facility.

**Programming Considerations**

As the famous architect said, form follows function. This is especially true for outdoor support facilities with budgets that are typically slim and buildings that are secondary to activities they support. Buildings should sustain the activities they serve. Keep them efficient in layout and useful in service. Make them user friendly so that they encourage active use.

Avoid overgeneralization. When you craft an architectural program for a support building, make certain that you have clear knowledge of who will use the building and what activities it will support. This is a time to be specific. Architectural programming is a bit like playing Twenty Questions. Ask yourself how the college students will get to the facility from their student housing. Will they walk, take a bike, or ride in a car? Will they travel on pavement, or will they tear up your valuable turf? What will they bring with them to the site? Where will people put their backpacks when it is raining or when the ground is muddy? Put yourself in the place of the user and walk through every arrival activity you can think of.

**Design Considerations**

This is where your heart can soar! Good building design is always an artistic expression, reflective of the passion you have for the activities within. Buildings that support outdoor endeavors are frequently free of encumbrances characteristic of more typical indoor facilities. Outdoor pavilions may be free of walls, simply providing a wonderful shaded environment for the users. Storage facilities can be dramatic backdrops for outdoor recreation fields and can be molded into almost any geometric shape. Concession stands can be dowdy plywood boxes or can be wonderful places, fully expressive of the school’s identity or the state’s economy. Go ahead, live on the edge and create a wonderful place to be.

**Safety**

Everyone expects a safe place to recreate. The early design phase of a project provides opportunity to explore the safety of the facility from the ground up. Your support buildings provide sanctuary from the elements and create a logical home for first aid equipment. At a large outdoor recreation venue, your staff should be able to observe the fields from the support buildings, be armed with telecommunications, have access to weather forecasts, be able to hear lightning warning alarms, and have immediate access to necessary first aid equipment.

Safety doesn’t stop at the support building, and there are many other important questions to ask.
How much lighting is required at night? How will users make their way from the recreation field back to the edge of campus? How many dark corners are created with the simple geometry of the design? Will the design lend itself to developing space that is passively safe, such that there is no need for special alarms or motion sensors, for example? If required, where have you placed emergency beacons and intercoms?

Outdoor support buildings are frequently secondary to outdoor fields of play. They have a tendency to fall into the category of “Oh, that will be good enough.” But will it really be good enough?

Make certain that you retain enough of your budget to craft a proper support facility. Request that this facility be as significant as your indoor facilities, capable of properly supporting your staff’s and the users’ needs. Most outdoor support buildings don’t need air conditioning, but they should be adequately ventilated so that the space is properly conditioned for human occupancy and there is a proper place for equipment storage. Make sure that the building design keeps water, moisture, and rodents outside.

**Critical Design Issues**

- **Universal design for accessibility.** How are you accomplishing this? Think clearly about how people of all abilities arrive at, use, and depart from your facilities. Proper accessible design speaks to creating a desirable environment for everyone, regardless of capabilities or impairments.
• **Seasonal use or not?** Many buildings for outdoor venues are seasonal, used in only two or three seasons of the year. In colder climates, these buildings must be winterized and shut down or maintained with costly heat and utilities to avoid freezing. The decision to winterize must be rendered in the design phase so you can plan the building for special foundations, drainable plumbing lines, special fixtures, freeze-proof materials, and proper construction detailing. Just imagine that you had to stand still, in one place, with no heat, all winter.

• **Wind direction.** Are you creating a wind break or a wind tunnel? Cold wintry winds can be the nemesis of outdoor recreational play. Learn what direction the winter winds come from at your building site. Evaluate your property to leverage natural windbreaks like hills, slopes, or tree lines, and decide where to create new ones with buildings, fences, or plantings.

• **Drainage.** Keep the water out of your facility. As with playing fields, you must properly divert flow and runoff of water to keep it from entering your buildings. Place your buildings in dry areas or sculpt the land to properly divert water around it. Direct roof drainage to avoid staining or flooding of sidewalks and pathways by diverting it in pipes or swales away from the building and public areas.

**Maintenance**

Just as with indoor facilities, users have a high standard for maintenance and upkeep. They expect great facilities, indoors and out. They expect a lot from you.

Support buildings are the logical host for maintenance equipment and resources. Plan accordingly. Craft your building for equipment repair and maintenance (desk, work bench, tool storage, file cabinets) and for the equip-

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**Ten Issues to Avoid**

1. **Building in a flood plain.** Many recreation fields, pitches, and support facilities are located in flood plains, but this situation requires special care and attention. Avoid building in a flood plain if possible because this limits seasons and requires expensive and complex building solutions.

2. **Poor long-range vision.** Make certain that you envision highly functioning and beneficial outdoor support buildings. Craft them so that they enhance the outdoor recreation experience. Build them so that they support and inspire high use.

3. **Inadequate budget.** Support buildings can cost as much or more per square foot as larger indoor recreation facilities. They are frequently burdened with inefficient footprints, poor skin-to-floor area ratios, and poor proximity to utilities.

4. **Bad planning.** It takes hard work and proper insight to plan a great facility. Make sure you work diligently to determine your space needs and continually seek better design solutions. Ask yourself an endless series of questions about the program needs and the pending design. Query, brainstorm, and collaborate.

5. **Poor proximity.** A great design or well-conceived program cannot overcome bad proximity. Make certain that your support spaces are well arranged for ease of access and beneficial use. Make certain that facilities are in the right locations and that they have great use access. Seek the best address you can afford.

6. **Inadequate support facilities.** Great facilities are backed up with great support facilities, great staff, and proper resources. Plan accordingly.

7. **Bad listening.** During your planning efforts you will hear many opinions, requests, demands, and concerns. Listen to them all. Actively listen, brainstorm, and problem solve your way to the best possible solutions. Do not ignore your constituents.

8. **Poor materials.** Outdoor support buildings are subject to more abuse and neglect than many buildings. They “stand guard” at distant outposts, season after season, enduring the cold ravages of winter and the sweltering heat of midsummer. Repairs are often neglected, and these buildings frequently populate lists for deferred maintenance budgets. Make certain that you create well-detailed buildings, using high-quality materials suitable for years of service.

9. **Overgeneralization.** Detail is good. Be specific in your intent and focused in your planning.

10. **Neglect of users.** In your planning work, do not forget the client, the end user. Keep constant tabs on what is necessary to properly support users’ connectivity to your programs. Provide spaces and facilities that keep them coming back for more.
ment itself (tractors, mower decks, aerators, power tools, hand tools, etc.). Proper access to these spaces can require a great deal of square footage.

Provide suitable dry storage for supplies (fertilizers, lime, chalk, spray paints, fuels, etc.) while paying close attention to local building codes that restrict the amounts of flammable materials and supplies allowed within an indoor environment. The building design can accommodate fire-rated walls and proper roof–ceiling assemblies to help keep the storage area proximate to the support staff.

Carefully consider the needs of staff and workers who will carry out the maintenance duties. What tools, supplies, or other resources will they need? Locate the janitor’s closets and maintenance rooms close to the areas they serve. This will reduce travel time and increase the operational efficiency of the staff.

**Operation**

Support facilities need to be well planned to allow highly efficient operation. And like the users who recreate in facilities, staff have high standards for the spaces they use. When a support building includes space for staff members, make certain to plan for their many needs.

- Where will staff secure their purses, backpacks, or laptops?
- Will staff have stationary work surfaces, or will they always be on the go?
- How will staff stay in touch with the main recreation building?
- Will the facility have full computer access, complete with printing?
- How and where will staff secure cash boxes?
- What point of sale devices and protocol will be used?
- What resources will staff have for emergency situations?
- Where will staff bathroom facilities be, and where will staff take a break?

Placing the support building in a centralized location will yield many benefits, including easy visual contact to the users, proximity to the outdoor recreation area, and centralized access to adjacent facilities (toilets, storage, equipment issue, etc.). Providing working space for multiple employees will allow ramping up for busy times of the day and decreasing the number of employees during the slower time periods.

**SUMMARY**

Planning for and constructing outdoor recreation facilities can be exciting and challenging for a college or university. Understanding the difference between user needs and wants is critical, and developing an appropriate program early in the design process in order for the facility to meet the needs of the institution will ultimately determine the success of the facility once it is implemented. It is highly recommended that an institution considering the construction of an outdoor recreation facility retain the services of a landscape architect early in the evaluation process to provide valuable guidance and expertise from initial programming through to implementation of the facility.
This chapter explores the various options for indoor and outdoor aquatic recreation that are available to the owner, user, architect and designer, and construction manager. We also discuss how to determine which option is right for a specific user and what the unique considerations are for each option. In the context of this discussion, **poolscape** refers to all exterior pools inside a safety barrier formed by components such as fences, walls, or the exterior of a building. A **natatorium** is a room enclosure containing one or more pools and attached to a number of support spaces.

**PROGRAMMING REQUIREMENTS**

Throughout most of the twentieth century, publically funded swimming facilities were driven by a single programming demand: wet recreation. In Europe, and later in the United States, it was also considered desirable to provide opportunities to instruct the population in water survival techniques. Swimming instruction evolved into competitions, and it was the requirements of these programs that shaped the design of swimming pools of that era.

Public swimming pools were typically rectangular, 25 or 50 yd (or 25 or 50 m) in length, and six to eight swimming lanes wide. Diving boards, usually 1 and 3 m, were provided at the deep end or in a separate diving tank. A narrow concrete deck surrounded the pools, and a chain link fence provided security for outdoor pools. Patrons entering the facility usually did so through the locker area of a bathhouse. Since there were few other options available to recreational users, these rectangular pools were popular attractions, and most of the municipalities that provided them subsidized their construction and operation as well as other public entitlements such as schools, libraries, and public transportation.

The popularity of these older facilities has waned, however, over the last few decades. Some erosion of attendance occurred as air-conditioning became commonplace, trumping one of the main motivations for people in warmer climates as they sought refuge from midsummer heat. The introduction of commercial water parks gave the population seeking recreational aquatics a much different and more exciting alternative. As water parks were introduced into regions, recreational attendance at traditional public pools began to decrease. Rather than appealing only to a narrow group of users, water parks had something for the whole family.

Zero-depth entry was an easy way for everyone to enter the pool, with the water gradating gradually to deeper water as on a beach. Water parks also provided an attractive gathering spot where parents could watch tiny tots and young children splash about in the shallow water while older children enjoyed nearby participatory play features. Teens found the water parks thrilling, with features like wave pools and towering chutes and slides. Even older adults enjoyed these parks; features such as lazy rivers and wide expanses of deck space were more conducive to socializing and relaxing than were the deep waters and crowded, narrow decks of the traditional public pools.

The municipal pools, which were heavily subsidized with nominal entrance fees even in their height of popularity, became even greater drains on public funds as attendance dwindled and operating and maintenance expenses of aging structures increased. At the same time, tighter
fiscal budgets made many operators consider subsidizing these facilities with increasingly critical views, resulting in a change of program to meet today’s aquatic needs.

Public aquatic centers today merge the best features of public pools and commercial water parks to offset escalating taxes coupled with a reduction in tax bases. They succeed in creating an adventurous ambience while segregating creative water play areas for various age groups. Safe and friendly municipal facilities with plentiful shade areas invite residents to use zero-depth entry pools, waterslides, and other fun attractions on a daily basis while charging higher admittance fees than their predecessors. Residents eagerly return year after year to slide down the thrilling new waterslide or climb the new water play structure in their own community. The recreation value is designed to accommodate the desire of today’s family to fulfill the “stay together and play together” ideal as opposed to the scenario in which parents dropped the kids off at the pool.

The development of campus leisure pools represents a changing facet of the recreation scene at colleges and universities. School officials and the university provost have been taking a long, critical look when replacing an aging pool, studying the substantial costs associated with a facility that supports a small portion of the student body. The shifting emphasis from facilities designed specifically for select, elite student athletes to facilities that accommodate the general student body possibly started with the 1972 Title IX legislation, which mandated equal facilities and opportunities for male and female collegiate athletes. Schools are now gravitating toward facilities where all students can enjoy swimming, including Americans with Disabilities Act (ADA) populations. Moreover, these facilities, offering students a place on campus to pursue exercise, leisure experiences, and recreation opportunities, have proven to be populated showpieces and a recruitment tool. A major clientele benefit of school recreation pools is the quadrennial turnover; thus, schools are always getting new “clients” for whom the leisure pool remains a fresh experience.

Determining Programming Needs

College leisure pools typically do not include waterslides or other “kiddie” features found in water parks and community aquatic centers; instead, students are more interested in fitness and socializing. Because fitness swimming
remains one of the most popular forms of exercise among students and faculty, lap lanes are popular. Adult play features consist of large spas, underwater bubble benches, current channels, and open space.

In practice, the challenge of determining appropriate programming requirements for a specific project is best met through a detailed study of the student body's desires. This information is usually derived from work with a project steering committee composed of various representatives from potential user groups—swim teams, lesson users, recreation swimmers, wellness and therapy users, and other groups with an interest in the type of facility being considered.

Typically, a design team assists in this process by interpreting requirements and suggesting various design options with features and systems that will achieve the desired objectives. This process usually takes place through a series of workshops in which the design team may meet with the steering committee and various interest groups to review specific needs and priorities of the project. These workshops may be completed in a day or in multiple meetings until a consensus is reached that will become the basis for the concept design.

### Potential Users and Facility Requirements

Generally, contemporary aquatic design and programming serve five defined user groups: competition, recreational and leisure, lessons and instructional, fitness and wellness, and therapeutic users. Each of these groups views certain facility characteristics as ideal for its activities. If designed appropriately, an aquatic facility can accommodate all user groups, though compromises usually must be made for minimum construction and maintenance costs, creating a flexible and functional facility to maximize efficient use.

### Competition Aquatics

Competition venues can have different sizes and configurations depending on the level of competition the facility expects to attract. At minimum, a **competition pool** must be 25 yd by six lanes (45 ft or 13.7 m) for short-course events and 50 m by eight lanes (25 yd or m) for long-course competitions. Many current standards require a minimum depth of over 5 ft (1.5 m) for starting block dives and a minimum of 4 ft (1.2 m) for flip turns. Water temperature at 78° to 82° F is...
ideal for training, competition, and water polo, although a few degrees warmer is acceptable in multiuse pools.

Other components of a competition venue may include the following:

- Warm-up and cool-down tank
- Diving tank
- Diving boards and platforms (1 and 3 m boards and 1, 3, 5, 7.5, and 10 m platforms)

- Spectator seating
- Wet and dry meeting rooms
- Automatic timing systems

### Recreational and Leisure Aquatics

The most obvious characteristics of a *recreational pool* (also known as a leisure pool) are the free-form dimensions of the pool tank, generally shallower water depths than in competition
Aquatic Facilities

pools, wider deck areas, and attractive recreation features. Entrance to an outdoor pool and deck is usually provided directly through a reception area without the uninviting detour through the locker areas typical of older pools. Fences are usually farther away from the deck to provide a more open feeling, while grassy areas and other landscaped plantings within the enclosure complement the wider decks to promote a relaxing environment. Indoors, these generous leisure spaces are scaled back to minimize air volume that requires treatment as well as higher construction costs. Water temperatures in an indoor leisure pool are usually maintained in the 82° to 86° F range, considerably warmer than in a competition pool.

Contemporary leisure aquatic poolscapes and natatoria (plural of “natatorium”) come in many different shapes and sizes, depending on expected user volume, programming requirements, and the age mix of users. To accommodate competitive, fitness, and lap swimming in a leisure pool, designers provide a rectangular course either as a stand-alone tank or incorporated into the free-form design of the recreational body of water.

These are other common features of leisure aquatic facilities, indoor or outdoor:

- Zero-depth entry—a beach-like entry to the main body of water where depth begins at zero and gradates to a maximum depth of 3.5 ft (1 m).
- Participatory play features—large, colorful “wet playground” structures that provide climbing opportunity as well as a variety of operating valves, sprays, and slides that give young children opportunities for hands-on play. Often these are signature structures, complementing the overall theme of the facility.
- Waterslides—vertical-drop features ranging from enclosed to open and from straight drop to corkscrew, in a variety of heights and “thrill” categories.
- Current channels—slow-moving flows of water through narrow passages, simulating a lazy stream. These can be part of the main body of water or a separate entity, often traversing the perimeter of the deck area.
- Tumble buckets—overhead containers that fill and randomly release water.
- Lily pad walks—tethered, floating foam forms that create a “water walk” across a pool.
• Sun-relief structures—large umbrellas or other structures that provide respite from the sun and also serve as gathering spots for socialization.
• Wave pools—separate or incorporated bodies of water where waves are generated mechanically on a periodic basis.

In addition to student fees, revenue can be obtained if pool time is rented during less attractive time slots: Fridays after 10 p.m., Saturdays between 6 and 8 p.m., and early on Sunday mornings. Many student groups (e.g., fraternities and sororities) often snap up the night spots.

Lessons and Instructional Aquatics
Whereas competitive swimmers must have specific pool dimensions for swim meets, lessons and instructional aquatic users are more concerned with water temperature and depth. Still, certain conditions that enhance the environment for these activities may be desirable if priorities allow. Ideally, water depth for instruction should be such that young participants can stand comfortably. Recreational pools easily accommodate this preference. Deeper competition pools can have movable floors or other means of altering water depth for instructional purposes. Water temperatures in recreational pools (82°-86° F range) are compatible with use for instruction.

Fitness and Wellness Aquatics
Programming emphasizing fitness includes lap swimming, aqua jogging, deep-water aerobics, and scuba instruction that take place in a competitive pool, which frees up the leisure pool for students who want to use the play features and swim socially. To accommodate class schedules, fitness classes are typically offered in the morning, at lunchtime, and in the early evening. Water depths for wellness programming vary from waist deep for certain water aerobic exercises to deeper waters for water treading workouts. Water temperatures in recreational pools (82°-86° F range) are compatible with use for wellness.

Therapeutic Aquatics
Aquatic therapy, rehabilitation performed in warm water, involves physical activity of exercise and motion in the presence of an aquatic therapist, sometimes referred to as an aquatic therapy provider. Though many people who use aquatic therapy are enthusiasts of meditation or massage, some are looking for rehabilitating, improving, or maintaining a certain level of health. Aqua therapy is typically provided by licensed professionals in a therapeutic pool dedicated to therapeutic use with warm water in the 88° to 92° F range.

Common Spaces
Other spaces will need to be created regardless of programming requirements. These include reception areas; administrative spaces; snack bars or vending areas; locker and shower areas; meeting rooms; and systems, operations, and equipment storage areas. While the purpose of this chapter is to discuss aquatic facility design, in practice these facilities are rarely stand-alone attractions. Rather, aquatic facilities are often combined with gymnasiums, community meeting spaces, fitness theaters, group exercise studios, and other spaces to create a multipurpose recreation center. Most of these common areas are typically found in the “dry side” of the facility. An exception is the storage and mechanical areas required for water recirculation and sanitation, discussed in more detail later in this chapter.

Circulation
Certain adjacencies and circulation patterns are necessary or desirable for efficient operation and a pleasurable experience of users. One of the most significant improvements in contemporary aquatic center design is the way patrons enter. Gone are the forced treks through dark and damp locker rooms, shower areas, and foot baths. Instead, contemporary designs lead guests directly from a reception area to the concrete deck area surrounding the pool, creating a much more positive initial impression.

The bathhouse with dressing rooms should open onto the pool deck near the shallow end of the pool. This is typically the area of zero-depth entry and participatory play elements in a leisure facility or in the shallow end opposite the diving well in a competition pool. In a high-level deep-water competition pool, other design considerations will determine these relationships.

Deck
Spacious decks in outdoor aquatic leisure poolscapes allow greater spaces for socializing, sunning, and avoiding sun exposure under sun-relief structures such as large shade umbrellas. In natatorium environments, the designer must be more conservative with building costs and
air-handling costs that increase exponentially with every additional cubic foot of volume. In competition facilities, adequate deck space must allow not only for the physical space needed for spectator seating but also for line-of-sight requirements. Seating is best placed along the length of the course.

**DESIGN AND CONSTRUCTION PROCESS**

The process that leads from programming requirements to a completed project includes several distinct stages, each a necessary stone in the foundation upon which the next stage is constructed. Participants in the process at various stages include the steering committee; the design team consisting of professional architects and engineers; and the construction team, including the general contractor or construction manager and various subcontractors. Additionally, a project manager usually represents the interests of the owner in the process.

Once the project steering committee has reached consensus on a program of spaces for users, the design team can begin to develop concepts along with opinions of probable cost. The concept stage frequently includes two or three graphic studies, and the committee may request additional drawings to explore a wider range of options.

**Conceptual drawings** show the spaces required by the major programming elements, the adjacencies, and necessary support spaces. These one-dimensional drawings provide a rough suggestion of what different design approaches might look like. The design team typically provides associated opinions of probable cost for the creation of different concepts for the steering committee to consider in choosing the final concept.

Cost of construction, though, is only part of the information that the committee will need when making a well-informed decision. Whether provided by the design team, a third-party consultant, or other sources, a complete analysis of the proposed project should include a total evaluation of factors that will affect the project’s economic viability, including the following:

- Market demographics
- Evaluation of other existing area programming providers
- Revenue and expense projections
- Total project cost projections (construction, loose equipment, land acquisition, site development, professional fees, contingencies, etc.)

Parties should clearly understand these factors when deliberating among various concepts, as they could affect decisions and modifications later in the process when changes become more costly to enact.

Once a concept has been identified, with or without modifications, schematic designs are created. These are more detailed, site-specific refinements of the chosen concept consisting of two-dimensional drawings of space layout and adjacencies. They identify more specifically the various amenities and elements of the proposed facility.

Upon approval of the schematic design, the process moves to the **design development** phase. The design development documents include all confirmed basic design decisions with preliminary design drawings and outline specifications, which describe specific systems. These documents answer all the questions that must be resolved for the development of the project and are used to confirm that projected construction costs are within budget or updated if necessary. It is especially important that the steering committee work closely with the design team throughout this phase to minimize wasted development time and additional costs due to misunderstandings or new considerations.

Following approval of the design drawings and outline specifications, **construction documents** provide detailed drawings and specifications to be used by the contractor during construction. These include all the technical documents for the drawings and specifications that, when approved, will be used as bid documents during the advertisement for bidders and the bidding process. Once a contractor is selected and under contract, the **construction phase** (building phase) commences with construction administration. The design team observes the contractor completing the work to make certain that installations are meeting the intent of the design. Upon completion of construction and owner acceptance, the project enters the **warranty phase**. This is typically a guarantee of one year for workmanship and of multiple years for equipment and systems.

**Unique Design Challenges**

Perhaps the single greatest challenge in poolscape or natatorium design is in the creation of
an affordable, long-life structure that supports the programming requirements of the many and varied user groups. More specifically, design challenges unique to these types of assets include site selection, soil conditions, codes, and conservation.

Site Selection, Access, and Parking
A study of the potential sites available, as well as the demographics of the region, will influence the selection of a suitable location for the aquatic center. Frequency of attendance decreases as the travel distance increases. These distances vary depending upon the experience and expectations of residents and traffic conditions of various regions, but the greatest percentage of visitors to a leisure aquatic facility will be drawn from a 5-mile (8 km) radius. This market size may increase for recreation swimmers, depending upon the relative attractiveness of the facility. Unlike recreation swimmers, whose attendance is usually occasional, competition and fitness swimmers are often daily users and may be less willing to drive longer distances when another suitable training facility is more convenient. Age and expendable income demographics also contribute to attendance; thus, the facility ideally should be located in a market where these factors are favorable.

Visibility from major thoroughfares is considered beneficial to marketing outdoor leisure poolscapes but is less of a factor for competition venues and natatoria. Traffic patterns at the proposed site should be studied to ensure that additional traffic created by the attraction will not lead to problems. Site conditions such as slope, soil conditions, surface runoff, and water table will affect construction costs and should be considered in site selection, as should availability of utilities such as potable water, electricity, and sewer systems.

Parking is usually dictated by local ordinances and codes, and the requirements are similar to those for municipal or educational buildings. Storm water pollution from paved area runoff is increasingly a concern in certain parts of the country. In some cases, codes are calling for on-site detention of this water before it discharges into the storm sewer. In some experimental projects, these detention ponds are landscaped to create a “wet pond,” a kind of man-made marsh constructed and planted to filter out the first flush of pollutants from runoff.

Security systems are also dictated by code and industry standards. Because of the attractiveness of aquatic facilities and the potential for injury, it is important to create effective authorization...
check systems during hours of operation. Also important are appropriate barriers and warning systems sufficient to prevent or alert in case of unauthorized entry into the poolscape or natatorium when the facility is closed or off-season.

**Soil Conditions and Groundwater**

Planners should study and clearly understand soil conditions and water tables when projecting construction costs, as site preparation and exceptional construction issues can significantly affect costs. Extremely rocky soils can add to site preparation costs, and unstable or expansive soils may require unique engineering responses to provide a solid foundation. A high water table may necessitate taking steps to protect the pool shell from damage due to hydrostatic pressure, and could add costs related to dewatering the site during construction and throughout operation over the life of the facility.

**Codes and ADA Requirements**

Most codes that apply to poolscape and natatorium are common to other types of public space buildings, but many apply specifically to aquatic facility construction and operation. Codes vary state by state and even community by community, and several federal regulations are also applicable. The following are sources of regulation and recommendations for pool design and operation:

- State and local health regulations for safety, operations, and administration
- Jurisdictional building codes
- Trade associations and organizations
- Public laws
- Federal regulatory agency codes
- Manufacturer recommendations
- Sanctioning entities and competition governing bodies
- Common and acceptable industry practices

State, county, and municipal pool regulations may govern permit requirements, equipment specifications, acceptable water quality parameters, chemical storage, chemical handling and dispensing methods, signage requirements, and other operational and design issues.

Federal regulations that apply to aquatic features include the **U.S. EPA Clean Water Act**, which controls the discharge of chemically treated water into the storm and sanitary sewer systems, leading in some jurisdictions to a requirement for permits to discharge chlorinated and dechlorinated pool water. In some cases, equipment such as neutralization tanks and diatomaceous earth separation tanks may be required; these are discussed in more detail later in this chapter.

The ADA also affects design decisions. Access must be provided to the building, to the pool, and all reasonable facilities. The following are examples of ADA-related pool design features:

- Wet ramps and dry ramps
- Self-controlled hydraulic seat lifts at pool’s edge for people who are physically disabled
- Barrier-free locker room facilities
- Increased deck width
- Raised access walls at hot water spas and whirlpools

The Centers for Disease Control and Prevention (CDC) also provides guidelines for water quality in swimming pools, recreational waterslide flumes, public spas, and hot tubs. These, too, are frequently adopted into state health and safety codes.

Other standards for equipment and design are established by trade and professional organizations:

- The International Association of Plumbing and Mechanical Officials (IAPMO) sets standards for quality and weight of various materials for pipes, valves and pumps, turnover times, and other mechanical issues.
- The National Sanitation Foundation (NSF) develops standards for swimming pool equipment and procedures.
- Several regional associations provide building codes and standards that are commonly adopted and enforced. These include the Western Fire Chiefs Association and the International Conference of Building Officials (western states), Building Officials and Code Administrators International (midwestern, mid-Atlantic, and northeastern states), and the Southern Building Code Congress International (southern and southeastern states).

Though it would be impossible to list all codes affecting pool design and operation, one area worth singling out is pool depth requirements.
One of the greatest safety risks in older pools is injury due to insufficient water depth under diving boards; platforms; starting blocks; and waterslides, chutes, and other features. In the 1950s, for example, the required depth under starting blocks was 3.5 ft (1 m). Today, the National Collegiate Athletic Association (NCAA) requires a minimum of 4 ft (1.2 m), but some state codes are now requiring 5 ft (1.5 m) or more. Depth of the diving well and designs of diving boards are also meeting with increasingly stricter codes due to technical developments that produce performance enhancement of divers. The purpose is to further minimize risk of cervical injury from impact with the pool bottom.

**Energy Conservation and Sustainability**

Energy and water costs are a significant part of the overall operating expenses of pools, and even more so in a natatorium. Pumps are required by regulations to run 24 h per day, while indoor air temperatures must be kept relatively high for patron comfort and control of evaporation and air quality. Therefore, it makes sense and is standard practice to specify energy-efficient pump motors, heating and cooling equipment, and light systems that are reasonable and affordable. Computerized controls and high-efficiency sensors can also reduce levels of wasted energy when maintained by well-trained operators.

In Europe, where energy costs are much higher than in the United States, solar energy, heat pumps, and heat exchangers are used to conserve energy, and water-to-water heat transfers are used increasingly to recapture energy to heat water. The high costs of this equipment once made them ineffective in the United States; however, sustainable design practices are becoming more important as energy costs rise in the U.S. Because of increasing interest in “LEED” and sustainable designs, some design options have been identified that can contribute to those goals. In making the recommendations, it is important to consider that any material substitution recommendations must still meet design specifications and requirements.

**Structural Systems**

When structural systems for poolscape and natatorium are being considered, reinforced concrete is the system that is most often used for public and institutional pool shells. For rectangular competition pools, cast-in-place (CIP) concrete frequently is the preferred method as part of the other CIP concrete work in the project. Pneumatically applied concrete is an acceptable alternate and is usually favored for outdoor public pools- capes. The free-form character of leisure pools often dictates pneumatically applied concrete because of its greater construction efficiency. In a very limited number of situations involving rectilinear pools, prefabricated stainless steel panels assembled on-site may be used with or without a concrete floor.

**Pool Shell**

Construction of the pool shell should also include consideration of the water table at the site and potential hydrostatic pressure issues. In cases in which abnormal subsurface hydrostatic pressure may occur, the pool shell could float, causing damage to the structure. Even in areas where there is no high water table, unnatural occurrences such as water pipe breakage could cause the rapid introduction (or an accumulation over time) of water to an otherwise dry subsurface, leading to damaging hydrostatic pressure under an empty pool.

One way of protecting the pool shell is to enclose it within another space such as a full basement or a surrounding tunnel. If no such space is provided, hydrostatic relief systems may be installed, consisting of the following components:

- Automatic check valves
- Concrete ballast
- Dehydration systems
- Refilling systems
- Substrate drainage to daylight

A sight well may also be installed adjacent to the pool, in the filter room, or outdoors next to the natatorium to allow for visual inspection of the water table.

Swimming pools are extremely durable when properly designed and constructed. History reveals that pools and natatoria become functionally obsolete due to changing user expectations, rules of competition, and health and safety regulations long before they fail physically.

**Natatorium Construction**

Special consideration for the wet, corrosive environment of natatorium space is the key decision maker when appropriate structural materials are specified. The structure of choice is reinforced
concrete and masonry walls with a concrete roof system. Structural steel beams, joists, and trusses may be suitable if a successful effort is made to protect these members from corrosion with an effective and long-lasting high-build polymide epoxy coating system. Preplanning should provide physical features that will simplify inspection of steel structural components and the periodic task of recoating.

**Mechanical Systems**

Most discussions of mechanical systems refer to the natatorium environment since few issues apply to the outdoor poolscape except for the bathhouse and the filter room. All systems are driven by the respective building codes and jurisdictional regulations in these areas, as well as in natatorium support spaces.

The natatorium environment represents a unique and challenging situation for heating, ventilation, and air-conditioning (HVAC) considerations in a space that is completely isolated from the rest of the building. Heating serves two purposes in the natatorium: to provide comfort to the patrons and to control condensation. In order to maintain an ideal relative humidity level of 50% (recognizing that relative humidity frequently drifts upward), air temperatures should be kept within 2°F above water temperatures, that is, at 82°F and 84°F, which will result in a dew point of approximately 64°F.

**Pool Heating**

Ideal water temperatures vary according to user demand. Competition swimmers prefer cooler temperatures at 78° to 82° F for strenuous workouts. Understandably, less active swimmers (fitness lap swimmers and recreational users) prefer warmer water. Addressing these preferences ranges from providing separate bodies of water, to changing water temperatures for various groups, to providing a compromise uniform temperature. Options chosen will have an effect on heating systems design.

Indoor pool water is usually heated through a heat exchanger system connected to the building's...
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central boiler. Dehumidifying systems can also heat pool water as a by-product of air-conditioning, though it may be necessary to use a standby backup heater or heat exchanger to provide supplemental heat.

**Natatorium Heating and Ventilation**

Evaporation from large areas of water in an indoor environment affects both the comfort of the people within and the physical condition of the building materials and finishes. Moisture content in the air and off-gassing of chloramines are the two components of pool water evaporation that affect user comfort and material experience. The formation of chloramines in the pool water is a significant challenge in relation to maintaining good indoor air quality (IAQ). The production of chloramines leads to the chlorine smell, irritated eyes and lungs, and a poor guest and staff experience overall. To mitigate the effect of chloramines within the environment, one must take into consideration both the HVAC design and the design of the pool disinfection system.

Since chloramines are produced in the pool water, they can also be destroyed through use of disinfection systems that treat the pool water. Ozone with its unstable molecular composition and ultraviolet (UV) with its bandwidth of light (a sterilization method used to break down micro-organisms in water purification) both destroy the chemical bonds of the chloramines, reducing their quantity and their impact on the indoor pool environment. The addition of either of these two systems to the pool disinfection system improves the IAQ of the facility through the destruction of chloramines. Breaking up the chloramines via ozone or UV is more energy efficient for maintaining good IAQ than introducing larger amounts of fresh air; although one must take initial first costs of these systems into account when making that decision. Currently, UV is the preferred sterilization treatment option in North America.

A combination of temperature control and humidity reduction is required to create the best environment possible in the interior space. To achieve these goals, the system must provide

- ventilation during unoccupied periods to reduce chemical vapor accumulation,
- air heating to offset building heat losses and maintain a space temperature of 2° to 3° F above the water temperature, and
- sensors and controls to prevent wall and roof condensation.

Automatic computerized controllers and sensors are essential to maintaining the desired mix of air temperature and humidity in the volatile natatorium environment for maximum comfort and economy. Such a system first dehumidifies the air through mechanical refrigeration. The moisture-laden air enters a mixing chamber, where a portion of natatorium air is purged and fresh air is drawn in to satisfy the ventilation requirement. The mixture of fresh and recirculated air is then heated for either space heating or pool water heating. Sensors on the walls and ceiling can measure the coldest surface temperature and reset the unit to the relative humidity set point.

Ventilation may be used to control humidity and provide fresh air. Air velocity within 8 ft (2.4 m) of the pool deck surface should not exceed 25 feet per minute (FPM) to avoid the chilling effect of evaporation on wet skin. In spectator areas, higher air velocities of 40 to 50 FPM are recommended. Since warm air can be uncomfortable on spectators’ faces, cool air should be introduced in raised spectator galleries. Placement and design of systems should minimize noise in the natatorium where significant acoustical issues exist.

The choice of building materials in all cases must take into account the volatile, corrosive environment in the natatorium. Stainless steel hangers and ducts are particularly vulnerable to corrosion and failure. If stainless steel is used for door and window openings or platform railings, it must be coated or it will require frequent protective cleaning.

**Electrical and Communications Systems**

Electrical systems in the moist environment of pools and natatoria must be designed with three criteria in mind: adequate illumination to meet user requirements, safety of the patrons, and protection of the systems from the corrosive environment. All systems are driven by the respective local building codes. In the outdoor facility, systems are not exposed to the same corrosive environment, but components should be
protected from atmospheric moisture and natural weathering conditions.

Fidelity of sound is a particular problem indoors. The inability to understand announcements is not uncommon in natatoria, which present the worst case for reverberation: water, tile, metal, concrete, masonry, and glass in what is often a rectangular box. The appropriate selection of systems along with careful design of acoustical features will help minimize this problem.

**Water Quality**

Water, a natural resource for which conservation methods continue to evolve, is the mainstay component of aquatics. Regenerative filter technology provides substantial reductions in water usage that can be realized due to the filtration design and operating parameters. Instead of 5 min backwash cycles on a typical basis of once or twice a week, which send thousands of gallons of heated water down the sanitary sewer, the regenerative filter empties the filter tank, which contains a few hundred gallons, once a month. This provides conservation of water, pool chemicals, and energy.

**Filter Systems**

There are several choices among filter systems, and specifying a particular system is based upon factors such as cost to build, cost to operate, and complexity to operate and skill of the operators, plus pool water volume and possibly local regulations. The backwash discharge requirement, for example, may also influence the choice of systems.

Sand pressure filter systems are the most widely used. Sand filters consist of a tank, usually filled with silica graded sand, and a system of internal pipes that direct the pool water through the sand in a way that traps large waterborne particulate matter. Sand filters are available in two forms, vacuum and pressure, which operate at flow rates of up to 15 to 20 gallons per minute (GPM) per square foot of filter area.

Sand vacuum filter tanks are another form of high-rate sand filtration. These units are usually installed in the ground and open to the pool deck elevation in the filter room. Because of the ground installation, corrosion of the tank can accelerate. Many designers locate these steel filter tanks in a larger concrete pit so that the tank walls and floor can be monitored for corrosion and leakage. Gravity sand filter systems, another type of sand filter, may be found at older pools, but are seldom specified for new systems.

Diatomaceous earth (DE) filters are also manufactured as either pressure or vacuum systems. They are more efficient than sand filters, capable of capturing much smaller particulate matter (5 to 10 μm compared to sand's capability of 40 to 50 μm) and therefore technically producing clearer water quality. The filtering medium, DE, is a powdery exoskeletal material that is applied to filter leaves or hollow filaments connected to septa or main headers, which join together to discharge the water out of the tank.

Pressure DE systems are usually enclosed in pressurized tanks where water is pumped, passes through the filtering media, and then is forced back into the pool. Vacuum DE systems are usually open-topped tanks positioned just above the pool water level. Water drains by gravity into the tank and is then drawn through the filter medium by a vacuum pump and discharged back into the pool. This system has an advantage over pressure sand systems in that it requires much less backwash water. An important consideration in the choice of a filter system is the requirement in some jurisdictions that backwashed DE be captured in a reclamation tank so that spent DE material is not discharged into the sewer system. Alternatives to using DE as the filter media, which are becoming available in the industry, minimize the concerns of jurisdictions about backwashing directly to the sewer system.

Vacuum DE systems require the operator to hose off, discard, and reapply DE material to the leaves. This adds to cost, compared to the reuse of sand, and is also a more labor-intensive procedure than that required for sand filters. Because of the added complexity, cost, and possible requirement for a reclamation system, many municipal designs specify high-rate sand filtration systems over DE systems. Pressure DE systems can reuse the media for several filtering cycles before discharge of the spent media is required. The reclamation requirements will still apply if regulations so stipulate.

**Sanitization Systems**

Chemical treatment of water in swimming pools is nearly always achieved through the use of some form of chlorine. Gas chlorine, once the industry standard, is highly effective, is relatively inexpensive, and includes a delivery system that is easy to install, monitor, and eject into the pool water. It is extremely hazardous, however, and
requires special handling procedures to ensure safety. Increasingly regulated and restricted, complex gas chlorine systems require highly skilled operators.

**Sodium hypochlorite**, frequently referred to as liquid chlorine, is safer to handle than gas chlorine and is also relatively easy and cost-effective to install, monitor, and eject into the pool water. Typically, a small pump injects the liquid into the main pool supply line. The disadvantages include a short shelf life and more complicated pH control. In many jurisdictions, liquid chlorine also requires additional space for storage tanks and a spill containment barrier system.

**Tablet calcium hypochlorite** is normally a more costly material than either liquid or gas forms; however, it is more stable, contains higher concentrations of chlorine than sodium hypochlorite, and requires less pH control. The delivery system has low first costs and is easy to install and operate. These advantages, plus its ease of handling and high-volume ejection system capabilities, make tablet calcium hypochlorite an increasingly popular material choice.

As already mentioned, chloramines are a source of irritant as well as damage to the natatorium environment, and the industry is continuing to look for ways to minimize chloramine generation. In addition to the sanitizing materials and systems just described, UV light, dual sanitizers with the use of potassium monopersulfate, and hybrid filter media are being developed and discussed as the industry continues to manage water quality as aggressively as possible.

**Recirculation System**

The recirculation system not only moves pool water to the treatment equipment and returns freshly treated water to the pool basin; in leisure pools it also supplies water to amenities such as waterslides, participatory play elements, sprays, and other features. The system includes the filtration and sanitation equipment discussed in the preceding section, plus pumps; pipes; valves; an efficient perimeter overflow system; and manual or automatic control systems with various sensors, monitors, and controllers to manage water treatment.

Equipment must be able to meet the required water flow rates specified by codes and regulations. These turnover rates vary with the type of pool and activities at the site and have generally become greater in recent years. In general, a turnover rate might be a maximum of 6 h for competition, 2 to 3 h for leisure pools, 3 h for therapeutic pools, as often as every 30 min for wading pools, and 15 min for whirlpool spas.

**Other Special Equipment**

In relation to the water quality system, keys to the safe and healthy operation of pools and natatoria include filtration to capture larger particulates in the water, sanitization to kill bacteria and other microscopic pathogens, and recirculation equipment to provide required turnover of treated water, as well as the water heating system already discussed. There are also numerous pieces of specialized temporary or permanent equipment, devices for particular programming, and safety equipment required by local regulations and industry standards. The fully equipped aquatic facility requires other specialized equipment for programming, safety, and maintenance. The following list, which is not exhaustive, includes examples of both fixed amenities and portable equipment that are regularly required:

**Competition Pool Equipment**

- Movable bulkheads
- Backstroke stanchions and pennants
- Starting blocks
- Diving equipment and supports
- Automatic timing system including touch pads and scoreboard
- Floating lane dividers
- Temporary or permanent spectator seating
- Water polo goals

**Leisure Pool Equipment**

- Anchor and participatory play feature
- Waterslides and chutes
- Tumble buckets, spray bars, and mushroom fountains
- Lily pad walks and other floatables
- Water cannons

**Instructional, Fitness, and Recreation Equipment**

- Kickboards and other flotation devices
- Canoe
- Snorkel and scuba equipment
- Flotation vests and resistance equipment for water exercise
- Water basketball goals
Pool Maintenance Equipment

- Portable vacuum cleaning systems
- Automatic electrical pool vacuum
- Built-in pool vacuum system
- Poles, surface skimming nets, wall brushes
- Water hoses
- Swimming pool test kits

Safety Equipment

- Lifeguard stands
- Rescue tubes, life rings, and throw ropes
- Shepherd’s hooks
- Safety ropes designating transition depths and different activity areas
- Spine boards
- First aid kits, breathing apparatus, fire extinguishers, and other apparatus as prescribed by local health and safety regulations

Gutter Systems and Deck Design

The primary purpose of the deck and gutter system is to keep as much pool water as possible in the pool and to keep water that makes its way to the deck surface from reentering the pool. Outdoors, the deck surface should be above surrounding grade as a barrier to water runoff from landscaped areas. The deck surface drains away from the pool and toward drains as prescribed by local regulations and industry standards.

