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- Senior living
- Urban design

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Our experience ranges from concise environmental audits that gather major lessons learned to more in-depth research studies that evaluate multiple aspects of a facility’s physical environment, operations and maintenance, and building occupants’ satisfaction and use patterns. We work with our clients to develop a course of action and schedule that is individualized to meet the unique needs of their organization. Regardless of the scope of the project, we always work within the framework of practice-based research to create results that have real-world applications.

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About the Study

Why the Study Was Conducted

In the past, pools in senior living communities were provided primarily for marketing purposes. Though fitness facilities and pools remain a marketing draw, they have greater value to today’s senior population. In the current retirement market, fitness and wellness are becoming increasingly important; and swimming has become a more popular form of exercise. In 1975, 6% of adults age 65 and older swam for recreation or exercise.1 By 1991, that percentage increased to 10%.2 Older adults are leading lifestyles that are more active and they are interested in spaces that support their wellness goals. “It seems only right that the generation that ushered in the fitness craze should be focused on wellness versus illness as they age.”3

Today’s senior living facilities are being designed with more extensive wellness and fitness facilities, including pools. In fact, a recent study found that:4

- 88% of survey respondents felt that spaces devoted to fitness are very important, reflecting older adults’ focus on fitness;
- Indoor swimming pools were associated with greater resident participation in organized sports and fitness activities; and
An indoor pool is an important feature to many residents both now and in the future.

Using pools for exercise has many benefits for older adults. Aquatherapy “is considered to be one of the best forms of exercise, especially for people who suffer from connective tissue problems, joint disorders, or arthritis.”6 Swimming and water aerobics, in particular, are recognized for their use in strengthening the whole body, without the muscle and joint strain associated with other exercises since the body’s weight is easily supported by water.7 Exercising in a pool can be especially valuable for older adults who are out of condition and want to regain flexibility and strength, without the risk of injury. Exercising in water and aquatherapy have the potential to extend the number of years that seniors can live vibrantly; and getting into a pool with a group of like-purposed friends can be a fun, social experience at any age.

Specific benefits of exercising in water include:8

- Improved cardiovascular conditioning;
- Improved flexibility;
- Improved physical appearance due to muscle toning;
- Improved posture;
- Increased muscle strength;
- Eased muscle tension;
- Improved balance;
- Weight and appetite control;
- Stress reduction; and
- Reduced risk of osteoporosis (when weights and bouncing are introduced).

The heat, buoyancy, and massage associated with hydro-massage (e.g. soaking in a spa) have also been known to provide many health benefits, including:9

- Relaxation and stress reduction, allowing the heart to work less hard, easier and deeper breathing, and better digestion;
- Raising body temperature and causing blood vessels to dilate, resulting in increased circulation and blood flow—speeding the elimination of lactic acids and other toxins that are then replaced by oxygen and the body’s natural nutrients, which accelerates the body’s natural healing process;
- Releasing endorphins (the body’s natural pain killers and “feel good” chemical, giving a sense of well-being and rejuvenation);
- Relaxing tense muscles, soothing aches and pains;
- Providing temporary relief from arthritis pain;
- Providing an ideal environment for stretching, which can help stimulate the production or retention of lubricants between connective tissue fibers;
- Decreasing swelling and stiffness and restoring strength and flexibility, which can help increase range of motion, prevent injuries, and protect joints against further damage;
- Relieving pressure on joints and muscles, due to the buoyancy from the water that reduces body weight by approximately 90%—making it a safe and gentle environment for warm water exercise; and
- Sleeping better, due to the drop in body temperature when someone soaks in hot water for 15 minutes approximately 90 minutes before bedtime.

Knowing the benefits of pool usage amongst a senior population, architects have long recognized the importance of designing a pool facility that encourages repeat use. The minimum objective to get people to visit the pool again and again is to provide a space that works well and supports the activities that are to take place there. Accordingly, the goal of this study was to determine what considerations should be made and what questions should be asked by architects during the design process to better design pools for a senior population. The study also offered an opportunity to recognize the requirements that are distinct to designing a pool for a senior user group, as opposed to the general population.