Gutters are designed to receive and capture water that flows over the lip. This water flows through the gutter flume to the surge tank, which stabilizes the surge in the pool, and then to the filtration equipment. The following are three common gutter profiles:

- Deep recessed gutter: The pool deck cantilevers over the gutter flume approximately 12 in. (30 cm) above the water surface (see figure 8.1a). This design is preferred by many competitive swimmers and coaches, as it provides a clear visual reference to swimmers and minimizes water on the deck surface. Egress from the pool is difficult with this type of gutter; hence, most people use a pool ladder.
- Deck-level gutter: Also called a rim-flow gutter, the deck-level gutter has the gutter lip very close to the top of the pool deck (see figure 8.1b). Egress is much easier with this design, but more water tends to splash onto deck surfaces.
- Roll-out gutter: A compromise between the other two systems, the roll-out gutter features a gutter lip and grate at water level, approximately 5 in. (13 cm) below the deck surface, which forms a curb at the rear of the gutter grate (see figure 8.1c). This system keeps decks drier than does the deck-level design while still allowing relatively easy egress from the pool.

Gutters are typically constructed and finished in the same manner and with the same materials as the pool and deck, using cast-in-place or pneumatically applied concrete with tile, paint, or rubbed concrete finishes and prefabricated stainless steel flumes with grate covers of fiberglass or polyvinyl chloride (PVC), a high-impact plastic.

In all systems, water is returned to the pool after treatment through a return piping inlet system located in the pool walls or the pool floor.

Durability Considerations

Nearly all considerations regarding material specification in a poolscape, and especially in a natatorium, are based upon the material’s reaction to the volatile, corrosive environment. All metal components in the structure should be corrosion resistant. Steel window casements, mullions, and
jambs last longer when galvanized steel is coated with a high-build epoxy coating system. Openings are most durable in a natatorium when manufactured from anodized aluminum or fiberglass. Aluminum is forgiving in a natatorium while stainless steel may develop pit corrosion, a cosmetic problem that nonetheless requires significant maintenance hours to keep under control. Ductwork hanger and cable systems should not be made from stainless steel due to its vulnerability to corrosion and subsequent failure.

Pool decking materials are often determined by budget. Indoors, the preferred material is ceramic tile set on the surface of reinforced concrete.

Figure 8.1  Gutter systems: (a) deep recessed gutter, (b) deck-level gutter, and (c) roll-out gutter.
Aquatic Facilities

Ceramic tile gives a high-quality appearance and provides a durable slip-resistant surface. Alternatively, at less cost, the pool perimeter may be finished in tile and the deck surface completed with less costly pavers or even broom-finished concrete. Outdoors, broom-finished concrete is preferred for its durability through fluctuating weather conditions including freeze–thaw cycles.

Considerations for pool shell finishes include several options. White ceramic tile is the top preference for durability and appearance but is the most costly. White marble plaster is the second preference, with lane and target markings inlaid in ceramic tile. The third option is white, long-lasting high-build epoxy paint with black lane lines and targets, if required.

**Interior Finishes**

The interior of a natatorium is a hard surface throughout. As just discussed, the preferred finish for pool decking is ceramic tile set on a concrete slab. Indoor leisure pools in western Europe make liberal use of tile throughout interiors, with impressive results. Other choices for indoors—also typically made for outdoors—are colored or uncolored concrete with a slight broom finish, sometimes scored. These can be successful but more economical options for finishes.

In competition pools, the pool interior is white and lane markings, targets, and depth markings are in a contrasting color; often stipulated through industry standards or regulations as black. Leisure pools typically have the same field color but can also have varying colors to complement particular themes or the design scheme of the rest of the room or poolscape. Plain colors tend to lose visual impact underwater.

Colors in the natatorium should establish or complement the overall color scheme of the space. Warm colors are often preferred in snowbelt areas. Green should be avoided because its reflection in the water can suggest algae and poor water quality. Ceilings are usually a light color to reflect light, which will place less demand on artificial and natural light sources.

Furnishings typical to a competition pool are few. Permanent wood, stainless steel, or masonry block benches provide seating for swimmers. Folding chairs may be desirable for instructional situations. Aluminum spectator seating may be temporary or permanent. Lifeguard stands and a timer’s table are customary in a competition pool.

Leisure pools require lounges, seats, tables, and umbrellas for sunning and socializing throughout the facility’s deck areas. Seats, tables, and umbrellas should also be provided in snack areas. This furniture is often used in indoor centers to create a theme of recreation and relaxation.

**Acoustics**

There are few acoustical problems in outside pools. Berm constructions and landscaped barriers can minimize nearby road traffic noise, as well as contain public address music and announcements to reduce potential noise issues for neighbors.

It is quite another matter inside a natatorium, where acoustical challenges can be significant. The interior surfaces of a natatorium consist of water, masonry, concrete, tile, metal, and glass. All have high sound reflection characteristics. When one adds the sounds of splashing and falling water, noises from loud mechanical systems, diving board reverberation, and shouting spectators and recreational swimmers, the intelligibility of public address announcements or even of the spoken words of coaches and lifeguards can be negatively affected.

For these reasons, acoustical treatment of an indoor pool is important, yet it is often unsatisfactory. Sometimes acoustics fall victim to value downgrading when budget constraints exist. Acoustical materials for a natatorium are more expensive than in conventional dry buildings due to moisture resistance requirements. Most materials used in sound control in dry spaces absorb moisture and therefore are not suitable for the high-humidity conditions in natatoria.

If priorities for acoustic treatment are necessary, first priority should be given to ceiling treatment. Perforated aluminum or galvanized structural steel panels are often used for their effectiveness and compatibility in the natatorium environment. A concrete modular unit (CMU) is often used in natatoria for acoustics, but an understanding of the module and the dynamics in the space is necessary. The slotted acoustical CMU is quite porous, and the moisture drive of the natatorium will penetrate through the Helmholtz resonator and then through the back of the CMU into the wall cavity. The moisture can then travel laterally to other spaces as well as through the exterior width of the wall, where during cold weather it can condense and freeze. To protect against this and subsequent potential damage,
the acoustical CMU must be sealed on its exterior surface and covered with an impermeable coating to serve as a vapor barrier.

If the ceiling is constructed of precast, pre-stressed concrete “Ts,” baffles between the Ts may also provide acoustical benefit.

**Lighting**

**Fenestration** (natural light coming into a building) and artificial lighting present unique issues for competition and recreation facilities. Lighting in natatoria affects safety, aesthetics, and spectator viewing and therefore is a significant design issue.

**Competition Pool Lighting**

Glare, reflection, and shadow are the major manifestations of improperly positioned fenestration or artificial light in competition pools. Windows, wall openings, or lights placed directly across the pool from spectators, judges, and coaches can create an impenetrable glare on the water surface, causing eyestrain and making it difficult to see the swimmers under water. Fenestration placed at the end of a race course impairs the ability of butterfly and backstroke swimmers to see the turning wall.

Ideally, translucent skylights should be installed overhead for vertical light penetration of the water without offensive reflection. Clerestory windows should be located behind the spectators if that wall is a north or east wall. South or west openings can be objectionable due to heat gain. If wall fenestration is unavoidable, saw-tooth panels or baffles may be used to screen outdoor light away from the water when across the pool from spectators. Overhead skylights and artificial lighting are desirable in competition pools. Ideally, artificial lights should be placed directly over the water surface to avoid shadows cast over the pool walls and to maximize light penetration of the water volume. However, this creates a relamping issue when fixtures are accessed for lamp replacement.

Light deteriorates rapidly under water as depth increases. Field tests show that approximately 50% of light at the water surface is lost within the first 12 in (30.5 cm). In deep-water high-performance competition pools, underwater lights may be necessary to increase illumination under water; in most outdoor pools, these are required. Underwater lights can also be helpful in reducing glare by “bleaching out” surface reflection. Other standards affecting lighting in competition pools are set by sport sanctioning bodies.
Leisure Pool Lighting

Lighting design is driven more by aesthetics in leisure pools; therefore, one can be more creative in establishing mood and atmosphere in this setting. Lower light levels at the water surface are acceptable, and greater use of natural light is desirable in connecting the inside and outside environments. Water depths are typically shallower, so underwater lighting is used more for atmosphere than for safety. Various colored lights, spotlights, and indirect lights can be used to achieve creative effects in leisure pool settings.

Outdoor Lighting

Overhead and underwater lighting in outdoor pools are provided primarily to comply with codes relating to night swimming and security issues. Orientation of the competition pool itself is a consideration for managing sunlight and glare in outdoor competition pools. Spectators should face north or east to avoid undesirable glare from the sun, reflection, and eyestrain when viewing swimming and diving competitions.

Signage

The use of signs in a natatorium or poolscape is driven primarily by liability and safety considerations and regulations requiring the facility to provide sufficient notice of hazards and dangers. By regulation, placards identifying the locations and nature of hazardous chemicals are posted on the outside of the pool fence, buildings, and chemical storage room so they can be read by emergency personnel as they approach in the event of an emergency.

Markings of pool depths should have sizes and shapes specified by local health department regulations, which also dictate the intervals at which they should be placed. Other signage advising of pool safety rules and protocols should be placed in conspicuous locations, and any restrictions or safety guidelines relating to specific equipment should also be clearly displayed.

Way-finding signs should clearly define locations of rest rooms, locker rooms, and bathhouses since contemporary traffic patterns no longer lead people through these areas on their way to the pool. Entrances and exits, as well as the locations of snack areas, meeting rooms, and other spaces, should also be clearly identified. Ideally, signage should be designed as a coordinated and complementary part of the overall design. In practice, signs are often excluded in original budgets and subsequently ordered by staff piece-meal at later times, resulting in a hodgepodge collection of signs that match neither in color nor in scale.

Key Cost Factors

Key cost factors affect costs in a number of ways. The primary construction element in pools is concrete. It is used for pool shells, concrete decks, foundations, and various building structures. Therefore, the local cost of bulk concrete has a major impact on overall project costs. Comparative costs of various-quality finishes and materials specified are also significant factors, for example the difference between tile deck surfaces and broom-finished concrete. Deck area is not as much of a factor outdoors as it is indoors, where every increase in square footage results in an increase in enclosure size and air volume needing treatment. Pool size also affects the sizes and costs of recirculating and sanitizing equipment necessary to treat additional water volume. More water treatment also means more water discharged into the storm and sanitary sewer systems, with subsequent increased fees to pay the local sewer districts.

Programming choices affect not only construction costs but also the facility's ability to recoup project costs and operating expenses through revenues. For example, indoor competition pools usually require a certain amount of spectator seating. This seating necessitates the addition of significant square footage to a building, yet it may be used only relatively few times per year. It creates a significant increase in construction and operating costs yet generates little or no revenue. One design option is to provide portable or retractable seating so that the seating area can be used for other purposes when competitions are not taking place. On the other hand, leisure pools typically have much higher bather loads than do competition pools and therefore may require larger mechanical systems to provide more frequent turnover rates. These systems also have to supply enough pressure to provide water to the play elements, current rivers, and other features. As a result, leisure pool filter rooms are usually larger.

The sanitizing system specified affects costs as well. First costs of equipment, space requirements, special storage and handling specifications,
ongoing costs of chemicals, and complexity of operation of various systems are all factors to consider, as previously discussed.

Finally, site-specific costs such as land costs, site preparation, utility costs, and labor are all factors that will influence the various decisions to be made during the design process.

**Renovation**

The structural durability of a properly designed and engineered poolscape or natatorium will typically maintain physical usability for 40 to 70 years. Long before this time expires, though, changing regulations and codes as well as evolving user expectations will render a facility functionally obsolete. Occasionally, foresight in the design of the initial facility allows greater flexibility, reuse, and modification of these existing structures in future years.

**Physical obsolescence** refers to the condition of a pool that is simply worn out. Leaking shells, spalling deck surfaces, rusting, and malfunctioning mechanical systems are just a few signs of a facility that has outlived its useful life. Changing health, safety, and construction codes as well as industry standards may also lead to physical obsolescence. For example, the changing requirements for water depths under starting blocks made many perfectly sound competition pools physically inadequate to accommodate this activity.

**Functional obsolescence** refers to the condition of a poolscape or natatorium that, regardless of physical condition, simply no longer appeals to its user groups. If this future possibility is not considered, a brand-new facility can be built that is functionally obsolete. Fifty years ago, kids were overjoyed to be able to go to the community rectangular pool with a separate wading pool. Expectations today in public leisure aquatic centers typically include free-form zero-depth entry pools with waterslides, play features, and lots of moving water. Often, however, it is possible to modify an existing poolscape to meet the newer expectations of the community. Rectangular pool shells can be cut and converted into leisure pools at a significant savings over totally new construction. Play features, more generous decks, more attractive landscaping, and more inviting entrance areas can all be provided to enhance the appeal of a poolscape or natatorium instead of starting from scratch. The feasibility and viability of such a makeover are a function of many factors, including municipal budgets, community expectations, and the condition of the existing structures.

**OPERATIONS**

The aquatic director develops the training of all staff and develops and implements all operational procedures and detailed emergency action plans while overseeing operating policies and procedures. He or she develops annual budgets and an effectively communicated measuring program for the coordination and monitoring of revenue collection that includes daily activity records of all participants, events, cost control disciplines, and attendance reports.

The aquatic director supervises lessons, recreation, and competition programming activities and a staff of aquatic instructors, coaching and sport staff, and lifeguards. Staff qualifications include Certified Water Safety Instructor, Certified Cardiopulmonary Resuscitation (CPR), Certified Aquatic Fitness Professional, and first aid. Highly trained lifeguards must possess a lifeguard, CPR, and first aid certificate offered by the American Red Cross, Ellis and Associates, or YMCA/YWCA. Students typically clamor for coveted lifeguard positions at the university aquatic center.

**Maintenance**

Pool operations include the overall maintenance of the pool system with attractive recreation features for risk reduction to the users, the employees, and the facility. Pump room technicians have a unique skill set, including Certified Pool Operator (CPO) or Aquatic Facility Operator (AFO), that gives them day-to-day chemical knowledge in order to operate the facility in compliance with the local health department requirements. Operations include industry knowledge for preseason inspection to identify and fix necessary parts and make repairs prior to opening. The operations team must meet critical needs during the season; complete the closing of the facility in the fall; perform postseason inspections to help identify and make necessary repairs and major renovations during the off-season; and perform winter maintenance during the winter months. For natatoria, pool operations continue year-round.

Maintenance and custodial expenses of a natatorium are significantly greater than those of an outdoor poolscape because of the large surface area that requires cleaning and maintenance attention in a frequently aggressive environ-
ment. Decisions made during the design stage can ameliorate these challenges, but greater first cost expenditures may be necessary to realize lower ongoing operations and maintenance expenses. Choosing mechanical, structural, and finish materials that better resist moisture absorption and corrosion, as discussed previously, will reduce frequency of cleaning, recoating, and replacement. Sophisticated electronic controller and sensor systems can reduce manual operator requirements and improve efficiency of operations in water treatment and recirculation systems. However, automation cannot replace a skilled operator.

Design considerations for adjacent support areas such as food services, mechanical systems, and chemical storage should include efficient access for supply deliveries and service. Manufacturers of several pieces of mechanical equipment recommend annual maintenance programs to ensure proper performance.

Water quality may be more challenging in certain outdoor environments where dust, pollen, leaves, and other blown-in debris are an issue. Otherwise this operational issue will primarily be an automated function in contemporary designs, with personnel requirements for monitoring of the system, periodic analysis of water quality, replenishment of chemical supplies, backwashing the filtration systems, and manual tasks such as vacuuming debris from the pool bottom, even where automatic vacuum systems are specified.

Many maintenance tasks may need to be subcontracted to outside sources (e.g., chemical balance firms, concessions firms, lifeguards).

**Marketing and Advertising**

The size and scope of marketing and advertising demands vary greatly with the nature and programming ambitions of the facility. Programming near capacity, however, is key to recapturing as much of the operating expense as possible, especially when the adjacent community is part of the programming at the university aquatic center.

Leisure aquatic facilities usually market themselves within a relatively small regional area. Small facilities usually choose to designate marketing and advertising responsibilities to a staff member such as the aquatic director. Large-scale facilities will likely find it necessary to have a person dedicated solely to this task or contract to outside services. In any case, the goal is to create a positive message that the community will identify with and to get the message out through a variety of means. Advertising through community newspapers, radio, and television is one aspect of a marketing program, but it can be costly. And while it may increase community awareness and shape positive opinion, its primary purpose is to attract attendees.

For leisure aquatic facilities, the single most important ingredient is relationships with customers (getting them and gaining their loyalty). Customers are a source of innovative ideas. Valuing customers and their opinions gives users a sense of ownership and pride in the facility—a perfect combination for continued word-of-mouth promotion. The following are tasks that marketers must perform:

- Identify customer groups and verify that the message of each marketing campaign is being successfully communicated.
- Ask for feedback through focus groups and surveys of programs and be open to customers’ observations and suggestions to help build a network within the community.
- Evaluate customer feedback to measure how users and nonusers view the image of the facility. Use the information to determine current levels of satisfaction, program fulfillment, and future needs.
- Make quantitative and qualitative improvements based on data (on what makes programs and services successful), so that services are consistently high quality, to increase revenue.
- Set objectives for improvement to increase market share.
- Identify resources and means of implementation by listing key action plans and cycle times.
- Brand services with consistency, including positioning each service to fit the market segment and promote the experience (benefit); people buy benefits.

Creative publicity initiatives can boost both awareness and image and have exponential word-of-mouth value that gives the marketing dollar more clout. Publicity-generating community promotions might include efforts such as these:

- Book drives to support local schools or libraries—discount admission for donations
Bring-a-Grandparent Day
- Report Card Bonus Days—“A” students get discounted admission
- Outreach programs to local groups such as Boy and Girl Scouts, USA Swimming, hospitals, retirement communities, and businesses
- Safety awareness—provide a spokesperson to media outlets to focus attention on water safety, first aid, and boating safety at the beginning of a season and summer holidays
- Advertisements and coupons in care packages given to new mothers at hospitals and Welcome Wagon packages to new residents
- Special events like Teen Nights, '50s Nights, and Dive-In Movie Nights to increase off-peak-hour attendance

Year-round natatoria generally require greater marketing and promotion efforts and more creative programming scheduling than seasonal outdoor leisure aquatic centers, particularly during the school year. To maximize use of the facility on weekdays, targeting seniors and therapy users for these hours is an effective strategy. The most common weakness in promotions of swim centers is the lack of sustainable exposure.

World-class competition venues usually market themselves to a wider national or international audience. They may seek to attract NCAA aquatic sport teams to the facility as a winter training destination (usually requiring that they be located in a desirably warm area), or they may seek to host regional, national, or international events. These goals need to be clearly understood in the design phase, as sanctioning sport bodies have distinct requirements for facility amenities; winning bids usually go to facilities that exceed those minimum requirements. Other factors outside the facility can also affect its ability to successfully bid on competitions, including travel access, local public transportation, parking availability, hotel room capacities, and security issues.

Any marketing program must have as its foundation an attractive and imaginatively designed facility. Given an exciting aquatic center, creative program management, and a successful marketing strategy, many facilities not only pay for themselves but earn additional revenues to support other recreation activities as well.

Financing

At universities, facility funding often comes from a combination of state legislature funding and student fees, or solely through student fees. Many universities view recreation centers as benefits and services to students and do not charge additional user fees. The quadrennial student turnover generally promotes higher attendance rates; tuition and student fees generally cover ongoing expenses.

When one is making final decisions regarding the size, features, and amenities of a new pool, numerous factors contribute to the end result. The amount of available funding plays a major role in the type of facility built. One way to perhaps increase funding for a project is to create a multiuse proposal. If designers can show school officials that a school recreational pool can also serve other departments (e.g., the athletic department can use a leisure pool as a physical therapy and rehab facility; the physical education department can use it as a “classroom”; or aquatic management and other leisure studies could be taught at the pool), more funds may be allocated. With greater representation from the student population, competitive proponents usually agree to compromise, resulting in aquatic centers with shorter-course pools, fewer spectator seats, and a leisure element.

Funding may also come from other sources, including direct appropriations and private contributions.

SUMMARY

Probably more than any other recreational experience, the swimming pool has undergone considerable progression, evolving from plain rectangular boxes to thoroughly planned, sophisticated facilities that offer students a place on campus to pursue exercise, leisure experiences, and recreation opportunities. In practice, the challenge of determining appropriate programming requirements for a specific project is best met through a detailed study of the student body’s desires with the aim of building populated showpieces as well as a recruitment tool.

The design process takes into consideration the intended programming; site-specific costs such as land, site preparation, utility, and labor costs; funding; changing regulations and codes; and evolving user expectations. Foresight in the design process will allow greater flexibility,
reuse, and modification of existing structures in future years.

Decisions made during the design stage can ameliorate these challenges, but greater first cost expenditures may be required in order to realize lower ongoing operations and maintenance expenses.

Therefore, investment must ensure that the aquatic facility's future (as a business enterprise as well as a public place) continues to thrive and evolve in nurturing success to both the facility and the university or community that it serves.

**DEFINITION OF TERMS**

**ADA**—Americans with Disabilities Act.

**AFO**—Aquatic Facility Operator.

**bid documents**—Construction documents ready for the price bidding process used in selecting the contractor to build the aquatic facility.

**CDC**—Centers for Disease Control and Prevention.

**chloramines**—Off-gassing of chlorine that leads to the strong smell in natatoria, causing irritated eyes and lungs and a poor guest and staff experience.

**chlorine**—Highly effective and relatively inexpensive but hazardous chemical treatment of pool water with a delivery system that is easy to install, monitor, and eject into the pool water.

**CIP**—Cast-in-place concrete.

**CMU**—Concrete modular unit, often used in natatoria for acoustics.

**competition pool**—A swimming contest tank that must be 25 yd by six lanes (45 ft or 13.7 m) for short-course events and 50 m by eight lanes (25 yd or m) for long-course events.

**conceptual drawings**—One-dimensional layout of the spaces required by the major programming elements, the adjacencies, and necessary support spaces.

**construction administration**—Phase in which the design team observes the contractor completing the work to make certain that installations are meeting the intent of the design.

**construction documents**—Documents, drawn up following approval of the design drawings and outline specifications, that provide detailed drawings and specifications to be used by the contractor during construction.

**construction phase**—The building period; commences once a successful bidder is selected and under contract.

**CPO**—Certified Pool Operator.

**CPR**—Certified Cardiopulmonary Resuscitation.

**DE**—Diatomaceous earth, a filtering medium using a powdery exoskeletal material that is applied to filter leaves or hollow filaments connected to septa or main headers, which join together to discharge the water out of the tank.

**design development**—The phase that commences after the schematic design has been approved; the design development documents include all confirmed basic design decisions with preliminary design drawings and outline specifications, which describe specific systems.

**fenestration**—Natural light coming into a building.

**FPM**—Feet per minute.

**functional obsolescence**—Condition of a poolscape or natatorium that, regardless of physical condition, simply no longer appeals to its user groups.

**GPM**—Gallons per minute.

**gravity sand filter system**—Type of sand filter found at older pools and seldom specified for new systems.

**HVAC**—Heating, ventilation, and air-conditioning.

**IAPMO**—International Association of Plumbing and Mechanical Officials, which sets standards for quality and weight of various materials for pipes, valves and pumps, turnover times, and other mechanical issues.

**IAQ**—Indoor air quality.

**natatoria**—Plural of natatorium.

**natatorium**—Room enclosure containing one or more indoor swimming pools.

**NCAA**—National Collegiate Athletic Association.

**NSF**—National Sanitation Foundation, which develops standards for swimming pool equipment and procedures.

**physical obsolescence**—The condition of a pool that is simply worn out.

**poolscape**—Any exterior pool inside a safety barrier formed by such components as a fence, wall, or exterior of a building.
**pressure DE system**—A system usually enclosed in stainless steel pressurized tanks where water is pumped, passes through the filtering media, and then is forced back into the pool.

**PVC**—Polyvinyl chloride, a high-impact plastic.

**recreational pool**—Free-form swimming tank generally with a shallower water depth than a competition pool; includes wider deck areas and attractive recreation features.

**sand pressure filter system**—The system most widely used for cleaning pool water, in which a tank is usually filled with silica graded sand and a system of internal pipes that direct the pool water through the sand in a way that traps large waterborne particulate matter.

**sand vacuum filter tanks**—Type of high-rate sand filtration with units that are usually installed in the ground and open to the pool deck elevation in the filter room.

**schematic design**—A two-dimensional drawing view of space layout and adjacencies.

**sodium hypochlorite**—A pool sanitizer, frequently referred to as liquid chlorine; safer to handle than gas chlorine.

**tablet calcium hypochlorite**—Normally a more costly sanitizer than either liquid or gas chlorine; it is more stable, contains higher concentrations of chlorine than sodium hypochlorite, and requires less pH control.

**Title IX legislation**—Federal legislation passed in 1972 that mandated equal facilities and opportunities for male and female collegiate athletes.

**U.S. EPA Clean Water Act**—Legislation that controls the discharge of chemically treated water into storm and sanitary sewer systems, leading in some jurisdictions to a requirement for permits to discharge chlorinated and dechlorinated pool water.

**UV**—Ultraviolet light, a sterilization method used to break down micro-organisms in water purification.

**vacuum DE system**—A system in which usually open-topped tanks are positioned just above the pool water level; water drains by gravity into the tank and is then drawn through the filter medium by a vacuum pump and discharged back into the pool.

**warranty phase**—Guarantee period, typically one year for workmanship and multiple years for equipment and systems of a newly completed aquatic facility.
Artificial rock climbing walls have become a popular fixture in recreation facilities around the country, and for good reason. Climbing and bouldering are fun for kids and adults, and both are exciting activities that build strength, flexibility, and focus. Elements of teamwork, communication, and camaraderie between belayer and climber are other great benefits to the sport of indoor climbing. Perhaps more important to facility owners, although climbing may have had a reputation as “risky” high-adventure sport in the past, numerous climbing walls in business for over 10 years have demonstrated that indoor rock climbing facilities can be successfully managed to limit exposure to injury. This chapter focuses on site selection, design, and planning issues for climbing wall facilities from initial concept to successful operations.

**THE VALUE AND BENEFITS OF A CLIMBING PROGRAM**

Climbing provides excellent exercise and stimulation of all the senses and involves mental, physical, and social dimensions. Indoor climbing can offer many benefits; certainly fosters balance, flexibility, strength, and endurance; and requires a great deal of concentration and focus to progress up the scale of difficulty. It’s also extremely fun!

Climbing is a great complement to other types of athletic activity. It combines well with running, cycling, stretching, weight training, yoga, and tai chi, to name just a few. All ages can enjoy the sport either as a climber or as a belayer—the person who holds the rope and takes in slack for the ascending climber. Climbing’s diversity of movement and use of knots and rope work make it challenging and stimulating. Individuals and groups can enjoy bouldering, which is unrope climbing on features relatively close to the ground. Partners can do **top-rope climbing** (the rope is secured from above) or **lead climbing** (the leader starts with the rope on the ground).

Indoor climbing is also an excellent introduction to the sport of climbing in general, and many budding indoor climbers will aspire to climb outdoors as well. While indoor climbing on artificial walls is accessible and fun, climbing outdoors in the natural world brings all of the beauty and complexity of nature into the mix. Likewise, avid outdoor climbers use the gym to train and stay fit during seasonal weather fluctuations. Many climbing facilities have indoor and outdoor climbing programs that work seamlessly to provide many options to their clientele, which helps to build a vibrant climbing community.

Climbing has been used with great success as an avenue for team building and leadership development, with its excellent opportunities to explore metaphors and focus on trust, communication, pushing personal limits, and real versus perceived risk. Climbing walls have also begun to emerge as an element for toddlers in the day care and preschool environment.

**TRENDS IN INDOOR ROCK CLIMBING**

The Outdoor Foundation, which tracks participation in indoor climbing and other sports, has shown in its research that participation in artificial wall climbing has surpassed participation in natural rock climbing. While some expansion and contraction of participation have been observed over the past three years, the 2005 Outdoor Recreation Participation Study identified 6.7 million participants...
in artificial rock climbing (vs. 5 million in natural rock climbing) and noted that 59% were young (16-24) Americans within the participant population, with gender split 65% male and 35% female. (*Outdoor Recreation Participation Study*, Outdoor Industry Foundation, 2005, p. 168). This is noteworthy because attracting this demographic to a facility can assist in the attraction of parents and younger siblings if that is desired.

The interest of youth in the sport of indoor climbing is an important trend for facility developers and those interested in combating the sedentary lifestyles that have emerged over the past decade. The formative youth and teen years are a critical period for developing lifelong habits of exercise and healthy living. The popularity of indoor climbing and bouldering provides an excellent opportunity to draw youth and families to recreation facilities and engage them in all the activities such facilities have to offer.

Another important trend that facility managers should be aware of is the development of competition climbing. USA Climbing is the national governing body for multiple disciplines of competition climbing: Difficulty, Bouldering, and Speed. USA Climbing receives sanctioning and is recognized by the American Alpine Club; the International Council for Competition Climbing (ICC), a division of the Union Internationale Des Associations D’Alpinisme (UIAA); the International Olympic Committee (IOC); and the United States Olympic Committee (USOC).

USA Climbing’s mission is to promote and encourage climbers of all ages in competitive climbing and to sanction, organize, and promote competitive climbing events in an atmosphere of camaraderie and respect, utilizing the support of climbers, parents, coaches, climbing facilities, and industry. To achieve that goal, USA Climbing organizes the largest tour of competitive climbing events in the world, sponsors both the youth and adult U.S. National Climbing Teams, and promotes the interests of climbing both in the United States and abroad. USA Climbing is run and supported by an extensive and committed network of volunteers who work to make this vision a reality.

**SITE SELECTION AND FACILITY PLANNING**

Choosing a location for installation of a climbing wall usually falls into two broad categories: deter-
mining the site of the wall in a new facility or in existing facilities that will be renovated. Regardless of facility goals, planning for a successful facility involves the five steps described next.

**Step 1.** Form a group of staff, administrators, architects, and end users of the facility to provide input on development. Leadership guru and author of *The Seven Habits of Highly Effective People*, Stephen Covey, says, “Begin with the end in mind.” And so it is with effective facility development. An advisory group can provide valuable input as to how the wall can and will be used and what attributes are most important to the end users. Information gathered from this group will help to make the facility more successful in the long run.

**Step 2.** Contact several climbing wall companies early in the process to gather ideas and cost information. Numerous firms specialize in the design and construction of climbing walls, and while it is possible to bid out elements such as design and construction to separate contractors, it is less complex to select one firm for the entire design-build process. Many of the most established climbing wall manufacturers can be found through the Climbing Wall Association, Inc., the nonprofit trade association of the climbing wall industry (www.climbingwallindustry.org). Most climbing wall manufacturers will provide a wealth of information free of charge to help you with planning and programming a facility. Beyond just the general marketing materials, an owner may wish to ask if manufacturers have information for architects and sample bid specifications for various types of construction. Many companies can provide preliminary design sketches. These resources will help in planning for adequate space, as well as in designing and engineering the space appropriately for the type of wall desired. This step can be taken by the owner, the general contractor, or an architect, depending on the facility.

**Step 3.** Beyond the wall purchase, plan and budget for several years of operations including programming, route setting, and maintenance. To experienced facility directors this is obvious. If a facility is to include a tennis court it will need myriad resources beyond the court itself in order to run a successful tennis program. Climbing walls are no different, as the owner will need a set of equipment to conduct effective climbing programs. Experienced climbing wall companies are able to provide owners with a complete list of equipment and recommendations on maintenance costs, route setting, and programming.

**Step 4.** Make site visits to other facilities to gather ideas. This is critical so that you can see what is being done in the area and at similar facilities nationally. The local climbing gym may have much different programming and demographics than the local community recreation center or a university program. Visiting different facilities gives owners a feel for the quality and variety available in different types of layouts, construction, surface textures, and climbing terrain options.

**Step 5.** Be realistic. It is important for owners to program the space with adequate room for fall zones, stretching, spotters and climbing partners, instructional programming, and traffic flow. Every facility will have space constraints at some point in the planning process. A common problem is trying to fit too large a climbing wall into too little space. Following steps 1 through 4 will ensure that a climbing wall is developed that is aesthetic and functional for the space allocated to climbing in the facility.

**New Facilities**

New facility design presents an excellent opportunity to incorporate climbing walls into the core offerings of a facility. Many new facilities place their climbing walls in a conspicuous location or near exterior windows to take advantage of the visual appeal and aesthetics of the wall’s texture and design. New facilities can also consider including complementary amenities such as changing areas, lockers, food services, and multipurpose rooms.

Many sport facility architects have a working knowledge of climbing wall spaces and construction techniques. If the architect lacks this experience and knowledge, it is advisable to select a climbing wall specialty firm and bring these personnel on board early in the architectural design process to consult on this aspect of the facility. This will ensure that all the right questions are asked during the programming phase.

**Renovations and Retrofits**

Retrofitting or remodeling an existing facility for installation of a climbing wall is an excellent way to bring a new activity and excitement into the facility. Many of the planning steps just explained apply to this type of project. One of the most common retrofits for climbing walls is the
racquetball court conversion. These 21 ft (6.4 m) tall spaces are perfect for a modest-size climbing wall; 21 ft is an adequate height for creating routes for beginners through experts. The lower 12 ft (3.7 m) of the wall can be used for bouldering and unroped climbing. Most climbing wall design and manufacturing firms have specialized designs and modular climbing wall systems for the retrofit of racquetball courts, gymnasiums, and similar existing spaces.

**DEVELOPMENT OF ARTIFICIAL CLIMBING STRUCTURE STANDARDS**

During the late 1980s, a number of U.S. manufacturers and industry leaders organized a group under the auspices of ORCA (Outdoor Recreation Coalition of America) called the Climbing Wall Industry Group (CWIG). The Climbing Wall Industry Group, now disbanded, developed and published written specifications for the design and engineering of climbing structures. The so-called CWIG standards addressed two primary topics, determination of live loads and structural requirements of anchor points. These two specifications were meant to supplement general design considerations involved in designing and engineering an artificial climbing structure (ACS). The CWIG specifications were intended as interim specifications until broader consensus-based standards could be developed; however, they are still in use by many firms today. The CWIG standards were submitted to ASTM International, where they were further developed, and were eventually transferred to the Climbing Wall Association (CWA) in November of 2005.

At about the same time the CWIG standards were published, members of the European Committee for Standardization, or Comité Européen de Normalisation (CEN), began to develop a standard for artificial climbing walls to be used in Europe. Industry standards are crucial for facilitating the engineering and implementation of individual projects and helping to minimize the risks to the climbing public that are posed by failure or inadequacy of any component of a climbing structure. These standards, once in place, will become readily available to designers, architects, engineers, and municipal officials involved in ACS projects. Europeans have a longer history of ACS use, dating back to the ’60s; the first commercial climbing gym in North America did not appear until 1987. The European ACS Standard was approved by CEN on December 5, 1998, and is referred to as EN 12572:1998 Artificial Climbing Structures, Protection Points, Stability Requirements, and Test Methods.

**The Climbing Wall Association, Inc.**

To address the ongoing safety issues inherent in climbing wall design, construction, and use in North America, members of CWIG and the Climbing Gym Association (CGA) formed the CWA in 2003 when ORCA disbanded all of its climbing specialty groups. The CWA is the nonprofit trade association of the climbing wall industry, composed of climbing equipment manufacturers, climbing wall designers and builders, and climbing wall operators. A principal publication of the CWA is *Industry Practices: A Sourcebook for the Operation of Manufactured Climbing Walls, Third Edition*. The CWA formed its Engineering Standards Committee, following American National Standards Institute (ANSI) core requirements for standard-setting organizations, to produce an up-to-date North American standard for climbing wall design and engineering. Participation on the committee is open and voluntary. The resulting standard, an evolution of the original CWIG draft standard, is currently being developed by the Engineering Standards Committee of CWA. The CWA also provides standards for an instructor certification program.

**How Were The Standards Developed?**

After its formation, CWIG (and later CWA) focused on two principal areas of activity, both relating to the establishment of climbing structure design standards. The first involved gathering physical test data to determine the loads and forces acting on wall components and climbers during normal wall use. Based on test data, load calculations, fall analysis, and other pertinent criteria, the CWIG standards draft was conservative in its specification of the loads that protection points and other anchors should be designed to sustain on a repetitive basis. The updated CWA standards will be similarly conservative.

These ACS standards do not replace widely accepted engineering practices or local build-
ing codes and regulations. They merely provide additional information to designers and engineers regarding issues that are unique to climbing and climbing structures. It is important to note that these standards are voluntary but have emerged as a result of opinions within the climbing design community over many years. This information should be utilized by the engineer in accordance with standard engineering practices as approved by local building codes for proper design of the climbing wall support structure.

**Ensuring Compliance With Current Standards**

Presently there are no laws or governmental regulations that require the use of an ACS standard or any other climbing structure standards, although regulation in Massachusetts is in development and will likely be the first. Use of the standards is purely elective unless required by a regulatory body with jurisdiction in the facility’s area or unless someone agrees under contract to use them. The owner needs to ask questions, receive written confirmation, and follow up on the details to ensure that all suppliers and consultants are providing a structure that complies with the most current ACS standard. To help ensure that the climbing structure conforms to the standards, consider the following actions:

- Inform the architect, engineer, or general contractor of the existence of the various ACS standards. Request that the project conform to one of these standards and ask for his or her assistance in reviewing the design drawings and calculation packet to ensure that the standards have been used. The ACS standards were developed to help ensure wall purchasers and users of a consistent set of load and design parameters. Established climbing wall design-build firms will help facilitate this process.

- Include language in all bids, Requests for Proposals, contracts with designers, and builders and suppliers that their work and products must conform to the most current ACS standard.

- Make sure that the designer, engineer, or wall builder provides you with drawings and plans stamped by a licensed engineer. Review the material for language that references compliance with the most current ACS standard.

- Ask questions, educate yourself, insist on compliance, and work only with reputable companies.

**DESIGN AND ENGINEERING**

Design and engineering is a critical part of the planning process, occurring early in the overall construction process in order to avoid structural changes later. During the design phase of a typical project, a designer determines the shape and configuration of the proposed climbing structure based on several factors. These include the physical constraints of the space to be developed, the square footage of structure allowed for in the construction budget, the type of wall construction to be used, and the desired mixture of bouldering, leading, and top-roping. The design of the overall facility is largely determined by the position of the walls, so the other improvements need to be configured appropriately. An architect or design professional is usually responsible for designing these portions of the project. A climbing structure design is usually represented in the form of a scale model or as a three-dimensional computer-aided design (CAD) drawing or rendering (see figure 9.1).

Once the design has been produced, an engineer specifies the details that are required to attach the climbing wall’s structural elements to the building. These details are dependent on the types of materials that the builder proposes to use to create the structural framework. The framework will support the weight of the climbing surface and the climbers themselves, as well as absorb the forces generated when roped falls occur. The sizes of the structural members in the frame, the details of the frame connections, and the configuration of the anchor point connections all need to be spelled out in calculation form for each project. This step can be simplified only if the builder and engineer have developed a satisfactory system that reduces the engineering to fewer major components. Engineers are also used to verify that the superstructure to which a climbing wall will be attached not only is strong enough to support itself, but also can support the additional loads imposed on it by the climbing walls, particularly lateral loads.

The exact scope of the services the owner receives from designers and engineers will vary depending on the specific project, as well as the type of climbing wall and the designer’s or engineer’s specialties. Most major climbing wall companies today offer complete design-build capabilities. When you are building larger walls, and especially when you are building climbing structures that will be open to the public, it is imperative to use a design professional, follow all local regulations, and obtain all required permits.
Climbing structures are subjected to substantial forces that vary significantly from the normal forces for which buildings are designed. To ensure the highest-quality and safest end product, consider the following guidelines:

1. Use a licensed engineer to analyze the structure of your facility and proposed climbing structure.
2. Verify that the building can support the additional loads imposed on it by the climbing structure.
3. Use an experienced climbing wall design-build company that is familiar with climbing wall structural standards. Many issues depend on knowledge specific to climbing and climbing structure design, making this experience invaluable.

THE BUILDING PROCESS

The following process may be considered typical when a climbing wall structure is to be built:

Step 1. Create a business, facility, or operations plan with specific budget guidelines. During this initial building programming phase, the owner, often with the involvement of the facility architect, should answer important questions about the size and scope of the climbing wall in relation to the facility, type of structural walls, and structural elements of the building. Foundation and recessed slabs to accommodate different flooring types are also considered during this process. Often overlooked, lighting of the climbing wall is important to consider early in the planning process. This is often a team effort of owner or manager plus architect.

Step 2. Research companies and select a climbing wall design-build company. A competitive bid process may be employed, and the choice of vendor involves looking at the various companies’ prior projects, experience, reputation, capabilities, and cost. The following are questions and requests that may help you evaluate a climbing wall design-build company:

- How many years has your organization been in operation?
- How many years have you been under current management?
- How many climbing wall projects have you completed?
- Do you carry general liability insurance of at least $1 million per occurrence and $2 million aggregate?
- Are your products designed, tested, labeled, and manufactured to meet or exceed all relevant governmental or industry standards? To what standards are products designed, tested, labeled, and manufactured?
- Do you have an internal quality control system or a system for monitoring the quality and strength of the final product (or both)?
- Are your designs subject to independent, external review, testing, or certification by a consulting professional engineer (registered or licensed in your state or province)? Please provide contact information for your consulting professional engineer.
- Please provide a letter from your bonding company stating your bonding ability and dollar capacity.
- Do you warrant your climbing structures against defects in materials and workmanship for one year?
- Do you provide any specific training or instruction for the ultimate user in the proper use of your climbing structure?
- Please provide three trade references that we may contact, including name, company, and telephone number.

Climbing Wall Facility Planning

An experienced climbing wall design-build firm will also assist with layout plans and engineering if requested. Some important considerations for facility layout include dust management, climbing wall volume, ease of supervision, client flow, and Americans with Disabilities Act access, and fall management.