**How the Study Was Conducted**

This report is a summary of the findings from post-occupancy evaluations of pools located in eight senior living communities. The facilities selected for this study are diverse in terms of size, expected usage (both in terms of quantity of users as well as the types of activities performed there), and location. All of the pools were designed to support an older population (i.e. for adults 55 years or older); and were chosen from senior living projects designed by Perkins Eastman that incorporated a pool.

The eight sites included:
- Buckingham’s Choice, located in Adamstown, MD;
- Glenmeadow Retirement Community, located in Longmeadow, MA;
- Grand Rapids Dominican Sisters – Marywood Center, located in Grand Rapids, MI;
- Kendal on Hudson, located in Sleepy Hollow, NY;
- Masonic Village at Sewickley, located in Sewickley, PA;
- Meramec Bluffs, located in Ballwin, MO;
- Sun City Park Yokohama, located in Yokohama City, Japan; and
- The Tradition of the Palm Beaches, located in West Palm Beach, FL.

See Appendix A for descriptions of the eight pools.
The study began with several conversations between the Perkins Eastman Research Collaborative and James P. Goldman, AIA, a sports facility consultant who helped identify key areas of interest that could be investigated at aquatic facilities for older adults. We then conducted a pilot study of one pool facility, which was followed by online surveying for seven other pool facilities.

The initial pilot study, conducted at Masonic Village at Sewickley, consisted of online surveys completed by the facility’s Administrator and Maintenance Supervisor; an interview with the Director of Health and Wellness; and a walk-through of the pool/fitness area. The pilot study provided insight into how the survey questions would be understood and whether any questions were unnecessary or missing, giving us an opportunity to improve the questionnaires before distributing them to the other participating facilities. Based on the feedback from the pilot study, the Administrator and Maintenance Supervisor surveys were revised; and a third survey, geared towards Wellness Managers, was developed. See Appendices B, D, and F for the questionnaires.

Because it was a comparative study, the post-occupancy evaluation process and surveying tools were kept consistent across all of the additional seven facilities that were evaluated. The surveys were used to assess the pool facilities in terms of who was using the spaces, how they were being used, and what was (or was not) working well. Many design aspects were also taken into consideration, from room layout and functionality to system operations and room finishes. We received completed surveys from all eight Administrators, all eight Maintenance Supervisors, and seven of the eight Wellness Managers. See Appendices C, E, and G for question-by-question summaries of the survey results.
Summary of Post-Occupancy Evaluation Findings

During the post-occupancy evaluations of the eight pools, the survey respondents had positive things to say about the physical environment and availability of the pool in their facility. People truly seem to appreciate having their pool as a recreational, fitness, therapeutic, and marketing resource. Though feedback was received regarding some things that could be improved upon in the future, the respondents also expressed that—even with the concerns they voiced—they are generally pleased with their pools.

Key findings from the post-occupancy evaluations include:

- Pools seem to affect marketing, from attracting potential residents to communicating an organization’s commitment to fitness and healthy aging.

Please note that all post-occupancy evaluation data provided in this report are for informational purposes only. The opinions expressed by the study’s participants are not those of Perkins Eastman.
Though indoor pools are the standard, providing natural light and a connection to the outdoors seems to be an important aspect of the design.

Pools are primarily used by independent living residents, who need little to no assistance using the pool.

When we asked the facilities’ Administrators what the anticipated usage of the pool and pool area was, they reported that the pools were expected to be used by approximately one-quarter of the facility’s resident population (based on 30 to 100 anticipated users at facilities housing up to 600 residents). However, the Wellness Managers reported that actual usage is, on average, only one-fifteenth of the population (typically from 10 to 30 daily users).

Pool sizes and pool deck widths vary, but the pools are typically 3’ to 4’ deep and rectangular in shape.

Neither the sizes nor depths of the pools seem to relate to the activities that occur there or to the users’ preferences in activities.

Aquatic exercises, lap swimming, lap walking, and free swimming are the most popular activities that take place in the pools.

Ladders, stairs, and pool lifts are the most common means of entry into the pools. The ladders and pool lifts, however, are reportedly not as easy to use as the stairs. Only one facility offers a ramp, which is said to be very popular; and several other facilities indicated that they wish they had a ramp.

Air temperatures in the pool rooms average 85°, with an average humidity of 43%.

Pool water temperatures average 86°. Several facilities mentioned that there is a constant debate over the water temperature. In particular, one facility noted that they wish they had two pools: A cooler pool for swimming and other cardio/conditioning activities and a warmer pool for aquatherapy.

Spas are appreciated, or desired where not available.

Changing/locker rooms are necessary since, on average, half of the people who use the pool arrive in clothing and change into their swimsuits when they get there.

Typically, the number of showers in the locker rooms to the number of daily users is approximately 1:3. In all but one facility (where only a women’s locker room is provided due to the all-female resident population), there are equal numbers of showers in the men’s and women’s locker rooms. For instance, if there are three showers in the men’s locker room, there would also be three in the women’s.

What the general public calls a “whirlpool” or “Jacuzzi” (which is a brand name), is actually, by code, called a spa. Whirlpools are generally quite small and used under the direction of medical personnel. Spas, on the other hand, are small pools of heated water used for soaking, relaxation, massage, and/or hydrotherapy.
If you are designing a pool for an athletic facility, many aspects of the design will be defined by standards. On the other end of the spectrum, there are pools that are basically designed for show, where the design decisions don’t matter so much as what fits (because the pool’s design goals are not about use). However, if your pool falls somewhere in between these two, you will be faced with many design decisions, as well as some constraints. Also, designing for a senior population layers on an additional level of decisions.

From determining a pool’s basic size and location to addressing its lighting needs, pool design can be complicated and has many important factors to consider. Though it may be necessary to engage a consultant (e.g. a sports fitness design consultant, acoustician, etc.), the following are some key considerations that came out of the research study, which designers should be aware of when embarking on the design of a pool for a senior population. Please refer to the Detailed Research Findings section for more information on each topic.
“SHBAL” / “VHBAL”

According to sports facility consultant James P. Goldman, AIA, most of the issues and concerns that are raised when planning a sports/recreation/activities center, be it new construction or a renovation, are generally quantitative in nature (e.g. determining the dimensions of the pool). However, the qualitative aspects are often what make a person look forward to coming back time and again—not to mention wanting to show off the center to prospective members/residents. Furthermore, very few of these qualitative features can be changed easily/inexpensively post-construction, which is why it is so important to consider them up front. To assist architects in remembering the key qualitative aspects to consider during the design process, Mr. Goldman developed the acronym **SHBAL/VHBAL**.

**S** (or **V**) = **Sight/Visibility**
The fitness center should be seen from the rest of the facility/community. Taken from another perspective, think of it as showing off the pool in a marketing sense, i.e. the marketing of your fitness programs and activities. By designing the center with as many vantage points as possible (including from the exterior), fitness comes to the forefront—a great solution for an organization focused on wellness. Furthermore, the aquatic complex is one of the most expensive areas to build and operate, so why not show it off. Just be careful you balance visibility with (some) people’s desire for a level of privacy while exercising.

**H** = **Height**
Fitness spaces are often designed with ceilings that are too low. The rooms may support their intended functions, but often feel like tunnels because of the large floor areas combined with low ceilings. Many gymnasium ceiling heights are set by their intended activity (e.g. at least 22’ for a basketball court), but for those rooms that do not have standard ceiling heights, be sure to consider the proportions of the space. For instance, a pool room with a ceiling height to room length ratio of 1:4 or 1:5 typically works well.

**B** = **Brightness**
In terms of artificial illumination, many sports have standard lighting levels (e.g. 80 foot candles for basketball, handball, and racquetball/squash). However, it is also important to consider the uniformity of the lighting, as well as the ease of maintaining the lighting (e.g. replacing burnt out lamps).

**A** = **Adjacency**
Don’t think of each fitness program area as a stand-alone space. There are a number of places that could benefit from being adjacent to each other—creating a fitness synergy. For instance, if a dance/aerobics studio is located next to a walking/jogging track, classes could warm up by doing laps. Or, having a weight room near a pool is a good way to encourage swimmers to cross-train. It is also important to consider any storage needs that a space may have (e.g. a closet adjacent to the pool room to store kickboards, hand buoys, etc.)