**Step 3.** Once the design-build firm has been chosen, the owner will review and comment on iterations of design that work toward an approved climbing wall design and layout. Upon approval, the designer’s scale model or drawings (or both) can be reviewed by a qualified engineer. Once begun, the design process is generally iterative as the designer develops an understanding of the owner’s wants and needs and translates them into design draft concepts. After the final design concept is accepted, generally one needs a structural analysis and review by a licensed engineer, in compliance with current industry specifications, prior to construction. In most cases, the agency issuing the building permit requires a local engineer’s formal approval to accept the plans. Some companies offer preengineered wall systems, but some site-specific engineering is usually necessary to make sure that the building can handle the additional loads from the climbing wall.

**Step 4.** The primary structural framework is constructed, usually by the climbing wall contractor or in some cases the general contractor.

**Step 5.** The climbing wall system or textured surface and custom colors are installed by the climbing wall contractor.

**Step 6.** The climbing wall contractor finishes the anchor points, handhold fasteners, and lead bolts. Handholds may be installed by the climbing wall contractor or the facility owner. Facility owners will want to understand who is responsible for handhold placement and route setting and have this defined in the contract.

**Step 7.** The impact-absorbing landing surface or flooring is installed. Flooring may be installed by the climbing wall contractor or another contractor. Facility owners will want this stipulated in the contract.

All of these steps can be performed by one company or coordinated among several. It is generally advisable to keep the number of players to a minimum to avoid compatibility and coordination problems. These decisions are usually made and coordinated before construction commences.

**CLIMBING WALL DESIGN CONSIDERATIONS**

While many aspects of an athletic facility have preestablished parameters, such as basketball courts, tennis courts, or running tracks, the design of a climbing wall presents an opportunity for creativity and innovation. The following are some frequently asked questions and answers along with design considerations for climbing walls and facilities.

**How Much Space Should I Allow for the Climbing Wall?**

Vertically, the ideal height is 30 to 35 ft (9.1-10.7 m). Climbing walls can be built higher, but generally satisfaction is optimized at heights of 24 to 35 ft (7.3-10.7 m). Frequently, because of space
considerations, walls are built to 20 ft (6 m) or lower in height. Although less than ideal, this height has the advantage of bringing the attraction of climbing to a facility with limited space. If the facility is to include bouldering terrain, the ideal height is 10 to 14 ft (3-4.3 m), although there are facilities with bouldering terrain approaching 20 ft (6 m) (see figure 9.2). Walls under 8 ft (2.4 m) tall can be great for bouldering terrain for kids. The facility needs a landing area that extends at least 6 ft (1.8 m) out from the farthest protruding wall feature. Look for a space with a minimum of 15 to 20 ft (4.6-6 m) horizontally to allow for exciting climbing features and safe flooring.

How Many Climbers Can Climb at One Time?

Here is a simple formula: Two active participants occupy a section of wall 8 ft (2.4 m) wide (one climber and one belayer or spotter). At peak capacity there will be one passive participant for every active participant. Therefore, every 8 linear ft of wall will engage four climbers. For example, 100 linear ft (30.5 m) of climbing wall under peak capacity would engage up to 50 participants. In order to decide how much wall to build, the owner must first understand the size of the user group. An advisory group will help the owner ascertain how many climbers the facility may expect at peak capacity; then use of this simple formula will allow the owner to determine how much climbing wall to build.

How Is the Square Footage of a Climbing Wall Calculated?

To calculate the square footage of a climbing wall, multiply the estimated height by the estimated width and add between 20% and 40% for relief. Large overhanging prows and archways will contain closer to 40% relief. For bouldering terrain, add between 25% and 50% depending on the amount of overhanging terrain.

How Long Will It Take to Build the Wall?

For custom walls, the entire process of setting up a climbing wall at a facility may take one to six months. For modular or panel systems, it may take less. This includes two to four weeks for design, planning, and engineering time and about two to eight weeks for construction depending on the size of the wall (one week per 1,000 square feet [SF] [93 m²] of wall plus one week setup and breakdown time). To expedite the process, start the climbing wall design and planning as early as possible.

Figure 9.2  Free-form bouldering arch at the University of Kansas.
Photo courtesy of Entre Prises Climbing Walls.
What Are “Fixed” and “Variable” Features?

A fixed feature is one that is part of the actual wall structure like a crack or an arête. It may have handholds and footholds but cannot be manipulated or altered in any way. If constructed well, fixed features often become favorites in a gym that climbers keep coming back to year after year as a barometer of their improvement. A variable feature is a climbing hold of any kind that can be moved and, in conjunction with other holds, reworked into an infinite number of different climbing routes. Variable routes are of value to the gym owner because they keep a loyal clientele coming back again and again. The facility should incorporate the maximum amount of handhold placements (T-nuts) appropriate for the type of texture.

Can the Owner Participate in the Design Process?

If the owner is planning on a custom-designed wall, the answer is yes. A modular system may not require any design input other than where it will be located. Climbing wall companies enjoy working with facility owners to come up with the perfect climbing wall design. An owner’s specific ideas and goals for the climbing structure are a welcome part of the process. Owners generally also have input on climbing wall color, surface texture, and features like cracks, flakes, and rappel ledges. Look for companies that use a CAD program to communicate the design changes as they evolve through the design process.

What Additional Costs should Be Planned for?

Installing the wall is just the first step in running a successful climbing program. Be aware of all the peripheral equipment needed to go with your wall. The following is a rough list.

- **Handholds and fastening hardware.** The handholds and footholds are the bolt-on features that the climber actually uses to move on the wall. Made of urethane, resin, and fillers, these handholds bolt onto the wall and can be grouped and regrouped to make terrain continually interesting and to adjust difficulty of routes for climbers (see figure 9.3). They range in size from the size of a poker chip to that of a large soufflé and in price from $3 to $30. You should use only top handhold companies that have a good reputation for making user-friendly designs with minimal breakage. Select a wide variety of shapes and sizes. A rule of thumb is to plan for one hold per 1.5 to 2 square feet (SF) (0.14-0.2 m²) of wall surface. For children’s programs, increase the quantity and size of the handholds in order to foster success and fun.

- **Landing pads and flooring material.** Current standards recommend the use of impact-attenuating landing surfaces at the base of climbing structures. Many types of surfaces are available. Options include gravel (not recommended for indoor use), shredded rubber and gymnastics-type padded mats and custom flooring, and the poured-in-place type of flooring. The final choice should take into consideration the highest height from which falls could occur, the climber’s potential orientation during landing, and the likelihood of the climbers’ dependence upon the landing surface to protect them from injury. The landing surface is not meant to replace skill, judgment, good spotting, or other safety equipment. Landing pads and flooring are there to minimize the consequences (to the head) of a fall when it happens. In addition to the type and depth of the landing material, it is important to consider how far away from the climbing structure it should be extended. Also consider padding objects into which a climber may fall or swing. There is currently no industry standard for landing surfaces specific to ACS applications.

Basically four flooring options exist. Three of these are 6 in. (15 cm) of pea gravel, 6 in. of shredded or chopped rubber, or a foam padding system covered with vinyl or carpeting. Poured-in-place rubber flooring is a fourth option, which provides somewhat minimal impact absorption. Gravel is the least expensive choice but creates a substantial amount of dust, causing air quality problems and a cleaning nightmare. Gravel costs roughly $200 per 1,000 square feet (SF) and should be replaced yearly. Shredded rubber is more expensive, is a little less safe because it displaces more easily, and weighs less than gravel. It costs around $1,000 to $2,000 per 1,000 square feet (SF). Foam padded protective flooring is the cleanest but most expensive option. It can cost upward of $15 per square foot and is usually surfaced with commercial-grade carpet or vinyl. Because of the popularity of bouldering (unroped climbing), supplemental gymnastics-type “crash pads” are
campus recreational sports facilities
now common in most facilities. Plan for protective flooring to extend 6 ft (1.8 m) beyond the farthest overhanging prominence of the wall.

- **Ropes.** Top ropes and lead ropes are among the larger operational costs, especially if a facility provides ropes for lead climbing. Depending on usage, top ropes may need to be replaced every six months, lead ropes every two months. Cost is roughly $1.40 per foot. Current construction standards are based on the forces that can be generated using UIAA-certified dynamic ropes. While dynamic ropes tend to be the industry standard, low elongation (low B or static) ropes are also used in some facilities due to the increased durability. If the facility chooses to use low elongation (static) ropes, it is important to understand what factors affect the forces generated by their use and to take measures to ensure that these forces do not reach levels at which either equipment failure or bodily injury can occur. Ropes that are not certified as UIAA dynamic ropes may generate impact forces sufficient to damage or cause failure in the climbing structure or equipment and cause bodily injury to the climber during a fall. Consult your builder, equipment manufacturers, and suppliers for information and recommendations on specific equipment and its appropriate use.

- **Rental equipment.** Operators of even small walls need a lot of rental equipment on hand. The size of classes to be offered usually determines the scope of the rental program. If the facility anticipates 10 students per class, it should carry a minimum of 15 harnesses of assorted sizes, 10 locking carabiners, 10 belay devices, and a few chalk bags. If the facility supplies footwear, 25 pairs of shoes in assorted sizes is a minimum. All equipment should be UIAA accredited to ensure quality, and climbing programs should always follow manufacturer's guidelines.

- **A few miscellaneous items.** A route-marking system using colored tape, quick draws with steel carabiners, floor anchors for lead climbing, tools for route setting, and an assortment of ladders are generally needed to complete the facility's ongoing maintenance.

**Types and Configurations of Walls**

While a variety of construction techniques and materials are available on the market today, climbing walls can generally be grouped into five categories.

1. **Traverse walls.** These panelized systems are generally 8 ft (2.4 m) in height and can be installed with basic tools. They ship easily and are removable. Traverse walls have minimal relief and features and require almost no engineering. This type of wall is great for small children and limited budgets.

2. **Panelized modular walls.** These modular wall panels are usually mounted to a framework that is anchored to the floor or building in some fashion. Materials range from plastics, fiberglass, resins, and glass fiber reinforced concrete (GFRC) (see figure 9.4) to composites. Some panels may be removed, replaced, and rotated. Some panel systems offer interesting relief and good T-nut density; they are usually installed in a grid pattern and may have visible seams.

3. **Planar, plywood- or wood-based climbing walls.** These are generally custom designed
and engineered to fit a given space or facility. The wood “skin” is usually mounted onto a steel framework that is anchored to the building walls and floor. Depending on the manufacturer, the wood is covered in a polymer concrete mix to achieve a seamless texture and a variety of finishes or color options. Finally the wood and concrete surface is drilled, and T-nut anchors are placed to fasten the handholds. Density of T-nuts and type of T-nut are a cost and quality factor. This type of wall, as well as the concrete walls listed next, provides maximum versatility to include interesting features such as arêtes, dihedrals, chimneys, arches, overhangs, towers, flakes, fins, cracks, and texture.

4. Concrete hand-sculpted or formed walls. This type of wall allows for many creative elements and varying degrees of rock realism. The texture may be hand applied or shot on with a concrete “gun” applicator. These walls are usually weatherproof and offer high relief and custom colors and features in the texture application (see figure 9.5). The T-nut density and route-setting possibilities may not be as great as with a wood substrate wall due to the number of sculpted features.

5. Rock-realistic molded panel walls. This type of wall is popular for architectural applications where absolute realism is desired. They are often fabricated using panels cast from actual rock cliffs and are available in a variety of texture and color options. Glass fiber reinforced concrete is a common substrate material for the panels, which are generally mounted to a steel framework. These walls are generally weatherproof and very durable. The T-nut density and route-setting possibilities may not be as great as with a wood substrate wall due to the number of features inherent in the rock-like texture.

The owner will want to work carefully through the details and specifications of the preferred climbing wall type. Compare the fine details between one manufacturer and another. Look at many photos and visit as many facilities as possible. It is also helpful during the design phase to talk with references to find out their overall experience with the wall’s performance over time.

LEGAL LIABILITY AND RISK MANAGEMENT

In the world of climbing walls, as with most other aspects of sport and recreation facilities, it is important to build the facility and program based on sound risk management principles (elimination, reduction, transfer, and acceptance) and to align your practices, policies, and procedures with manufacturer recommendations, generally accepted climbing practices, and practices used by other similar and respected facilities. Networking with similar established facilities and programs and following sound risk management procedures established by national organizations like the National Intramural-Recreational Sports Association will accelerate the development of the facility’s risk management plan. Fortunately, the controls available in indoor rock climbing create an opportunity to implement sound risk management plans focusing on prevention that would not be available with climbing in the outdoors.
Figure 9.5  Glass fiber reinforced concrete boulders mimic real stone and can withstand outdoor weather conditions. Location: Boulder Rock Club.
Photo courtesy of Eldorado Wall Company.

A written risk management plan for climbing wall operations might include the following:

1. Risk management plan outline
2. Incident and accident protocol and procedures
3. Safety rules, policies, and procedures
4. Staff manual
5. Exculpatory agreement appropriate to your state
6. Rope and equipment purchasing and use log forms
7. Participant top-rope belay test (practical)
8. Participant lead climbing belay test (practical)
9. Youth certification program (for under 18, written and practical)
10. Climbing wall maintenance log
11. Teaching outlines for any curricula being taught

Facility Factors

The actual design of the facility and its physical layout are important elements of risk management. As described earlier, the wall space should include adequate fall zones and traffic flow and should take into account the potential for pendulum swings in top-rope and lead areas. Protective, impact-absorbent flooring should be in place. The facility itself, as well as all climbing equipment, should be inspected and documented on a predetermined schedule as recommended by the wall or equipment manufacturer.

Equipment Considerations

All equipment used in an indoor climbing wall should be UIAA (Union International des Associations d’Alpinisme) or CE (Committee for European Normalization) approved if a UIAA or CE standard exists for the given type of equipment. This rating generally applies to the technical equipment used in climbing walls: ropes, helmets,
harnesses, quick draws, carabiners and belay devices. Use only climbing equipment manufactured by reputable and established climbing gear manufacturers. It is common practice to record the purchase dates or dates of manufacture (or both) and log the use of ropes and webbing equipment (harnesses, quick draws) on a regularly scheduled basis. Always follow the manufacturer’s guidelines regarding use, care, inspection, and replacement on all climbing equipment.

**Climbing Wall Maintenance and Operations**

The purchase of the climbing wall should include basic training on maintenance and operations. Choose a climbing wall or manufacturer with a demonstrated track record of producing climbing walls that withstand the test of time. There are several types of walls, as discussed here, and the various types have different maintenance issues. Just as with climbing equipment, it is important to follow the manufacturer’s recommendations.

**SUMMARY**

Climbing walls are an attractive and engaging addition to recreation facilities. Climbing as an activity and a sport is fun and challenging and offers participants of all abilities a progression of learning, physical conditioning, and skill development. By following the guidance provided in this chapter, facility owners will be able to effectively and more efficiently design and program climbing walls into new facilities or retrofit climbing walls into existing facilities to bring this recreational activity to the facility’s end users.

**DEFINITION OF TERMS**

**arête**—A sharp V-shaped fin, ridge, or prow on a climb.

**auto-belay**—A device attached to the top of or behind the wall that eliminates the need for a belay partner.

**belayer**—The person who takes in or pays out rope for an ascending or descending climber. “Belay” is the system and process by which this is done.

**bouldering**—Unroped climbing, usually on the lower portion of a wall, rock face, or boulder.

**crack**—A split feature on a wall or climb, generally described by its size in relation to the fingers or hand, for example finger crack, hand crack, fingertip crack, fist crack.

**lead climbing**—The process of ascending a climb with the rope, climber, and belayer from the ground up. The lead climber ascends and clips the rope through preset “quick draws” anchored to the wall at intervals. At the top he or she passes the rope through a final anchor and is lowered to the ground.

**pendulum swing**—The potential swing on the rope that climbers may take if they let go of the rock. If climbing to the left or right of a top-rope anchor, or on an overhanging section of wall, a climber would swing if he or she let go.

**quick draw**—Two links (carabiners) and a short 4 to 6 in. (10-15 cm) webbing loop that are attached to the wall as intermediate lead anchor and top-rope anchor points or both.

**spotter**—A partner in bouldering who helps stabilize or break the fall of a boulderer if he or she were to come off of the rock.

**T-nut**—Specialized nut that is mounted to the climbing wall to allow the threading of modular handholds.

**top-rope climbing**—Climbing with the rope anchored from above. In the gym the rope is usually passed through anchors or belay bars at the top of the wall and both ends of the rope are on the ground.

**RESOURCES**

**Climbing Wall Industry Information**

Several organizations may be of help in providing information, common practices, and contacts with other climbing wall facility managers.

**Association of Outdoor Recreation and Education, 540-484-1380**
www.aore.org

**Climbing Wall Association, 720-838-8284**
www.climbingwallindustry.org

**National Intramural-Recreational Sports Association, 541-766-8211**
www.nirsa.org

**USA Climbing, 888-944-4244**
www.usaclimbing.org
Books

Climb Your Best by Heather Reynolds Sagar, Stackpole Books
Climbing: From Gym to Crag by S. Peter Lewis and Dan Cauthorn, Mountaineers Press
Gym Climb by John Long, Falcon Press
Gym Climbing: Maximizing Your Indoor Experience by Matt Burbach, The Mountaineers Books
The Handbook of Climbing by Allen Fyffe and Iain Peter, British Mountaineering Council


Periodicals

Climbing Magazine
Rock & Ice Magazine
Urban Climber Magazine
This chapter describes the proper integration of furniture, fixtures, and equipment (FF&E) planning into the architectural design process. The benefits of properly incorporating this process early in the design process will ensure accurate budgeting, allow for coordination of building infrastructure, provide an opportunity to rethink standard operating procedures, and augment growth and flexibility for the future.

**THE NECESSITY OF EARLY FF&E SELECTION**

Finally, the hard work is paying off. The budget is set, and the planning stages have begun for building a state-of-the-art recreation center that will serve students, faculty members, and special guests for the next 20 years. The existing building, designed in the 1960s, is going to be demolished, and crowded locker rooms and nightmarish scheduling issues will be a thing of the past. Visions of an elevated running track, eight-lane competition pool, and brand-new exercise gear are clear. The administration has fully backed the plan, and all are prepared to sit down with the design team and make this dream come true. However, during the initial predesign meetings, a designer asks a question that catches everyone off guard: “Do you want to use systems furniture in the administration area?” Systems furniture? Can that decision wait until later? It becomes apparent that not only does this treasured facility have to serve students looking to maintain a fit lifestyle; it also has to be furnished to allow the staff to run an efficient and successful facility.

Furniture, fixtures, and equipment (FF&E) selection is much more than choosing desks, filing cabinets, treadmills, and stair climbing machines. It’s a necessary step in providing equipment for every space in the center. It might not seem like a large task during the planning stages, but it can become a difficult and confusing chore if it isn’t addressed as early as possible.

As already mentioned, the benefits of properly integrating this process will ensure accurate budgeting, allow for coordination with building infrastructure, provide an opportunity to evaluate standard operating procedures, and augment growth and flexibility in the future.

Whether the architect provides FF&E selection services or a separate FF&E consultant is involved, it’s wise to start the process as early as possible.

**ANALYZING THE ARCHITECTURAL PROGRAM**

An architectural program defines the overall size, scope, and cost of a building. It’s usually completed after several meetings with the owner, user...
An additional step in the analysis of the architectural program includes tours of other recreation facilities. Tours provide the owner with an opportunity to learn about different designs, organizational procedures, and operational issues. Another benefit is that tours stimulate productive communication between owners and their peers. The National Intramural-Recreational Sports Association is a leader in this regard. Attending the National Recreation Facilities Institute is a good way to see different facilities and to discuss the pros and cons of various design approaches. This popular yearly institute offers educational sessions that often focus on new facility design or on elements of the process itself.

Facility visits frequently stir emotional responses ranging from excitement to bewilderment, and owners can see what FF&E selections might work or not work in their facilities. They get an in-depth look at administrative spaces, entry areas, locker rooms, toilet rooms, weight fitness areas, and any other area that will require FF&E items. Visits are a great way for owners to see firsthand what's available for their new center and to decide what they like and don't like. Facility visits also provide the owner and designer with an opportunity to identify particular furniture and exercise equipment manufacturers that they might be interested in using.

From 2002 to 2004, George Brown, Executive Director of University Recreation at the University of Alabama, participated in the facility design and FF&E selection processes for the university's new student recreation center, which was designed by TMP Associates, Inc. of Bloomfield Hills, Michigan, and Sherlock, Smith & Adams (SS&A) of Montgomery, Alabama. According to Brown, facility visits are one of the most important steps required when one is designing a new recreation center. “You can’t substitute seeing, feeling, and listening to end users’ accounts of what works and doesn’t work in their facilities. Facility visits allow facility directors and their staff to really see how other end users live with their recreation center and furniture selections. I would recommend facility tours to any director or manager that’s going to design a new recreation center.”

When Brown, TMP, and SS&A were in the early design stages of the new center, they visited student recreation centers in Michigan and Ohio to get different perspectives about design trends at the college and university level. Brown says groups, and administrative staff. It’s the starting point from which all buildings are designed, and review of the completed program is critical so that people get entirely familiar with the nature of the spaces and the scope of the project.

When analyzing the architectural program, it’s critical to ask questions regarding FF&E selection. The questions are meant to elicit responses about operating procedures. For example, common questions are about how the current facility is run, how the new facility should be run, and what the ideal situation is for a new facility. Why ask these questions? They provide an avenue for the design team and owner to communicate and share ideas about what FF&E issues were a problem in the past and what FF&E options might work in the future.

Future growth is also a factor to consider during the analysis. Do demographic forecasts indicate that user groups will grow in size in the future? Will more people be hired to run this facility? Is there a possibility of expanding the center? All of those questions will affect FF&E selection.
that getting out of your comfort zone is a good way to gather information about various designs. “Visiting out-of-state facilities can be a real eye-opener. It provides the director and staff members with different perspectives regarding national design trends and can uncover little nuggets of information that can be used when designing a new center.”

**Key Points**
- Ask questions.
- Paint a mental picture of your ideal recreation center.
- Visit other facilities.

**PRELIMINARY FURNITURE LIST**

The program analysis stage is an assessment of the architectural program, which often uncovers issues that might have been overlooked during earlier planning stages and flushes out questions that usually don’t surface until later in the process. It is the stage at which final changes can be made with regard to additions, alterations, or deletions within the composition of space in the building. The analysis also helps in the creation of a preliminary furniture list itemizing the FF&E requirements that are suggested as a result of the program analysis.

When the project budget of the new center is established, it’s necessary to identify a budget item to cover the FF&E components. Unless there’s a special budget for FF&E, it has to come out of the main budget. This is where the preliminary furniture list becomes useful. It becomes a checklist and justification to establish a realistic budget allowance. A realistic number plugged into the overall budget protects other budgeted items and gives more control of the final product.

The preliminary furniture list (table 10.1) is an itemized list of every FF&E piece that’s anticipated for the recreation center. It’s a working document that will evolve as the project unfolds. All the items on the list might not be used, and some needed items may be overlooked at this early stage; but the list gives the owner a tool for thinking about what will be needed in the center. Thinking about and listing everything from desks and chairs to waste receptacles and so on is the best way to begin.

The list features the name of each space, furniture or equipment description, anticipated quantity, individual probable costs, and total probable costs. If an FF&E consultant is working on the recreation center, he or she can provide adequate preliminary costs for these items. Web sites and local furniture and equipment dealers can also help. Creating the list in a simple spreadsheet format allows it to be easily updated with a click of the mouse and a couple of keystrokes.

Compiling a preliminary furniture list is a crucial step in the early stages of the design process because it helps to maintain the budget and gives everyone an idea of how many items are needed for a facility. In the case of the University of Alabama recreation center, the list allowed the owner to understand how large the lobby was going to be via a written tabulation of café tables and chairs that were proposed for the space.

This is an opportunity for owners to really examine how their facility currently functions and how they would like their new facility to operate. They also need to think about every piece of furniture and sport equipment that will reside in the building. The task can be daunting because hundreds of items are needed to operate a successful recreation center. However, tackling the preliminary furniture list early allows the owner and design team to work together in creating the most efficient, coordinated, and attractive center possible.

“Just as important as laying the groundwork to stay within the budget, the preliminary furniture list provides an avenue for team members to look at spaces and realize that they might be too cluttered or they might need additional pieces of furniture and equipment,” Brown explains. The act of creating this list spurs constructive communication on how spaces should operate and how they should be equipped. It makes people think about the whole space rather than just the basics of the space.

It’s important to reconcile the budget against the emerging list of FF&E items and to make the necessary adjustments before proceeding to subsequent steps. This sometimes requires some soul searching and revisiting of priorities. Facing the realities of the budget early in the planning and design stages avoids disappointment and loss of control later in the process.

For instance, there might be existing furniture that has been recently purchased and looks great, that is completely functional, and that the owner likes. If that’s the case, now is the time to place those pieces on the preliminary furniture list as zero-cost items and note them as “existing.”
Key Points

- Make a preliminary furniture list of everything you can think of that you may want and need in the new facility, and include anything to be reused.
- Think about how your facility runs now and how you would like it to run.
- Reconcile the preliminary furniture list with the budget realities.

SCHEMATIC DESIGN PHASE

During the schematic design phase, various building schemes are developed using the architectural program statement as a "recipe" for the project. This statement is a list of all individual spaces within the building, with square footage totals at the bottom. Everything is taken into consideration during schematics: Site configuration and traffic patterns are scrutinized, service access areas are studied, and every other situation imaginable is looked at. The shape and image of the building, both inside and out, are starting to take form during this stage, and those options are presented to the client.

While the architectural team is designing various conceptual options for the building, this is a good time to test the emerging architectural plan layouts by dropping in conceptual furniture layouts to see how they fit into a particular space. For example, in heavy furniture use spaces like the administrative offices, testing the plan layout with conceptual furniture options allows the designers and owner to uncover potential weaknesses in the architectural plan configuration and create a better solution. The trick is to marry good looks with functionality, and the challenge is to not compromise on either issue.

The benefit of taking the time to do this exercise during the schematic design phase is that the designers can maximize the efficiency of the layout early on in the process and make changes if necessary. With early consideration of FF&E, it is easier to make adjustments because the building design is fluid at this point, still evolving to fit the owner's needs.

It's important to note that the schematic phase is a collaborative effort between the design team and the owner. The owner is reviewing all of the schemes with the designers and providing input about how their respective departments operate. This participation provides designers with critical information about operational issues that affect the placement of certain pieces of furniture. On the flip side, it lets owners convey their interests, ideas, and concerns to the designers. This back-and-forth dialog helps iron out potential operational conflicts.

“One of the great things about collaborating with the TMP/SS&A design team during schematics was that we were able to look at different layouts and decide what would work for us and what to avoid. Their design expertise, coupled with our knowledge base, allowed us to create an operational process as the building was being designed. By collaborating with the design team, we learned the operational process through the design process,” says Brown.

Additionally, each scheme is documented on paper so that everyone on the design team and the owner's team can review the various layout options and designs. Incorporating furniture layouts at this time can sometimes have a significant impact on the final architectural design. The following graphics illustrate how spaces can be manipulated to improve functionality without loss to the overall architectural intent. The graphics are schematic designs created by the TMP design team during the initial design phases of University of Alabama’s recreation center.

As shown in figure 10.1 on page 178, the design team explored a stepped geometry as part of the overall form and expression of the building. The initial thought was to design enclosed offices along the stepped geometry; however, after laying out furniture and equipment in these spaces, it became clear that this approach would require expensive customization of desktops and create awkward spaces. This sketch also illustrates a philosophical approach to the function of the control desk, which is shown as the curving element in this plan. With this approach, graduate assistants are placed immediately behind the service counter and are a part of the overall administrative suite. Although this layout works during the day, nighttime use is another matter. It would be impossible to secure the office environment once the permanent staff left for the evening. Although the stepped geometry was promising as an exterior expression, the functionality of this shape relative to the office requirements was compromised, and it was necessary to explore another approach. Without taking the additional step of testing the viability of the spaces with a conceptual furniture layout, it’s possible to mistake the true opportunities and limitations of the proposed design.
Table 10.1  Furnishings Listing With Probable Costs for University of Alabama Student Recreation Center

<table>
<thead>
<tr>
<th>Space</th>
<th>Room no.</th>
<th>Item</th>
<th>Qty</th>
<th>Cost/Item</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower level/zone A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Café/entry lounge</td>
<td>A101</td>
<td>Café tables</td>
<td>21</td>
<td>$400</td>
<td>$8,400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Café chairs</td>
<td>65</td>
<td>$200</td>
<td>$13,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sectional sofas</td>
<td>3</td>
<td>$4,700</td>
<td>$14,100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lounge chairs</td>
<td>8</td>
<td>$1,200</td>
<td>$9,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TV/VCR cabinets</td>
<td></td>
<td>By owner</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Oval coffee table</td>
<td>2</td>
<td>$800</td>
<td>$1,688</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Rectangular coffee table</td>
<td>1</td>
<td>$800</td>
<td>$1,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Special events table</td>
<td>1</td>
<td>$1,200</td>
<td>$1,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kiosk</td>
<td>3</td>
<td>$1,000</td>
<td>$3,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surround sound TV</td>
<td></td>
<td>By owner</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste receptacle</td>
<td>6</td>
<td>$350</td>
<td>$2,100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plants and planters</td>
<td>3</td>
<td>$6,000</td>
<td>$18,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Artwork and murals</td>
<td>4</td>
<td>$2,500</td>
<td>$10,000</td>
</tr>
<tr>
<td>Control desk</td>
<td>A102</td>
<td>Task chair</td>
<td>5</td>
<td>$600</td>
<td>$3,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>File pedestal</td>
<td>3</td>
<td>$500</td>
<td>$1,500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lateral file</td>
<td>2</td>
<td>$800</td>
<td>$1,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wastebasket</td>
<td>4</td>
<td>$50</td>
<td>$200</td>
</tr>
<tr>
<td>Lower level/zone C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student reception</td>
<td>C101</td>
<td>Task chair</td>
<td>2</td>
<td>$600</td>
<td>$1,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Clerical workstation</td>
<td>1</td>
<td>$8,000</td>
<td>$8,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Copier and fax</td>
<td></td>
<td>By owner</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wastebasket</td>
<td>2</td>
<td>$50</td>
<td>$100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Safe</td>
<td></td>
<td>By owner</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste receptacle</td>
<td>1</td>
<td>$350</td>
<td>$350</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Settee</td>
<td>2</td>
<td>$1,500</td>
<td>$3,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Coffee table</td>
<td>2</td>
<td>$500</td>
<td>$1,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plants and planters</td>
<td>1</td>
<td>$1,000</td>
<td>$1,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Area rug</td>
<td>1</td>
<td>$1,000</td>
<td>$1,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Artwork</td>
<td>1</td>
<td>$1,500</td>
<td>$1,500</td>
</tr>
<tr>
<td>Coordinator office</td>
<td>C102</td>
<td>U-shaped workstation</td>
<td>10</td>
<td>$6,150</td>
<td>$61,500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Task chair</td>
<td>10</td>
<td>$600</td>
<td>$6,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guest chair</td>
<td>20</td>
<td>$300</td>
<td>$6,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wastebasket</td>
<td>10</td>
<td>$50</td>
<td>$500</td>
</tr>
</tbody>
</table>

(continued)
<table>
<thead>
<tr>
<th>Space</th>
<th>Room no.</th>
<th>Item</th>
<th>Qty</th>
<th>Cost/Item</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower level/zone C</strong></td>
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<td><strong>(continued)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate director</td>
<td>C104</td>
<td>U-shaped workstation</td>
<td>3</td>
<td>$8,689</td>
<td>$26,067</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Task chair</td>
<td>3</td>
<td>$600</td>
<td>$1,800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guest chair</td>
<td>6</td>
<td>$350</td>
<td>$2,100</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wastebasket</td>
<td>3</td>
<td>$50</td>
<td>$150</td>
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<td>Director</td>
<td>C112</td>
<td>U-shaped workstation</td>
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<td>$8,689</td>
<td>$8,689</td>
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<tr>
<td></td>
<td></td>
<td>Task chair</td>
<td>1</td>
<td>$600</td>
<td>$600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Guest chair</td>
<td>3</td>
<td>$350</td>
<td>$1,050</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wastebasket</td>
<td>1</td>
<td>$50</td>
<td>$50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Window coverings (linear feet)</td>
<td>16</td>
<td>$25</td>
<td>$400</td>
</tr>
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<td>Executive secretary</td>
<td>C113</td>
<td>U-shaped workstation</td>
<td>1</td>
<td>$6,150</td>
<td>$6,150</td>
</tr>
<tr>
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<td>1</td>
<td>$50</td>
<td>$50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wastebasket</td>
<td>1</td>
<td>$50</td>
<td>$50</td>
</tr>
<tr>
<td>Staff gathering area</td>
<td>C116</td>
<td>Table 4</td>
<td>4</td>
<td>$990</td>
<td>$3,960</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chair</td>
<td>16</td>
<td>$300</td>
<td>$4,800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mobile markerboards</td>
<td>3</td>
<td>$1,400</td>
<td>$4,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mobile lounge chairs</td>
<td>6</td>
<td>$1,160</td>
<td>$6,960</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equipment table</td>
<td>1</td>
<td>$450</td>
<td>$450</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mobile TV/VCR cart</td>
<td>1</td>
<td>$1,500</td>
<td>$1,500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plant and planter</td>
<td>1</td>
<td>$1,000</td>
<td>$1,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Artwork</td>
<td>1</td>
<td>$1,500</td>
<td>$1,500</td>
</tr>
<tr>
<td>Work room</td>
<td>C117</td>
<td>Table</td>
<td>1</td>
<td>$800</td>
<td>$800</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chair</td>
<td>4</td>
<td>$300</td>
<td>$1,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Copier and fax</td>
<td></td>
<td>By owner</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trash receptacle</td>
<td>1</td>
<td>$350</td>
<td>$350</td>
</tr>
<tr>
<td>Open office area</td>
<td>C120</td>
<td>Clerical workstation</td>
<td>4</td>
<td>$8,400</td>
<td>$33,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Task chair</td>
<td>4</td>
<td>$600</td>
<td>$2,400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Storage and filing station</td>
<td>1</td>
<td>$5,000</td>
<td>$5,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filing</td>
<td>2</td>
<td>$600</td>
<td>$1,200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wastebasket</td>
<td>4</td>
<td>$50</td>
<td>$200</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plants and planters</td>
<td>1</td>
<td>$300</td>
<td>$300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Artwork</td>
<td>1</td>
<td>$1,500</td>
<td>$1,500</td>
</tr>
<tr>
<td>Conference room</td>
<td>C122</td>
<td>Conference table</td>
<td>1</td>
<td>$4,600</td>
<td>$4,600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chair</td>
<td>18</td>
<td>$650</td>
<td>$11,700</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Credenza and TV cabinet</td>
<td>1</td>
<td>$7,000</td>
<td>$7,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Waste receptacle</td>
<td>1</td>
<td>$250</td>
<td>$250</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Plant and planter</td>
<td>1</td>
<td>$600</td>
<td>$600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Artwork</td>
<td>1</td>
<td>$1,500</td>
<td>$1,500</td>
</tr>
</tbody>
</table>
Figure 10.2 shows the office areas in a more rectangular layout to allow a more efficient use of space. As the administrative needs were being reviewed, the owner requested the addition of several large conference rooms near the entrance to the administrative suite. These rooms placed the graduate assistants farther from the control desk, rendering them less effective for supervision of the functions at the control desk. Once again, the area functioned adequately for daytime use, but did not provide separation of the permanent staff areas for nighttime use. Also at this point in the development of the design, the client started to rethink the notion of traditional conferencing as a communications and coordination tool. In lieu of a large enclosed conference room for regular staff meetings, TMP designers discussed the idea of an informal gathering area within the office suite to foster a more creative atmosphere. This area would be equipped with less formal furniture and feel more like a family room than a conference room. With this approach, it was not as important to place the large meeting rooms mentioned earlier within the office suite.
Figure 10.1  Initial schematic design.
Drawing courtesy of TMP Associates Inc.

Figure 10.2  Second schematic design.
Drawing courtesy of TMP Associates Inc.
In figure 10.3, the third schematic design scheme, the informal gathering space has been given more space within the office suite even though it’s still defined with a traditional arrangement of conference tables. The designers and owner also discussed audiovisual opportunities for this area and ultimately decided to use an interactive projection system that saves information written on a white board to a shared computer file. The graduate assistants and the student employee areas are adjacent to the control desk but are separated from the main office suite. This makes it possible for the students and graduate assistants to manage the front desk at night while allowing the main office suite to be secure. At this point, tentative office assignments are being considered along with open office assignments.

Even though intense programming occurred at the beginning of the project, the design team is still in the design mode, and adjustments can be made as these program elements are actually illustrated in sketch form.

The actual floor plan illustrates the final evolution in the planning process (see figure 10.4). During the design phase, it was determined by the university that the recreation program would reduce its use of graduate assistants and increase its use of student employees to operate the facility. Also, the decision was made to centralize the control desk and the equipment issue functions including the laundry. The resulting layout eliminates the graduate assistant space delineated in prior layouts and groups the control desk, equipment issue, storage, and the laundry. This minimizes the overall number of staff required to operate the facility, and the location provides convenient supervision of adjacent spaces such as the lounge and weight fitness areas. It’s important to note that the saw-toothed form initially thought of for the administrative suite is now incorporated into the lobby design. The final design uses the saw-tooth motif in a more significant way and is one of the signature spaces in the facility. The architectural design process overlaid with the FF&E design process pushed the design team to explore other options that resulted in a design with great functionality and great looks.

During the transition from the abstract to the tangible, initial ideas are challenged and new ideas emerge. This is a natural part of design development and is enhanced with the FF&E design process.

Figure 10.3  Third schematic design.
Drawing courtesy of TMP Associates Inc.
The schematic design phase also results in the beginning of discussions relative to furniture type such as systems versus freestanding furniture, closed versus open offices, and central versus individual filing and storage, as well as support elements that will be in use in equipment issue areas, control desks, locker rooms, and so on.

When the owner and architect work closely together during the schematic phase, the required furniture types within the building start to emerge, and the operational flow begins to take shape as well.

Remember, the goal is to get it right the first time. If FF&E selection isn't incorporated into the schematic design phase, the opportunity to maximize the ideal functionality of the allotted space is lost.

This is also a good time to solicit input from weight fitness equipment dealers regarding potential layouts and suggestions for the type of equipment desired for the weight fitness area.

Preliminary schematic weight fitness layouts not only help identify potential cost, but also help clarify what the space can accommodate in terms of type and quantity of equipment, where the staff desk should be, mirrors, and so on.

**Key Points**
- Create preliminary layouts to test functions of the spaces and start thinking about more definitive types of FF&E.
- Review preliminary layouts with staff.

**VERIFYING PROCUREMENT PROCEDURES**

How much is all this going to cost and where is it going to be purchased? Remember, the budget for the center is already set, and FF&E costs
have been established in a preliminary manner. It’s very helpful at this time to understand what manufacturers will be used.

Before actual pieces of furniture are selected or even evaluated, it’s a good idea to determine how the items are going to be procured. The owner and the purchasing group, if one exists, should communicate about procurement issues as early in the process as possible.

The more information known about procurement procedures now, the more likely it is that the owner will be able to secure the pieces that are really wanted later on. Lack of knowledge regarding procurement procedures at this stage leaves everyone at risk for selecting items that won’t be available. Ultimately, this can cause frustration, disappointment, and problems with building coordination.

“Facility directors and managers should know the rules of engagement prior to procuring any furniture or equipment. The rules of engagement are the directives that govern the procurement procedures for individual institutions,” Brown says.

Universities or municipalities might have a blanket contract with one manufacturer, which means that they purchase products made by that manufacturer at a prenegotiated price structure. It’s in their best interest to limit their furniture search to products made by that company.

Perhaps the university or municipality has a standards program throughout the campus or city. This tells the owner at an early phase what the parameters are in furniture selection. Why do extensive research if there are predetermined purchasing limits?

“We are fortunate enough to have a wonderful purchasing department at the university and they let us know early on what kind of discounts we would get and what kind of standing contracts were available to us. This information was extremely helpful when we actually started selecting items,” says Brown.

It’s also a good idea at this time to ask the purchasing group about their bidding requirements. If a design professional is involved in FF&E selection, he or she will usually participate in this process. The objective is to make sure the university’s procurement process is followed and incorporated correctly into the bid documents.

In other words, furniture is usually bid to local dealers who will actually provide and install the products. Will your organization allow you to stipulate a manufacturer’s name and a model number that the dealers can competitively bid on? Or is it a requirement of the purchasing group that the owner can’t state the name of a manufacturer and that the bid has to be “opened” up to anyone who can provide a similar product?

The best scenario is the former, in which owners can choose the actual furniture product that’s best for their recreation center, specify it by manufacturer’s name and model number, and bid it to local furniture dealerships that will order it, receive it, and install it. This scenario allows owners to spend quality time evaluating the products that meet their needs without limitations. The other scenario will not eliminate but will delay the evaluation process because evaluation will have to occur after the bids are received, thus limiting the choices and hindering the ability of the owner to fully coordinate the furnishings with the building design.

Procurement procedures matter and will come into play in the design development stage. In the meantime, all the steps are coming together. The budget is confirmed; the owner knows the furniture selection limitations; and the final shapes and sizes of all the rooms are approved. Design development is the next step, and that’s where all the operational details are hashed out.

Key Points
- Know the procurement procedures for FF&E and how they will affect furniture selection.
- Are standards programs and blanket contracts required?
- What is the university’s bidding and procurement process?

**DESIGN DEVELOPMENT PHASE**

The design development phase of a new recreation center is the bridge between the schematic design and actual construction document phases. During the design development phase, the building’s form, shape, and costs are settled. However, there are so many coordination and systems issues required in the design and planning of a building that this transitional phase is necessary to get them all in order.

Engineering issues like where to put electrical outlets, where light fixtures are to be placed, and how ductwork is to be routed are examples of issues that are addressed in the design development
stage. Building systems are being engineered and coordination is taking place to ensure that the image and function of the building can be realized.

In terms of FF&E selection, the layouts from the previous step are being refined and developed in this phase. The schematic design options have been approved and are going to be fitted with all the FF&E gear needed to create a state-of-the-art recreation center.

This is a very important stage for the design team. They are creating environments that need to house work stations, filing cabinets, computers, coat racks, weight fitness equipment, and everything else that resides in a center. A common practice is for the designers to interview the individuals who will be working in the spaces. This allows the designers to understand the details of how spaces function and what kinds of FF&E items are needed to support those functions. Examples of typical issues that affect FF&E selection include the following:

- Where do employees hang coats, place lunches, and go on breaks?
- Where do control desk workers run photocopies?
- How is money cashed out, and where is it placed at the end of the workday?
- What kind of desk or control center may be needed in the weight fitness area?