**L** = **dayLight**
Though daylight is traditionally not incorporated into fitness facilities (and is still often discouraged for sports facilities that will hold televised events), it is a great qualitative addition to a space. Daylight is free, it’s uplifting, and at the same time helps you earn LEED® points. Glare is rarely a problem and the passive solar heat gain is often a plus.
Pool Design Goals

*market value, aesthetics, intended use*

Refer to pages 13-17 for more information.

When starting to design a pool, architects need to consider several key factors, including:

- Local/applicable health and safety codes and requirements (including lifeguard requirements);
- The “feel” of the space—if the pool should be (e.g.) spa resort-like, fitness club-style, or a plain room with great views;
- What kinds of people will be visiting the pool, such as independent living residents who need little to no assistance using the pool, those with mobility impairments, people visiting the pool for aquatherapy sessions, etc.;
- The frequency and duration of use, including the number of people using the pool daily;
- What types of activities will occur there (e.g. lap swimming and walking versus water aerobic classes); and
- Pool access (e.g. 24-hour versus key card access), including any lifeguard requirements.

Pool Layout

*location, size/shape/depth, means of entry, spa*

Refer to pages 18-26 for more information.

Don’t leave the pool layout to the end of the project since this often results in a design based simply on what space is left over in the facility. When laying out the pool, a designer should consider the following.

- The pool should be located in an easy-to-access, central location (e.g. the main Commons building) and adjacent to other fitness areas. (Refer to the “S” and “A” of SHBAL/VHBA, on page 8.)
- Two pools should be considered: one with a warmer water temperature for water aerobics classes and another cooler pool for lap swimming/walking.
- Spas are often appreciated. Of the five evaluated facilities with spas, the sizes range from 56 to 163 square feet, with an average size of 90 square feet.
- A rectangular pool is versatile and creates less water disturbance than a pool with a curved shape.
- The pool’s length should be based on multiples of 100 yards (e.g. 50’, 60’, or 75’), since that is typically how lap swimmers track how far they have swum.
- The pool’s width should be based on the number of lap lanes, with 8’ of width per lane plus an additional 1’ for each outside lane.
- Most pool depths range from 3’ to 4’, allowing for flexibility (e.g. accommodating both water aerobics and lap swimming). However, note that the pool’s depth may affect lifeguarding requirements.
Means of entry into a pool can vary, though there are some recommendations for pool access. For older adults, ladders are not popular; stairs and ramps are. Please note that a ramp with a slope of 1:16 or 1:20 can be safer (i.e. less slippery) than the typical 1:12 slope. Regardless, handrails and a non-slip floor material should always be specified.

**Recommended Means of Pool Access:**

<table>
<thead>
<tr>
<th>Pool type</th>
<th>Pool lifts</th>
<th>Sloped entry</th>
<th>Stairs</th>
<th>Transfer systems</th>
<th>Transfer walls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swimming pool (less than 300 linear feet of pool wall)—one required method of entry, minimum</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming pool (more than 300 linear feet of pool wall)—two required methods of entry, minimum*</td>
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<td></td>
</tr>
<tr>
<td>Spa—one required method of entry, minimum</td>
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<tr>
<td>Wading pool—one required method of entry, minimum</td>
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</table>

* Primary means must be sloped entry or lift; secondary means can be any of the other permitted types.

The pool deck should be a minimum of 3’ wide and broaden to 5’ where equipment extends 18” to 24” onto the deck (e.g. grab rails). This deck width allows sufficient space for people in wheelchairs and for a class instructor to issue poolside directions. However, a minimum width of 8’ should be provided when lounge chairs will be made available.

The pool room’s ceiling height should result in a ratio of 1:4 or 1:5, when compared to the length of the long axis of the room. (Refer to the “H” of SHBAL/VHBAL, on page 8.)

The ceiling above the pool should not distract people doing the backstroke. For instance, the ceiling pattern (e.g. caused by trusses or ceiling tile grids) can be used to provide a visual cue to help people swim straight. Also, swimmers should be prevented from looking directly up into lights. (Refer to the Ambient Environment section on page 11 for more about lighting in pool rooms.)

**Support Spaces**

**changing/locker rooms and bathrooms, equipment storage, staff offices**

Refer to pages 27-30 for more information.

In addition to the pool, itself, the experience of using an aquatic facility can be influenced by the available amenities. Architects should take into account the support spaces, as well.

Many pool users will arrive to the aquatic facility in their clothing and change into their swimsuit when they get there. Accordingly, it is important to address people’s needs in the bathrooms and locker rooms. In addition to being conveniently located to the pool and offering privacy from adjacent public spaces, consider providing:

- A family changing room;
- Lockers that are at least 15” wide (so a pair of shoes can easily fit inside);
- Comfortable seating in the showers and locker rooms (i.e. not just a 12” plank of wood);
Grab rails in the changing/locker rooms, in addition to in the showers;
One large shower (approximately fifteen square feet) for every three
daily users;
Hooks for towels and robes near the showers; and
Shelves in the showers (e.g. for shampoo).
Provide a 30 to 50 square foot closet or alcove off the pool room for
the storage of (e.g.) water-suitable wheelchairs/aquatic chairs, kick
boards, hand buoys, etc.
Pool staffing varies, but consider providing an office (e.g. 10’ by 10’
for two people) that extends onto the pool deck 3’ to 4’ for visibility.

**Ambient Environment**

*lighting, water temperature, air temperature and humidity, acoustics*

Refer to pages 30-33 for more information.

Lighting and ventilation systems in aquatic facilities are often limited by
codes/regulations, as well as owner discretion (e.g. not wanting light fixtures
over the pool because it is difficult to change burnt out bulbs). These systems
also tend to be difficult to control. Designers should work with their client to
specify systems that will provide the control and ambient conditions desired.

- Provide 30 to 40 foot candles of uniform light at the water’s surface.
  (Refer to the “B” of SHBAL/VHBAL, on page 8.)
- Natural light is appreciated in a pool room. (Refer to the “L” of SHBAL/
  VHBAL, on page 8.) Consider orienting the pool room so that its lon-
  gest wall faces south (in the northern hemisphere), with 50% glazing.
The pool’s water temperature should vary depending on the activity intended to occur there: Lap swimmers/walkers prefer water temperatures in the high 70s to low 80s Fahrenheit, which tends to be too cool for people taking water aerobics classes. Instead, these users typically prefer water temperatures in the mid to high 80s. Since you cannot have one pool with half warm water and half cool water, a two-pool scenario is the only solution.

The air temperature in a pool room is typically kept 4° to 5° higher than the water temperature, though only about 1° higher when the water temperature is over 85° Fahrenheit.

When swimmers say they feel cold, it is often due to air passing over their skin. Accordingly, try to prevent drafts while still moving air over the water’s surface to eliminate chloramines (or specify an ultraviolet disinfection system).

Include a dehumidification system to keep the relative air humidity at 50-55%, for comfort as well as to prevent damage to room finishes.

Consider acoustic treatments in the pool room (which is full of hard surfaces), so that pool users are not distracted by noise and can hear instructor directions during aquatic fitness classes.

Operations and Maintenance

Adjacent to the pool room, provide at least 60 square feet for the storage of pool cleaning/maintenance supplies. This room should include a slop sink with a hose attachment and a floor drain. It is also useful to include a hose hydrant (bib) on a wall or floor in the pool room opposite the maintenance supply room.

The pool’s equipment/maintenance room should be conveniently located to the pool. Though filtering systems work best when the equipment is located one floor below the pool, the mechanical room is often located immediately adjacent to the pool (with a trench that allows the pump to operate more efficiently). The mechanical room should include a floor drain(s) and must be ventilated. Providing air-conditioning can also help control humidity and prevent equipment corrosion.

To prevent slips/falls, specify non-slip floor materials throughout the pool room and wet areas of the locker rooms, such as 1” by 1” tile or an interlocking anti-skid PVC flooring system.

To prevent cracks and uneven floors, consider designing the pool deck as a structural element, ensure proper soil compaction, and include sufficient expansion and control joints.