Designers are also assessing building infrastructure issues in this phase. Today, many pieces of office furniture fall under the systems furniture category. Systems furniture can be wired directly into the building's electrical source. This means that electrical components like computers and calculators are plugged directly into an outlet that's built into the furniture. Since this is common, it's imperative that the designers understand and coordinate elements to ensure proper final installation of FF&E components. With proper planning, it won't be necessary to place a filing cabinet over a power box or to cover an electrical wall outlet with a piece of furniture, rendering it useless, or to discover that circuiting will not support the furniture system.

This is also the time for the designers and owner to start looking closely at specific FF&E items for the recreation center. Both parties have already taken tours of other facilities and nailed down which manufacturers they are going to use. The next step is to review product catalogs and spend some time in furniture showrooms to look closely at the FF&E items that are going to be placed in the designated spaces.

Special technology needs like smart boards, flat screen monitors, printers, and computers require technology-compatible furnishings. The traditional desk, credenza, and filing cabinet may not be enough in today's workplace.

Showroom visits allow owners to get a good look at the FF&E gear. They can feel, test, and scrutinize the products and make decisions based on tangible experiences. A showroom visit is also an opportunity to speak with product manufacturers and ask critical questions about their products.

Brown is a staunch advocate of showroom visits. His staff and interior designers from TMP and SS&A visited showrooms in Atlanta, Georgia, to get a close look at different products from various manufacturers. “Showroom visits are a great way to see the best and brightest items that manufacturers have to offer, and you can get an idea of the amount of office productivity that's possible when manufacturers show you how the different items work. Additionally, items that you might browse over in a catalog might catch your eye when you see them in person.”

Fabrics, color schemes, and finishes for FF&E items are also selected during the design development stage. The design professional works with the owner to determine a palette unique to the owner's requirements for image, maintenance, and so on and coordinates all building material colors with those of the FF&E. When this exercise is accomplished at this phase, true coordination can occur since everything is evolving in tandem. The process is generally subjective because it includes the owner, staff members, and designers, and everyone can have a voice in the final decision.

Interior designers often create palettes that highlight fabrics, colors, and finishes, providing an invaluable tool that shows how the facility is going to look. Every recreation center has its own identity, so certain colors and fabrics are going to be a natural fit in the building. If the owner knows that a definitive color needs to be used, this should be confirmed as soon as possible. It is imperative to include staff members in the selection process because they are going to be working in the facility.

While all this is happening, the preliminary furniture list is being updated. As mentioned earlier in the chapter, the preliminary furniture
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list is an itemized list of every FF&E piece needed for a recreation center. The list is created in the early stages of FF&E selection and features items that might be needed for the center. That’s why the list is set up in an easily edited spreadsheet—so it can be changed throughout the design process. The list is being continuously updated as the designers and owners figure out what FF&E items are needed for the center. Original estimates are changed, items are removed, new items are added, and costs figures are fluctuating. The point of this list is to create a final cost estimate to ensure that final FF&E selection will be within budget. If the team is over budget, it’s time to trim unnecessary items off the list.

As the design development phase nears completion, so should the FF&E selection process. Each step prior to the end of design development has prepped the team for final FF&E selection. The designers and owner have met over and over again to review products, pour over catalogs, and visit other recreation centers and showrooms. Users have been interviewed to gain an understanding of how they use their spaces. The preliminary furniture list has been updated throughout each step and has evolved into a complete and final cost estimate. And most importantly, the design team and owner have communicated throughout the process to make sure they are on the same page. Now it’s time to create the construction documents.

**Key Points**

- Interview individuals who are going to use the spaces for operational input.
- Assess building infrastructure to ensure proper placement of FF&E.
- Visit showrooms to start reviewing specific FF&E items.
- Pick colors, textures, and fabrics for FF&E items.
- Continue updating the preliminary furniture list, turning it into a final furniture list.

**CONSTRUCTION DOCUMENTATION PHASE**

Construction documents are the legal documents that the construction trades use to bid and build a project. These are the documents that dictate the final specifications of the new recreation center, and they are extremely important because they’re the legal documents used to define the final scope and quality of the project.

Just like construction documents, the FF&E documents are legal documents that local furnishing dealers use to bid, provide, and install FF&E gear. These documents include specifications, installation drawings, and anything and everything so that the FF&E items can be priced and bid for installation.

Right out of the gate, the designers must perform final coordination with the architectural plans, engineering plans, and building specifications. This means that each space must be carefully reviewed relative to the placement of doors, windows, electrical outlets, lighting fixtures, and all the architectural and engineering devices located on the plans. This exercise is another audit point in the process to ensure that the FF&E components will reinforce the design goals established in earlier phases.

A good example of coordinating FF&E items with the architectural, electrical, and mechanical elements in the building is the location of thermostats. During this phase, the designer must review the location of something as simple as a thermostat to make sure that a bookcase or large filing cabinet isn’t placed in front of it. The same applies to fire extinguishers, electrical outlets, light switches, unit ventilators, and anything else that relates to the operation of the space. It’s essential for the designers to go through this process because it is very difficult and expensive to alter the construction when these coordination issues are discovered in the field.

**COORDINATING FINAL BIDDING INSTRUCTIONS**

Coordinating the final bidding instructions prior to securing bids for FF&E is an additional required step. These instructions are part of the bidding specifications and note when bids are due, to whom they should be submitted, and so forth. The designer, general contractor, and owner create the guidelines that furnishing dealers must follow prior to the initiation of the bidding process.

The bidding instructions also include parameters regarding FF&E delivery times, installation phasing, and so on. The instructions are spelled out in this written document so that each bidder has the same information and can compete with competitors on a level playing field. “Bidding
instructions gave us clarity about scheduling, phasing, and installation issues. The instructions were critical because we had to install our furniture and equipment by phases and the document spelled out everything that needed to be done and when it was going to happen,” Brown explains.

Final bidding instructions can have a major impact on bidding approaches. Since specific delivery and installation times are prescribed in the instructions, the instructions can affect the bidding strategy of companies that will eventually offer quotes. For example, dealers might have warehousing capabilities that enable them to purchase all the items at once at a lower cost. Subsequently, they can store the items months before delivery and installation. A competitor might not have access to storage and would have to charge a higher price to offset any price increases on the part of manufacturers.

The final bidding instructions also feature requirements and expectations regarding payment terms, roles and responsibilities of team members, responsibility for wiring systems furniture, union versus nonunion labor, trash removal after installation, and damage to the facility during delivery and installation. The instructions are very thorough, covering all the issues that must be addressed from bidding through occupancy. Developing these instructions is a huge task that requires experience, patience, and organization.

“It would have been an absolute logistics nightmare if we didn’t have the final bidding instructions. There’s no way we could have had weight equipment delivered at the same time as general administrative or lobby furniture because we wouldn’t have had a place to store it and delivery trucks would have literally been docking and bumping into each other. There’s no question that we would have had damaged equipment,” Brown states.

In addition to the final bidding instructions, the designers also develop detailed specifications about the actual FF&E items that will grace the various spaces of the new recreation center. Specifications include the size, color, model numbers, descriptions, weight, and dimensions of the items.

The preliminary furniture list, which has evolved by this time to a final furniture listing, serves as a platform for the development of the actual FF&E specifications. Since the designers have been updating the list throughout the design process, it’s a logical place to start to create the final FF&E specifications list. The approved items on the final furniture list are assigned a bid specification number, placed in a bid package, and described by model number and finish.

A recommended method for bidding furniture is to format the specifications into bid packages. Each bid package includes the items from one manufacturer, and all of these items are bundled together in a group. Grouping only those items from a single manufacturer allows pricing to be received from all the furniture dealers in the area that carry that manufacturer’s furniture.

For example, one dealer may carry the Herman Miller line of furniture and another dealer may carry Steelcase. Not all dealers carry the same lines of furniture. Placing the specific manufacturers in bid packages allows all the local dealers to bid on the packages that apply to the manufacturers that they carry. Although this procedure results in having several furniture dealers provide FF&E on a project rather than having everything coming from one source, it guarantees the best pricing without compromise to the items that have been so thoroughly evaluated and selected in design development.

The bidders sometimes offer substitutions for various specified items. Although it’s generally advisable to avoid substitutions, some purchasing departments require this at times. In some situations, substitutions become necessary because products and materials can be unexpectedly discontinued. This situation requires an adjustment. The FF&E consultant will evaluate and provide a coordinated response to ensure the integrity of the solution.

**Key Points**

- Coordinate FF&E items with the architectural, electrical, and mechanical elements of the building.
- Create final bidding instructions.
- Write specifications about each FF&E item.
- Assemble bid packages for dealers.

**CONSTRUCTION ADMINISTRATION PHASE**

During the construction administration phase of the new recreation center, architects are working regularly in conjunction with the contracting trades to get the new recreation center built as documented. Both parties are meeting on a
Getting It Right the First Time With FF&E

weekly basis to ensure that the building process is moving as smoothly as possible. **Shop drawings** are being reviewed and substitutions are considered to maintain coordination and to ensure adherence to the design goals of the owner.

Moreover, contracts with furnishing dealers are signed, and soon these dealers will be working with the building contractor to verify the delivery and installation times for the FF&E items. They will need to coordinate use of loading docks and staging areas with the building contractor. Remember, the final price, delivery times, installation procedures, and so on were stipulated in the bidding instructions, and everything is clearly spelled out. If changes are required, it’s best to learn about these adjustments sooner rather than later to avoid up-charges due to delays in the construction.

This is a good time to assign an FF&E manager from the recreation staff to be the liaison between the building contractor and furnishing dealers. The building contractor will not coordinate furniture installation without an additional fee, so the FF&E manager will coordinate the two disciplines. This allows all parties to contact one individual to deal with coordination items and any unexpected situations. This individual is the liaison to the building contractor, architect, interior designer, recreation staff, and furniture dealers.

A single point of contact ensures that items that are supposed to be installed aren’t simply drop shipped and that items scheduled to be delivered on a Thursday don’t arrive on Tuesday, for example. The contact is in charge of making sure that delivery and installation run smoothly.

The construction administration phase can be an overwhelming process for the owner and staff. In addition to the construction of the recreation center, FF&E items are being delivered and installed; questions are surfacing; and, most importantly, excitement is building. All the hard work is paying off and the building is starting to take shape.

Brown believes that confidence and comfort are two necessary attributes needed for survival...
of the process. “After two years of planning and designing the University of Alabama Student Recreation Center, a certain confidence and comfort level set in and I became more adept at performing the tasks. My comfort level included having a staff that I totally trusted and a design team that was on top of all the issues,” explains Brown.

Additionally, Brown stresses the importance of teamwork. “Naturally, there are some hiccups along the way, but that’s to be expected with any large building project. What’s important is that the staff, architects, interior designers, engineers, and construction managers need to work together as a team. Everyone should feel as if they are part of the process to ensure that everyone is committed and on the same page,” Brown summarizes.

**Key Points**

- Issue purchase orders to furnishing dealers.
- Assign an FF&E manager from the recreation staff for coordination of FF&E contractors and building contractor activities.

**OCCUPANCY PHASE**

As mentioned earlier, the furniture dealers, via the FF&E manager, coordinate with the building contractor prior to and during FF&E delivery and installation. Since the final bidding instructions were agreed to prior to occupancy, both parties have a legal document defining the requirements for delivery and installation. Adherence to the installation time lines and sequencing requirements is critical in order to avoid numerous problems and aggravations that can result from disregarding the bid agreement.

Understanding what to do and what to avoid during the installation and occupancy phase is a must. Even though the guidelines are clearly spelled out in the bidding instructions, FF&E gear is sometimes delivered on the incorrect date or at the wrong time. An understandable reaction on the part of the owner is to accept the FF&E gear, place it in an area that’s out of the way, and worry about installing it at a later date. It’s critical for owners to avoid this trap at all costs!

Here is a sequence of events to avoid. The bidding instructions state that a specific package of furniture must be delivered and installed between 8:00 a.m. and 4:00 p.m. and should not be drop shipped. However, the dealer actually arranges for the furnishings to come directly to the job site from the factory **(drop shipping)** and provides none of his staff to meet the truck to unload and install. Since drop shipping doesn’t allow the driver to unload, the driver asks if the owner has some people who can help him unload the items. The owner should refuse the delivery and contact the dealer to review the agreed-upon delivery and installation requirements. The situation is unacceptable and unprofessional and should not be tolerated. The owner will not be responsible for extra fees and charges because the delivery and installation criteria were clearly stated in the bidding instructions.

If the owner does accept the furniture and stores it in a back room, he or she risks the possibility of theft, overcrowding of spaces, unaccountable damage, and possible installation problems. Once again, the dealer and owner must follow the delivery and installation schedule in order to maintain a smooth process.

Owners should never make changes in the field while installation is in progress. Maybe the owner has a new idea about moving a staff member. The owner should immediately contact the designers so that the problem can be resolved in a way that fits the architectural layout of the room and resolves any “ripple” effects elsewhere in the building.

After the FF&E equipment is completely installed, the designers will walk through the center and develop a **punch list**. This entails examining every piece of FF&E gear in the center for damage, proper installation, and omissions. The list is then given to the owner; it states what is completed, what’s pending, and what percentage should be paid to the furniture dealers. The owner is then equipped with a tool to follow up on the items and to make sure everything is executed properly.

It’s recommended that the FF&E contractors not be paid in full until the work is 100% complete. The practice of withholding a percentage of the total contract amount until the work is complete is common and is called **retainage**. In the final hectic days prior to occupancy, everyone is under great pressure to get everything done for the grand opening. It’s human nature to look for ways to facilitate the schedule by cutting corners or by ignoring problems. The industry recognizes this weakness by withholding a portion of the contract amount as an incentive to ensure that these issues are not forgotten or ignored when the pressure to get done and get
out of the way is very keen. The retainage gives you some control and authority during this phase to make sure that the project meets the requirements of the plans and specifications. If it becomes apparent that a particular installer is unresponsive, that installer forfeits the retainage, and you can correct the problem using the associated retainage fund. The recommendation is to retain 25% of the contract amount until the installation complies with the plans and specifications. Whether the issue is a scratched work surface or a missing bracket, hold on to the retainage until the work is complete.

**Key Points**
- Make sure delivery and installation guidelines are followed.
- Contact designers if changes to the layout are being considered, and never give instructions directly to installers.
- Conduct punch list activity after final installation.

**SUMMARY**

The integration of FF&E into a new recreation center is much like putting together a large three-dimensional puzzle without looking at the picture on the front of the box. For many, it can be difficult to visualize the finished building during the planning stages when it’s still a drawing or rendering on paper. But it is precisely during this planning stage that FF&E should be integrated, allowing for maximum efficiency of the spaces. If the owner chooses to integrate the equipment and furnishings after the facility is built, a loss of control and coordination often occurs. Upfront planning minimizes risk and in the long run results in a functional and attractive facility that meets the needs of the users.

**DEFINITION OF TERMS**

**bid package**—A package of product specifications usually based on one manufacturer.
There are multiple bid packages when several manufacturers are used.

**drop shipping**—The shipping of furniture or equipment directly to a facility from the factory. In drop shipping, the truck driver does not unload the truck.

**FF&E**—All of the items that will reside inside a recreation center.

**furniture and equipment dealer**—An individual or company that sells or distributes one or more brands of furniture or equipment.

**furniture showrooms**—Venues that showcase specific FF&E items sold by various dealers.

**installation drawings**—Drawings that locate every piece of furniture and equipment on the architectural floor plan. Each item is identified with a number that matches the item number as listed in the specifications.

**payment terms**—Terms that dictate the parameters required for payment of products between the buyer and seller.

**preliminary furniture list**—An itemized list of every FF&E piece that's anticipated for a facility and its estimated installed cost.

**punch list**—A list derived from a process whereby every piece of furniture and equipment in a completed installation is examined for damage and for compliance with the plans and specifications. Upon verification of compliance, the furnishings contractor is paid the remaining contract amount (retainage).

**retainage**—An amount of money held back after initial payment is made until installation of all items is 100% satisfactory. Under payment terms, it's customary to pay 75% when installation is complete and then retain 25% until all punch list items are completed.

**shop drawings**—Drawings that the furnishings contractor submits to the architect, showing how the contractor intends to fabricate the custom piece of furniture as drawn for design intent by the architect in the specifications.

**specifications**—Descriptions of the properties of items to be procured and the procedures for installation. The manufacturer's name, model number, dimensions, color, and weight are indicated. Items are identified by a number that keys into the installation drawings and schedule and phasing, and any other requirements are explained. The specifications and the installation drawings comprise the contract documents that are the legal description of the scope of the work.

**systems furniture**—A series of components that includes partitions and panels, work surfaces, storage units, and so on, arranged to meet specific functional and aesthetic requirements to create the work stations needed for a specific program. The components can be rearranged to accommodate future needs. Often, power and data are distributed through the systems furniture via a raceway that is part of the partition component and is wired directly to the building infrastructure at specific points.
PART II

CONSTRUCTION AND MOVE-IN
A construction manager is involved in much more than building a facility. The construction process entails planning and analysis, in conjunction with the owner and architect, from the very beginning of a project.

Let’s say your university is in a competitive conference, academically and athletically. The board of trustees and the administration have been successful in their efforts to mount a productive capital campaign and are looking to attract the best and brightest students in a hotly competitive admissions environment.

Incoming students are dedicated to a healthy lifestyle; your university recognizes this interest and has decided to invest in a facility to provide recreational and intramural sports facilities that will enhance the student life experience on your campus. You receive an e-mail announcing that funding has been approved for a new recreation and fitness center facility. Now what?

Depending on your position within the university’s structure, the first thing that pops into your mind might be, “Great, I finally get a new office!” or perhaps “Who are the stakeholders?”

Before you can answer this question or the many others you may have, it’s best to understand who the players are in a construction project and how they affect the process of moving a facility from paper to reality. In this chapter we define the various players, along with the roles and responsibilities, who come together to orchestrate a successful building project. The three primary professionals involved are the owner, designer, and builder. Each party has a distinct yet supporting role, much as in a sport team that depends on everyone’s expertise and support to achieve a successful season or championship (see figure 11.1).

**WHO’S IN CHARGE?**
**THE ROLES AND RESPONSIBILITIES OF PROJECT TEAM MEMBERS**

“On this team, we’re all united in a common goal: to keep my job.”

—Lou Holtz

Team members’ responsibilities change and adjust throughout the different phases of a project’s journey to reality. First—prior to design initiation—the owner makes decisions regarding program, budget, scope, and funding for the project. Once design work has begun, the owner must monitor the project’s progress and quality relative to what was originally outlined. The owner is also responsible for periodic payments to the design and construction professionals for the various stages of their work. Finally, upon completion of construction, it is
The owner’s imperative to maintain, protect, and often enhance the building as an investment in the overall campus environment.

Users are the often-forgotten participants in a building’s development. The user group generally drives the program’s needs and requirements and will occupy the building upon completion. At the beginning of the design and construction process, users are hopeful and excited about the prospect of a new facility. If communication with the user group is not properly maintained, the users may be disappointed when the final outcome doesn’t match their initial expectations.

It is incumbent upon the owner to identify a facility's users and determine how these users might be involved in review of and decisions about design and construction of a new facility. Most importantly, this involvement begins during the first phase of the owner's development of the project’s program, budget, scope, and funding.

The designer is often the architect or A/E (this acronym indicates the dual architect/engineer role of a company that has an engineering team within the firm). The architect and the firm’s design-engineering consultants compose the design team, which has several areas of responsibility including translation of the owner’s requirements into drawings and drawing up specifications to be used for construction. During construction, it is typical for the design team and the owner to monitor building progress, assist with review of the quality of construction, and provide certification of progress payments to contractors. The architect’s
other responsibilities include interpretation of design documents plus additional instructions as necessary during the planning and construction phases, in the field as well as during shop drawing review.

The role of the construction manager (CM) is to deliver the project as designed and as accepted by the owner, whether the choice of management services involves an agency or an at-risk position. The role of the CM is to represent the owner and integrate the needs of both the owner and designer of a project by providing management services and expertise including, but not limited to, design, engineering, constructability, cost, scheduling, phasing, and assessing the project’s effects on the surrounding community. This entails application and integration of comprehensive project controls to help manage safety, quality, time, and cost on the owner’s behalf.

The subcontractors are the field teams that build a facility. These team members construct the building according to a series of bid packages that contain drawings and specifications organized and distributed by the CM. The CM ensures that construction is completed, without any sacrifices in quality, as outlined in the project documents and in keeping with the safety of all members of the on-site project teams. At final turnover of the building, the CM organizes the various subcontractors submissions and equipment warranties and ensures that the owner has been properly trained in maintenance and operation of the various building system components.

All of these delivery systems are possible with a CM managing the unique delivery method chosen for your project.

What Is a Construction Manager?

The term construction manager refers to the “third leg of the stool,” the third member of a team that delivers a construction project. It is important to distinguish between the delivery and management aspects of project delivery so as to avoid confusion.

Delivery is a method of assigning responsibility to an organization or an individual, and management refers to a means of coordinating the process of design and construction, according to the Joint Committee of American Institute of Architects’ “Primer on Project Delivery” (2004).

One may wonder why these distinctions are necessary; it might seem the CM should manage the construction process. Consider these questions as we discuss the role of the CM:

- Does the CM hold trade contracts?
- Is construction management a delivery system, providing both design and construction under one contract?
- Does the CM guarantee the cost and schedule for the project?

Construction Manager: Delivery Methods

Construction management is defined by the Construction Management Association of America (CMAA) as “a professional service that applies effective management techniques to the planning, design, and construction of a project from inception to completion for the purpose of controlling time, cost, and quality” (2002).

Thus, the CM provides professional services and serves as an extension of the owner’s team. The CM acts an advocate for the owner, as well as a professional to bridge the gaps that may exist between owner, designer, and trade contractors.

Construction management is no longer a mere alternative to traditional general contracting. Rather, due to the inherent advantages of using a CM for complex and high-profile projects, it has become the principal choice for project delivery (Potter, 1996).
There are variations on the CM theme, such as construction management agency and construction manager at risk (both are alternative delivery methods). A CM may be hired to manage services via several different types of delivery methods. Depending on the circumstances surrounding any individual project, certain delivery methods may be more or less appropriate. There is no single correct way to approach a project, and it is always advisable to seek counsel from a CM and trusted advisors when one is selecting a delivery method.

Let’s look at some of the delivery method options and their pros and cons.

**General Contracting**

The problem with the traditional method of lump-sum general contracting, or design/bid/build lies in the inherent disadvantages of this approach for large or complex facilities. General contracting is characterized by a lack of builder input during the design phase, a lengthier schedule due to the requirement for complete design documents before bidding to the subcontractor market, limitations on competitive bidding in this low-bid lump-sum environment, and the owner’s inherently insignificant role in quality control and input during the construction process. See Lump-Sum Bid General Contracting Delivery Method sidebar.

**Design-Build**

The design-build approach has become an alternative for owners who want a single point of contact and single contractual source and need to meet an aggressive schedule for project completion. See Design-Build Delivery Method sidebar. This approach puts all responsibility for design and construction (including schedule management and cost impacts) in the hands of a single entity—in many cases, a CM.

This creates an opportunity to overlap design and construction activities and accelerate the project’s overall schedule. Risks that still exist with this delivery method are similar to the risks of the general contracting method: There is very little opportunity for objective evaluation (checks and balances) between design and construction alternatives for the owner, and the review of subcontracts rests solely in the hands of the single contracting entity.

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**Lump-Sum Bid General Contracting Delivery Method**

- **Owner**
- **Architect/engineer**
- **General contractor**
- **Subcontractor**
- **Subcontractor**
- **Subcontractor**
- **Subcontractor**

**Pros**
- Simple, traditional approach
- Defined project scope
- Suitable for small or straightforward projects
- Clarity of fiduciary A/E and nonfiduciary general contractor roles

**Cons**
- No builder input in design
- Price uncertain until bids
- Slowest project delivery
- No control over subcontractor selection
- Adversarial relationship between A/E, owner, and contractor
- Prone to cost growth via changes and claims
- High incidence of litigation
The Construction Process—Now Build It!

Design-Build/Finance/Leaseback

A construction project encompasses more than the decisions associated with facility design and construction. Obtaining funding and securing a location are also project requirements, as are operations and maintenance support after a building is occupied.

When this bigger picture comes into focus, some owners will consider contracting with a developer that will provide financing, project management (which would include design and construction management for project requirements), and various degrees of ownership and perhaps leaseback opportunities.

Owners faced with managing projects on tight budgets and short time frames may find the option of design/build/finance/leaseback (DBFL) appealing. See sidebar. This more inclusive delivery method allows owners to turn over all or some of these duties to a developer, but still enables them to afford a project that may otherwise have proven too costly.

Construction Management at Risk

As indicated by its name, the construction management at risk delivery method (see sidebar) involves a construction manager, but what does “at risk” really mean? It means that the CM holds the contracts for all (or a portion) of the subcontractors and therefore assumes the risk for construction performance in terms of both delivery and quality. A guaranteed maximum price (GMP) agreement typically is used with this approach, at the point when the design phase nears completion and the construction phase begins. The CM manages the construction and is responsible for cost, schedule, and constructability input during the design phase.

This early involvement by the CM allows for the possibility of fast-track scheduling, or perhaps implementation of a phased schedule at the beginning of construction activities. The CM's early involvement also leads to a better understanding of anticipated construction costs.

Construction Management Agency

Construction management agency also is crafted around the advantages of using a construction management method. See Construction Management Agency Delivery Method sidebar. However, using the agency element is significantly different from an at-risk approach. The owner holds the contracts of the subcontractors, and the CM

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<thead>
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<th>Pros</th>
<th>Cons</th>
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<tr>
<td>Single point of responsibility for design and construction</td>
<td>Loss of owner control, quality, or both</td>
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<tr>
<td>Fastest schedule delivery</td>
<td>Loss of checks and balances</td>
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<tr>
<td>Early identification of guaranteed cost</td>
<td>Potential adversarial relationship between owner and design-builder</td>
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<tr>
<td>Contractor profits may be excessive</td>
<td>Competitive bid design-build selection with guaranteed maximum price is problematic</td>
</tr>
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Design/Build/Finance/Leaseback Delivery Method

- **Owner**
- **Developer**
- **Design/build contractor**
- **A/E**
- **Subcontractor**

**Pros**
- Lease commitment versus capital expense
- Early lease cost determination
- Single-source management of entire program and risk assumption
- Lease, financing, and ownership flexibility
- Avoids long-term capital ownership commitment

**Cons**
- Potential interest rate risks (depending on structure)
- Diminished owner control
- Potential for higher operating costs
- Future facility control limited
- Reduced or eliminated residual value

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Construction Manager At Risk Delivery Method

- **Owner**
- **Construction management at risk**
- **Architect/engineer**
- **Subcontractor**

**Pros**
- Preconstruction services
- Single point of responsibility for construction
- Team concept, checks and balances
- Faster delivery schedule
- Change flexibility
- Controlled purchasing, open book
- Effective quality control
- Balances advocacy with risk assumption

**Cons**
- Guaranteed maximum price contingency versus risk trade-off
- Potential for increased adversarial relationship with A/E
- Guaranteed maximum price protection may compromise construction manager’s advocacy
The Construction Process—Now Build It!

Table 11.1 shows the range of benefits with the various types of delivery methods.

**Agreements**

There are many types of contractual agreements for retaining a CM. It is best to employ one that describes each aspect of the preferred delivery method and with whom agreements are carefully detailed to ensure appropriate management of risk.

Many contracts are available for purchase from industry associations, or your own legal counsel may tailor one for your use or draft a new contract using the standard contracts for reference. The delivery method will determine the choice of contract language. Table 11.2 pairs standard contracts with appropriate delivery methods. These contracts are available from the American Institute of Architects (AIA), Associated
General Contractors of America (AGC), Construction Management Association of America (CMAA), and Design-Build Institute of America (DBIA).

**LONG BEFORE THE GROUNDBREAKING: EARLY INVOLVEMENT OF THE CONSTRUCTION MANAGER**

The CM often can offer many valuable tools to an owner during the early stages of planning and design, or predesign (sometimes referred to as preconstruction). The CM’s involvement at this early stage of the project ensures that the team will continually work with the end in mind: The CM will remain involved every step of the way, as an advocate for the client and as counsel to the design team, to ensure that decisions made during the formative stages of a project are thoroughly understood. The CM will provide the designer with valuable input regarding budgeting, site impact, constructability, alternative systems, and materials evaluations.

**Budget Development: How Much Money Is Needed?**

First things first: Will we have enough money to pay for this project?

The CM will develop and review the total project budget and confirm that all project costs are accounted for. At this stage, a conceptual estimate of the project costs must be established. However, these costs should not be limited to design and construction or to direct and indirect costs.

---

**Table 11.1  Range of Benefits Included With the Different Delivery Methods**

<table>
<thead>
<tr>
<th>Project characteristics</th>
<th>Conventional design-bid-build lump-sum GC</th>
<th>Design-build</th>
<th>CM agency</th>
<th>CM at risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple design, small project</td>
<td>●</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Complex design</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Phased construction; accelerated schedule</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Design to budget</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Early cost guarantee</td>
<td>○</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Need for preconstruction services</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Desire for builder advocacy</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Owner’s ability to implement changes</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Quality assurance</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

● suggests complete concurrence; ○ partial concurrence; ○ no concurrence.

**Table 11.2  Standard Contracts by Delivery Method From Each of the Professional Associations**

<table>
<thead>
<tr>
<th></th>
<th>Lump sum (D/B/B)</th>
<th>CM at risk</th>
<th>CM agency</th>
<th>Design-build</th>
<th>D/B/F/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIA</td>
<td>A101, A201, A107, B141</td>
<td>A111, A121CMc, A201, A131/CMc</td>
<td>B801/CMa, A101/CMa, A201/CMa, B141/CMa</td>
<td>A191, Parts 1 and 2</td>
<td>N/A</td>
</tr>
<tr>
<td>AGC</td>
<td>200, 205, 240, 245</td>
<td>230, 250, 565, 566</td>
<td>510, 520, 530, 800</td>
<td>400, 410, 415, 499</td>
<td>N/A</td>
</tr>
<tr>
<td>CMAA</td>
<td>N/A</td>
<td>CMAR1-4</td>
<td>A1-4</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>DBIA</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

D/B/B: design/bid/build; AIA: American Association of Architects; AGC: Associated General Contractors of America; CMAA: Construction Managers Association of America; DBIA: Design-Build Institute of America.
Rather, the total project cost should be evaluated so that the team may use it as a measurement tool throughout the remainder of the project. Costs to consider (other than construction) include the following:

- Land acquisition and development costs
- Permitting procurement costs
- Utility tie-in, connection, or impact fees
- Attorney’s fees for zoning and permitting
- Regulatory costs
- Consultant fees (traffic, parking, security, kitchen planning, environmental and housekeeping upgrades, etc.)
- Costs for relocation, staff, and new building simulation drills
- Costs for building commissioning and activation
- Costs for signage, public relations, ceremonies, and brochures
- Furniture, fixtures, and equipment (FF&E) costs
- Data, security, and telephone infrastructure costs
- Costs for testing and inspection services

Developing a cost model in a format consistent with the bid packaging or trade contractor buyouts of the project enables tracking of costs by each contract and close monitoring of individual line-item variances for the entire life of the project.

**Site Selection and Acquisition: Where’s the Right Place to Build?**

A very important, but not very simple, task is determination of the exact project location. If project funding has been applied for and approved, the location may already be established before work begins, but there are many reasons to involve your CM and architect in an evaluation of the selected site.

Site selection typically is broken down into three tasks:
1. Establishment of evaluation criteria
2. Site identification
3. Detailed evaluations and recommendations

During site selection, prospective sites are assessed for the following:

- Size
- Existing and adjacent land use
- Topography, landscape, and environmental conditions
- Zoning
- Future expansion potential
- Existing roads and site access
- Public transportation
- Vehicular circulation, traffic volume, and parking
- Land acquisition and site development costs
- Demolition costs
- Existing utility service, utility service improvements, or impact fees or both
- Visibility from major roads
- The area’s economic development potential
- Potential for implementation acceleration and delay
- Accessibility by public safety services (fire, police)

The following criteria can be used to help determine a site’s viability:

- Estimated total site acreage
- Estimated usable acreage
- Site geometry
- Zoning designation: Is use allowable? What zoning relief is required?
- Are parcels under investigation being considered for future city or county planned development?
- Primary property type (commercial, residential, industrial)
- Number of properties on site
- Number of owners on site
- Site value: estimated acquisition price, based on sales of comparable properties
- Number and type of businesses to be relocated and budget impacts
- Number and type of residences to be relocated and budget impacts
- Site availability: Is property for sale now?
- Site environmental remediation estimates
- Site demolition estimates
- Site development and utility infrastructure development issues and costs
- Parking availability
- Traffic impact, neighborhood, and business disruption
- Historic structures on-site
- Construction staging challenges

**Cost Estimating: How Much Will This Cost?**

During the course of a project’s design and construction, myriad decisions will be made that will affect the cost of the project (see figure 11.2).

A professional CM should have sufficient experience with similar projects, and have in place proven systems, in order to be able to act as a true owner advocate. This advocacy includes the preparation of accurate cost estimates and the monitoring of costs, from procurement to new construction to expansion or renovation activities. Many CMs maintain a local and national database that provides estimators with immediate cost ranges (low vs. high dollar amounts) as dictated by a project’s location, and can adjust those ranges based on a thorough understanding of the design intent.

A construction management team develops accurate budgets and cost estimates from detailed quantity surveys and takeoffs; cost data from recent, relevant project estimates; a project cost database reflecting similar experience; and budgets provided by qualified subcontractors and suppliers.

Because of the complex nature and expense of mechanical, electrical, and plumbing (MEP) systems in sport and recreation facilities, it is important to ensure that the CM includes experienced MEP estimators on the project team. Construction managers can be expected to spend a considerable amount of time reviewing the plans and specifications and performing detailed quantity takeoffs, as well as holding regular meetings with the design-engineering consultants to ensure that they understand the intent of all phases of design documents. The
CM will review every element of the project in detail (interior finishes; foundation; skin; utilities; heating, ventilation, and air-conditioning [HVAC] systems; equipment, etc.) to gain a comprehensive understanding of all materials and systems for use in developing the most comprehensive and accurate cost estimate.

This information in the early project stages (schematic design and design development) will serve as the focal point for support to value engineering and constructability reviews, and as the basis for cost evaluation throughout the life of the project. From the earliest assessment of alternative systems to final decisions on design details, material, and systems, a CM provides up-to-date cost data and recommendations to improve design and construction efficiency.

**Value Engineering: How Can I Save Some Money?**

Value engineering (VE) and analysis is a process aimed at defining the most cost-effective design and scope for the purposes and conditions of a project.

Formal and informal VE services jointly are led by the project executives and chief estimators from the CM’s team and involve key project team members. Due to the complexity and cost of engineering systems, the CM’s MEP estimator should actively participate in all VE activities. It is important that the team be prepared to engage in formal VE efforts as early in the design process as practical and contribute input during the design process.

The CM assesses construction cost and schedule impacts of alternative materials, systems, and equipment and makes recommendations on the constructability, reliability, and performance of alternative design concepts for critical components. The intent is to identify systems or components that may result in lower costs without sacrificing quality.

As part of the VE process, a review of drawings and project details (to analyze cost and schedule impact) may include the following considerations:

- Facility siting options and land development costs
- Central plant and utility requirements
- Foundation systems
- Structural systems
- Mechanical, HVAC, and electrical systems and components
- Enclosure systems (skin and roof)
- Conveyance systems
- Interior partition systems and finishes
- Traffic and work flow patterns
- Phasing and sequencing cost implications
- Bid packaging and subcontractor procurement

**Constructability: Can It Be Built?**

The constructability review is a method of improving overall document quality, streamlining the design documentation process, and reducing field changes and delays. A methodical process, as well as the participation of trained estimators and field personnel, ensures thorough coverage...
of drawings and specifications and brings to light problems that may occur in the field.

Informal constructability reviews are conducted throughout the design phase, and results are reported at scheduled project meetings or directly conveyed to the design team as they are discovered.

This exercise is a system of checks and balances intended to improve the quality of documents prior to construction. Constructability is assessed prior to bidding as a way to reduce procurement phase questions and clarifications, Requests for Information, field changes, and delays.

A constructability review usually consists of the following:

- Assessing the ease or difficulty of constructing the proposed design and making recommendations for practical changes, VE alternatives, and cost savings options
- Reviewing drawings and specifications for inconsistencies, errors and omissions, and adherence to codes in an effort to eliminate change orders and delays during construction
- Making recommendations for the use of alternative material for design details when it is observed that there are inherent schedule implications
- Making recommendations for specification changes when preferred specifications are likely to limit competition or cause excessive delays in delivery

**Commissioning: Begin With The End in Mind**

Commissioning services are first defined to ensure that the owner receives the level of services anticipated.

According to the Building Commissioning Association (BCA), “Building commissioning provides documented confirmation that building systems function according to criteria set forth in the project documents to satisfy the owner’s operational needs. Commissioning existing systems may require developing new functional criteria to address the owner’s current requirements for system performance” (Building Commissioning Association Web site, www.bcxa.org).

This definition is based on the critical understanding that owners must have some means of verifying that their functional needs are rigorously addressed during design, construction, and acceptance.

The decision to hire a commissioning agent is addressed with both the A/E and the CM in the earliest stages of a project. A commissioning agent’s role begins as soon as a project commences: The agent participates in the drawing review and up-front coordination, assisting in design decisions and looking for design requirements noted on the documents, as well as developing operating protocols that will be used as metrics to measure system performance against once the building is complete. The agent then takes a more active field role during the closeout stage to help ensure proper system operation and optimize energy consumption.

The initial plan for the start-up and commissioning activities includes the following:

- **System turnover procedures:** A verification checklist to verify that the systems have been inspected for completeness and are ready for use by the owner and user.
- **Start-up leaders:** Members of the project team who have been delegated the task of ensuring that all required installation checks and testing procedures are completed prior to actual start-up of the equipment. It is common to have a start-up leader who is responsible for the entire system (e.g., chilled water pumps, chillers, cooling towers). Other leaders are assigned different components to verify for completeness and readiness for start-up.
- **Start-up plan:** A detailed checklist based on each manufacturer’s recommendations for the respective equipment. This and other checklists compose a final checklist in which all components of a specific system are identified and signed off on to verify when the system is ready for start-up.
- **Support groups:** Teams that are composed of several disciplines to respond to questions or issues that come up during preparations for start-up. These teams are likely to include A/Es, technical personnel, manufacturers’ reps, and maintenance personnel.
- **Training schedule:** Schedule normally developed during the design phase in coordination with the owner-user group. The owner-user group consists of the facility manager and operations and maintenance personnel to ensure that training is sufficient. The time frame necessary for the training is determined and then input into the overall construction schedule.
• **Tracking and reporting systems:** These are the checklists already mentioned, which have a sign-off area with a date for traceability of the system.

The commissioning agent can be an independent company or individual or a representative of the design engineer, but in every case, the scope of the agent's work is best negotiated up-front at the time of the development of the agreements to avoid any loss of clarity about all parties' responsibilities for commissioning during design, construction, and warranty phases. (For more information about commissioning, see “Almost Done,” page 223.)

**Sustainability: Green Building Begins on Day One**

Sustainable practices—and the desire to teach students and the community how our decisions today affect our environment tomorrow—are important to the design and construction of new facilities. Requirements are changing on many campuses, and more municipalities are requiring that buildings achieve a LEED (Leadership in Energy and Environmental Design) certification. Thus, more project teams are using sustainable strategies in their building projects.

What is a “green” building or “sustainable design”? According to the Office of the Federal Environmental Executive (2003), green building is “the practice of (1) increasing the efficiency with which buildings and their sites use energy, water, and materials, and (2) reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal—the complete building life cycle.”

The United States Green Building Council (USBGC) has created the LEED standard to measure and certify buildings that employ environmentally sound and energy-efficient design and construction.

What do these sustainable choices really mean? Will they increase the cost of a building? Or will they perhaps affect the maintenance staff and require more training for the operation of a new facility?

As with any construction project, the process, planning, and project team coordination are keys to success or failure. When sustainability requirements are added to a project's goals, it becomes incumbent on the entire team to develop effective strategies that meet the intent of a green building.

A project team experienced in sustainable strategies is paramount to the development of a cost-effective plan for a green building. Lack of familiarity with a new green building product can add cost or risk and requires research to ensure that such a product is compatible with a particular building's systems.

In addition, a knowledgeable project team will accurately track and record the “points” a project acquires en route to LEED certification. These administrative costs should be a part of the project plan, in addition to the costs associated with registering the building with the USBGC. (Several “free” optional credits may be available to a project based on the location of the site.)

Ultimately, a review of life cycle costs and payback cycles is encouraged as a means to assess the impact of incorporating sustainable strategies into a project. Such a review may help an owner discover that the design and construction costs for LEED are easily neutralized by a more efficient “green” system that boosts both occupational quality and building life cycle.

**OKAY, LET’S BUILD IT**

“Confidence comes from being prepared.”

—John Wooden

Managing a project's schedule and budget requires a reliable program that minimizes administrative efforts. While the design and construction industry has many applications at its disposal, one of the most advanced integration tools emerging is BIM, or building information modeling. Building information modeling allows all the professionals associated with a project—owners, architects, designers, engineers, the CM, and the subcontractors and major tradesmen—to review and develop takeoffs in real time from one centralized host. In this way, when a change occurs on the drawings, all team members see it in real time and are able to make any necessary adjustments.

Scheduling software may be Primavera Project Planner (P3) along with next generations of the Primavera application, P5 and P6 for scheduling. For estimating, there's Timberline with On Screen Takeoff and EOS for historical cost tracking. When BIM is introduced, it begins to integrate disparate applications utilizing Autodesk Revit.
and Autodesk NavisWorks for schedule integration and clash detection and Innovaya Visual Estimating for quantity takeoff.