Specifying equipment and finishes that are of a good quality and durable will prolong their life and maintain the excellence of the facility. For instance, since stainless means “stains less” (not “corrosion-proof”) consider using non-metal fixtures where water may splash onto surfaces and dry before being able to be wiped clean.
The following guidelines have been developed to inform decision-making during the process of planning and designing pools for senior living facilities. Though the number of participants from this study (only eight analyzed sites and 23 survey respondents) is too small for statistical significance, each section includes related findings from the post-occupancy evaluations. The report also includes “Ask the Expert” commentary, in which insights from sports facility consultant James P. Goldman, AIA, have been included.\textsuperscript{12}

**Pool Design Goals**

*market value, aesthetics, intended use*

Whether a pool is meant to be a marketing tool or to support a resident population that is focused on fitness, the designer of the pool should begin the design process by understanding who will be using the pool and for what activities. This not only will influence the layout and amenities of the pool and fitness areas, but it will also inform what the aesthetics should be based on (e.g. if it should be like a fitness club or like a spa resort).
Questions that designers should ask themselves and their client include:

- What kind of “feel” should the pool have?
- Who will be using the pool; how frequently and for what duration?
- What types of activities will occur in the pool; how frequently?
- What kind of access will users have to the pool (e.g. 24-hour or key card access)?

Study Findings: Pool Design Goals

The “feel” of the pool:

- Only three of eight facilities noted pool-specific design objectives. These included:
  - Creating a grand, elegant, and sophisticated atmosphere that was pampering and encourages fitness;
  - Providing excellent natural light and a connection to the adjacent outdoor terrace and river; and
  - Including stairs and an appropriate depth so the pool could be used for swimming laps as well as water aerobics.

- In terms of marketing value, six of the facilities said that the pool, pool area, and pool services have had a positive impact on attracting residents. Several facilities responded that residents moved to the facility (in part) because of the pool; and that residents are proud to show the pool to visitors.

- Seven of the facilities noted how much they appreciate the aesthetics of their pool room. The appearance of the pools in these facilities vary, from spaces that look like modern, high-end spa resorts, to fitness clubs, to plain rooms that focus more on their plentiful windows and great views to the outdoors.

Pool users and the frequency and duration of use:

- Of the respondents that answered the question, the number of anticipated pool users ranged from 30 to 100 people for facilities housing roughly 150 to 600 independent living, assisted living, skilled nursing, and memory support residents. The pools were expected to be used by approximately one-quarter of the resident population. In reality, the average number of pool users per day ranges from less than 10 and up to 30 people—closer to one-fifteenth of the resident population.

- The typical number of hours per day that the pool is used ranges from two to six hours, with an average of about four hours. When asked to rate if this usage is high or low in their opinion, seven of eight respondents felt that the pool should be used more than it currently is. For six of these facilities, their rate of usage reportedly has not changed since their facility was opened. The two other facilities, however, have noticed that pool usage has increased, perhaps (according to one respondent) because residents are becoming more aware of the benefits of aquatherapy and are taking greater advantage of it.

- The eight pools are used largely by independent living residents, ranging from 10% to 90% of the users at the different facilities, with an average of 52%. Assisted living residents are the next largest group of users, ranging from 5% to 50% of the users, with an average of 11%.
Very few skilled nursing residents use the pools, ranging from 0% to 10% of the users at the different facilities, with an average of 3%. None of the facilities listed memory support residents using the pools. Use of the pools by staff ranges from 0% to 10% of the users, with an average of 3%. Use of the pools by visitors (i.e. non-staff and non-residents) ranges from 5% to 15% of the users at the different facilities, with an average of 7%.

The use of the pools by men versus women is comparable to the proportions of men and women living in the facilities: an average of approximately 25% men to 75% women.
In terms of requiring assistance when using the pool (e.g. needing help to get in and out of the water, or a therapist to assist with participation in water activities), pool users requiring no assistance range from 40% to 100% at the different facilities, with an average of 86%. Pool users requiring some assistance range from 0% to 50%, with an average of 12%. Users requiring full assistance range from 0% to 10% at the different facilities, with an average of 2%.