Communications can occur electronically, which greatly reduces paper flow and enhances timely decision making. A schedule and budget management program may include, among other elements, the production, logging, and tracking of these administrative functions:

- Requests for Information
- Change order control
- Notices of noncompliance
- Transmittals, letters, and memos
- Cost reporting
- Schedule updating and forecasting
- Meeting minutes
- Punch lists

It is beneficial to adopt a system that interfaces with the A/E's and CM's information management systems, centralizes all project information, and allows for a seamless transition from design to construction. Tracking all project information, such as correspondence, meeting minutes, design documents, specifications, cost information, schedules, RFIs, submittals, procurement activity, reports, and warranties, on a Web-based system provides real-time data exchange to enhance teamwork and communications.

Specific reports used on a project are a function of the size and complexity of the project. The following are five primary reports:

- Project management cost report
- Change request summary report
- Change request audit report
- Purchase and award schedule
- Cash flow projection

Cash flow projections are also developed in concert with the electronic scheduling system at the onset of the project. By loading the schedule with the cost of individual construction activities, the CM can project the cost of construction by month.

**Buy-Out: Bidding and Contractor Procurement**

Purchasing strategy and planning are crucial to controlling a project's cost, quality, and schedule goals. The quantity and configuration of a project's bid packages are critical to the success of the project. Bid packages are structured to foster competition among local and regional firms with single-source responsibility to generate lower prices.

The CM typically develops bid packages and solicitation procedures. An informed CM is constantly in touch with the local contracting community to stimulate bidding interest (and price competition), and keeps them abreast of the bidding schedule of the project.

A well-conceived and manageable bid packaging strategy generally leads to a competitive bid situation, which provides the best value for the owner. A greater number of trade packages (within reason) results in better control of a project and greater reductions in cost. Conversely, having too many packages requires extensive paperwork and project administration, necessitates protracted procurement efforts, and leads to potentially increased risk.

Major trade packages typically include those listed next. However, many of these can be segmented into smaller and more specialized trades, in keeping with the unique aspects of a given project.

- BP1: Site work and site utilities
- BP 1a: Selective demolition
- BP 2: Foundations
- BP 3: Concrete (structural and miscellaneous)
- BP 4: Structural steel
- BP 5: Sprayed-on fireproofing
- BP 6: Building enclosure (windows, glazing, metal panels, masonry)
- BP 7: Roofing and waterproofing
- BP 8: Mechanical systems and plumbing
- BP 8a: Sprinklers
- BP 9: Electrical systems
- BP 10: Elevators
- BP 11: General construction (studs, drywall, doors, hardware, ceilings, finishes, etc.)
- BP 12: Painting
- BP 13: Flooring
- BP 14: Major equipment, FF&E (see chapter 10)
- BP 15: Landscaping and paving

Following receipt of bids, the CM, owner, and designer review the bids for completeness and compliance. The CM conducts a thorough scope
review with two or three of the most responsive and lowest-priced contractors for each bid package to ensure that all elements of the work, schedule, and manpower requirements have been included in the bids. Recommendations for choosing a subcontractor's bid typically are based on the following:

- Equipment pricing is on a firm fixed price.
- Pricing received includes all costs associated with testing, technical start-up, and certification requirements.
- Alternatives for cost savings, value, or both are evaluated.
- Technical deviations, exceptions, and inclusions are identified.
- Warranty and indemnification meet bidding requirements.
- Bids are compared to the project budget.
- Schedules and necessary manpower commitments are consistent with the CM's estimate.

Upon contract award, the CM supervises and coordinates all contractor activities, such as shop drawing preparation durations, approval durations, and fabrication and delivery durations—all of which are incorporated and monitored according to the project schedule.

**Project Scheduling**

The CM and the owner develop a project's initial schedule for the design and construction phases. The CM seeks input from local contractors and relevant labor unions to determine construction activity in a project's local area, as well as the potential impact on labor availability. The CM updates the project schedule on a monthly basis, noting any significant changes from previous schedules. This often includes the following:

- **A critical path method (CPM) schedule** (see figure 11.3) for both the design and construction phases of the project, including milestone dates for the owner, designer, and CM. Milestone activities include design document completion, permit applications, reviews and approvals, cost estimates, VE reviews, and design and constructability review sessions.
- A system for planning and reporting the status of each project phase to ensure completion within approved schedules. The system should allow for integration of all aspects of the design and construction processes and provide for coordination of all work to be performed.

  - Monitoring the schedule and notifying project team members when actual or potential constraints to achieving the schedule exist, plus making recommendations for corrective action.
  - Ensuring that the design, permitting and approval, and procurement phase schedule is maintained.
  - Coordination of a design phase schedule planning session that integrates critical design phase activities required by each of the project team members.
  - Working with the project team to update the master schedules monthly and submit approved revisions to the owner and the entire team.

**Construction Phase Schedule**

Control of the construction phase schedule begins during the design process. It is the CM's responsibility to monitor the project schedule throughout construction to ensure that major project milestones are met and that subcontractors and suppliers are meeting their requisite productivity levels at all times. As a project proceeds through the bidding and award phases, contractors' and suppliers' schedules are validated and incorporated into a master schedule.

A central component in the successful development and implementation of a project management schedule is system coordination. To that end, the CM implements a master project controls system that monitors every element of the project. Every construction- and nonconstruction-related activity is given a project identification number that can then be assigned to a specific element of the project. A centralized project reporting system integrates all elements of the project in a management system.

Superintendents generally conduct regular “two-week look-ahead” meetings to coordinate and verify adherence to the schedules of key contractors and suppliers. They confirm that key contractors have the necessary manpower, supplies, and equipment on-site to ensure that productivity is in place to meet the project schedule. If construction activities "slip," the CM develops a recovery schedule with relevant trade contractors and monitors progress until the project is back on schedule.
**Constructing Phase Planning**

Completing large-scale utility and site work improvements, building parking structures on occupied campuses or other sites, and constructing new recreation facilities require a veteran staff of construction professionals. The CM’s project team works closely with the owner and architect to evaluate all construction options, as well as to develop a realistic phasing and sequencing plan and project schedule consistent with the owner’s program requirements and budget.

The owner provides significant input on developing and approving site use, as well as phasing and sequencing plans for any project. If renovations are planned, minimization of disruption and risk to existing operations is paramount. Specific elements of a renovation plan include ingress and egress of subcontractor personnel, material delivery, debris disposal, and noise and vibration mitigation plans.

**Construction Coordination With the Architect/Engineer and Owner**

Construction is a complicated undertaking involving many companies and entities. Communication is key to successfully building a recreation center in keeping with the way it was designed. Construction managers use several tools to foster this communication:

- Request for Information forms
- Shop drawings
- Submittals and product selections
- Mock-ups

Some of these construction tools may be unfamiliar to sport and facilities staff. The following brief explanations will help facilities personnel

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![Sample critical path method schedule.](image)

_Courtesy of Gilbane Building Company._
understand the processes required to build a new facility.

**Answers to Contractor Questions: Requests for Information**

The Request for Information (RFI) is used primarily to obtain clarification of drawings or specifications from the A/E. Other uses for RFIs include confirming owner or A/E verbal directions; identifying field conflicts; resolving missing, conflicting, or unclear information; and requesting requirement deviations.

The RFI creates a documented written record of the question and the response. A hard copy of the RFI and the A/E’s response is promptly posted in the specifications, on the affected contract drawing(s), or both. An RFI log is maintained for the project, including information about the affected drawings or specifications and the dates and times when RFIs were posted. All RFIs are cross-referenced to all related contract documents such as change requests, sketches, and notes on drawings.

An individual RFI may result in a change to the contract amount or time, but most RFIs are informational and intended to clarify. Requests for Information are expedited by all to allow incorporation into the work without adverse effects on contract time or cost.

**Shop Drawings**

Much of a building is actually put together from “shop drawings” rather than design drawings produced by the architect. Although design drawings are comprehensive and detailed, the fabricators of the major individual systems in the building, such as structural steel and HVAC sheet metal ductwork (which typically are fabricated in a shop off-site), need their own more detailed and larger-scale drawings to aid in building these components.

These fabrication drawings are submitted to the CM and A/E for review, comment, and approval before the fabrication of the components begins in order to ensure that the systems are compatible when the pieces ultimately arrive at the job site. The timing of the exchange and review of shop drawings is an important scheduling consideration, since the development and approval of these drawings precede the fabrication and since the components need to arrive on the job site at precisely the time when the contractor is ready to install them.

**Document Control and Communications During Construction**

The use of the Internet for Web-based construction project management has become common. An interactive, Web-based project management approach allows project team members to access the latest project information in a secure, flexible environment. Document control and communication systems designed for this medium are used to issue, track, and log project-related documents, including RFIs, shop drawings, and submittal logs, as well as correspondence, meeting minutes, schedule revisions, change management information, budget and cost reports, and digital photography.

The construction industry has accelerated and streamlined the construction process, using information technology to provide real-time reporting of schedules, budgets, plans, and all other documents associated with complex construction projects. This allows the owner, A/E, CM, and trade contractors to access up-to-the-minute, project-critical information 24 h a day.

Construction managers now have the technological capability to also offer data archival document management systems, video conferencing, digital photography, local area network (LAN) infrastructure, and instantaneous project information through the use of Web site management systems. Many owners offer Web site access, real-time construction progress photography, or streaming video to the public via the Internet.

**Submittals**

A log of all submittals is maintained on each project, usually electronically, using a specialized program or a spreadsheet. The CM typically is responsible for maintaining this log, and the architect usually keeps submittal records as well to ensure that the review process does not delay the project. At the start of a project, a review of the specifications and plans identifies all submittal requirements and long-lead items, including prepurchase of equipment and materials for early delivery to meet schedule requirements. Early-scheduled deliveries may require direct purchase by the CM or owner or both prior to bidding of trade contracts.

A submittal schedule is requested from each originator, trade contractor, or supplier, including a complete listing of all items such as shop
drawings and samples that are to be produced and their scheduled production dates. This schedule is used to control the receipt of all required submittals (including shop drawings), to assess the project workload and schedule, and to inform the A/E in coordinating staffing to process the submittal drawings on a timely basis.

Shop drawings, samples, and other submittals are reviewed by the CM for conformance to plans and specifications, accuracy, and completeness. Satisfactory drawings are forwarded to the A/E for review and approval.

**Mock-Ups**

Models of work built in advance of the scheduled construction of the represented work are known as mock-ups. They are constructed so that they are identical to the intended final building, setting a standard for the system. A typical example is a mock-up of a small section of brick wall, including the intended mortar joints, flashing, weeps, brick appearance, and so on.

Prior to the start of mock-up construction, the CM conducts a preinstallation meeting for review of the plans, specifications, submittals, shop drawings, codes, and referenced standards to ensure full understanding of the requirements by trade contractors. Contractors must represent the means and methods that can produce this work throughout the normal course of construction. Specific concerns or problems are documented to prevent repetition in later construction.

**Roles and Responsibilities: Does Everyone Know What to Do?**

Although a large part of any communication issue, whether on a construction site or at home, boils down to the parties listening to one another, the listening requires a context for understanding. The context for the listening and understanding can be described with use of a roles and responsibilities matrix, another useful communication tool employed by the CM. The matrix is a chart that details all of the key tasks to be accomplished, identifies the party responsible for the completion of each, and identifies the roles others on the matrix play in supporting the party with the primary responsibility. Developing a comprehensive matrix in an inclusive way, by seeking buy-in from the owner, user, A/E, and subcontractors, helps to ensure that there are no misunderstandings about which party is responsible for any given task.

**Building Permits and Approvals**

The CM, in conjunction with the owner, takes the lead in obtaining approvals and permits. During the design phase, the CM determines which permits and approvals are required for the pertinent governmental agencies and develops a formal structure for submitting necessary documents to the appropriate agencies for approval. Successful permitting takes experience, good teamwork, and coordination.

The CM is responsible for identifying and tracking all permits required for the project, regardless of who has filing responsibility. A permit status log is maintained on the job site and regularly updated and posted as required. The CM obtains and files all required building permits for project construction in accordance with the requirements of the jurisdiction governing the project and the contract between the CM and the owner.

Examples of permits that may be required include environmental plan, temporary office, demolition, building, fence, sign, street opening, encroachment, curb cut or driveway entrance, and mechanical and electrical permits by trade contractors. The issuing entity may charge fees for permits.

Careful attention is given to documentation required for the permits, the duration for processing permit applications, the number of jurisdictions having permit and review authority, and the progress of the work so that necessary permits are obtained prior to the start of the affected work. No construction work proceeds without the proper permits in hand. Approved plan-checked drawings received from the local reviewing authority are maintained in a secure location where they will be protected from damage or loss.

The permitting process may also require the CM to handle inspection duties, including providing adequate advance notice to the inspector, so that inspections may take place without delaying the project schedule. Any deficiency noted during such an inspection is to be recorded on the completion list and immediately corrected. Reinspection of the project is performed before the work is covered or any other work is performed that would preclude proper reinspection of the nonconforming work.
Site Issues

The existing site is the first thing that must be addressed when a new construction project begins. Careful thought and coordination among the CM, architect, and owner about the planning on-site will support a successful construction phase. The team will address the following:

- Site evaluation: What are the current conditions of the site and adjacent structures that need to be cared for during construction?
- Site utilization planning: How will the construction phasing be completed with minimal disruption to surroundings?
- Infrastructure coordination: What existing utilities will be tied into to support the systems of the new facility? Will others need to be carefully avoided?

Environmental Investigations and Reports

There are many opportunities for environmental issues to arise on a construction site; some are known about in advance and planned for, and others appear during the course of the work. Every construction project involves environmental issues. Even the list of the usual issues encountered is long:

- Management
- Lead
- Silica
- Mold
- Building-related hazards
- Biological hazards
- Spill preparedness and response
- Soil management
- Underground storage tanks
- Air permitting
- Wetlands permitting
- Coastal permitting
- Storm water management
- Construction dewatering
- Indoor air quality
- Personal protective equipment
- Respiratory protection

The owner, to the extent feasible, identifies environmental conditions in advance, but once on-site for construction, it is up to the CM to manage all the environmental issues so that the site remains safe for both construction workers and occupants.

The determination of the requirements occurs via a defined and regulated process; and there are myriad regulations from multiple levels of government to comply with, including those of the Occupational Safety and Health Administration (OSHA) and U.S. Environmental Protection Agency (EPA) and laws such as those under the National Environmental Policy Act (NEPA). The requirements may vary from state to state, and the detail of the requirements is beyond the scope of this guide. Suffice it to say that experienced and trained designers and construction professionals are needed to maintain the health, safety, and welfare of those involved in the project construction.

Topographic Surveys

Topographic surveys that accurately detail every feature of the existing site are fundamental to the design and construction process. Unknown conditions are always a problem on a job site. To prevent unknowns, a complete topographic survey is prepared by an experienced surveyor licensed in the state in which the project is located. The survey comes in the form of one or more detailed drawings and is completed for use by the A/E in the design process.

The survey is the basis for locating benchmarks on the job site, which are expressed in horizontal and vertical measures. Elevations, underground utilities, manholes, invert elevations for storm and sanitary sewers, building locations, significant trees, fences, property lines, sidewalks, parking lots, drives, grades and drainage, and precise locations of every other visible feature are identified on the drawings. Also, legal description specifies in words the exact bounds of the property so that everyone stays within the law.

During construction, a baseline and elevation benchmarks are set in the field, functioning as survey controls. Once established, the survey controls are protected from damage from construction activities for quality assurance.

During construction, a baseline and elevation benchmarks are set in the field, functioning as survey controls. Once established, the survey controls are protected from damage from construction activities for quality assurance.

Usually the owner engages the surveyor as a third party, and the CM and A/E provide assistance to the owner in the development of the survey requirements. Construction cannot start until all site conditions are known and imparted to all the contractors on the site.

A precondition survey is another type of survey that may be involved in situations in which a project includes construction adjacent to other
structures. This survey documents the condition of buildings, driveways, curbs, utilities, and any other physical facility that may be affected by the construction contractor’s activities, providing a basis for any claim of damage or repair.

**Geotechnical Investigation**

Another job site unknown is eliminated when the geology of the earth that underlies the site is investigated by an expert in that field, the geotechnical engineer, and a report is provided to the design engineer and to the CM. **Geotechnical engineering** is a highly specialized engineering discipline that is concerned with subsurface conditions under a structure—essential information for the designer of the foundation system, the cost estimator, and the contractor that bids the project.

Specialized drilling rigs are used to obtain soil samples from deep borings into the earth to find the bearing strata, or bedrock. A measurement of the level of water that seeps into the boring hole over time determines the elevation of the water table. These data inform the designer about the properties and characteristics of the layers of sand, clay, shale, and so on that are encountered and at what specific depth these materials may be present.

The design engineer uses the information from the samples, or cores, to select the type of foundation and determine the size and depth requirements for the specific load to be supported, considering lateral imposed forces, such as earthquake and wind forces on the building, that are carried to the foundations. The foundation design is specific to the structure being planned, and every building requires a design that is unique to its environment and soil conditions.

The geotechnical report includes recommendations from the geotechnical engineer about design considerations, types of foundations to be employed for the specific situation, and construction considerations such as caisson lining to prevent cave-ins. The geotechnical engineer typically is commissioned by the owner on a third-party basis, ensuring independent analysis. Often the geotechnical engineer is retained by the CM to monitor foundation placement and take samples of concrete for quality assurance and independent laboratory testing for strength.

**Urban Sites**

Building locations, or sites, come in all shapes and sizes. The building site often is chosen for reasons not related to ease of construction; for example, it may be in a congested area such as a central business district or a university campus. These urban sites present some challenges to the CM and the construction contractors.

A CM employs a site utilization plan, which considers the construction equipment access requirements, construction worker parking, emergency vehicle routes, materials storage, laydown areas, work zones, office trailer location, safety and security, trash removal, demolitions and connections, traffic pattern analysis, and so on. Urban sites demand a very precise plan and site controls. If necessary, the CM’s superintendent directs traffic to get needed materials into the site in the correct sequence.

Just-in-time deliveries to the job site place the delivery truck at the designated place on the site so that the crane operator can take the materials off the truck and lift them into place where needed at the precise time for the planned construction sequence that day. Deliveries are carefully coordinated in advance, and the construction schedule may depend on the efficiency and coordination of the supply chain of manufacturers, suppliers, and deliveries. Planning and scheduling deliveries is one of the most important parts of the CM’s job, especially in close quarters.

Completing large-scale utility and site work requires a veteran staff of construction professionals. The CM works closely with the owner to develop a realistic site management, traffic, and material delivery plan to minimize the impact of construction on and adjacent to the selected project site.

**Site Security**

Project sites need adequate perimeter security fencing to prevent unauthorized access, and during non-working hours the site is secured so as to provide safe, hazard-free conditions for the public.

Whenever work is being performed on the project site, whether by trade contractors or the owner, a representative of the CM project staff must be present on the site. Some construction sites require a higher level of security, with uniformed and trained security guards employed to control access and minimize vandalism and theft.

All visitors are required to report to the CM field office upon entering a project site. Access to the site is limited to individuals who have justifiable business on the site.

**Infrastructure Coordination**

Utilities include electric power, water, sewer, natural gas, telephone, and data communications,
as well as roads and drives—collectively referred to as infrastructure. Most building sites come with some existing infrastructure to connect the building services to, whether for temporary or permanent service. Connection to these services requires careful coordination and may involve preplanned outages for adjacent occupied buildings or areas of a campus.

Existing utilities are often concealed and underground. One of the design team’s and CM’s challenges on any project is to avoid hitting any existing lines or disrupting utility services. Before any digging begins on a job site, the underground services are located, marked, and protected. Dig service finders are contacted to locate existing live utilities as needed.

Many sites, especially those in urban areas or on campus, are laced with abandoned or unidentified utilities. Each apparently abandoned pipe or conduit is carefully investigated to determine the history and status of the service, and the owner’s approval is secured before any utility is demolished.

Temporary power is required on the construction site to run power tools and temporary lighting in the building and connect to job site office trailers. The cost of the temporary power is typically paid by the CM and included in the total cost of construction. As soon as possible upon installation of the building’s electrical service, the permanent power is employed, and from that point the electrical cost is often borne by the owner even though the building is not yet complete. The arrangement is addressed in the agreement between the owner and CM.

**Job Site Control: The People Make the Job**

A recreation center may have several construction professionals in the job site trailers and always has one key person in charge of the site, the superintendent. An experienced, competent “super” is one of the keys to the success of any construction project. The role is similar to that
of a ship's captain: Everything that happens on
the job site is his or her responsibility.

The importance of the qualifications and
experience of the job site personnel cannot be over-
emphasized. The CM has many parts to play in the
recreation center production, including scheduler;
cost estimator; construction engineer; documents
controller; safety guardian, and quality controller;
and the ability to efficiently perform all these
tasks is critical to the success of the project.

Management, Supervision,
and Coordination
of Subcontractors and Vendors
The CM provides a full complement of experi-
enced management and supervisory personnel
at the project site to ensure that work progresses
according to the initial plans. The staff provides
daily supervision and quality control management
to ensure that subcontractor and supplier activi-
ties are coordinated and are meeting the product-
tivity and quality levels necessary for fulfilling the
project’s budget and schedule requirements.

From start to finish, all trade contractors,
suppliers, and materials and equipment are care-
fully monitored by the CM’s on-site project team to
ensure compliance with quality standards, contract
drawings, and specifications. Trade contractor
management and quality control efforts eliminate
time-consuming rework and increase productiv-
ity. Program benefits derived from a quality con-
trol program include a heightened awareness of
quality construction on the following levels:

• Project management
• Trade contractors
• Job site foremen
• Craftsmen and laborers
• Historical documentation and a permanent
  record of deficiencies and resolutions
• Elimination or reduction of punch list
  items
• Elimination of rework, leading to increased
  productivity, reduced costs, and time sav-
  ings
• Increased efficiency of subcontractors, craft-
  smen, and labor through constant work
  monitoring

Availability of Trades
Each trade contractor plays an important role in
follow-through on the ideas and design criteria
for a new facility. The availability of tradesmen
to complete this challenging task can be of some
concert. A CM is able to offer advice regarding
the current labor conditions and the possible
effects of adjacent projects and economic condi-
tions on the availability of trade contractors for
your project.

RECREATION CENTERS ARE
UNIQUE: SOME ISSUES
TO PLAN FOR
The design and construction process for build-
ings of any type is complicated, to say the least,
and filled with opportunity for missteps. The
recreation center, though, is more complex than
might be expected, involving close tolerances on
flooring, concrete flatness and dryness, humid-
ity control in the HVAC systems, and much more.
Hopefully the project team will have had prior
experience with similar building types and be able
to avoid problems by understanding the special
features of recreation centers and anticipating
the issues.

Courts Flooring
Recreation center gyms may have wood floors
or poured sports floors; either way the balls
don't bounce properly if the floors aren't flat. So,
how flat is flat? Flooring manufacturers and the
subcontractors who install the flooring require
the substrate to be of acceptable flatness (and
dryness) before the flooring installation begins.
The architect specifies in the design documents
how flat the concrete slabs must be.

**FF/FL** is the construction shorthand for the
flatness and levelness measurement of a flooring
surface and is the American Concrete Institute
(ACI) standard. **FF**, or Flatness F-Number, is a
numeric value that defines the maximum floor
bumpiness allowed over a 2 ft (0.6 m) distance;
**FL**, or Levelness F-Number, defines the tilt or
pitch of a floor over a 10 ft (3 m) distance. The
higher the F-Number value, the more level
or flat the slab. For example, an FF/FL of 40
30 may be acceptable flatness and levelness
(the first number is always the flatness). For
gym floors in recreation centers, a 50 FF is not
uncommon.

If an F-Number is specified for flatness, it must
be at least the equivalent of the Maple Flooring
Manufacturers Association (MFMA) standard 1/8 in. (0.3 cm) in 10 ft (3 m) radius tolerance, which is roughly a 40 FF. Flatness measurements are taken within 72 h of the slab placement, because slab flatness can change over time as the concrete cures, or dries out. Preferably, measurements are taken as soon as each day’s placement is dry enough to bear foot traffic; the results can then be used to make corrections in any construction problems before placement is repeated the next day.

Flatness and levelness are more readily achievable for “slab-on-grade” concrete than for “elevated slabs,” or concrete slabs poured on a prepared surface on the ground (as opposed to upper floors). Accordingly, elevated slabs typically are measured only for the single FF number.

Concrete floor slabs above grade are either (1) composite construction, consisting of light gauge corrugated metal deck, reinforcing steel mesh and concrete, or (2) poured-in-place concrete. The wet concrete is heavy, and when poured the weight causes the metal deck on which it rests to deflect, or sag slightly. When the elevated slab cures, or dries out enough to take weight, or load, other than itself, it is a little lower in the middle of the span.

To counteract some of the deflection and keep the slab as flat as possible, shoring can be placed under the midpoint of the span of the metal deck, as shown in figure 11.4 for the Cleveland State University Recreation Center project. These measures typically are supplemented by filling in low spots on top of the slab if necessary.

Prior to flooring installation, the installer measures the substrate flatness before accepting the conditions as satisfactory for the final surface. The FF readings can be taken in 1 ft (0.3 m) intervals in 11 ft (3.4 m) sections using equipment specialized for that purpose; however, many installers may rely on the basic straightedge method.

Figure 11.4  Shoring between spans in Cleveland State University’s new recreation center under construction.

Courtesy of Gilbane Building Company.
Concrete and Flooring: The Dryness Chase

The concrete under gym floors not only has to be really flat, it has to be really dry. If it’s not dry enough, the flooring that goes on top of it may have serious problems, such as debonding, blistering, buckling, or adhesive failure caused by water vapor.

On the recreation center construction site, the race is on to dry out the concrete slab in time for the flooring installation, whether the floors are wood, synthetic sports floor, or vinyl tile. Each flooring material has an industry standard for how dry the concrete substrate has to be before it is acceptable, and each product manufacturer may have its own requirement.

Although concrete looks monolithic and impenetrable, it is actually quite porous to water vapor. The water that is added to the concrete mix to make it fluid enough to easily pour into place eventually evaporates, leaving tiny voids throughout the slab. Water vapor migrates through these voids, moving from areas of higher relative humidity to areas of lower humidity, such as from the ground below the slab on grade to inside the building.

The properties of the concrete are affected by a wide range of factors, such as weather; amount of water in the mix of the cement, water, sand, lime, and aggregate (stone) that concrete is made of; the mix design; and the amount of time between mixing and placement. Some or all of these factors can conspire to cause a floor slab to be too moist to accept the flooring material.

So, what do you do about this problem if you are the CM? You dry the slab out until the numbers are right. The numbers are the measurement of the concrete dryness, and low numbers are needed for flooring material adhesion and performance. Typically, testing is conducted with either surface moisture meters or standard test kits that collect the moisture in a 1 square foot (SF) (0.09 m²) area over a 24 h period. The moisture emitted by the slab is absorbed by a measured amount of calcium chloride and weighed. The weight is expressed in pounds per 1,000 square feet (SF); the lower the number, the drier the slab. Sensors embedded in the body of the concrete are the most accurate moisture measurement method but are less commonly employed for this building type.

The drying-out process can take a long time, but the flooring installation has to wait for the moisture emission levels to be low enough, or else the flooring will fail in some way. For example, wood floors may require results to be 3.5 lb (1.6 kg) or less to be right for the flooring installer. For rubber and vinyl floors, 3.0 lb (1.4 kg) or less is generally the standard. Moisture testing is conducted by a trained and certified independent testing agent. The test results are reviewed by the architect or a knowledgeable consultant to determine whether or not the surface is ready for the flooring installation.

Drying out the concrete is mostly a matter of time, but the process can be accelerated by methods employed immediately after the slab is poured and other methods after the building is enclosed. Floor tests must be made after the air-conditioning system is operating and has been at service conditions for at least 48 h, allowing time for water vapor to migrate and humidity to stabilize inside the building.

A dry slab starts with a dry construction site and continues with a vapor barrier properly placed under the slab on grade. The vapor barrier is a sheet of plastic at least 6 mm thick that typically is placed between the stone or sand base and the concrete. The product is protected during construction because punctures in the barrier allow the water vapor through and may make the moisture content of the slab hard to overcome.

After the slab is poured, the concrete is kept moist to improve the hydration process, or curing. Moisture-retaining blankets facilitate the curing better than wet curing compounds. After some months of drying while other construction activities proceed, the slabs still may not test out. If so, isolation of the slab area—plus dehumidifiers and fans—usually does the job.

Steel Erection: The Race Is On

In the structural steel business, speed is king. The overall project schedule depends on getting the skeleton of the building erected as soon as possible. Everything else to be built depends on having the frame in place on time. In order for the steel to get topped out quickly, the individual pieces that make up the frame have to fit together precisely.

Structural steel shop drawings are used for the very specific purpose of getting the pieces to fit. Every bolt-hole location and size is planned, every dimension shown, and every connection between pieces designed and drawn before any steel beam or column is made. The shop draw-
ings are submitted to the project structural engineer for review and approval and in the sequence in which the steel will be placed. Due to their effect on the critical path of the construction schedule, the structural shop drawing submittals are carefully planned to facilitate a steady flow through the engineer’s office, avoiding review bottlenecks.

The precision of fit requirements extends to the levelness of the frame and its vertical and horizontal elements. After erection, the structural steel is surveyed with precision instruments for plumb, alignment, and elevation. This as-built survey is conducted by a third party to provide documentation of quality and evidence of suitability for work of the trade contractors that will follow, such as the masonry and glazing.

**Long Structural Spans:**
**Gravity Is Not Your Friend**

Recreation centers have several types of courts, each with its own dimensional requirements. The largest are basketball courts, which can vary in length but are nominally 90 ft (27 m) long by two or more courts side by side. A long clear distance is needed inside the building, without support columns. This is economically achieved through use of structural steel trusses or truss joists.

A **truss** is a structural element constructed of angled and vertical steel members connecting a top and bottom cord; it looks like a steel bridge. The truss is specially designed and constructed specifically for each job. Truss joists are similar, but off-the-shelf sizes are selected for each length of span.

Erecting trusses is a tricky business; they are very long (typically more than 100 ft [30.4 m] in length) and very heavy. Specialty contractors with specialized equipment and experience are employed to do this work, because one slip can be a disaster (see figure 11.5). On a construction site, gravity is not a friend.

Trusses and other long-span structural members are built with camber, or upward bowing, to compensate for the sag caused by the weight of the truss itself plus the weight of the roof and other loads such as snow. This sag is known as deflection, and the longer the truss, the greater the deflection and offsetting camber.

Truss deflection is not fully predictable in the field for a variety of reasons, and it affects other building systems that may be designed such that they come into contact with the truss, like window frames and plumbing. In such cases the contractors provide for flexible connections, or spacers, to allow for the movement of the structure.

**Cranes**

Cranes are a vital part of any construction operation. To ensure that they properly handle the loads safely and with great efficiency, very precise procedures are necessary for setup and ground stability. The crane operator is responsible for the proper placement of the crane in relation to the load to be handled and the landing area so as to obtain the optimum rated lifting capacity.

Leveling the crane and the proper placement and use of outriggers for all lifts are essential for crane safety, as well as crane swing radius protection. The determination of stable or unstable ground is also the individual crane operator’s responsibility. Often additional floats, cribbing, timbers, or other structural members are needed to ensure solid footing.

**Natatoria**

Many recreation centers have swimming pools as a part of the program of requirements. Natatoria
and indoor aquatic centers are complex structures, with unique construction issues that are covered in detail in chapter 8, “Aquatic Facilities.”

**Indoor Running Tracks**

Many recreation centers are designed to accommodate indoor running-walking tracks, which are often suspended from the roof structure. These types of tracks are elevated above and along the perimeter of the gymnasium floor to use a portion of the large volume of space that comes with high ceilings (see figure 11.6). The long span structures that are required to support the roof are typically custom steel trusses. These roof structure trusses normally contain some variance in the elevation of the bottom chords of the truss that carries the track framework, and the frame is lightweight, so construction crews may find it difficult to get the final track subfloor as flat and level as is required for use.

Uniformity of the track running-walking surface is the goal. Tolerances are specified by the manufacturer and achieved by the installer, starting with the floor flatness. Ways to achieve uniformity in the field include grinding off the concrete floor slab high spots and filling in low spots. Durability of the track surface is an important issue for users and owners. To achieve the critical uniform thickness of a poured synthetic rubber surface, specialized equipment and experienced, certified subcontractors are required, and they will ensure that the subsurface is properly prepared.

**Playing Surfaces**

Recreation centers may have many different types of sports flooring surfaces, depending on the flooring’s intended use. Basketball courts, racquetball courts, and aerobics rooms may have wood floors; multipurpose courts may have poured urethane sports flooring, vinyl composition tile, or other types of resilient flooring. Strength training or weight rooms may have a composite, energy-absorbent fitness floor or solid rubber. Whatever the flooring system, each is selected by the designer and owner according to playability, cost, and maintenance considerations. Each system has its own construction considerations as well. Every manufacturer of each playing surface system has its own set of installation requirements, and failure to precisely adhere to the requirements may void the warranty.

The durability of the floor is one of the first considerations in its selection and is a factor in acceptance of the construction of the facility. The durability of a floor is largely determined by its ability to withstand loads and abrasion. Floors experience both athletic and nonathletic loads; typical nonathletic loads may include the movement of portable equipment, such as basketball...
backstops, scissor lifts, and mat carts, as well as substantial loads of retractable bleachers. Even the placement of chairs on the surface can result in significant point loads. The start-and-stop nature of athletic movements on a floor will result in wear of the floor surface, and roller skating will increase wear of the floor, as will ordinary foot traffic in nonathletic shoes.

Criteria for the performance of an athletic floor are defined at the start, and performance is measured following installation. The criteria include requirements for resistance to impacts, static loads, rolling loads, and wear, as well as dimensional stability. Standards from the American Sports Builders Association (ASBA) include performance criteria for evaluating sports flooring, such as shock absorption, energy restitution, vertical deformation, slip resistance, and ball bounce. Mechanical criteria for evaluating sports flooring include resistance to indentation and heavy moving loads, impact absorption, abrasion resistance, light reflection, and surface uniformity.

Wood Floors

There are many options for wood floors and several levels of quality, measured by grades of wood and type of system selected. Wood floors will be specified by the designer, bought by the CM, installed by the contractor, warranted by the manufacturer, inspected and accepted by the owner, and hopefully appreciated by the user.
Ideally, communication about the details of the design and selection of the wood floor system occurs early and often.

Wood floors are specified in several species of hardwoods, but the desired floor often is maple because of the hardness, durability, and appearance of the finished product. Maple flooring types include random length, finger jointed, and parquet. Quality levels are expressed in five grades as described by the MFMA, from first down to utility level, according to the published grading rules set by the association. Of course, the lower grades cost less.

Random length northern hard maple flooring is commonly provided in 2 1/4 in. (5.7 cm) wide strips, continuous tongue-and-grooved and end matched, and the product is shipped in graded bundles. The maple flooring strips are placed on subfloor cushioning systems, commonly over plywood on top of “sleepers,” or padded support board spacers, which provide the unique ball bounce and cushioning characteristics of wood floors. The sleeper system provides an air space below the floor system. Standard thickness of the flooring is 25/32 in. or about 3/4 in. (2 cm), although higher-traffic floors might require the greater thickness, 33/32 in. or about 1 in. (2.5 cm).

Finger-jointed maple flooring comprises one or more individual board segments attached end to end using a series of interlocking fingers and adhesive. The number of segments varies by grade. The finger-jointed product is the same basic assembly as the random length flooring and is similar in appearance. The parquet floor appearance is very different, consisting of individual slats or pickets 1 1/8 in. (about 3 cm) wide that fasten together in mesh-backed panels ranging from 6 to 12 in. (15-30 cm) with a minimum thickness of 5/16 in. (0.8 cm).

Wood warps, buckles, and cups if it gets wet or if moisture conditions are not right. Wood flooring is made from lumber that has been kiln dried to the proper moisture content (6% to 9% moisture content), then cooled and cut into strips, milled, graded, bundled, and stored in an environmentally controlled warehouse. Once it is shipped, care in handling and transport is taken to maintain dryness; and when delivered to the job site, it is off-loaded to a dry, well-protected and ventilated space where the relative humidity is low.

The wood floors will go down last: after the concrete subfloor has been dried, its moisture content has been tested and accepted, and all masonry work and overhead mechanical work in the building have been completed and tested. The permanent heat, light, and ventilation for the building is working and maintaining between 55° and 75° F and between 35% and 50% relative humidity. The flooring is delivered a minimum of seven days before installation and is placed in the area where it is to be installed to ensure proper acclimation to the environmental conditions of the room.

After final installation of the floor and finishes, some minor movement is to be expected. Sleeves and cover plates for equipment inserts such as volleyball posts need just a little room for movement of the floor; both in the center and at the edges. The wood floor playing surface is not fixed to the subfloor for that reason: It will need to expand and contract as environmental conditions change.

If a mechanical room is adjacent to the gymnasium and at the same level, consider installing an 8 in. (20 cm) or higher integral curb to contain water releases from plumbing accidents. Otherwise, someone may end up buying a new floor. Consider buying extended warranties for all fitness flooring and wood floors.

**Fitness Center Equipment**

In a new facility, the fitness equipment can take a while to install and check out. During the installation period, the subcontractors are finishing the interior construction of the building and generating lots of dust, which settles on the new equipment if it’s not protected. When the
building's HVAC systems are started up and the construction filters are in place to catch it, the dust is less of an issue. All equipment, whether new or relocated, should be protected and covered until the building is nearly ready to open.

Much of the active fitness equipment today is motor driven, and the motors can be rather large, such that a single piece of equipment has its own dedicated electrical circuit (for example, one wire in a conduit that goes all the way to the breaker at the distribution panel). The placement of the electrical outlets for the equipment plugs is a coordination issue to be resolved in the design process—not after the floor outlets are roughed in and concrete has been poured around the electrical boxes. Often, each item of equipment has a dedicated television as well, and the coordination of the wiring for that system can be involved and take several weeks to complete and test. Start early and test often.

Climbing Walls

Climbing and bouldering are popular activities and key features of modern recreation and fitness centers. The construction issues involved in climbing walls are detailed in chapter 9.

CHANGES

A change is defined as any addition, deletion, or revision in the work, time, or contract conditions whether or not it results in an increase or a decrease in the contract sum or a change in the contract time. Additionally, any alteration in the terms and conditions of a contractual agreement can represent a change. Not all changed conditions involve a change in contract price or contract time, but all changes to the contract requirements must, upon proper authorization, be formalized by an amendment to the contract.

Undiscovered Conditions

Sometimes changes arise from undiscovered job site conditions that appear after construction starts and that were, despite their best efforts, unknown to the architect, owner, or CM. These undiscovered conditions may affect the contractor's assumptions about the project and affect the cost of the work in a planned or unplanned way.

A planned undiscovered condition occurs in foundations, where the depth into the ground needed for a drilled pier is based on where the bearing strata, or rock, are found. In these cases, a unit value is quoted by the contractor in the bidding stage, typically in cost per foot of depth by size of pier. Additional or lesser amounts are calculated, and the contract amount is adjusted accordingly.

An unplanned unknown condition may be a utility line not shown on the drawings that has to be worked around or an archeological artifact that is discovered during the digging of a basement. In renovation work, conditions are frequently discovered in the existing structures that may not match the drawings because it may be impractical to investigate behind walls or above ceilings ahead of time in occupied spaces. Such undiscovered conditions usually
generate changes in the project cost and schedule, as well as change orders to the construction contract.

**Change Process**

The CM's contract documents specify the CM's obligations with respect to changed conditions, both in the form of notice and in the time for its submittal. Upon confirmation of a changed condition or the recognition of a claim for a contract modification, notification is immediately given to the owner.

All changes are carefully documented. An owner may orally authorize changes, and initial documentation occurs in the meeting minutes; this is followed up with a written change authorization given to the owner for signature to secure the formal approval to proceed with the change work.

Changes require a properly executed authorization from the owner before any work that is beyond the scope of the contract can begin. Construction managers won't issue amendments to a contractor for out-of-scope work without a properly executed change order.

A change authorization is used whenever work to be performed is beyond the contract scope of work; the work proceeds before the formal contract change order is signed and

Multiple rock climbing opportunities in Ohio State University's Recreation & Physical Activity Center. © Brad Feinknopf 2008
provides for the change in contract cost or time (or both) to be approved as a fixed, estimated, or guaranteed maximum amount or allows for work to be performed on a time and materials basis.

**In- or Out-of-Scope Changes**

Changes are further defined as “in scope” or “out of scope” on CM at risk projects, lump-sum, or GMP contract work. When the CM is managing a project’s construction budget for the owner and is not at risk, discerning in-scope versus out-of-scope changes may still be necessary if the owner wants to track changes in this manner. The actual use of these identifiers for changes on not-at-risk contracts must be reviewed and agreed upon with the owner and A/E at the beginning of a project to avoid confusion and misunderstandings.

- **Mistakes: Everybody Makes Some.** An in-scope change is for work that is included in the scope of work of the contract documents between the owner and CM, but is not included in the scope of work in the contracts between the CM and the trade contractors. An in-scope change requires an amendment to the trade contract but generally does not require a change order from the owner, because it is already part of the contractual obligations of the CM by original contract or executed owner change order.

- **Owner- and User-Requested Upgrades.** An out-of-scope change is for work not included in the scope of work of the contract documents between the owner and CM, and requires issuance of a change order to the owner–CM contract for the work to be included in the contract. A formally approved change order to the owner–CM contract is required prior to issuance of an amendment to a trade contract for out-of-scope work. Any amendment written to a trade contractor is subject to the same terms and conditions that the CM has assumed from the owner. Out-of-scope change order work is not allowed to proceed until the owner formally approves the work.

**Change Orders and Approval Process**

When a change order request is initiated, a decision must be rendered on whether or not the change should be implemented. The owner and CM will need to resolve the following issues:

- Is the proposed change valid?
- Does the proposed change represent an advantage to the client-owner?
- Is the change reasonable in terms of cost and cost effectiveness?
- How will the change affect the project schedule?

The key to appropriate decision making is good documentation. The CM will check each request to verify that the work requested is outside the scope of the contract. If the request is found to be necessary and beneficial to the client, the CM will obtain the client’s approval to proceed with the change order process.

This process includes the preparation of an independent estimate of the cost and schedule impact of the requested change, as well as cost quotations for the work from appropriate trade contractors. Change orders typically include a schedule and an itemized breakdown of labor, material, overhead, and fee, in addition to information regarding who initiated the change order and the reason for the work to proceed.