In terms of the activities that occur in the pools:

- People like to swim laps. This activity usually occurs several times a week, if not daily. The typical number of lap swimmers per day at the different facilities ranges from zero to twelve, with an average of six swimmers per day.
- Lap walking is also well liked and occurs daily at some of the facilities. Other facilities, however, report few instances of lap walking. The typical number of lap walkers per day at the different facilities ranges from zero to ten, with an average of five walkers per day.
- Group aquatic exercise classes usually occur several times a week at the facilities; and are very popular. The typical number of group classes per week at the different facilities ranges from one to six, with an average of four classes per week. The usual number of participants per class ranges from three to forty, with an average of ten people per class.
- Free swimming occurs at all eight facilities, with people typically visiting the pool three to five days a week.
- Swimming instruction occurs at only one facility, but it is very well liked and is offered there three times a week.
- Aquatherapy sessions occur at two of the facilities, two to three times each week. Those who participate enjoy these sessions a lot.
- One-on-one rehab with a specialized instructor occurs at three of the facilities, where sessions are held two to three times each week. The sessions are reportedly popular.
Pool access:

- Three respondents indicated that the pool was expected to be open from about 8am to 8pm daily.
- In reality, three of the eight facilities offer 24-hour access to the pool (one of which requires a proxy card). The remaining five facilities only offer scheduled access to the pool (i.e. during select posted hours).
- Two respondents noted that the same residents typically use the pool on a daily basis; and that the pool is busier in the morning than in the afternoon/evening.
- One facility noted issues with access into their pool room since the doors are heavy and difficult to maneuver through for those using mobility assistance devices.
- Based on the six facilities that provided information regarding the number of days each week and the amount of time per day that the pool is “supervised” (e.g. that there is a lifeguard on duty or an instructor leading a class), the times vary. Several of the facilities are only supervised for one to two hours several times a week. Two facilities extend this to three to four hours several times a week. One facility is supervised for twelve hours daily, though this is by requirement of local regulations.
Pool Layout

location, size/shape/depth, means of entry, spa

All too often, the layout of a pool is simply determined by the leftover space available within a designated fitness area. However, certain factors (e.g. pool length, depth, and width of the surrounding deck) influence what kinds of activities can occur within and around the pool. For instance, pools used for lap swimming are typically longer and preferably have cooler water temperatures than pools used for aquatherapy. In addition, pools used for therapy and water aerobics need a wider pool deck so that staff can stand outside the pool to issue instructions and demonstrate body positioning. Furthermore, how people get into/out of the pool (e.g. via a ladder, stairs, or ramp) can also influence how much a pool gets used.

Because the pool will not be used if people find it a difficult or frustrating experience, designers need to be conscious of how the choices that they make regarding pool layout can affect the use of the pool. Questions that designers should ask themselves and their client include:

- Where should the pool be located within the facility?
- Where should the pool be located in relation to other fitness spaces?
- Should more than one type of pool be offered?
- What size and shape should the pool be?
- How deep should the pool be?
- How large should the pool deck be (both for circulation and additional space for furnishings that support socialization)?
- Are multiple access points and varied means of entry provided for pool users to get into/out of the water?
- Should a spa be provided?

Designers should also follow regulatory codes. See Appendix H for the ADA Accessibility Guidelines for Recreation Facilities, section 15.8: Swimming Pools, Wading Pools, and Spas (2002).

Study Findings: Pool Layout

Pool location:

- All eight pools are located within a main Commons building, in a larger fitness center that includes such spaces as locker rooms, a fitness equipment room, and/or exercise classroom.
- One pool is located on a subterranean level, with no natural light. The seven other pools are located on the ground floor of their facility; each with windows to the outdoors and some with adjacent outdoor patios. Two of these facilities also have glazed roofs.

Ask the Expert

How do you handle permitting?
In terms of permitting, I generally require the Swimming Pool Contractor (SPC) to secure all permits that pertain to both the construction of the pool and, once completed, the permit to operate the pool.

Where should my pool be located?
I encourage my clients to make the pool visible from as many locations as possible. By making the pool and other fitness spaces visible, it highlights the space for marketing purposes and “reminds” people to meet their fitness goals. An aquatic complex is an expensive space to construct, to maintain, and to staff—so why not show it off along with other activity areas of your center. (Just be aware of privacy issues, since some people feel uncomfortable when seen in their swimwear.) Locating the pool within a larger fitness center is also beneficial since the adjacencies create a synergy focused on wellness. Consider creating a fitness suite consisting of an exercise classroom, fitness equipment room, PT/OT therapy gym, indoor pool, locker rooms, a place to socialize (such as a juice bar), and connections to the outdoors to encourage people to socialize as well as work out.
One facility, which is in Japan, said that they would have preferred the pool to be located adjacent to the ofuros (traditional Japanese baths) since residents typically swim and then go to the ofuro baths.