**Change Order Management**

Change order management is critical to the CM’s role. In summary, a CM will take the following actions:

- Evaluate the owner’s and A/E’s change proposals for impact on project budget and schedule
- Review proposed changes and provide sufficient information for determination of the cost effectiveness of accepting the changes
- Make independent estimates of verified change order requests and recommend approval levels
- Challenge the validity of change order pricing submitted to the owner by the subcontractors
- Prepare appropriate change order agreements for the owner’s approval
- Make changes to the project budget and schedule as directed by approved change orders
- Maintain a change order log
SAFETY

Although job sites are inherently dangerous places, it is possible to have no injuries to construction workers—and that is always the goal of the construction professional. There are standards for safety in the construction industry, and measurements are required by OSHA. The measurements are recordable accidents and lost-time incidents.

Hazards Analysis

Hazards analyses are conducted for all major construction activities prior to start of construction and ideally prior to bidding; they include a broad analysis of the construction activities, the hazards presented by these activities, and the corrective or preventive actions. Hazards analysis of particular job activities that are job site specific are conducted by the subcontractors and trade contractors for their own operations.

Fall Protection

Generally, no worker, employee, or visitor is to be exposed to a fall greater than 6 ft (1.8 m) at any time, and where any more stringent requirements (e.g., OSHA, state, federal, client, or local) exist, they apply.

Fall protection may involve a variety of protective systems, including but not limited to the following: guardrails, scaffolds, work platforms such as scissor lifts, extensible boom platform lifts, and personal all-arrest systems such as safety harnesses with appropriate shock-absorbing lanyards and anchorage points.

Claims and Disputes

Claims can come from anywhere on a project, but they generally are between contractors or between the contractor and the owner. However, third parties, such as bonding companies and insurance carriers, may become involved. Disputes are not uncommon on a project such as a recreation center, characterized by the involvement of many different parties.

When conditions arise that are the basis of a claim, either from a subcontractor against the contractor or the contractor against the owner, a change estimate is created by the construction manager and maintained in a change estimate log. Documentation that defends against or proves the basis of the claim is accumulated in a change estimate file. An assessment of the validity of the claim is performed by the CM, and it includes a realistic analysis of the basis of the claim, the issues on which the originator of the claim may prevail, and any supporting documentation that can be presented. The CM is responsible for acting on behalf of the owner to resolve all claims. Whenever possible, claims are resolved before either party requires the use of outside legal counsel.

The best defense against a claim is a complete, comprehensive, and coordinated set of construction documents issued for construction by the A/E after incorporation of the CM’s and owner’s constructability review comments.

DRAWDOWN: WHO PAYS WHAT AND WHEN

Timely payments are key to the success of any construction project. The owner pays all the bills eventually, but a payment process that all can rely on for business financial planning is one of the most important project success factors. On a typical construction project the owner pays all the project expenses for the cost of the design, construction, and equipment as well as the ongoing operations and maintenance, and the price for the construction work is established before agreements are written with the CM.

Progress Payments

A fact of every project is payment for progress. Each contractor is at the job doing his or her best to go home with a paycheck, but it’s not always easy to determine how to conduct payment. On a typical project, the construction contractors submit a payment request based on the amount of work put in place and for construction materials and equipment properly stored and ready to be put in place.

These progress payment requests are submitted based on a percent complete of a line item from a preapproved Schedule of Values, a document provided by each contractor at the beginning of a project that details the amount of money each component of the work is worth. The CM reviews and approves the request before payment is recommended to the owner.
Retainage

A portion of the construction contract amount is typically held back by the owner until all elements of the work are satisfactorily completed. The amount withheld, or the “retainage,” is established in the beginning of a project and is normally specified in the contract as a percentage. Retainage may be built into a contingency amount managed by the CM or the owner.

ALMOST DONE: COMMISSIONING—CHECKING IT OUT

“Excellence is the gradual result of always striving to do better.”
—Pat Riley

Commissioning a building is like commissioning a new ship: Take it to sea and watch what happens, then make adjustments or corrections as needed to optimize the performance of the vessel and crew. During the construction phase of a building, the CM is preparing for the checkout and is doing so based on the commissioning plan developed during the preconstruction phase, usually provided by a third-party commissioning agent.

A commissioning agent, a third party to the contract between the owner and the CM, is often engaged to perform the commissioning tasks. The advantage is that an independent party who is not involved in either the design or construction can develop the testing criteria and objectively measure and report testing results based on the drawings and specifications, then make recommendations to optimize the systems’ performance.

Whether commissioning is performed by the CM, by an agent, or by the design engineer, the tasks during construction include the following:

- Review of shop drawings of components and systems in the commissioning program, verification of sequences of controls
- Periodic field observation of installation, and attendance as necessary, at component start-up; testing, balancing, and controls sequence pretesting to ensure system readiness for final commissioning
- Attendance at all system commissioning activities and verification of results through physical observation of system response, and documentation of performance
- Development of a training schedule and training documentation and coordination with owner and contractors
- Review of operations and maintenance manuals for conformance to project specifications
- Preparation of preventive maintenance schedules for equipment and systems installed

It is critical to the success of the investment in a commissioning effort that the start-up process be communicated to team members and management throughout the project to allow immediate identification of any challenges. Start-up is like a preflight checklist, ensuring that all required components are installed correctly for every building system involved. The checklist is developed at the beginning of a project and may even be included in the specifications. This typically is accomplished through tracking and reporting of status at the individual system level and rolling this information into an overall start-up critical path schedule. Each “start-up team” (leaders involved in the installation, inspection, and start-up activities) develops a plan that includes a schedule of tasks and resource requirements for commissioning each system. The schedule for each team is updated as often as conditions warrant and is reconciled with the project construction schedule.

Once start-up of systems is complete and after the building is occupied, the commissioning tasks continue with periodic reviews during the warranty period to verify that equipment and systems are operating as expected, as well as to assist the owner and design team in investigation and resolution of system operating issues.

CONSTRUCTION COMPLETION

Completing a project sometimes can be almost as challenging as building it in the first place. For example, the expectations held by the owner or user about the final product may not emerge until the building is nearly finished, when it’s too late to make meaningful changes without significant cost or when the completion list is lengthy or contentious, or both. To complete the project
gracefully the CM, architect, and owner must agree upon the completion requirements.

**Punch List**

The CM keeps a running list of the corrections to be made by the contractors and of work yet to be completed. The term **punch list** generally is applied to both corrections and incomplete items, but items are placed on the punch list only after the construction of a building component or system is sufficiently complete that its quality can be evaluated.

Punch lists are directly related to the quality of work on a project and are a good indicator of the effectiveness of a construction management role. In an industry where punch lists at the end of a job can contain several hundred items, constant monitoring by a CM can significantly reduce the number of items to a very manageable range.

**Substantial Completion**

Completion of construction of the project is a staged process. When the building, or sometimes just a portion of a building, is complete enough for the occupants to safely move in and function productively, substantial completion can be declared. But before the move-in begins, a Certificate of Substantial Completion document is signed, usually by the owner, architect, and CM. The document includes the date of completion, and the completion list is attached. This document is important both legally and operationally, and the achievement of this milestone marks the beginning of the end of the project.

The CM identifies criteria that establish substantial and final completion; prepares the owner’s completion list with the A/E when notified by the contractors of substantial completion; assists the owner’s maintenance and operational personnel in the checkout and start-up of all systems turned over to the owner by the contractors; receives and reviews all documents, warranties, manuals, and maintenance information for the owner; and checks them for completeness, assembles them, and turns them over to the owner.

The CM’s on-site field supervisors assist the owner in the complex task of the transition from construction to the operational mode because the CM and the construction team have familiarity with the work accomplished and the systems installed, which expedites the crucial final steps of the project.

**Final Completion**

The CM is responsible for coordinating the work required to obtain a Certificate of Final Completion and Certificate of Occupancy with the contractors and design team. At the completion of all work, the CM and architect perform a final comprehensive review of the project requirements and make recommendations to the owner regarding final payment to the contractors.

**Warranty and Guarantee**

When work is performed by the CM’s own staff or by trade contractors under contract, the CM warrants that all materials and equipment included in such work will be new, unless otherwise specified. The work should be of good quality, free from improper workmanship and defective materials, and in accordance with a project’s drawings and specifications.

Construction managers generally agree to correct all work that is defective in material and workmanship for a period of one year from the date of substantial completion, or for longer time periods as set forth with respect to specific warranties in the trade sections of the specifications.

A CM maintains a record of details and dimensional locations, or as-built drawings, to indicate the actual installation conditions of equipment, utilities, and so on. In addition, the CM furnishes maintenance and operating instructions on installed equipment and spare parts, warranties, guarantees, and other information.

**Operation and Maintenance Manuals**

Operation and maintenance manuals, warranties, and guarantees for all equipment installed in the project are organized and turned over to the owner after substantial completion.

Training programs conducted by the systems installers or by specialty suppliers and an operations manual for the facility will ensure that the owner can

- start, operate, and shut down the systems effectively and safely;
- efficiently maintain and, if appropriate, repair the systems;
- identify parts and service suppliers; and
- understand warranty terms and conditions.
Training
The CM can coordinate with vendors and trade contractors in scheduling training for the owner’s team regarding the operation and maintenance of all systems and equipment. The CM directs all the closeout, start-up, and testing of operations systems performed by the subcontractors. The training includes seminars conducted by the manufacturers of the equipment, safety guidelines, walk-through replacements, and preventive maintenance schedules, as well as complete instructions on the interpretation and understanding of warranty terms and conditions.

As-Built and Record Drawings
In the course of construction, frequently some elements of a project may be constructed somewhat differently than contemplated in the design and as shown on the construction document drawings. When that happens, the master copy of the architect’s or engineer’s drawings that is maintained on the construction site is marked up by each contractor to show the change from the original drawing, or shown “as built.” At the end of the project construction, these marked-up as-built drawings are turned over to the owner and the architect so that an accurate record of the actual construction is transferred along with the possession of the building.

If contracted by the owner to do so, the architect transfers the as-built information on the marked-up drawings on the original drawings, thereby providing the owner with a neat and accurate set of drawings that are reproducible. These record drawings replace the sometimes tattered, marked-up field set of as-built drawings and provide the documentation for the condition of the completed project—a valuable asset for the next project.

Move-In
The typical move-in of a recreation center is quite different from that of any other facility. Although the task may seem unmanageable, with a carefully thought-out plan the relocation of equipment and programs can be a very positive experience.

Some owners choose to hire a transition planning and management contractor to assist in their efforts to moving sporting and fitness equipment, facilities and maintenance staff, and the myriad other pieces of a facility that are not included in the construction documents. This outside support and assistance can often lead to a smoother transition because of the focused efforts on planning in advance.

Many facilities already have staff that conduct procurement of equipment and handle the move of staff into a new facility. This internal team focus on the transition of the staff can also be a positive experience if the appropriate planning is conducted in advance.

PROJECT CLOSEOUT

“Believe deep down in your heart that you’re destined to do great things.”
—Joe Paterno

The closeout of a project starts at the beginning of the project and continues through its life. Closeout is an ongoing process that must be well planned and carefully tracked through project completion. Generally the CM strives to completely close out projects within 90 days after the last staff member leaves the site.

A closeout schedule is prepared during the final quarter of construction. The schedule details the remaining construction activities, outstanding change order work, punch list completion, contract closing activities, and archival functions.

To have any hope of closing out a project within the schedule goal, the project paperwork has to be kept current during the course of the project. Project paperwork includes change estimates, contractor credits, change orders, amendments, logs, RFI files, and more. Special attention is given to expediting completion list items.

One important step in reaching a concluded “closeout” phase is obtaining approvals from the owner and users. A plan of approvals is established when a closeout plan is assembled at the start of construction. This plan includes delineation of who must inspect each punch list item and who has authority to sign off on a final approval. Most often, this definition can be incorporated into a contract at the start of construction to avoid any questions at the end. Often the approval includes a signature from the architect, owner-user representative, and sometimes a campus facilities manager.

These approvals can then be used to agree on an approved date for final payment to the CM,
including any retainers held during the course of the project. In this final stage of closeout, often after the facility has already been occupied, a clear definition of the punch list and approvals of completed items will avoid any confusion for final payment release. Diligence on the part of the CM and the architect is critical to completing this task within the 90-day goal that many CMs strive for:

**Warranty Period**

The warranty period also is defined in the up-front contract documentation, most often in the specifications issued by the architect. The typical warranty period is one year from the date of substantial completion, although a few systems require a longer period under warranty. These systems often include chillers and air-handling units, roofing, and glass and glazing systems.

A CM and subcontractors will turn over a complete contact information sheet with all other closeout documentation to ensure that the owner can call if there are any warranty issues to address during this first year of occupancy. At this stage, the subcontractors are directly contacted by the owner, and the CM becomes involved in warranty call-backs only if there are issues with that contact or if a system issue exists that involves more than one subcontractor.

**Postoccupancy Walk-Through**

As the close of the warranty period approaches, the CM contacts the owner for a postoccupancy walk-through, which is an opportunity to address any warranty issues that may need attention before the warranty period is contractually complete. This inspection also allows the CM and architect an opportunity to listen to the owner regarding any lessons about the design and construction of the facility, which many times leads to decisions for future projects to improve and enhance the design and construction.

**SUMMARY**

The construction of a recreation facility can be approached in several project delivery modes. A complete analysis of the options and features of each mode at the very beginning of the project is critical to the success of the project. This facility type will benefit from the early involvement of an experienced CM who can provide cost estimating, constructability reviews, VE, and strategic advice on site selection and construction issues during the crucial concept and design stages. The planning of bid package strategies that optimize the competitive bid market and consider the availability of trades is a key feature of early CM involvement.

During the course of construction, the CM employs sophisticated cost and budget controls to keep the project on track and uses advanced information management and communications tools to keep the stakeholders and project team coordinated and together. Individual team member roles and responsibilities are communicated; frequent team meetings with the owner and A/E facilitate the resolution of issues; and Web-based tools can allow ready access to project documents such as shop drawings, submittals, permits, or change management records. Benchmarks of a successful construction project team are outstanding communications, focus on job site safety, and an overarching concentration on quality at every level.

Recreation centers are complex. Building systems must be in harmony with the performance requirements of the building, ensuring that the technical use spaces such as courts and pools do not have completion issues or operational and maintenance problems. Attention to detail during the installation of critical systems will pay dividends, helping to ensure that such common recreation center issues as floor slab flatness, concrete dryness, and humidity are addressed and completely resolved. “Begin with the end in mind” is a time-honored maxim for most tasks, but especially so for the construction and commissioning of recreation centers.

The design, construction, and equipping of a recreation center is a journey, and the experience can be a character builder. But with the owner’s commitment to success and the involvement of seasoned architects, engineers, and construction management professionals, the experience will be rewarding and the results exciting to see on opening day.

**DEFINITION OF TERMS**

AGC—Associated General Contractors of America, online at www.agc.org.

AIA—American Institute of Architects, online at www.aia.org.
BCA—Building Commissioning Association, online at www.bcxa.org/.

CMAA—Construction Management Association of America, online at www.cmaanet.org.

construction management—As defined by the Construction Management Association of America (CMAA), "a professional service that applies effective management techniques to the planning, design, and construction of a project from inception to completion for the purpose of controlling time, cost, and quality."

construction management at risk—Delivery method in which the construction manager holds the contracts for all (or a portion) of the subcontractors and therefore assumes the risk for construction performance in terms of both delivery and quality.

construction manager (CM)—The party who delivers a project as designed and accepted by the owner. The CM represents the owner and integrates the needs of both the owner and the designer of a project by providing management services and expertise including, but not limited to, design, engineering, constructability, cost, scheduling, phasing, and assessing the project’s effects on the surrounding community.

critical path method (CPM)—A schedule for both design and construction phases of the project, including milestone dates for the owner, designer, and construction manager. Milestone activities include design documents completion, permit applications, reviews and approvals, cost estimates, value engineering reviews, and design and constructability review sessions.

debonding—A breakdown of the adhesive holding together building materials, also known as delamination.

design-build—A project management approach with a single point of contact and single contractual source, as well as the need to meet an aggressive schedule for project completion.

design/build/finance/leaseback—An agreement wherein a developer provides financing, project management (which would include design and construction management for project requirements), and various degrees of ownership and perhaps leaseback opportunities. This approach is appealing to owners faced with managing projects on tight budgets and short time frames.

designer—The architect or A/E. The architect and the firm’s design-engineering consultants compose the design team, which has several areas of responsibility, including translation of the owner’s requirements into drawings and specifications to be used for construction.

fall protection—A safety measure that may consist of a variety of protective systems, including, but not limited to, guardrails, scaffolds, work platforms such as scissor lifts, extensible boom platform lifts, and personal all-arrest systems such as safety harnesses with appropriate shock-absorbing lanyards and anchorage points.

FF/FL—The American Concrete Institute (ACI) standard for the flatness and levelness measurement of a flooring surface. FF, or Flatness F-Number, is a numeric value that defines the maximum floor bumpiness allowed over a 2 ft (0.6 m) distance; FL, or Levelness F-Number, defines the tilt or pitch of a floor over a 10 ft (3 m) distance. The higher the F-Number value, the more level or flat the slab.

flashing—A thin impervious material placed between a roof and a wall, or over exterior doors and windows, to prevent water penetration or provide water drainage or both.

geotechnical engineering—A highly specialized engineering discipline concerned with subsurface conditions under a structure, which is essential information for the designer of the foundation system, the cost estimator, and the contractor that bids the project.

green building—According to the Office of the Federal Environmental Executive, “the practice of (1) increasing the efficiency with which building and their sites use energy, water, and materials, and (2) reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal—the complete building life cycle.”

groundbreaking—A traditional ceremony that celebrates the first day of construction for a building or other project. Dignitaries such as politicians and businessmen often attend.

infrastructure—The collection of utilities such as electric power, water, sewer, natural gas, telephone, and data communications, as well as roads and drives.

LEED—Acronym for Leadership in Energy and Environmental Design, a standard created by the United States Green Building Council to measure and certify buildings that employ
environmentally sound and energy-efficient design and construction, practices, and features.

**lump-sum general contracting**—A contracting approach characterized by a lack of builder input during the design phase and a lengthier schedule due to the requirement for complete design documents before bidding to the subcontractor market.

**MFMA**—Maple Flooring Manufacturers Association, online at www.maplefloor.org.

**mock-ups**—Assemblies constructed so that they are identical to the intended final building, which set a standard for actual construction of components and systems.

**owner**—The owner of a building, who makes decisions regarding program, budget, scope, and funding for a project.

**postoccupancy walk-through**—An inspection that provides an opportunity to address any warranty issues that may need attention before the warranty period is contractually complete. This inspection also allows the construction manager and architect to consider lessons learned about the design and construction of the facility, which often leads to decisions about future projects to improve and enhance the design and construction.

**precondition survey**—A survey used when a project includes construction adjacent to other structures. This survey documents the condition of buildings, driveways, curbs, utilities, and any other physical facility that may be affected by the construction contractor’s activities, providing a basis for any claim of damage or repair.

**punch list**—A running list of the corrections to be made by the contractors and of work remaining to be completed. The term “punch list” is generally applied to both, but a punch list item is generated only after the construction of a building component or system is sufficiently complete to enable evaluation of its quality. Punch lists are directly related to the quality of work.

**RFI**—The Request for Information, primarily used to obtain clarification of drawings or specifications from the A/E. Other uses for RFIs may include confirming owner or A/E oral directions; identifying field conflicts; resolving missing, conflicting, or unclear information; and requesting requirement deviations.

**site utilization plan**—A plan that assesses the construction equipment access requirements, construction worker parking, emergency vehicle routes, materials storage, lay-down areas, work zones, office trailer location, safety and security, trash removal, demolitions and connections, traffic patterns, and so on.

**subcontractors**—The field teams that construct a building or facility. These team members construct a building according to a series of bid packages containing drawings and specifications organized and distributed by the construction manager.

**topographic survey**—A complete survey, prepared by an experienced surveyor licensed in the state in which the project is located, that maps the contours and characteristics of the property and locates significant natural features such as wetlands and man-made features such as utilities.

**truss**—A structural element constructed of angled and vertical steel members connecting a top and bottom cord; it looks very much like a steel bridge. The truss is designed and constructed specifically for each job.

**users**—The group that generally drives the program’s needs and requirements and will occupy the building upon completion.

**value engineering**—A process that attempts to define the most cost-effective design and scope for the purposes and conditions of a project.

**vapor barrier**—A sheet of plastic at least 6 mm thick that typically is placed between the stone or sand base and concrete. The product is protected during construction because punctures in the barrier allow the water vapor through and may make the moisture content of the slab hard to overcome.

**warranty**—Document specifying the warranty period, which is defined in the up-front contract documentation and most often found in the specifications issued by the architect. The typical warranty period is one year from the date of substantial completion, although a few systems require a longer period under warranty, including chillers and air-handling units, roofing, and glass and glazing systems.

**weeps**—Small openings at the bottom of a brick cavity wall that allow water to drain from behind the brick layer to the exterior of the building.
REFERENCES


After years of planning and designing the facility and months of wearing a construction hard hat, the owner must now focus attention on ensuring that the facility is ready for opening day. This will be the one and only opportunity to make a good first impression. Moving into and opening a new facility is a much anticipated and memorable event for the staff and the entire community. This is the final and perhaps the most challenging phase of the project, especially for owners and staff. It’s “crunch time” for finalizing staffing and building operating plans to ensure that opening day will be a success.

The opening will bring visibility and attention to the programs, staff, and facilities. It is crucial for the owner to step up and take on the task of overseeing the project to coordinate the efforts of architects, contractors, staff, and all others involved and invested in the new facility. The owner will need to sharpen his or her interpersonal skills to rally and motivate the many people who will play an integral role in bringing the project to fulfillment during the final countdown to completion. Contact with the architects and contractors must be constant in order to ensure that the project stays on schedule. Another requirement is ongoing coordination and communication with the contractors, interior designers, and vendors to ensure that furniture, fixtures, and equipment purchases and deliveries are on schedule and that the budgets remain balanced.

This chapter will help owners, users, architects, designers, and contract managers know what to expect when anticipating the opening of a new recreational sports facility and how to best make a good and memorable first impression on opening day. The chapter also covers the dedication and celebration of a new or renovated facility.

PREOPENING

A countless number of assignments and projects must be performed in order to ensure a successful move-in and opening. It is imperative to have a plan for the months leading up to the opening day. Include and involve other staff in this preopening planning process. Mark Fletcher, Director of Intramurals and Recreational Sports at the University of Virginia, understands what it takes and offers these insights: “Projects of this magnitude help us identify who the real players are on our team.” The amount of work necessary
to complete a building project makes delegation of responsibility a necessity, and it’s imperative to the success of this phase of the project. Know who your players are and ask them to step up to the plate and hit a home run for the team.

Begin by making a list of all the possible tasks and projects, creating a checklist that can be used as a countdown to the opening day. Include starting and ending dates, and assign each project to a staff member. This will ensure that all projects have been included in the plan, given a time line, and assigned to someone. During the months leading up to opening day, schedule regular meetings and use this checklist as a way to stay on task and provide progress reports. Table 12.1 presents an example of a checklist.

**Communication**

Communication is key in the preplanning process. As the building is undergoing construction, the staff and community will be anxiously awaiting the day the doors open. It is imperative to keep the staff and community informed and updated about the project and its progress. Not only will this bring positive exposure, visibility, and publicity to the project, it will also be a welcomed and proactive approach to anticipating and responding to the many questions and concerns surrounding the facility, thus reducing the amount of misinformation. The following are some suggestions for successful preplanning communication:

- Identify a staff person as the communications coordinator.
- Organize a communications planning committee.
- Develop a list of frequently asked questions.
- Design a Web site that will include updated information and progress reports.
- Develop a PowerPoint presentation that can be easily modified and updated.
- Attend community meetings to make announcements and presentations.

**Communications Coordinator and Committee**

Identify a staff person as the communications coordinator to represent the department with all contacts outside the department. This will provide a clearinghouse for all communication and will
### Table 12.1 Opening Day Checklist

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Responsible</th>
<th>Beginning date</th>
<th>Completion date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staff</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop updated job descriptions for all positions</td>
<td>All staff</td>
<td>1/1/2010</td>
<td>3/1/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Develop policies and procedures for facility supervision</td>
<td>C. Roberts</td>
<td>3/1/2010</td>
<td>5/1/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Develop a training and evaluation program for staff</td>
<td>C. Roberts</td>
<td>4/1/2010</td>
<td>5/15/2010</td>
<td>In progress</td>
</tr>
<tr>
<td>Recruit and hire all student staff positions</td>
<td>All staff</td>
<td>4/1/2010</td>
<td>6/1/2010</td>
<td>In progress</td>
</tr>
<tr>
<td>Create staff schedules</td>
<td>All staff</td>
<td>6/1/2010</td>
<td>6/15/2010</td>
<td>In progress</td>
</tr>
<tr>
<td><strong>Operations</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop facility scheduling policy and procedures</td>
<td>K. Williams</td>
<td>1/1/2010</td>
<td>3/1/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Develop opening and closing procedures</td>
<td>K. Williams</td>
<td>3/1/2010</td>
<td>5/1/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Develop ingress and egress procedures</td>
<td>K. Williams</td>
<td>3/1/2010</td>
<td>5/1/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Review and update locker checkout policies and procedures</td>
<td>K. Williams</td>
<td>4/1/2010</td>
<td>5/15/2010</td>
<td>In progress</td>
</tr>
<tr>
<td>Review and update guest policies and procedures</td>
<td>K. Williams</td>
<td>4/1/2010</td>
<td>6/1/2010</td>
<td>In progress</td>
</tr>
<tr>
<td>Key control—master, submaster, distribution of staff keys</td>
<td>C. Roberts</td>
<td>4/1/2010</td>
<td>6/15/2010</td>
<td>In progress</td>
</tr>
<tr>
<td><strong>Member services</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop informal recreation equipment inventory</td>
<td>K. Fisher</td>
<td>3/1/2010</td>
<td>5/1/2010</td>
<td>In progress</td>
</tr>
<tr>
<td>Develop equipment checkout procedures and hand biometrics</td>
<td>K. Fisher</td>
<td>3/1/2010</td>
<td>5/1/2010</td>
<td>In progress</td>
</tr>
<tr>
<td>Develop key storage and checkout procedures</td>
<td>K. Fisher</td>
<td>3/1/2010</td>
<td>5/1/2010</td>
<td>In progress</td>
</tr>
<tr>
<td><strong>Risk management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Purchase and install risk management equipment</td>
<td>K. Farlee</td>
<td>3/1/2010</td>
<td>6/1/2010</td>
<td>In progress</td>
</tr>
<tr>
<td><strong>Equipment installation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop and design a floor plan for all equipment</td>
<td>A. Ardner</td>
<td>1/1/2010</td>
<td>3/1/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Develop a plan and time line for delivery and installation of equipment</td>
<td>A. Ardner</td>
<td>3/15/2010</td>
<td>4/15/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Contact vendors to review and confirm delivery schedules</td>
<td>A. Ardner</td>
<td>4/15/2010</td>
<td>5/1/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Schedule vendors to assist with equipment installation</td>
<td>A. Ardner</td>
<td>5/1/2010</td>
<td>5/21/2010</td>
<td>In progress</td>
</tr>
</tbody>
</table>
| Install equipment                                                                | A. Ardner   | 6/1/2010       | 6/21/2010       | In progress  | (continued)
Table 12.1 (continued)

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Responsible</th>
<th>Beginning date</th>
<th>Completion date</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Furniture installation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop and design a floor plan for all furniture</td>
<td>K. Sue</td>
<td>1/15/2010</td>
<td>3/15/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Develop a plan and time line for delivery and installation of furniture</td>
<td>K. Sue</td>
<td>4/15/2010</td>
<td>5/15/2010</td>
<td>Complete</td>
</tr>
<tr>
<td>Contact vendors to review and confirm delivery schedules</td>
<td>K. Sue</td>
<td>5/15/2010</td>
<td>6/1/2010</td>
<td>In progress</td>
</tr>
<tr>
<td>Install furniture</td>
<td>K. Sue</td>
<td>6/15/2010</td>
<td>6/21/2010</td>
<td>In progress</td>
</tr>
</tbody>
</table>

improve the speed and accuracy of information. Have the communications coordinator organize a planning committee to meet on a regular basis to review and discuss the project and keep everyone informed on progress. These committee members should be representatives of various constituencies to help review and disseminate project information to the greater community.

Frequently Asked Questions

Developing a list of frequently asked questions surrounding the project and preparing and publicizing responses can be a very useful method of communication and can be used in a variety of ways, including presentations, bulletin and message boards, and Web sites. The questions should be periodically updated as the project progresses and as a need arises to respond to frequently asked questions. Preparing the list of questions and responses helps the staff and planning committee members give thoughtful answers to sometimes difficult questions. This will ensure that everyone is getting and giving consistent, accurate, and updated information. The following are examples of frequently asked questions to anticipate during the construction and before the opening.

Sample Question 1: Is the project on schedule and when will the new facility open?

- Suggestion. This will likely be the most frequently asked question. Be careful not to give a premature opening date that may be out of your control. Provide an answer that is accurate but also allows for flexibility.

- Sample answer. The project is on schedule, and the new building is scheduled to open in the spring. A dedication celebration is planned for several months after the opening. The exact days and times will be announced as we get closer to the spring and the scheduled opening date.

Sample Question 2: What activity areas will be in the new facility?

- Suggestion. Never assume that everyone understands the scope of the project. Continue to promote the project and provide the very basic information.

- Sample answer. The expanded and enhanced facility will be approximately 90,000 square feet (SF) (8,560 m²), which will allow for the growth of existing programs and for the implementation of new initiatives. These are some of the highlights of new facility:
  - Three-court gym with an elevated jogging track
  - 50-meter pool
  - Two-level fitness center
  - Two multipurpose rooms
  - Game room
  - Locker rooms and saunas

Sample Question 3: Will more equipment be available in the new facility?

- Suggestion. Most participants will not understand the significance of the increase in square footage of a facility, but they will understand an increase in the amount of fitness equipment. If possible, provide them with specific numbers of types of equipment and comparisons with current or past facilities.

- Sample answer. The facility will be equipped with state-of-the-art equipment as well as the resources necessary to serve the population in
demand of personal fitness and healthy lifestyles programming. These are some highlights of the new equipment:

- 28 treadmills—an increase of 14 treadmills
- 30 ellipticals—an increase of 15 ellipticals
- 26 recumbent and upright bikes—an increase of 13 recumbent and upright bikes

**Sample Question 4: What are the operational hours for the new facility?**

- Suggestion. This is one of the most commonly asked questions; the owner should be prepared to answer it early to give the community some good news and get people excited about the upcoming opening.

- Sample answer. The facility hours will be expanded to better meet the needs and interest of participants. The facility will open earlier in the morning, close later at night, and open for more hours on weekends and during holidays. The following is a summary of the anticipated facility schedule:
  - Weekdays 6 a.m. to midnight, weekends 10 a.m. to midnight
  - Summer weekdays 6 a.m. to 10 p.m., weekends 10 a.m. to 6 p.m.
  - Hours may be reduced during holidays

**Sample Question 5: Will membership and program fees increase?**

- Suggestion. The opening of a new recreational sports facility is a good opportunity to review membership levels and fees. Use this as an opportunity to introduce and announce possible changes that may positively or adversely affect groups.

- Sample answer. Our organization is committed to providing optimal recreational opportunities to members. Anticipate membership and program fees to increase approximately 10%.

**Sample Question 6: Will there be more job opportunities?**

- Suggestion. Use this as an opportunity to begin recruiting and hiring new staff.

- Sample answer. Increased programs and operational hours equal increased employment opportunities. Visit our Web site for additional information.

**Sample Question 7: How can the community get involved and provide comments and suggestions?**

- Suggestion. Use this as an opportunity to encourage comments and input from the community. This can also be a useful method of managing expectations.

- Sample answer. Visit our Web site to keep up with the progress of this project and offer your comments and suggestions to the planning committee.

**Developing a Web Site**

A well-designed Web site is another valuable communication tool that can be used to provide the community with updated and visually exciting project information and illustrations, as well as an opportunity to submit comments and suggestions. The following are some recommended components of the Web site:

- **Overview of project:** Provide a brief summary of the status, cost, size, and scope of the project—for example, “The board of trustees’ executive committee has voted to move forward with the planning and design phases for construction of a new $12 million Recreation and Wellness Center. The proposed Recreation and Wellness Center includes a major new facility, adding 26,400 square feet (SF) of new space and renovating 32,500 square feet (SF) of existing space.” This will provide a brief overview of the project.

- **Planning committee:** Include the names of the committee members, the groups they represent, and a summary of their responsibilities and progress. Having an inclusive planning committee will help communicate that this is an open process with a diverse representation of the community.

- **Justification and benefits:** Provide a summary of the justifications for building the facility and outline the benefits to the community. A well-written justification and list of benefits will help educate the community and develop support for the project.

- **Headline news:** Include a chronological listing of any news articles and public service announcements. Many newspapers and publications will have electronic versions of the articles. Often a link can be included on the Web site so that people can view the article and any photographs that may have been published. This will also help keep the community educated, updated, and in the news.
• **Pictures of progress:** Every week or month, take pictures of the project and post them on the Web site. The photographs can provide visuals of areas that will most likely be off-limits to most people. They will also provide historical records for future use.

• **Webcam:** Consider purchasing a Webcam to provide live coverage of the construction project through the Internet. The Webcam can also help with security surveillance of the construction site and can be used for many purposes at the conclusion of the project.

• **Summary of plans:** This section includes updated diagrams and illustrations of the plans for the recreational sports facility.

• **Frequently asked questions:** Keep this section of the Web site updated.

• **Comments and suggestions:** Provide a link to encourage participants to offer comments and suggestions to the planning committee.

Through the frequently asked questions, the Web site provides the staff with a reference for updated and accurate information. This information also prepares and provides the communications coordinator with the necessary tools to reach out to the community and make announcements and presentations to talk proactively about the many benefits of the new facility. Make an effort to attend as many community meetings and events as possible in order to bring visibility to the project and update groups on its progress. Invite the community to attend several open meetings hosted by the members of the planning committee and architects to review and discuss the plans for the recreational sports facility.

### Staff Change Considerations

The renovation or the opening of a new facility provides an excellent window of opportunity to consider change. Carefully examine and evaluate the programs, review the staff organizational chart and job duties, and scrutinize and update the operational policies and procedures. This can be an extensive process; it must begin long before the opening and likely will continue long after the doors have opened. In a new facility, the programming schedule must be in place from the first day of operation. Staff must be professional and prepared.

The importance of a knowledgeable and well-trained staff that is customer service oriented is paramount and essential to the success of a new facility. As stated earlier, a new facility brings increased demands from participants. The staff must therefore be fully prepared to live up to these higher expectations. Some staff items to consider in preparation for the opening are the following:

- Reorganizing staff reporting lines, titles, and responsibilities
- Recruiting and hiring professional staff
- Conducting training and orientation for employees
- Updating policies and procedures

### Reorganizing Staff

A review of the organizational chart and job descriptions needs to be completed early in the process to ensure that the programs and facilities can be properly staffed and operated and that employee workloads are equally balanced. An increase in facilities and programs should justify the need for an increase in staff. Unfortunately, it’s not always that simple; often owners and operators are required to develop a proposal and justification to make a case for additional staffing. There are several ways of accomplishing this, including developing projections for the anticipated increases in participants, programs, and operational hours and using comparative data for similar facilities and organizations. If funds are not readily available, it may be necessary to look into increasing revenues to offset operating and staff costs. Whichever way additional staff is justified and funded, it is imperative that new staff be recruited and hired as early in the process as possible, be involved in the decision-making process, and be given a sense of ownership of the programs and facilities for which they will be responsible. Depending on the position and the responsibilities, the recommendation is to hire staff anywhere from one year to one month before the building opens.

### Recruiting and Hiring Staff

Jeff Huskey, Director of Campus Recreation at Stephen F. Austin State University, offers this suggestion: “Work really hard with your administration to be able to bring any new professional staff or graduate assistants in early. We were lucky enough to bring our new staff in an entire year prior to opening. We were able to work on our departmental culture and to delegate many tasks by having this luxury. We have been able
to develop policies and procedures, to purchase equipment, to work with card services, to develop our student employee culture, and to form many relationships across campus this year. When it comes time to move in, we are just physically moving instead of having to recreate the entire wheel at the same time. While I was at another university, all of the new professional staff started in early July and we opened in late August. We were worrying about things like what color student staff shirts we were going to have while we should have been one hundred percent focused on the opening. It took us at least a year after opening to get out of the putting-out-fires mode just because we were so far behind to start with.”

**Training Staff**

Developing and implementing creative and innovative training and orientation programs, to help staff to learn how to operate and manage the new facility, will contribute to a safe and effective management. Tom Kirch, Director of Recreational Sports at Oregon State University, provides the following advice: “Plan and complete training of staff for operations, risk management, emergency drills, and so on. Be ready so users do not need to unlearn use patterns or behavior once established. That is to say, walk through the building and consider all situations in the training of staff. Better yet, visit other institutions and spend time observing their operations.”

The challenge for the owner and staff may be finding the time to learn how the building and the new systems and technologies operate before they are able to instruct and train others. There is usually only a small window of time between the move-in date and the day the building is scheduled to open. This and the pressure to open the building as soon as possible usually mean that there is not enough time to learn and understand the new systems and adequately train staff. A common solution to this dilemma is to have a soft opening. This is a period in which a new building, perhaps not yet fully complete and operational, is open for business for limited hours until the project is complete, or in this case until the staff is fully hired and trained.

**Updating Policies and Procedures**

In order for a facility to operate safely and efficiently, policies and procedures must be established. Involve the planning committee in the development of any new or updated policies and procedures to get their input and support.

To formulate sensible and practical policies, it is necessary to research policies used by others. Technology makes this an easy process. Visit Web sites of other institutions that have recently opened new recreational sports facilities and search for their facility policies and procedures to get ideas for fair and effective policies. Follow up with phone calls to other professionals to ensure that the changes in policies and procedures you are considering are actually working, are transferable to your situation, and will be effective in your setting. The following are some of the more common policies and procedures to review and consider updating for a new recreational sports facility:

- Access control
- Equipment checkout system
- Facility reservations
- Membership levels and fees
- Facility rentals
- Locker checkout
- Key control and distribution
- Cash handling
- Risk management

Use the various communication methods discussed earlier to inform users of the new policies and procedures. Educate participants about the justification and rationale for the changes in policies, and explain that the new policies are designed to better serve diverse recreational needs and provide a safe environment. At some point, the policies and procedures will need to be written and posted in the building and on the Web site so that they are easily accessible to all participants. This may be something to consider after the building has been open and operational for several months. Waiting will give you an opportunity to test and if necessary to modify the policies and procedures. It will also help you to identify policies that are commonly misunderstood or violated and are in need of being posted, as well as the most appropriate locations for posting policies. Policies and procedures that are problematic and need constant reminders or that are necessary for the safety of participants should be posted in strategic locations to provide good visibility and ensure that they are seen by everyone. In addition, all policies should be posted on the departmental Web site, and a hard copy should be put in a notebook at the front desk or control center to provide staff easy access when problem situations arise.
Owners, architects, and contractors agree that the weeks leading up to the move-in and opening of the new facility are perhaps the most tumultuous. Everyone is under tremendous pressure to get his or her job done, and the challenge is often that one person cannot begin a project until another project is completed by someone else. The matter is further complicated because of the number of projects in progress and the numbers of subcontractors and vendors involved. To make matters worse, there may be a two-headed monster overseeing the projects, with the construction manager coordinating the subcontractors and the owner overseeing workers who are installing the equipment and staff who are moving into offices. Matt McGregor, Director of Campus Recreation at Longwood University, has this advice: “It is important for owners to lead any of these processes when necessary. If you are not aware of what support is in place, make sure you find out. Will you get help with movers? Are there campus employees or contracted employees that can provide assistance? How do you surplus old equipment or supplies you are not taking?”

This stage of the project is one in which the owner must step in and demonstrate the necessary leadership, communication, organizational, and managerial skills to coordinate a fluid plan for including and involving all players in completing the project cooperatively. The following are some important tasks to do at this time:

- Determine the date construction will be complete.
- Schedule inspections.
- Schedule cleanup.
- Schedule equipment move.
- Schedule furniture move.
- Schedule office move.
- Schedule soft opening.

Determining Construction Completion Date

Obviously the dates for completion that were established in the beginning of the project may...
have changed over time due to poor weather conditions or other unanticipated delays. Approximately two months before the scheduled completion date is a crucial time to sit down with architects and contractors to determine exact dates to anticipate that construction will be complete and the owner will be able to occupy and open the building. “Nailing down a date for the move-in!” was the most difficult challenge for Joe Carter, Director of University Recreation at Appalachian State University, which recently opened the 120,000 square foot (SF) (11,150 m²) Student Recreation Center. “Setting delivery dates of equipment, finding storage solutions for equipment, keeping everyone on the same page for the move-in date, communication to staff, communication to the campus, and communication to the administration” were all identified as challenges for Carter and the staff at Appalachian State University.

First and foremost, the exact date of completion of construction must be determined. Perhaps more importantly, what the contractor and the owner can expect on that date must be clarified—exactly what will be in place and ready for operations and what will still need to take place before the building can be occupied and opened. Once the date for completion of construction has been determined, the move-in dates and plans for opening the facility can be scheduled accordingly.

**Inspections**

One of the most important steps in the completion of the construction process is the inspections that must take place before the building can be legally occupied and opened to the users. The essential document used to certify the legal use and occupancy of a building is called the Certificate of Occupancy, often referred to as the CO. A new building cannot be legally occupied until either a final or a temporary Certificate of Occupancy has been issued. A Temporary Certificate of Occupancy (TCO) documents that while the buildings department has determined that the building is safe to occupy, the approval is only temporary and is subject to expiration, usually 90 days after its date of issuance. The Certificate of Occupancy is issued when the completed work complies with the submitted plans and applicable laws, all paperwork is completed, all necessary approvals have been obtained from other appropriate city agencies, all fees owed to the department are paid, and all relevant violations have been resolved. The request for this document is typically initiated by the construction manager; the document is issued by the city or county department of buildings or development and describes how a building may be occupied.

The construction manager makes the necessary arrangements for inspectors to perform the required construction inspections. These commonly include the following:

- Elevator testing and inspection
- Fire alarm testing and inspection
- Egress lighting testing and inspection
- Plumbing inspection
- Electrical inspection
- Mechanical inspection

Because the building cannot be legally occupied without the Certificate of Occupancy, the failure to pass any one of the many inspections, or a delay in getting the inspection, can complicate and set back the move and the opening of a building. Sometimes a Temporary Certificate of Occupancy is issued for only the section of the building that has been inspected and approved as safe to occupy. For example, the building may have three major activity areas—a fitness center, a gymnasium, and a natatorium. The fitness center and gymnasium may pass inspection and receive a Temporary Certificate of Occupancy, which will allow these two areas to be opened and occupied while the natatorium remains closed until the contractor completes the necessary work to pass inspection and receive the final Certificate of Occupancy.

Before opening, the contractor, architect, and owner conduct an inspection to determine if the facility is complete and all work has been properly performed. Items observed to be incomplete, to require additional work, or not to be in compliance with the contract documents are included on a checklist known as the punch list. All punch list items must be corrected or completed prior to achievement of final completion of the project. Whenever possible, avoid moving into and occupying the building until all work has been completed and punch list work has been identified and completed. This allows the contractor the opportunity to finish all necessary work without interference and disruptions. See table 12.2 for a sample of a construction punch list.

**Scheduling**

Unfortunately, the reality is that the move often takes place while the subcontractors are completing...
Table 12.2  Sample Punch List

Date: 16 February 2010
(Revised) Project: Weinstein Center

An inspection to determine if the referenced facility was substantially complete was performed on the date indicated. The following items were observed to be incomplete, to require additional work, or not to be in compliance with the contract documents. All punch list items must be corrected or completed prior to achieving final completion of the project.

<table>
<thead>
<tr>
<th>Item no.</th>
<th>Room</th>
<th>Description</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Interior items</td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>1023</td>
<td>Remove plastic from lights.</td>
<td>□</td>
</tr>
<tr>
<td>2.</td>
<td>1023</td>
<td>Touch up paint on conduits.</td>
<td>□</td>
</tr>
<tr>
<td>3.</td>
<td>1023</td>
<td>Touch up paint door frame.</td>
<td>□</td>
</tr>
<tr>
<td>4.</td>
<td>1024</td>
<td>Repair solenoid valves.</td>
<td>□</td>
</tr>
<tr>
<td>5.</td>
<td>1024</td>
<td>Paint gas piping yellow.</td>
<td>□</td>
</tr>
<tr>
<td>6.</td>
<td>1025</td>
<td>Touch up wall paint.</td>
<td>□</td>
</tr>
<tr>
<td>7.</td>
<td>1025</td>
<td>Provide pipe escutcheon at ceiling.</td>
<td>□</td>
</tr>
<tr>
<td>8.</td>
<td>1025</td>
<td>Missing door silencer.</td>
<td>□</td>
</tr>
<tr>
<td>9.</td>
<td>1025</td>
<td>Adjust door closer.</td>
<td>□</td>
</tr>
<tr>
<td>10.</td>
<td>1025</td>
<td>Adjust lock cylinder.</td>
<td>□</td>
</tr>
<tr>
<td>11.</td>
<td>1026</td>
<td>Need ceiling outlet cover.</td>
<td>□</td>
</tr>
<tr>
<td>12.</td>
<td>1026</td>
<td>Touch up wall paint.</td>
<td>□</td>
</tr>
<tr>
<td>13.</td>
<td>1026</td>
<td>Clean faucet.</td>
<td>□</td>
</tr>
<tr>
<td>14.</td>
<td>1027</td>
<td>Touch up paint at fire extinguisher cabinet.</td>
<td>□</td>
</tr>
<tr>
<td>15.</td>
<td>1027</td>
<td>Door 1027B needs silencer.</td>
<td>□</td>
</tr>
<tr>
<td>16.</td>
<td>1029</td>
<td>Repair wall at corners of towel drop.</td>
<td>□</td>
</tr>
<tr>
<td>17.</td>
<td>1029</td>
<td>Paint counter support at towel drop.</td>
<td>□</td>
</tr>
<tr>
<td>18.</td>
<td>1029</td>
<td>Provide vinyl base at towel drop.</td>
<td>□</td>
</tr>
<tr>
<td>19.</td>
<td>1029</td>
<td>Locker doors 1, 2, 3, 34, 81 do not lock.</td>
<td>□</td>
</tr>
<tr>
<td>20.</td>
<td>1029</td>
<td>Adjust locker doors 5, 7, 8, 44, 47, 67, and 99.</td>
<td>□</td>
</tr>
<tr>
<td>21.</td>
<td>1030</td>
<td>Door handles loose.</td>
<td>□</td>
</tr>
<tr>
<td>22.</td>
<td>1030</td>
<td>Paint sauna circuit breaker cover plate and replace screws.</td>
<td>□</td>
</tr>
<tr>
<td>23.</td>
<td>1031</td>
<td>End stall pilaster too short—replace.</td>
<td>□</td>
</tr>
<tr>
<td>24.</td>
<td>1032</td>
<td>Light fixture trim missing.</td>
<td>□</td>
</tr>
<tr>
<td>25.</td>
<td>1032</td>
<td>Remove paint from wall tile.</td>
<td>□</td>
</tr>
<tr>
<td>26.</td>
<td>1033</td>
<td>Access panel under vanity missing.</td>
<td>□</td>
</tr>
<tr>
<td>27.</td>
<td>1034</td>
<td>Door 1034A: incorrect deadbolt function.</td>
<td>□</td>
</tr>
<tr>
<td>28.</td>
<td>1034</td>
<td>Repair vinyl base at door 1034.</td>
<td>□</td>
</tr>
<tr>
<td>29.</td>
<td>1034</td>
<td>Repair buckle in carpet below swimsuit water extractor.</td>
<td>□</td>
</tr>
<tr>
<td>30.</td>
<td>1034</td>
<td>Paint sauna circuit breaker cover plate.</td>
<td>□</td>
</tr>
<tr>
<td>31.</td>
<td>1034</td>
<td>Clean return air grille.</td>
<td>□</td>
</tr>
<tr>
<td>32.</td>
<td>1034</td>
<td>Paint edge of acoustical tile above door to sauna.</td>
<td>□</td>
</tr>
</tbody>
</table>
their work and before the Certificate of Occupancy has been obtained. This happens because everyone is under tremendous pressure to complete the project and open the building.

William Gillespie, with Taylor & Parrish Construction, the general contractor on the University of Richmond’s recent $13.5 million Weinstein Center for Recreation and Wellness project, provides this advice to recreational professionals: “Always be flexible enough to have options, plan for things not to go according to the first plan.” The key is to have a schedule and a plan but to expect it to change. With numerous players and variables involved, something is bound to go wrong that can interrupt the plans. Have a plan that is flexible, and do not allow one or two disruptions to derail and delay the entire plan.

For planning purposes, assume that the final stages of construction and the move will occur simultaneously, and coordinate the move-in schedule around these final construction projects, earmarking dates for projects to be completed and moves to be scheduled. Obviously this must all be carefully timed with the delivery schedule for the furniture and equipment and also communicated and coordinated with the contractors, subcontractors, and movers. A schedule might look something like this:

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 11</td>
<td>Floor installation complete 2nd level fitness center</td>
</tr>
<tr>
<td></td>
<td>Fitness equipment installation begins 2nd level fitness center</td>
</tr>
<tr>
<td>December 18</td>
<td>Carpet installation complete 1st level fitness center</td>
</tr>
<tr>
<td></td>
<td>Carpet installation complete 2nd level fitness center</td>
</tr>
<tr>
<td></td>
<td>Fitness equipment installation begins 1st level fitness center</td>
</tr>
<tr>
<td></td>
<td>Fitness equipment installation continues 2nd level fitness center</td>
</tr>
<tr>
<td>December 20</td>
<td>Carpet installation complete 1st level offices</td>
</tr>
<tr>
<td></td>
<td>Carpet installation complete 2nd level offices</td>
</tr>
<tr>
<td></td>
<td>Office furniture installation begins 1st level offices</td>
</tr>
<tr>
<td></td>
<td>Office furniture installation begins 2nd level offices</td>
</tr>
<tr>
<td>January 2</td>
<td>Staff office moves begin</td>
</tr>
<tr>
<td>January 8</td>
<td>Facility opens for business</td>
</tr>
<tr>
<td>March 1</td>
<td>Facility dedication</td>
</tr>
</tbody>
</table>

**Cleaning**

Cleaning is another task that cannot be overlooked and needs to be scheduled and completed before people move in and occupy the building. Throughout the project, the contractor has a responsibility to maintain the site, keeping conditions clean and orderly and periodically removing waste materials, debris, and rubbish from the site and disposing of them off-site. In addition, the construction documents may include the following stipulations for final cleaning:

- Clean interior and exterior glass
- Clean equipment and fixtures to sanitary condition
- Remove temporary labels, stains, and foreign substances
- Polish transparent and glossy surfaces
- Vacuum carpeted and soft surfaces
- Replace filters of operating equipment
- Clean site, sweep paved areas, rake landscaped surfaces clean
- Remove waste and surplus materials

Construction final cleaning may not completely satisfy the expectations of the owner or recreational professional. Therefore, a recommendation is to make the necessary arrangements with in-house custodians or housekeeping staff to provide a thorough cleaning and scrubbing before the move into the new facility.

**Equipment, Furniture, and Office Moves**

After months of planning and preparation and maybe a few unexpected delays, it is finally time to move equipment, furniture, and staff into the new facility. The move is often coordinated by the owner and contracted out to professional movers. Most likely, the most arduous and cumbersome task will be moving the fitness equipment. Have a staff person who is responsible for equipment purchases work with your equipment vendors to design and develop a detailed drawing of the floor plans and recommended locations for equipment. Whenever possible, include delivery and installation of equipment on the purchase order and pay the vendor to complete this work. If necessary, ask the equipment vendor to help identify local professionals who can be hired to unpack, move, install, and clean the fitness equipment. Do not underestimate the time and expertise essential
for this massive and exhausting task. This is a responsibility that can be coordinated by the owner and staff but should not be carried out without professional input and assistance.

Equipment delivery dates are very irregular and unreliable, forcing the owner and operator to err on the side of caution and have equipment delivered early. This will avoid any delays that may result in equipment's not being delivered and installed when the building is scheduled to open. Again, carefully coordinate scheduled delivery dates and installations with your equipment vendors, and ask for their patience and cooperation if dates need to be changed or delayed. You should also have a backup plan so that storage is available for any equipment delivered unexpectedly or before the move is approved. Options for storage include space available in temporary facilities, an equipment vendor's storage location, rental of portable storage units or tractor trailers, or a space in the new facility that can be identified for storage. Chances are good that some delay or an unexpected untimely delivery will necessitate immediate equipment storage.

Another complex hurdle relating to the equipment move arises when fitness equipment needs to be transferred from a temporary fitness facility into the new facility after it is open; it is important for this to occur without disrupting facility and program schedules and upsetting users. In many circumstances these kinds of disruptions are unavoidable. When the time comes for the equipment to be transferred into the new facility, it is best to look for a window of opportunity that will not adversely affect programs and facility schedules. Once again, the key is good communication. Make every effort to inform users early, helping them to understand that along with these short-term delays and inconveniences there will be many long-term benefits.

The delivery and installation of the furniture should be one of the last activities scheduled before staff move into their offices. This will keep furniture out of the way of contractors as they complete last-minute projects and also keep them from using pieces of furniture for step ladders or as lounge furniture during lunch breaks. The delivery and installation of furniture is generally the responsibility of interior designers contracted by the owners or the architects. The interior designers will coordinate with vendors, much as the owner will with equipment vendors, to design floor plans that lay out the furniture, schedule delivery dates, and if necessary make arrangements for storage and hire professionals to move and install the furniture.

The final and perhaps the most gratifying part of the move is when the staff members make the move into their new offices. Unless the staff are prepared to work wearing hard hats, this is one phase of the move that cannot be completed until at least a Temporary Certificate of Occupancy has been approved. Once again, it may be difficult to determine and nail down the exact date for this final move, which is not good for the morale of an overworked and exhausted staff. Anticipate a delay and provide staff ongoing communication and updates on the progress of the inspections, asking for their patience and cooperation. When the day arrives to move staff out of their cramped and crowded temporary “offices” and into the new building, there is good reason to celebrate. Find a way to take time out during this stressful period and bring the staff together to celebrate this important occasion and recognize their many contributions that have led to this day.

**Soft Opening**

Under ideal conditions, the move into a new recreational sports facility would be trouble free provided that the construction was on schedule, that the inspections were all completed on time, and that all equipment and furniture deliveries arrived on schedule. Unfortunately, that is not how it typically happens, and the shrewd owner will have a contingency plan and be prepared to change it. Andrew McBride, an experienced architect who has been involved in numerous construction projects, provides these words of wisdom for owners preparing to move into a new facility: “Keep all of the different crews from getting in each other’s way. As deadlines approach, the construction trades are frantically trying to complete work and hopefully fix punch list items at the same time the owner is trying to move in furniture and equipment along with dressing the place up for opening day.”

It’s common and prudent to have soft openings or open houses prior to the formal dedication and grand opening. This allows for any unexpected delays in opening and will give staff time to settle in, work out any kinks, and get comfortable with the operations of the new facility and equipment. Soft openings and open houses can last for days or weeks and may include special events and activities for the users and community. An informal opening is also one of the best ways to raise awareness, bring visibility to the project,
and bring people into the new facility. These first visitors can be your best form of advertisement, spreading the word about your business to everyone they know.

DEDICATION

The dedication and grand opening is an opportunity to express thanks and appreciation to the many individuals who participated in the project and to recognize any significant donors. The formal dedication ceremony, often by invitation only, includes individuals directly involved in the planning and construction of the building as well as dignitaries and significant benefactors of the project. The grand opening is often a more inclusive event, open to the public, that celebrates the first time the building is fully open and operational. The dedication can be scheduled to coincide with the grand opening celebration or can be scheduled before or after the grand opening of the building.

Begin the planning early and consider these steps as part of the planning process:

- Form a planning committee.
- Determine date.
- Decide on ceremony.
- Develop guest list.
- Develop program.
- Invite media.

Planning Committee

When asked what advice he has for other owners preparing for the dedication and grand opening of a new recreational sports facility, Tom Kirch, Director of Recreational Sports at Oregon State University and the Dixon Recreation Center, suggested “forming a planning committee and letting them implement the plan. The director will be busy completing the project and then on the day of the dedication will be busy meeting and greeting visitors.” An inclusive and comprehensive committee should be created to plan the dedication and grand opening ceremonies. The president’s office or another department responsible for planning large special events may want to take the lead or to be included and involved in this committee. Most universities have a protocol that needs to be followed when they are hosting events of this magnitude that include the media and special guests.

Dedication Date

One of the first items on the agenda for the planning committee is to determine a date for the dedication ceremony. For planning purposes, they should select the date six months to a year ahead of time. They will need to choose the date for the dedication and grand opening carefully, as it must be close enough to the scheduled completion that the event can still be viewed as a grand opening celebration but not so close that the construction is not complete and a full Certificate of Occupancy has not been approved. That can be an embarrassment and a disaster! Therefore, consult with the architects and contractors and err on the side of caution: Allow several months between the scheduled completion date and the dedication and grand opening date. It often seems that no matter how much time is allowed, the finishing touches are still being made during the final weeks, days, and hours before the dedication and grand opening. Keep this in mind, and don’t let the little things ruin this very important day when your focus and concentration should be on entertaining the guests attending the ceremony.

Guest List

Once a date has been determined, a guest list must be developed. The guest list will vary according to the type of ceremony and program. Eric Huth, Director of Campus Recreation at San Diego State

The dedication is an opportunity to give thanks and appreciation to the many individuals who participated in the project.

Photo courtesy of The University of Richmond.
University, talked about the dedication and grand opening ceremony as an opportunity to invite and thank the people who participated in the project: “We invited all supporters that participated in the successful referendum that funded the construction bond to come back to campus and enjoy the fruits of their hard work too.” These are some suggestions for the guest list:

- **Users:** All users should be welcome and invited to attend larger grand opening ceremonies. Smaller, more private, and less inclusive dedication ceremonies may involve only users who hold leadership or volunteer positions within the organization.

- **Staff:** All full-time and part-time staff.

- **Administrators:** Past and present administrators who have contributed to the success of project.

- **Dignitaries:** Board of trustees members and politicians.

- **Benefactors:** Donors and their immediate family members.

- **Architects, contractors, subcontractors, and vendors:** Outside personnel who have contributed to the success of the project.

- **Professional colleagues:** It’s common to invite recreational professionals and staff at other local and regional recreational sports facilities and related organizations.

As memorable and exciting as the dedication and grand opening ceremony can be, it can also be a disappointment for some of the staff who have worked hard and have not received deserved recognition. They may feel slighted that the event is more about the nonparticipants. Jeff Huskey, Director of Campus Recreation at Stephen F. Austin State University, has these words for people who might be in this group: “Have a thick skin. Realize that others are going to get a lot of the recognition during the opening ceremony who probably didn’t spend anywhere near the amount of blood, sweat, and tears that you did on getting this facility ready.” Consider having a private grand opening for the staff and their families prior to the actual grand opening. Use this as an opportunity to properly recognize and reward the recreational sports staff themselves for their involvement and participation in the process, and thank the others for the sacrifices they must have made as their family member spent extra hours at work completing the project.

**Developing Ideas for the Ceremony**

There are many dedication and grand opening ideas and themes that you can incorporate into your ceremony. Great dedication and grand opening ideas can make your event more exciting and appealing. Find a unique approach so that your ceremony differs from similar events. A vibrant dedication and grand opening celebration will attract attention and will make a good and lasting impression. Much of this will be determined by the budget available and the source of funds. Find out how much is available from operational budgets and, if necessary, consider asking vendors to sponsor and donate funding or in-kind gifts appropriately.

Visual effects will make your dedication and grand opening memorable. One of the more exciting visual and auditory effects can be achieved with confetti or streamers. Confetti and streamer cannons are low-cost items that create a spectacle and are sure to please the crowd. The decorations should be bright and festive and should match the theme of the ceremony. Adding balloons will help create a party-type atmosphere. Balloons can fill up those empty spaces or call attention to a special location you want everyone to notice. Plan to maximize your visibility with high-flying cloud buster balloons, banners, and pennant streamers. Have giveaway items that represent the facility and programs and that include university and departmental logos. These are examples of popular giveaway items:

- Gym bags
- Water bottles
- T-shirts
- Hats
- Tote bags
- Jump ropes
- Stretch bands

Another important consideration when you are planning the ceremony and the theme is food and beverages. These will vary depending on the type of ceremony and the amount budgeted. It is not necessary to have food and beverages, but they do enhance the celebration and will likely increase attendance.

**Program**

The dedication and grand opening program typically includes some brief formal remarks from
owners, dignitaries, and benefactors, followed by events that will highlight the facility and programs. Decide in advance on the role each speaker will have in the program, and ask the speakers to prepare their remarks accordingly to ensure that everyone who needs to be thanked and recognized is acknowledged. Ask speakers to send a written draft of their remarks in advance of the event so that the content can be reviewed; you want to ensure that speakers are fulfilling their role and not duplicating what others say. The written draft will also provide assurance that the speaker is staying within the time allotted (and that the remarks are politically correct and will not offend anyone).

This following speech was made at a grand opening dedication by Tom Roberts, Director of Recreation and Wellness at the University of Richmond. Tom was asked to talk about the new recreational sports facility and expanded programs and how they would benefit the campus community.

“It is an honor to be here tonight to celebrate the opening of the Weinstein Center for Recreation and Wellness. The University of Richmond has opened and dedicated residence halls, academic buildings, and athletic facilities. This is a first for celebrating the opening of a recreation and wellness center! The opening of the Weinstein Center communicates clearly that the University of Richmond is as committed to the health and wellness of our students as we are to their intellectual development. To attend class, students need to be healthy and able to perform at their best. Tonight is all about the students! Tonight you are going to see and experience what goes on in this facility 18 hours a day, seven days a week. Do not be fooled by what you see tonight. This facility and these programs are much more than funs and games. These are meaningful and purposeful programs in alignment with the mission of the university. Immediately after the grand opening ceremony we will be starting our women’s intramural basketball playoffs. Intramural sports provide competitive activities, promote teamwork, and help students find a connection—connections that are a major determinant of student satisfaction and retention. Perhaps you arrived early and observed the belly dance class, or later tonight you plan to participate in the yoga or martial arts classes! Group exercise classes promote physical fitness, relieve stress, and help students with their emotional and psychological well being. We have 24 active sport clubs, and tonight some of them will be having demonstrations, practices, and competitions. Sport clubs involve students in the administration of an organization and encourage leadership and responsibility. Look around tonight and you will notice a melting pot of diversity where students can recreate and socialize on a common ground in the absence of racial and economic barriers. Judging from the reactions of prospective students touring the facility, the Weinstein Center has already had an impact on recruitment of new students and their parents. There is not time for me thank and recognize everyone that has contributed to this project, but I do want to take this opportunity to thank our Recreation and Wellness staff and ask them to please stand and be recognized. I would now like to like to introduce our next speaker, the university chancellor.”

Develop a detailed script that outlines everyone’s role and provides a schedule of events. This will remind the speakers of the time that has been allocated for their remarks and help everyone stay on schedule. The following is an example of a grand opening program schedule and plan:

5:30 p.m. — Program begins with sport club council president, who will welcome everyone and thank the generous benefactors on behalf of the student body. She will then present the benefactors with their gifts. She will then introduce the director of Recreation and Wellness.

5:35 p.m. — Director of Recreation and Wellness offers remarks about the new building and expanded programs and how these will benefit the campus community. He then introduces the university chancellor.

5:40 p.m. — University chancellor offers brief remarks about the project and the fast track to complete it. He also acknowledges the Recreation and Wellness staff and the architects and contractors. He then introduces the university president.

5:40 p.m. — University president offers brief remarks about the impact the facility has had on the university and how grateful the university is for the generosity of the benefactors. He then introduces the benefactors and their families and asks them to come forward. He
Campus Recreational Sports Facilities offers the podium to the benefactors for brief remarks. He concludes his remarks by shooting a starting gun, and confetti cannons go off, showering everyone with confetti.

5:52 p.m. — The president invites everyone to enjoy the food and special events and explore the magnificent facility.

Before and after the formal ceremony, consider scheduling events and programs that will highlight activities occurring daily in the facility. These special events can also be an excellent way to showcase programs and recognize the staff. Ideas include the following:

- Facility tours
- Equipment demonstrations
- Fitness classes and clinics
- Chair massages
- Fitness and wellness assessments
- Club and organization demonstrations and competitions
- Competitive events

Another program idea is to invite a local celebrity or professional athlete to attend and to be a general speaker at the ceremony, or perhaps give a performance. This is another effective strategy for generating interest and increasing attendance.

Inviting Media

It’s a good idea to invite the media and enlist their help in letting the community know that you’re open for business. Take this a step further and schedule a media day several days or a week before the grand opening. Provide the media private tours for photo opportunities, and give them media packages that include facts and figures about the facilities and programs. This will help generate additional visibility and excitement about the upcoming grand opening.

SUMMARY

The dedication and grand opening ceremony represents the culmination of a very long journey and the beginning of the next phase, the administration and operations of the building. Owners and staff know and understand that the work does not end with the opening of a facility. In fact, the work is just beginning. “Don’t assume that the hard work is over after you move in. It will take at least six months to a year to get all the bugs worked out and everything working perfectly. There is a good chance that the roof will leak, an elevator won’t work right, a fire alarm will go off for no reason, etc. . . . after you move in,” says Jeff Huskey, Director of Campus Recreation at Stephen F. Austin State University.

Do not underestimate the impact that opening a new recreational sports facility will have on the users and community. Suddenly the recreation facilities and programs are the focus of attention. Anticipate and be prepared for the following to happen in the aftermath of opening a new facility:

- Increase in memberships
- Increase in requests from nonmembers for memberships
- Increase in positive feedback from members
- Increase in criticism from members
- Increase in demand for more operational hours and equipment
- Increase in facility requests
- Increase in facility rentals
- Increase in requests to collaborate
- Increase in visitors
- Visits from staff at other universities
- Visits from dignitaries requesting tours
- Visits and phone calls from media requesting information and interviews

The wise owner anticipates being center stage and seizes the opportunity to shine and to highlight the magnificent facilities and programs. Enjoy the visibility and seek out the awards and recognition. Host socials and special events, invite the press, and welcome the media attention. Work cooperatively with the architects who have been on the project to take professional photographs of the facility so that you can produce a high-quality brochure. The photographs and literature will provide a valuable historical record of the new facility and can also be helpful in applications for architectural and facility design awards and recognition.

Just about the time this incredible journey begins to come to an end, there will be a phase two or another new project will begin. This time the ride will be a little less tumultuous and the road a little more familiar.
DEFINITION OF TERMS

Certificate of Occupancy—A document that certifies the legal use or occupancy (or both) of a building. If planned construction will create a new building or will result in a change of use, egress, or occupancy for an existing building, a new or amended Certificate of Occupancy is necessary.

punch list—A checklist derived from an inspection to determine if the facility is complete and all work has been properly performed on the date indicated. Items observed to be incomplete, to require additional work, or not to be in compliance with the contract documents are included. All punch list items must be corrected or completed prior to achieving final completion of the project.

soft opening—A period of time when a new building, which may not be fully complete, is open for business but has not opened formally.

Temporary Certificate of Occupancy—A document certifying that while the buildings department has determined the building to be safe to occupy, the approval is only temporary and is subject to expiration, usually 90 days after its date of issuance.
Appendix
Standards for Indoor and Outdoor Courts and Facilities

Many sport organizations update their rule books every year. Therefore, specific Web sites for field or court dimensions could change annually. The Web site for the national governing body (NGB) of each sport is listed here along with instructions on finding the most current dimensions for each sport. To easily access all the sites on the Web, go to http://nirsa.humankinetics.com/CampusRecreationalSportsFacilities/.

**INDOOR COURTS AND FACILITIES**

**Badminton (Badminton World Federation)**
www.internationalbadminton.org/statues.asp
Click on Laws of Badminton. Law 1 includes court dimensions and a diagram.

**Basketball (NCAA)**
www.ncaa.org/wps/portal
Go to Winter Sports (men's and women's court dimensions are the same, so choose men's). Click on Rules and Officiating Web Page. Click on Download Rules Book. Rule 1 includes the court dimensions.

**Basketball (NFHS)**
www.nfhs.org
Under Sports, click on Basketball. Click on Basketball Court Diagram.pdf.

**Handball (US Handball Association)**
www.ushandball.org/content/view/50/128/#twoone

**Ice hockey (NCAA)**
www.ncaa.org/wps/portal
Go to Winter Sports (men's and women's rink dimensions are the same, so choose men's). Click on Rules and Officiating Web Page. Click on Download Rules Book. Rule 1 includes rink dimensions.

**Indoor soccer (US Indoor Soccer Association)**
www.usindoor.com
Click on Rules. Rule 1 includes indoor field dimensions.

**Racquetball (USA Racquetball)**
http://usra.org
Click on Rulebook and select Court Specification.

**Squash (US Squash)**
www.ussquash.com/audiences/content.aspx?id=894
Court specifications for world singles and doubles and North American doubles.

**Swimming and diving**
www.ncaa.org/wps/portal
Go to Winter Sports (men's and women's pool dimensions are the same, so choose men's). Click on Rules and Officiating Web Page. Click on Download Rules Book. Rule 1 includes pool dimensions.

**Volleyball (NFHS)**
www.nfhs.org
Under Sports, click on Volleyball. Click on Volleyball Court Diagram.pdf.

**Volleyball (USAV)**
www.usavolleyball.org/content/index/405
Click on the most recent version of the USA Volleyball Domestic Competition Regulations. Chapter 1, rule 1 includes court dimensions and playing area.
OUTDOOR FIELDS AND COURTS

Baseball (NCAA)
www.ncaa.org/wps/portal
Go to Spring sports. Choose baseball. Click on Rules and Officiating Web Page. Click on Download Rules Book. Rule 1 includes field dimensions.

Baseball (NFHS)
www.nfhs.org
Under Sports, click on Baseball. Click on Baseball field diagram pdf.

Beach volleyball (FIVB: Fédération Internationale de Volleyball)
www.fivb.ch/EN/BeachVolleyball/Rules/rules.htm
Click on the most recent version of Official Beach Volleyball Rules. Chapter 1 includes court dimensions.

Bocce ball (USBF: United States Bocce Federation)
www.bocce.com/boccecourt.htm

Field hockey (NFHS)
www.nfhs.org
Under Sports, click on Field Hockey. Click on Field Hockey Field Diagram pdf.

Field hockey (USA Field Hockey)
www.usfieldhockey.com
Click on Rules of Field Hockey. Click on Field of Play.

Flag football (NIRSA)

Lacrosse (NCAA)
www.ncaa.org/wps/portal
Go to Spring Sports (men's and women's field dimensions are different, so you'll need to select both). Click on Rules and Officiating Web Page. Click on Download Rules Book. Rule 1 includes the field dimensions.

Lacrosse (US Lacrosse)
www.uslacrosse.org/the_sport/rules.phtml
Click on the appropriate category of rules: men's rules, women's rules, boys' rules, girls' rules.

Rugby (International Rugby Board)
www.irb.com/lawregulations/laws/index.html
Select Law 01 in English to find field dimensions.

Soccer (FIFA: Fédération Internationale de Football Association)
www.fifa.com/flash/lotg/football/en/Laws1_01.htm

Soccer (NCAA)
www.ncaa.org/wps/portal
Go to Fall Sports (men's and women's field dimensions are the same, so choose men's). Click on Rules and Officiating Page. Click on Download Rules Book. Rule 1 includes field dimensions.

Soccer (NFHS)
www.nfhs.org
Under Sports, click on Soccer. Click on Soccer Field Diagram pdf.

Softball (NCAA)
www.ncaa.org/wps/portal
Go to Spring Sports. Choose Softball. Click on Rules and Officiating Web Page. Click on Download Rules Book. Rule 1 includes field dimensions.

Softball (NFHS)
www.nfhs.org
Under Sports, click on Softball. Click on Softball Field Diagram pdf.

Softball (NIRSA)

Tennis (ASBA: American Sports Builders Association)
http://sportsbuilders.org/page.php?id=17&from%5B%5D=28&

Track and field (ASBA: American Sports Builders Association)
http://sportsbuilders.org/page.php?id=21&from%5B%5D=28&

Ultimate disc (Ultimate Players Association)
www.upa.org
See Playing Field in the current rule book. Click on About Ultimate. Click on Rules. Click on most recent version of the rule book. Section III includes the field dimensions.
Glossary

ADA—Americans with Disabilities Act (see chapter 8).

advancement—Solicitation of financial support (see chapter 4).

A/E or AE—Architectural and engineering (see chapter 5).

AFO—Aquatic Facility Operator (see chapter 8).

AGC—Associated General Contractors of America, online at www.agc.org (see chapter 11).

AIA documents—Documents, prepared by the American Institute of Architects, that bring nationwide consistency and predictability to the construction process and can easily be modified to accommodate individual project demands. These documents can be obtained by an architect (see chapter 5).

American Institute of Architects (AIA)—The professional organization for architects. In order to be a member, an architect must be licensed or registered in at least one state in the United States. Not all registered architects elect to become American Institute of Architects members. For more information, visit www.aia.org (see chapters 5 and 11).

architect—A professional engaged in designing buildings, open areas, communities, and other constructions and environments. The individual is licensed to practice the architectural profession in a state. Architects are licensed by states and not nationally (see chapters 2 and 5).

arête—A sharp V-shaped fin, ridge, or prow on a climb (see chapter 9).

ASID—American Society of Interior Designers (see chapter 5).

athletic center—An exercise and fitness facility intended for the use of the school's intercollegiate athletes and coaching staff of varsity sports teams (see chapter 3).

auto-belay—A device attached to the top of or behind the wall that eliminates the need for a belay partner (see chapter 9).

basic services—Defined by American Institute of Architects documents as schematic design, design development, contract documents, bidding and negotiating, and construction administration. An architect can offer a wide variety of other services as well, which may be considered additional services under the American Institute of Architects agreements (see chapter 5).

BCA—Building Commissioning Association, online at www.bcxa.org/ (see chapter 11).

belayer—The person who takes in or pays out rope for an ascending or descending climber. “Belay” is the system and process by which this is done (see chapter 9).

benchmarking—The process of collecting data not only to find out what peer institutions are doing in terms of staffing, salaries, programs, and facilities, but also to help define the marketplace and provide important information relative to financial and space parameters or expectations for a project. It is a standard or reference by which others can be measured or judged (see chapters 1 and 2).

bid documents—Construction documents ready for the price bidding process used in selecting the contractor to build the aquatic facility (see chapter 8).

bid package—A package of product specifications usually based on one manufacturer. There are multiple bid packages when several manufacturers are used (see chapter 10).

bidding documents—The contract documents, including any addenda issued prior to receipt of bids (see chapter 5).

bonding—Selling bonds to help finance a construction project (see chapter 4).

bouldering—Unroped climbing, usually on the lower portion of a wall, rock face, or boulder (see chapter 9).

built form—Any building, structure, or landscape created or modified by the actions of humans. The term is often used interchangeably with the term “built environment” (see chapter 1).

campus master plan—A plan of a campus showing proposed physical changes to buildings and grounds. The changes are in response to a college or university’s strategic plan or budget.
cycle. Changes are usually projected in time frames such as 5 years, 10 years, or 20 years (see chapter 2).

capital campaign feasibility study—Study conducted by the university to determine potential donors' level of wealth and the potential to receive donations from them (see chapter 4).

capital improvement program—Program in which new facilities are constructed or existing facilities are renovated, expanded, or both (see chapter 4).

case statement—A detailed statement of why a facility is needed, where it should be located, and the types of spaces it will contain (see chapter 4).

CDC—Centers for Disease Control and Prevention (see chapter 8).

Certificate of Occupancy—A document that certifies the legal use or occupancy (or both) of a building. If planned construction will create a new building or will result in a change of use, egress, or occupancy for an existing building, a new or amended Certificate of Occupancy is necessary (see chapter 12).

challenge grant—Funding in which a donor promises to give a certain amount of money if the institution can raise an equal amount from other sources (see chapter 4).

chloramines—Off-gassing of chlorine that leads to the strong smell in natatoria, causing irritated eyes and lungs and a poor guest and staff experience (see chapter 8).

chlorine—Highly effective and relatively inexpensive but hazardous chemical treatment of pool water with a delivery system that is easy to install, monitor, and eject into the pool water (see chapter 8).

CIP—Cast-in-place concrete (see chapter 8).

CMAA—Construction Management Association of America, online at www.cmaanet.org (see chapter 11).

CMU—Concrete modular unit, often used in natatoria for acoustics (see chapter 8).

competition pool—A swimming contest tank that must be 25 yd by six lanes (45 ft or 13.7 m) for short-course events and 50 m by eight lanes (25 yd or m) for long-course events (see chapter 8).

computer model—A three-dimensional drawing created on a computer using a software package designed for this purpose (see chapter 5).

conceptual design—A building and site design generated during a feasibility study. It is conceptual and is the first response to the owner's program as well as the constraints and opportunities of a specific site (see chapter 2).

conceptual design phase—Initial design phase for a project. Products of this phase include a preliminary construction cost estimate for the project as well as a rendering, or picture, of how the facility will look on the site (see chapter 4).

conceptual drawings—One-dimensional layout of the spaces required by the major programming elements, the adjacencies, and necessary support spaces (see chapter 8).

constructability—The ease with which a particular design can be built. To determine constructability one considers such factors as the sequence in which materials will be put in place, the locations of cranes for lifting and the distances of the reach, and the type of weather anticipated during various phases of construction (see chapter 5).

construction administration—The duties and responsibilities of the architect during the construction phase. It is the phase in which the design team observes the contractor completing the work to make certain that installations are meeting the intent of the design (see chapters 5 and 8).

construction budget—The cost of actual construction or the amount of money paid to the contractor for the building; does not include architectural fees, contingencies, and so on (see chapter 5).

construction documents—Documents, drawn up following approval of the design drawings and outline specifications, that provide detailed drawings and specifications to be used by the contractor during construction (see chapter 8).

construction management—As defined by the Construction Management Association of America (CMAA), "a professional service that applies effective management techniques to the planning, design, and construction of a project from inception to completion for the purpose of controlling time, cost, and quality" (see chapter 11).

construction management at risk—Delivery method in which the construction manager holds the contracts for all (or a portion of the subcontractors and therefore assumes the risk
for construction performance in terms of both delivery and quality (see chapter 11).

c **construction manager** (CM)—The party who delivers a project as designed and accepted by the owner. The CM represents the owner and integrates the needs of both the owner and the designer of a project by providing management services and expertise including, but not limited to, design, engineering, constructability, cost, scheduling, phasing, and assessing the project's effects on the surrounding community (see chapter 11).

c **construction phase**—The building period; commences once a successful bidder is selected and under contract (see chapter 8).

c **contingency**—In project planning, a budget amount for project costs not yet known because of the early phase of design, usually measured as a percentage of an estimate of construction cost (see chapter 2).

c **contract documents**—The contract between the owner and contractor, including requirements for the construction of the project: conditions of the contract (general, supplementary, and other conditions), drawings, specifications, and addenda issued prior to execution of the contract (see chapter 5).

c **CPO**—Certified Pool Operator (see chapter 8).

c **CPR**—Certified Cardiopulmonary Resuscitation (see chapter 8).

c **crack**—A split feature on a wall or climb, generally described by its size in relation to the fingers or hand, for example finger crack, hand crack, fingertip crack, fist crack (see chapter 9).

c **critical path method** (CPM)—A schedule for both design and construction phases of the project, including milestone dates for the owner, designer, and construction manager. Milestone activities include design documents completion, permit applications, reviews and approvals, cost estimates, value engineering reviews, and design and constructability review sessions (see chapter 11).

c **DE**—Diatomaceous earth, a filtering medium using a powdery exoskeletal material that is applied to filter leaves or hollow filaments connected to septa or main headers, which join together to discharge the water out of the tank (see chapter 8).

c **debonding**—A breakdown of the adhesive holding together building materials, also known as delamination (see chapter 11).

c **demographic**—University student, faculty, staff, and alumni population characteristics. Important data points for recreation planning include student population distributions by age, class, place of current residence, permanent residence, school division, and financial aid. For employees, population distributions are provided for age, employment classification, and zip code. Alumni demographics include year of graduation and current mailing zip code (see chapter 6).

c **design**—The act or process of planning a building, open area, community, or other construction to satisfy an owner's requirements as defined by a program and a budget (see chapter 2).

c **design-build**—A project management approach with a single point of contact and single contractual source, as well as the need to meet an aggressive schedule for project completion (see chapter 11).

c **design/build/finance/leaseback**—An agreement wherein a developer provides financing, project management (which would include design and construction management for project requirements), and various degrees of ownership and perhaps leaseback opportunities. This approach is appealing to owners faced with managing projects on tight budgets and short time frames (see chapter 11).

c **design development**—The phase that commences after the schematic design has been approved; the design development documents include all confirmed basic design decisions with preliminary design drawings and outline specifications, which describe specific systems (see chapter 8).

c **design development documents**—Drawings and other documents that fix and describe the size and character of the entire project regarding architectural, structural, mechanical, and electrical systems; materials; and such other elements as appropriate (see chapter 5).

c **design guidelines**—Guidelines established for projects across the campus to ensure a consistency of built form and open space relationships. The guidelines address heritage buildings, the built form, and open spaces, especially historic landscapes, and they combine with the precinct plan concepts to form the basis for future preparation of precinct plans for each area of the campus (see chapter 1).

c **designer**—The architect or A/E. The architect and the firm's design-engineering consultants
compose the design team, which has several areas of responsibility, including translation of the owner's requirements into drawings and specifications to be used for construction (see chapter 11).

detailed space requirements—The portion of the program of architectural requirements that provides the technical data for each space to be included within the building. The descriptions should include the function, location, occupancy dimensions, and specific architectural and engineering requirements for each space (see chapter 6).

detailing—Drawings that show how materials and geometry come together and instruct the contractor how to build particular junctures in a building (see chapter 5).

development—Solicitation of financial support (see chapter 4).

drop shipping—The shipping of furniture or equipment directly to a facility from the factory. In drop shipping, the truck driver does not unload the truck (see chapter 10).

efficiency factor—The ratio of net assignable area to gross building area, the latter of which consists of net assignable area plus primary and secondary circulation space, mechanical areas, structural elements, and other non-occupiable spaces such as walls and janitorial closets (see chapter 6).

engineer—A professional engaged in designing building or environmental systems; in building design, in collaboration with an architect (see chapter 2).

exurban—Rural areas outside of the major metropolitan areas, often land that is still in agricultural use (see chapter 3).

facilities plan—A highly defined (detailed) single-purpose document for land development or the planning, scheduling, and predesign for buildings or other facilities. This effort, however, is directed by the principles, policies, and guidelines in the campus master plan (see chapter 1).

fall protection—A safety measure that may consist of a variety of protective systems, including, but not limited to, guardrails, scaffolds, work platforms such as scissor lifts, extensible boom platform lifts, and personal all-arrest systems such as safety harnesses with appropriate shock-absorbing lanyards and anchorage points (see chapter 11).

fast track—A process in which certain portions of the architect’s design services overlap with construction activities with the intention of expediting the owner’s early occupancy of all or a portion of the project (see chapter 5).

feasibility study—An analysis of an owner’s program and testing of conceptual solutions usually on alternative sites; often the first step in the design process (see chapter 2).

fenestration—Natural light coming into a building (see chapter 8).

FF&E—Furniture, Fixtures, and Equipment. All of the items that will reside inside a recreation center (see chapter 10).

FF/FL—The American Concrete Institute (ACI) standard for the flatness and levelness measurement of a flooring surface. FF, or Flatness F-Number, is a numeric value that defines the maximum floor bumpiness allowed over a 2 ft (0.6 m) distance; FL, or Levelness F-Number, defines the tilt or pitch of a floor over a 10 ft (3 m) distance. The higher the F-Number value, the more level or flat the slab (see chapter 11).

flashing—A thin impervious material placed between a roof and a wall, or over exterior doors and windows, to prevent water penetration or provide water drainage or both (see chapter 11).

floor plan—Two-dimensional drawing showing location and size of various spaces within a building (see chapter 4).

focus group—In a building design process, a group of owner’s staff representing one program area who establish program requirements and review design solutions, for example, food service staff or security staff. It is a market analysis tool used to bring various groups of university constituents in a casual dialogue about campus priorities and their opinions on existing facilities (see chapters 2 and 6).

footprint area—A building’s perimeter, that is, the exact area that the building occupies relative to the land on which it is built (see chapter 3).

FPM—Feet per minute (see chapter 8).

functional obsolescence—Condition of a poolscape or natatorium that, regardless of physical condition, simply no longer appeals to its user groups (see chapter 8).

furniture and equipment dealer—An individual or company that sells or distributes one or more brands of furniture or equipment (see chapter 10).
furniture showrooms—Venues that showcase specific FF&E items sold by various dealers (see chapter 10).

general contractor—The firm that has entered into a contract with an owner to construct the project described in the contract documents. The general contractor typically contracts with a number of subcontractors who specialize in various trades (see chapter 5).

geotechnical engineering—A highly specialized engineering discipline concerned with subsurface conditions under a structure, which is essential information for the designer of the foundation system, the cost estimator, and the contractor that bids the project (see chapter 11).

goals and objectives—Detailed targets set by an institution or department, typically intended to help meet the mission (see chapter 6).

GPM—Gallons per minute (see chapter 6).

gravity sand filter system—Type of sand filter found at older pools and seldom specified for new systems (see chapter 8).

green building—According to the Office of the Federal Environmental Executive, “the practice of (1) increasing the efficiency with which buildings and their sites use energy, water, and materials, and (2) reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and removal—the complete building life cycle” (see chapter 11).

greenfields—Related to exurban, this is land that is largely undeveloped and tends to be either on the periphery of urban areas or in exurban areas. It can either be open fields or land used for agriculture. Its opposite is “brownfields,” generally urban land that has been used for decades for industrial uses (see chapter 3).

gross building area—The sum of the floor plan areas of a building measured to the outside of the outside walls (see chapter 2).

gross square feet (GSF)—The total square footage of a building, including net assignable area plus primary and secondary circulation space, mechanical areas, structural elements, and other nonoccupiable spaces such as walls and janitorial closets (see chapter 6).

groundbreaking—A traditional ceremony that celebrates the first day of construction for a building or other project. Dignitaries such as politicians and businessmen often attend (see chapter 11).

hard costs—The actual “bricks-and-mortar” costs paid to construct a building, includes most of its “built-in” components such as HVAC and plumbing. Hard costs include materials as well as fees paid to the general contractor and subcontractors. Architects often describe hard costs to laymen as follows: “It’s everything that would not fall out if you turned a building upside down and shook it” (see chapters 3 and 4).

hub—In campus or urban planning, a focus of activities or a crossroads of pedestrian pathways (see chapter 2).

HVAC—Heating, ventilation, and air-conditioning (see chapter 8).

IAPMO—International Association of Plumbing and Mechanical Officials, which sets standards for quality and weight of various materials for pipes, valves and pumps, turnover times, and other mechanical issues (see chapter 8).

IAQ—Indoor air quality (see chapter 8).

infrastructure—The collection of utilities such as electric power, water, sewer, natural gas, telephone, and data communications, as well as roads and drives (see chapter 11).

installation drawings—Drawings that locate every piece of furniture and equipment on the architectural floor plan. Each item is identified with a number that matches the item number as listed in the specifications (see chapter 10).

institutional planning and development process—A holistic approach requiring the integration of academic, financial, and physical (facilities) planning into the annual planning, programming, budgeting, and development cycle of colleges and universities. It requires the institution to develop policies, procedures, and schedules to ensure that the various activities occur in the proper sequence and to avoid decisions made in a vacuum (see chapter 1).

inventory and audit report—A complete and accurate account of existing facilities (land and buildings) and personnel (see chapter 1).

Jeffersonian principles—Principles developed by Thomas Jefferson to guide the development of the University of Virginia and, subsequently, used as a model by other colleges and universities. A key feature of Jefferson’s campus planning approach was the creation of the
“Academical Village,” which provided a balanced and integrated education and physical environment that combined living and learning experiences for faculty and students. Campus buildings were constructed in a U-shaped form, connected by gardens and organized around a large open space (lawn) that would serve as a place for the exchange and exploration of ideas (see chapter 1).

**lead climbing**—The process of ascending a climb with the rope, climber, and belayer from the ground up. The lead climber ascends and clips the rope through preset “quick draws” anchored to the wall at intervals. At the top he or she passes the rope through a final anchor and is lowered to the ground (see chapter 9).

**lead gift**—Generally a large donation (at least $1 million) that will give the capital campaign credibility and lead others to donate (see chapter 9).

**LEED**—Acronym for Leadership in Energy and Environmental Design, a standard created by the United States Green Building Council to measure and certify buildings that employ environmentally sound and energy-efficient design and construction, practices, and features. An existing building can receive the LEED Existing Building (EB) certification. Renovated buildings are given ratings based on their sustainability profiles. Categories include, among others, “Bronze, Silver, Gold, and Platinum,” Platinum being the highest rating (see chapters 3 and 11).

**leisure and recreation space**—Space as viewed in accordance with a fundamental change in thinking about campus recreation, which includes a broader definition of recreational sports in the narrow context of higher education. In this definition, recreational sports encompasses a variety of leisure activities such as walking, gardening, casual bike riding, relaxing, and reading in less formal settings. Recreation space includes pedestrian walkways, bicycle paths, hiking trails, lakes, rivers, and green spaces for passive and active leisure activities (see chapter 1).

**life cycle cost**—The capital and operational cost of a construction item or system during the estimated useful life of the building (see chapter 5).

**lump-sum general contracting**—A contracting approach characterized by a lack of builder input during the design phase and a lengthier schedule due to the requirement for complete design documents before bidding to the subcontractor market (see chapter 11).

**market analysis**—The projection of demand characteristics for a recreational facility through detailed review of enrollment, schedules, peer institutions, and other university-specific conditions (see chapter 6).

**massing**—The three-dimensional form of a building: the height, width, and depth along with roof shapes (see chapter 5).

**master planning process**—A process that establishes the framework for the long-term evolution of a college or university based on a “vision for its future.” It builds upon the institution’s people, programs, and existing physical assets, including natural features, open spaces, buildings, and the network for use and movement to and from the property boundaries (see chapter 1).

**MFMA**—Maple Flooring Manufacturers Association, online at www.maplefloor.org (see chapter 11).

**mind–body fitness**—Category of group exercises focusing on strength, flexibility, and relaxation; activities such as yoga, Pilates, and tai chi chuan are typical (see chapter 6).

**mission**—The business with which an institution or department is charged (see chapter 6).

**mission statement**—A statement of an institution’s purpose or reasons for existence (see chapter 2).

**mock-ups**—Assemblies constructed so that they are identical to the intended final building, which set a standard for actual construction of components and systems (see chapter 11).

**naming rights**—The right to have a facility or a portion of a facility named after a donor or the donor’s designee (see chapter 4).

**natatoria**—Plural of natatorium (see chapter 8).

**natatorium**—Room enclosure containing one or more indoor swimming pools (see chapter 8).

**NCAA**—National Collegiate Athletic Association (see chapter 8).

**needs assessment**—A systematic analysis of existing facility conditions and requirements to reach facility goals (see chapter 4).

**needs assessment survey**—A survey, typically electronic, administered during the early planning phases as a highly effective market analysis tool used to determine utilization patterns (see chapter 6).
net assignable area—Space specific to a program or activity as defined by the owner (see chapter 6).

net building area—The programmed plan area of a building, that is, the area assigned for use by the building occupants. The following areas are not included in net but are included in gross: circulation space (corridors, stairs, elevators), mechanical rooms, toilet rooms, walls, and partitions (see chapter 2).

nonassignable program element—Project spaces not specified within the program outline, typically including circulation or service spaces that are driven by each unique building design or local building code. These spaces include entry, public toilets, stairs, hallways, and so on (see chapter 6).

NSF—National Sanitation Foundation, which develops standards for swimming pool equipment and procedures (see chapter 8).

Olmstead’s principles—Ideas of Frederick Law Olmsted; the primary principle for campus planning required a clearly defined, integrated pattern of educational units, housing, and open space (lawn) with a dignified campus entrance that would be developed, over time, in an orderly manner. The plan required sensitivity to the beauty of the natural environment and what the geography dictated, thereby producing a proper relationship among building construction, landscaping, and open space (see chapter 1).

owner—A person or entity that retains services for design and contracts for construction or furniture, furnishings, and equipment; so called because this person or entity typically owns or is the lessee of the building site or project premises. The owner makes decisions regarding program, budget, scope, and funding for a project (see chapters 5 and 11).

participatory photographic approach—An incisive and effective technique for engaging campus constituents (faculty, staff, students, alumni, neighborhoods, etc.) in surveying the campus environment and documenting the full range of qualities that contribute, positively or negatively, to their experiences. Use of this technique is a powerful way to engage campus and community constituents in exploring the campus environment and commenting from knowledge-based (visual) and emotional (spiritual) experience (see chapter 1).

payment terms—Terms that dictate the parameters required for payment of products between the buyer and seller (see chapter 10).

pendulum swing—The potential swing on the rope that climbers may take if they let go of the rock. If climbing to the left or right of a top-rope anchor, or on an overhanging section of wall, a climber would swing if he or she let go (see chapter 9).

physical obsolescence—The condition of a pool that is simply worn out (see chapter 8).

planning consultant—A professional who typically gathers benchmarking data from other institutions; conducts feasibility studies; performs program and space needs assessments; surveys the campus community; interviews students, faculty, staff, and administrators; and develops business plans for the financing of the building and future operating budget for the facility and staff (see chapter 1).

planning principles—Principles that provide a guideline for campus master planners and recreational sports directors to integrate recreation with academic, social, and physical spaces into the overall master plan and the development of the physical campus (see chapter 1).

poolscape—Any exterior pool inside a safety barrier formed by such components as a fence, wall, or exterior of a building (see chapter 8).

postoccupancy walk-through—An inspection that provides an opportunity to address any warranty issues that may need attention before the warranty period is contractually complete. This inspection also allows the construction manager and architect to consider lessons learned about the design and construction of the facility, which often leads to decisions about future projects to improve and enhance the design and construction (see chapter 11).

precinct plan—A “mini” master plan that establishes detailed physical guidelines for the land, buildings, open space, landscape, and infrastructure improvements and proposed development for each discrete area within the campus master plan. A few examples include an athletics area, a graduate school quad, or a transportation hub (see chapters 1 and 2).

precondition survey—A survey used when a project includes construction adjacent to other structures. This survey documents the condition of buildings, driveways, curbs, utilities,
and any other physical facility that may be affected by the construction contractor’s activities, providing a basis for any claim of damage or repair (see chapter 11).

**preliminary furniture list**—An itemized list of every FF&E piece that's anticipated for a facility and its estimated installed cost (see chapter 10).

**pressure DE system**—A system usually enclosed in stainless steel pressurized tanks where water is pumped, passes through the filtering media, and then is forced back into the pool (see chapter 8).

**principal in charge**—A principal is a senior manager within the architectural or engineering firm. The principal in charge (PIC) is responsible for overseeing the overall development of the project. In some firms, the PIC also may have other roles such as design or project management (see chapter 5).

**program of architectural requirements**—The document used to convey the owner’s requirements for the recreational center to the architect, which should include project objective, design philosophy, location and site requirements, outline program, development budget, functional relationships, detailed space requirements, and outline specifications (see chapter 6).

**programming**—Most often in this book programming refers to preliminary scope of a building, including the rooms to be accommodated, their size, the project and construction budget, and the schedule for the design and construction. It is a process in which architects and planners work with institution personnel to determine the types, sizes, and general organizational relationship of spaces within a facility—the owner’s requirements for the project (see chapters 2, 4, and 5). It can also refer to the development of student activities by the recreation department (see chapter 6).

**project architect**—The individual responsible for coordination of in-house production staff and consultants (see chapter 5).

**project budget**—The total cost of a project including costs outside of the construction. For example, the project budget includes the construction budget as well as the cost of furniture, equipment, materials testing services, architectural and engineering services, land, and any other costs that the owner may have to bear in the process of design, construction, and moving into a building (see chapter 5).

**project designer**—(1) In an architect’s office, the individual responsible for establishing the overall direction of the architectural design of a given project; (2) in a consultant’s office, the individual responsible for the design of a specific portion of a project, such as structural, mechanical, electrical, sanitary, civil, acoustical, and food service elements (see chapter 5).

**project manager**—The individual designated by the principal in charge to manage the firm’s services related to a given project; the term is frequently used interchangeably with project architect. Normally these services include administrative responsibilities as well as technical responsibilities (see chapter 5).

**punch list**—A list derived from a process whereby every piece of furniture and equipment in a completed installation is examined for damage and for compliance with the plans and specifications. It is also a list of corrections to be made and of work remaining to be completed. Items observed to be incomplete, to require additional work, or not to be in compliance with the contract documents are included. Punch lists are directly related to the quality of work. Upon verification of compliance, the furnishings contractor is paid the remaining contract amount (retainage) (see chapters 10, 11, and 12).

**PVC**—Polyvinyl chloride, a high-impact plastic (see chapter 8).

**quick draw**—Two links (carabiners) and a short 4 to 6 in. (10-15 cm) webbing loop that are attached to the wall as intermediate lead anchor and top-rope anchor points or both (see chapter 9).

**recreation**—Refreshment of one’s mind or body after work through activity that amuses or stimulates; play (see chapter 6).

**recreation center**—A facility intended as a place of exercise and fitness for the general student population, as opposed to more specialized athletic facilities intended for use by members of an institution’s varsity sports teams (see chapter 3).

**recreational pool**—Free-form swimming tank generally with a shallower water depth than a competition pool; includes wider deck areas and attractive recreation features (see chapter 8).
registered architect (RA)—A title used by an individual who is licensed to practice architecture in at least one state in the United States (see chapter 5).

rendering—Near-photo-quality illustration depicting what a facility will look like when constructed. Architects prepare such drawings at the conclusion of the project's conceptual design phase (see chapter 4).

Request for Information (RFI)—A document that a contractor issues to ask the architect for a clarification or for additional information (see chapter 5).

retainage—An amount of money held back after initial payment is made until installation of all items is 100% satisfactory. Under payment terms, it's customary to pay 75% when installation is complete and then retain 25% until all punch list items are completed (see chapter 10).

RFI—The Request for Information, primarily used to obtain clarification of drawings or specifications from the A/E. Other uses for RFIs may include confirming owner or A/E oral directions; identifying field conflicts; resolving missing, conflicting, or unclear information; and requesting requirement deviations (see chapter 11).

R-value—A measure of thermal resistance used to compare insulating values of building enclosures (see chapter 3).

sand pressure filter system—The system most widely used for cleaning pool water, in which a tank is usually filled with silica graded sand and a system of internal pipes that direct the pool water through the sand in a way that traps large waterborne particulate matter (see chapter 8).

sand vacuum filter tanks—Type of high-rate sand filtration with units that are usually installed in the ground and open to the pool deck elevation in the filter room (see chapter 8).

schematic design—A two-dimensional drawing view of space layout and adjacencies (see chapter 8).

schematic design documents—Drawings and other documents conceptually illustrating the scale and relationship of project components (see chapter 5).

schematic design phase—The phase of the architect's services in which the architect consults with the owner to ascertain the requirements of the project and prepares schematic design documents for approval by the owner. These consist of drawings and other documents illustrating the scale and relationship of the project components (see chapter 5).

scope creep—A process whereby the scope of a project is increased because of certain conditions in the building discovered after the project begins; thus, for example, a hidden structural issue requires intervention by structural engineers and thus the “scope” of the project has increased (see chapter 3).

scorecard—For the purposes of this chapter, a point system developed by Sasaki Associates to aid in making decisions about whether to renovate a recreation center or build from scratch (see chapter 3).

shop drawings—Drawings that the furnishings contractor submits to the architect, showing how the contractor intends to fabricate the custom piece of furniture as drawn for design intent by the architect in the specifications (see chapter 10).

site plan—Two-dimensional drawing showing where a facility will be located. It generally indicates the facility's relationship to other buildings and activities on-site (see chapter 4).

site utilization plan—A plan that assesses the construction equipment access requirements, construction worker parking, emergency vehicle routes, materials storage, lay-down areas, work zones, office trailer location, safety and security, trash removal, demolitions and connections, traffic patterns, and so on (see chapter 11).

sodium hypochlorite—A pool sanitizer, frequently referred to as liquid chlorine; safer to handle than gas chlorine (see chapter 8).

soft costs—Professional consultant and architect fees; the cost to purchase and install furniture, fixtures, and equipment; contingency fund; escalation; charge-back expenses from the university; financing fees; bond-underwriting costs; and operating and maintenance costs for the constructed facility (see chapter 3 and chapter 4).

soft opening—A period of time when a new building, which may not be fully complete, is open for business but has not opened formally (see chapter 12).

space utilization study—An analysis performed to quantify the amount of recreation space and usage applied against campus or national
standards and guidelines (or both), including data gathered from comparable (benchmark) institutions (see chapter 1).

**specifications**—Descriptions of the products and materials to be used on the project and the procedures for installation. The manufacturer’s name, model number, dimensions, color, and weight are indicated. Any warranties that will be required are indicated, too. Items are identified by a number that keys into the installation drawings and schedule and phasing, and any other requirements are explained. The specifications and the installation drawings comprise the contract documents that are the legal description of the scope of the work (see chapter 5 and chapter 10).

**spotter**—A partner in bouldering who helps stabilize or break the fall of a boulderer if he or she were to come off of the rock (see chapter 9).

**strategic plan**—A documented framework for achieving a college or university’s desired future based on its mission. A strategic plan could include such topics as the growth or retraction of colleges or departments, changes in staff allocation, real estate acquisitions or sell-offs, and building developments (see chapter 2).

**subcontractors**—The field teams that construct a building or facility. These team members construct a building according to a series of bid packages containing drawings and specifications organized and distributed by the construction manager. A subcontractor works for the general contractor in building a certain portion of the construction, or trade, in which they specialize. For example, one subcontractor might install wood floors (see chapter 5 and chapter 11).

**sustainability**—“The ability of a society, ecosystem, or any such ongoing system to continue functions into the indefinite future . . . . For architecture, this means design that delivers buildings and communities with lower environmental impacts while enhancing health, productivity, community, and quality of life”; put another way, “sustainable development involves . . . meeting the needs of the present without compromising the ability of future generations to meet their own needs” (see chapter 1).

**systems furniture**—A series of components that includes partitions and panels, work surfaces, storage units, and so on, arranged to meet specific functional and aesthetic requirements to create the work stations needed for a specific program. The components can be rearranged to accommodate future needs. Often, power and data are distributed through the systems furniture via a raceway that is part of the partition component and is wired directly to the building infrastructure at specific points (see chapter 10).

**tablet calcium hypochlorite**—Normally a more costly sanitizer than either liquid or gas chlorine; it is more stable, contains higher concentrations of chlorine than sodium hypochlorite, and requires less pH control (see chapter 8).

**tactical plan**—The development of strategies, policies, and procedures regarding how the planning process will be carried out, the persons to be involved, the budget, and the time frame (see chapter 1).

**Temporary Certificate of Occupancy**—A document certifying that while the buildings department has determined the building to be safe to occupy, the approval is only temporary and is subject to expiration, usually 90 days after its date of issuance (see chapter 12).

**Title IX legislation**—Federal legislation passed in 1972 that mandated equal facilities and opportunities for male and female collegiate athletes (see chapter 8).

**T-nut**—Specialized nut that is mounted to the climbing wall to allow the threading of modular handholds (see chapter 9).

**top-rope climbing**—Climbing with the rope anchored from above. In the gym the rope is usually passed through anchors or belay bars at the top of the wall and both ends of the rope are on the ground (see chapter 9).

**topographic survey**—A complete survey, prepared by an experienced surveyor licensed in the state in which the project is located, that maps the contours and characteristics of the property and locates significant natural features such as wetlands and man-made features such as utilities (see chapter 11).

**topography**—The detailed mapping or charting of the features of an area or district usually by means of surveying (see chapter 2).

**truss**—A structural element constructed of angled and vertical steel members connecting a top and bottom cord; it looks very much like a steel bridge. The truss is designed and constructed specifically for each job (see chapter 11).
universal design—“A user-friendly approach to design in the living environment where people of any culture, age, size, weight, race, gender and ability can experience an environment that promotes their health, safety and welfare in the future” (retrieved September 29, 2005, from www.universaldesign.org/) (see chapter 1).

U.S. EPA Clean Water Act—Legislation that controls the discharge of chemically treated water into storm and sanitary sewer systems, leading in some jurisdictions to a requirement for permits to discharge chlorinated and dechlorinated pool water (see chapter 8).

users—The group that generally drives the program’s needs and requirements and will occupy the building upon completion (see chapter 11).

UV—Ultraviolet light, a sterilization method used to break down micro-organisms in water purification (see chapter 8).

vacuum DE system—A system in which usually open-topped tanks are positioned just above the pool water level; water drains by gravity into the tank and is then drawn through the filter medium by a vacuum pump and discharged back into the pool (see chapter 8).

value engineering—A process that attempts to define the most cost-effective design and scope for the purposes and conditions of a project (see chapter 11).

evapor barrier—A sheet of plastic at least 6 mm thick that typically is placed between the stone or sand base and concrete. The product is protected during construction because punctures in the barrier allow the water vapor through and may make the moisture content of the slab hard to overcome (see chapter 11).

warranty—Document specifying the warranty period, which is defined in the up-front contract documentation and most often found in the specifications issued by the architect. The typical warranty period is one year from the date of substantial completion, although a few systems require a longer period under warranty, including chillers and air-handling units, roofing, and glass and glazing systems (see chapter 11).

warranty phase—Guarantee period, typically one year for workmanship and multiple years for equipment and systems of a newly completed aquatic facility (see chapter 8).

weeps—Small openings at the bottom of a brick cavity wall that allow water to drain from behind the brick layer to the exterior of the building (see chapter 8).

wellness—The condition of good physical and mental health, especially when maintained by proper diet, exercise, and habits (see chapter 6).
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About NIRSA

The National Intramural-Recreational Sports Association (NIRSA) is the leading resource for professional and student development, education, and research in collegiate recreational sports. Headquartered in Corvallis, Oregon, NIRSA was established in 1950 at a meeting at Dillard University of 22 African American men and women from 11 historically black colleges and universities. NIRSA now has nearly 4,000 highly trained professional, student, and associate members throughout the U.S., Canada, and other countries. NIRSA members serve an estimated 5.5 million students who regularly participate in campus recreational sports programs. NIRSA’s mission is to provide for the education and development of its members and to foster quality recreation programs, facilities, and services for diverse populations. The association’s commitment to excellence is shown in its use of resources that promote ethical and healthy lifestyle choices.
About the Contributors

Robert J. Bailey, AIA, CCS, CSI, is a specifications architect at WTW Architects, Inc. in Pittsburgh, Pennsylvania, where he has worked on over 350 projects. He was also a project architect at WTW for five years prior to becoming a full-time specifier. The projects he has worked on include the Upper St. Clair CRC, University of Maryland at Baltimore Campus Center, and California University of Pennsylvania Herron Hall. Bailey is the author of *Building Materials of the 20th Century*, a comprehensive look at the development of modern building materials, and he has had several other works published in *Construction Specifier, Hospital News*, and *Corrections Today*. He serves on the board of the Pittsburgh Chapter of the Construction Specifications Institute. Bailey also writes regularly for the American Institute of Architects Pittsburgh Chapter (AIA) *Columns* magazine, where he has been reviewing architectural books since 1993. He received his bachelor's degree in architecture from Carnegie Mellon University.

Karen A. Bean, ASID, is a senior interior designer at TMP Associates, Inc. in Bloomfield Hills, Michigan, a firm that specializes in recreation and sport centers. She has served as lead interior designer for recreation facilities since 1998, including the award-winning University of Alabama Recreation Center and the Dearborn (Michigan) Community Center project, a 130,000 square foot (SF) addition. At the NIRSA and Athletic Business annual conferences in 2002, she was a featured interior design speaker, and she has been a source of numerous journal articles. Most recently she was the primary source of a special flooring supplement in *Recreation Management* and was interviewed by *Construction Association of Michigan Magazine* for several articles. As a member of the American Society of Interior Designers, she speaks at conferences and serves on a committee of professionals who critique student profiles. Bean is a graduate of Michigan State University with a bachelor of arts in human environment design.

Mike Bell, ASLA, is a partner and landscape architect at RDG Planning & Design in Des Moines, Iowa. His professional focus is on urban design, including park and recreation facilities, and university planning. He has been a member of the American Society of Landscape Architects (ASLA) since 1995 and speaks at national, regional, state, and local Recreation and Park Association conferences related to park and recreation design, trends, and comprehensive planning. He received his bachelor’s degree in landscape architecture from Iowa State University and his master’s while teaching at his alma mater in the landscape architecture department.

Geff Bottomley is vice president and corporate director of marketing at Gilbane Building Company, a national leader in sports construction, located in Providence, Rhode Island. As the organizer of Gilbane’s Higher Education Facilities Forum, he has had the benefit of visiting projects across the country to learn about and understand the unique challenges and solutions involved in building sport and recreation facilities. Prior to Gilbane, he was a project manager and designer with architecture and design firms for over 23 years. A member of NIRSA, the Society for College and University Planning (SCUP), and AIA, Bottomley is a designer and avid sport enthusiast at heart. He is a graduate of Pratt Institute.

Jacob L. Buehler, APR, is a former marketing and publications coordinator with TMP Associates, Inc. and is currently the director of communications for the American Society of Radiologic Technologists. He is the author of “Planning and Designing an Urban High School,” which appeared in the *Educational Facility Planner (EFP) Journal* in 2004. He also wrote several articles about recreation and sport for *American School & University, Recreation Management, and School Planning & Management* magazines. Buehler received a bachelor of arts in communication from Oakland University.

Warren T. Bulseco, AIA, LEED AP, is a senior associate at WTW Architects, Inc. in Pittsburgh, Pennsylvania, where he has designed student recreation facilities, athletic facilities, and community recreation centers. His work on the Indiana University of Pennsylvania Student Union and...
Bulseco was also a contributing author to *College Union Dynamic—Flexible Solutions to Successful Facilities* (2005). He is a member of NIRSA, the Pennsylvania Parks and Recreation Society, and AIA, and he is a presenter and exhibitor for NIRSA, NIRSA Region 1, The Association of College Unions International, and National Association of College Auxiliary Services. He received his bachelor's degree in architecture from Cincinnati University.

Christopher Chivetta, PE, LEED AP, is the president of Hastings & Chivetta Architects, Inc., an architectural firm that is nationally recognized for its student recreation centers. He has been active in the planning, design, and construction of recreation facilities for over 20 years. His firm has worked on over 200 recreation, wellness, fitness and sports centers throughout the nation. Chivetta participated in securing funding at University of Missouri–Columbia and University of Dayton for their recreation centers and assisted with the creation of a private-public partnership with Wartburg College for funding a new facility. He is also a licensed professional engineer in 11 states and is a LEED accredited professional. He has authored several articles for trade and professional magazines. He has won several awards, including the 40 under 40 award from *St. Louis Business Journal* in 1999 and the young alumni award from Washington University in 2000. He received a bachelor of science in mechanical engineering and a master of business administration from Washington University.

Doug Cook, PE, MBA, LEED AP, is studio director at Counsilman-Hunsaker, responsible for leading a team of engineering professionals who design and engineer national and international aquatic venues. This process involves developing owner concepts into reality, completing construction documents and technical specifications, assisting potential bidders during the project bidding phase, and construction administration, as well as owner assistance in the start-up and operation of aquatic facilities and research and review of aquatic trends in the industry. He is a licensed professional engineer in 20 states and has completed over 70 swimming pool projects since joining Counsilman-Hunsaker & Associates in 1998. Cook graduated from St. Louis University with a master of business administration.

Richard Cook is an avid climber who has worked to develop recreation and outdoor sport programs for over 20 years. He has taught at several colleges and universities and consulted with recreation centers and facilities nationally. He has contributed to several publications and conferences with the Climbing Wall Association, Outdoor Recreation Coalition of America, International Mountain Bicycling Association, and Association for Experiential Education. He serves on the board of directors of the Climbing Wall Association and the Backcountry Snowsports Alliance and works to advance programs in the outdoor adventure sport and bicycle industries. He has served as executive director of the Breckenridge Outdoor Education Center; general manager of Eldorado Climbing Walls/Franklin Handholds; director of the University of Colorado, Boulder Outdoor Program; and development director with the International Mountain Bicycling Association. He holds degrees in business administration from the Leeds College of Business at the University of Colorado and in Liberal Arts/Outdoor Studies from Colorado Mountain College.

Scott Crawford, ASLA, LEED AP, is a partner and landscape architect at RDG Planning & Design, which is a nationally recognized multi-disciplinary design firm specializing in recreation, sports, athletics, and parks facilities design based in Des Moines, Iowa. His professional focus is in sport, athletics, recreation, and wellness facility programming, planning, and design. His work with a diverse group of clients, including college and university athletic and recreation directors, city and county parks and recreation directors, and private service providers, has provided him with the experience, knowledge, skills, and abilities to develop functional and creative recreation and sport facilities. He has authored several publications related to sports and recreation planning and design. He received his bachelor's degree in landscape architecture from the College of Design at Iowa State University.

David J. Dymecki, AIA, is a principal and director of the Sports Design Studio at Sasaki. He has overseen design of numerous major projects including the Cleveland State University Recreation Center, Cleveland, Ohio; the Grinnell College Athletic and Recreation Facility, Grinnell, Iowa; the Rensselaer Polytechnic Institute Athletic Facilities, Troy, New York; the Trinity College Koeppel Community Sports Complex, Hartford, Connecticut; and the Drexel University...
Recreation Center, Philadelphia, Pennsylvania. He has received numerous awards including a Princeton University Academic Fellowship and the Frederick C. Widman Prize in Architecture from Washington University, St. Louis. He graduated from Washington University in St. Louis summa cum laude and received a master of architecture from Princeton University.

Nancy B. Freedman, AIA, LEED AP, is a principal at Sasaki Associates with over 20 years of experience in architecture. Her recent focus has been on recreation facilities, including the University Recreation Center at Cleveland State University, Cleveland, Ohio; the David A. Beckerman Recreation Center, University of New Haven, Connecticut; and the Trinity College Koeppel Community Sports Complex in Hartford, Connecticut. She is the author of “Size Wise,” an article in Athletic Business that explored the issues around programming, construction, and operations of indoor swimming pools. She received a bachelor of arts from Dartmouth College and a master of architecture from the Harvard University Graduate School of Design.

Clinton N. Hewitt, ASLA, is an associate professor at the University of Minnesota’s College of Design and former Associate Vice President for Campus Master Planning. His professional career has included planning, designing, and developing facilities for the University of Minnesota System, during which time he managed the construction of athletic and recreation facilities at the Twin Cities campus and the campuses of Duluth, Morris, Crookston, and Waseca. The University’s Four Campus Master Planning Principles in the Campus Master Plan directed by Hewitt provided a foundation for NIRSA’s Planning Principles for College and University Recreation Facilities, and he was an editor for “Elements of Facilities Planning,” a section in Facilities Management: A Manual for Plant Administration. He also teaches campus master planning classes at APPAs (The Association of Higher Education Facilities Officers) Institute for Facilities Management and has conducted space management workshops for the Society for College and University Planning (SCUP). He is an active member of SCUP, serving as its president in 1983-84, and has received numerous awards, including the Founders’ Award for Distinguished Achievement in Higher Education Planning and the Distinguished Service Award from SCUP and the Distinguished Service Award from the Association of Higher Education Facilities Officers Institute for Facilities Management. Hewitt received his master of landscape architecture degree from Michigan State University and in 2005 received its Distinguished Alumni Award for Landscape Architecture.

D. Scot Hunsaker is president of Counsilman-Hunsaker & Associates, which is a planning, design, and engineering firm with a national and international clientele. Hunsaker’s firm specializes in aquatic centers for international-level competition and community water parks, both indoors and outdoors. During the past 15 years, he has crafted a unique protocol for combining the goals of recreation with the reality of business disciplines to maximize success. In addition to being the CEO of an exciting group of professionals, he is a sought-after speaker, having recently given lectures at the Harvard Graduate School of Design, the Athletic Business Conference, the National Recreation and Parks Congress, and NIRSA. Hunsaker also contributes articles and interviews to industry and professional publications. He received a bachelor of science from Indiana University.

Paul Knell, AIA, NCARB, is a senior principal at WTW Architects, Inc. He has been involved in the planning and design of student life facilities and recreation centers for 25 years. His recently published book, College Union Dynamic: Flexible Solutions for Successful Facilities, has established Knell as a national authority on student life centers. He is a 20-year member of the Association of College Unions International and serves on its Education and Research Committee. Knell earned his bachelor’s degree in architecture from Carnegie Mellon University.

David W. Larson, AIA, is a senior vice president at TMP Associates, Inc., where he leads the firm’s sport and recreation facility designs. His projects at TMP have received several awards for recreation facility design, including the 2005 NIRSA Outstanding Sports Facility Award and the American School & University magazine Collegiate Citation for Interiors in 2006 (both for the University of Alabama Recreation Center, Tuscaloosa). He has been involved with NIRSA for 18 years and has been a speaker at the NIRSA Facility Symposium six times. He is also an active member of AIA, having served on several committees. He authored “A Recipe for Success,” an article featured in Athletic Business about successful planning for athletic building food
service operations, and has been a source for several trade publications, including *Recreation Management* and *American School & University*. He received his bachelor's degree in architecture from Kent State University.

**Brad McCord, AIA**, is a senior associate and project manager in Sasaki's Sports Design Studio. Since joining Sasaki Associates in 1992, his focus has been on projects for institutional clients with a particular emphasis on athletic facilities and student recreation centers. These include the Grinnell College Athletic Center, Grinnell, Iowa; the University of Massachusetts–Amherst Student Recreation Center, Amherst, Massachusetts; the Arvin Cadet Physical Development Center at the U.S. Military Academy, West Point, New York; and the student recreation center at the University at Stony Brook, Stony Brook, New York. He holds a bachelor's degree in architecture from the University of Kansas and received the Ewart Scholarship at the Heriot Watt University School of Architecture in Edinburgh, Scotland.

**Jack Patton, AIA, LEED AP**, is a registered architect and LEED Accredited Professional. He is a principal with RDG Planning & Design, an architecture, landscape architecture, interior design, and planning corporation. Patton has over 25 years of architectural experience and for the past 15 years has focused on college and university recreation and sport facilities. He has been personally involved with recreation and sport facilities on more than 25 college campuses and in several communities. He has been an invited speaker and presenter at 19 National Sports Conferences and authored several articles for *Athletic Business*. He is actively involved in all phases of the architectural process but primarily focuses on programming and conceptual design. He received his bachelor's degree in architecture from the University of Arizona.

**Anita Picozzi Moran, AIA**, is the Education, Science and Technology Studio leader for WHR Architects, a firm in Dallas, Texas. During her previous tenure as a principal at F&S Partners Incorporated, she authored chapter 5, “Steps in the Architectural Process” in this book. Also while at F&S Partners Incorporated, she designed more than 15 university and another dozen community recreation facilities, including the University of Texas at Austin Recreational Sports Center (one of the first campus recreation centers in the country) and the University of Texas at San Antonio Recreation and Wellness Phase II, a major expansion and addition to that campus's center that included a major outdoor aquatics complex. Her projects have received numerous awards. Most recently her student recreation center at the University of North Texas won the 2004 NIRSA Outstanding Sports Facility Award. Moran coauthored “Designing for More Than Dance,” which was her first article in *Athletic Business*, in 1999. She received her bachelor of science from Cornell University and a master's degree in architecture from the University of Virginia.

**Thomas M. Roberts, MS**, is the director of the University of Richmond Weinstein Center for Recreation and Wellness. He contributed to the design and opening of the center. In 2008, this center was one of five universities to receive the NIRSA outstanding sports facility award. Roberts is a former instructor of sports administration at San Diego State University. He has produced and published a recreation facility risk management employee training CD that is used by more than 50 institutions. He has been active as a committee member in NIRSA, has authored numerous publications, and has regularly presented at state, regional, and national conferences. Roberts received the Virginia Recreational Sports Association (VRSA) Professional Award of Merit in 2008. He has a master of science in physical education.

**John A. Selby, AIA, LEED AP**, is a project executive at Gilbane Building Company in Cleveland, Ohio. Selby has more than 30 years of experience in design, construction, and program management of major civic and institutional projects, including several arenas, stadiums, recreation facilities, and the recently completed Cleveland State University Recreation Facility in Cleveland. He is a member of AIA and Construction Management Association of America. He is also a member of the U.S. Green Building Council and a LEED Accredited Professional. He received his bachelor's degree in architecture from Oklahoma State University.

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**Paul J. Tellers, AIA,** is the director of planning at WTW Architects. Tellers coordinates planning activities in creating master plans for colleges and universities. Prior to joining WTW Architects in 2005, Tellers was the university architect at Carnegie Mellon University for 19 years. While there, he coordinated two university master plans and guided the designs of the University Center and the Purnell Center for the Arts. He served in the U.S. Peace Corps in Malawi, Africa, after graduating in architecture from the University of Detroit. Tellers is a member of the Historic Review Commission and is on the President Board of the Bach Choir of Pittsburgh. He has served on the boards of the Community Design Center of Pittsburgh, the Mt. Lebanon Planning Board, Mt. Washington Community Development Corporation, and the Oakland Task Force.

**James C. Turman, PhD,** is the director of the department of recreational sports and the assistant vice provost for student affairs at the University of Minnesota. A NIRSA member since 1974 and a Society for College and University Planning (SCUP) member since 2000, he has served on campus and system-wide physical master planning committees and worked on more than 20 capital projects for recreation, athletics, student unions, and the alumni association. Turman’s work as lead author and editor of NIRSA’s *Planning Principles for College and University Recreation Facilities* won him NIRSA’s national service award in 2002. He has won several NIRSA awards, including national service awards for significant contributions to the association as executive vice president in 1984 and for the development of the association logo in 1978. He received his PhD from the University of Minnesota and teaches a graduate class in sport facilities planning and design.

**Donald Vitters, AIA,** is a principal at Sasaki Associates with more than 30 years of experience in the design of college and university buildings. His involvement with the design of recreational facilities includes work on Cornell University’s Schoellkopf Memorial Hall in Ithaca, New York; the Worcester Polytechnic Institute recreational facilities in Worcester, Massachusetts; and the Rensselaer Polytechnic Institute Athletic Facilities in Troy, New York. He received his bachelor’s degree in architecture from Cornell University.
Company Descriptions

The following companies are NIRSA associate members that provide products or services for recreational sports facilities or programs.

**Brailsford & Dunlavey**

1140 Connecticut Avenue NW, Suite 400  
Washington, DC 20036  
202-289-4455  
info@facilityplanners.com  
www.facilityplanners.com

Brailsford & Dunlavey (B&D) is a facility planning and program management firm dedicated to helping clients plan and implement quality-of-life facilities. B&D has conducted more than 150 recreation studies, and its work has led to the development of more than 60 new university recreation centers. Additional offices are located in Chicago and Los Angeles with clientele in 48 states.

**Counsilman-Hunsaker**

10733 Sunset Office Drive, Suite 400  
St. Louis, MO 63127  
info@chh2o.com  
www.chh2o.com  
Contact: Scot Hunsaker

Counsilman-Hunsaker has served clients for over 40 years in aquatic engineering, planning, and design. Portfolio includes various markets, such as competition venues, water parks, universities, park and recreation, resorts, spas, wellness, and K-12.

**Eldorado Climbing Walls**

1835 38th Street  
Boulder, CO 80301  
303-447-0512  
www.eldowalls.com  
Contact: Steve Holmes  
steve@eldowalls.com  
Chapter 9 author inquiries: Richard Cook  
richcook@eldowalls.com

Since 1994, Eldorado Wall Company has designed and built hundreds of rock climbing walls for universities, recreation centers, fitness clubs, and military units. They have a selection of climbing wall types to suit any facility and budget. They welcome inquiries at any stage of planning.

**Gilbane Building Company**

The B.F. Keith Building  
1621 Euclid Avenue, Suite 1830  
Cleveland, OH 44115  
216-535-3000  
www.gilbaneco.com  
Contact: John Selby, project executive  
JSelby@GilbaneCo.com

Gilbane, a full-service construction and real estate development company, provides facility-related services for competitive and recreational facilities and an active and competitive student body. Ranked consistently as the leading builder of educational facilities, according to ENR, and at the forefront of sustainable and high-performance building practices, Gilbane is building more than buildings every day.

**Hastings & Chivetta Architects, Inc.**

700 Corporate Park Drive, Suite 400  
St. Louis, MO 63105  
314-863-5717  
www.hastingschivetta.com  
Contact: Chris Chivetta, PE, LEED AP  
cchivetta@hcarchitects.com

Hastings & Chivetta Architects has been a nationally recognized leader in the field of collegiate architectural design for almost 50 years. They have completed more than 200 recreation, athletic, or wellness projects on over 180 college and university campuses, and many clients engage their services for multiple projects. More than 80 percent of their work is from repeat or referred clients. Their experience and collaborative approach, combined with high-quality service and state-of-the-art designs, are the cornerstone of their practice.
RDG Planning & Design
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www.rdgusa.com/sports
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RDG is a multidisciplinary firm recognized nationally for its work on recreation, sports, athletic, and parks facilities. Specializing in programming, planning, and award-winning design, the firm has offices in Des Moines, Iowa; Fort Myers, Florida; and Omaha, Nebraska.

Sasaki Associates
64 Pleasant Street
Watertown, MA 02472
617-926-3300
info@sasaki.com
www.sasaki.com
Sasaki Associates is an interdisciplinary design firm with offices in Watertown, Massachusetts, and San Francisco. The firm’s sports architecture studio has designed recreation and athletic facilities at colleges and universities around the United States.

TMP Architecture
1191 W. Square Lake Road
Bloomfield Hills, MI 48302
www.tmp-architecture.com
Contact: Dave Larson, AIA
dlarson@tmp-architecture.com
TMP Architecture is a 100-person creative planning and design firm with expertise in the design of recreational sports and related facilities for colleges and universities nationally. TMP’s designs foster lifelong learning, promote good choices, and reinforce positive community connections.

WHR Architects, Inc.
3131 McKinney Avenue, Suite 340
Dallas, TX 75204
www.whrarchitects.com
Contact: Anita Picozzi Moran, AIA
WHR Architects is a full-service architecture and interior design firm focused on designing facilities for health care, science, research, technology, academics, and campus recreation and sports worldwide.

WTW Architects
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WTW is an architecture and planning firm focused on the design of higher education facilities, including student recreation centers, athletic facilities, student housing, and student unions.