Types of pools:
- When asked, one of the facilities indicated that they would have preferred two separate pools (one pool for lap swimmers/walkers and a separate pool for water aerobics classes). The reason cited was that lap swimmers prefer the water temperature to be cooler.

**Ask the Expert**
Why would I offer more than one pool?
I always urge my clients to consider two pools, since that is the only way to settle the common water temperature debate.
Pool size and shape:

- At the eight facilities, pool sizes range from about 300 to 2,420 net square feet, with an average of 1,240 net square feet. Pool widths range from about 13’ to 40’, with an average of 23’-4”; and pool lengths range from 23’ to 65’-6”, with an average of about 50’—a third less than the standard 75’ length for lap pools. When asked if the size of their pool is appropriate for the number of users and types of activities desired to take place there, seven of the eight respondents said that their pool size is appropriate. The sizes of the evaluated pools do not seem to relate to the frequency, type, or user preferences for the activities that occur in the pools. However, as a greater number of older adults begin to swim for exercise, the stronger the desire will be for pools that meet the expectations and standards for the sport.

- All eight pools are rectangular in shape.

- For the five sites where information was available, ceiling heights in the pool rooms range from 10’-8” to 24’, with an average of 15’-3”. Ceiling height to pool room length ratios range from 1:3 to 1:6, with an average of 1:4.

Pool depth:

- At the eight facilities, pool depths range from 3’ to 4’-6”. None of the facilities described an issue with the depth of their pool. However, two respondents commented that they particularly like the depth of their pools (one having a depth of 3’ to 3’-6” and the other having a depth of 3’ to 4’). The depths of the eight pools do not seem to relate to the frequency, type, or user preferences for the activities that occur there.

- When asked if their pool users prefer a specific water depth, most facilities did not list a preference. However, one facility noted that their 4’-6” depth is not as well liked as the shallower portion of the pool, where there is a 4’ depth.

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Ask the Expert

What advice do you have about pool size?

In terms of pool length, lap swimmers typically track the number of hundreds of yards that they swim. Accordingly, a pool size in multiples of 100 yards is best. For instance, four laps in a 75’ (25 yard) long pool equal 100 yards. Where space and/or budget constraints limit the pool length, shorter pools of 50’ or 60’ (also multiples of 100 yards) work out well.

Pool widths are typically based on lap lane sizes. When considering what width to make a pool for lap swimming, I suggest starting with 8’ wide lanes, with an additional 1’ of width for the outside lanes. If there are space or budget restrictions, 7’ wide lines (again with an additional foot for the outside lanes) are acceptable.

Why are public pools typically rectangular?

Rectangular pools are versatile, since they more easily serve different pool activities (e.g. supporting lap swimming as well as water aerobics). Rectangular pools also generate less turbulence than curved pools, making them more practical for swimming and aquatherapy programs. Rectangular pools have an additional advantage over irregularly shaped pools in that they can be fitted with a mechanized pool cover.

How tall should the ceilings be in the pool room?

When considering the ceiling height of the pool room, I strongly recommend that the ratio of the ceiling height to the long axis of the pool room be as close to 1:5 as possible, though a ratio of 1:4 is even better. In addition, be conscious of the treatment of the ceiling. Just as lane lines on the pool’s floor provides scale and visual cues for swimmers, the ceiling treatment over the pool can also be influential.

A regular ceiling pattern (e.g. made by trusses or ceiling tile grids) can help people doing the backstroke stay swimming in a straight line. Someone could easily be thrown off by a ceiling pattern that is curved, on a diagonal, or (to a lesser extent) perpendicular to the swimming lanes. It is also important to consider other elements that are over the pool, such as the artificial lighting. Lights should be aligned with the lane lines instead of over the middle of the lanes so that people doing the backstroke don’t have to look up into the lights.
Pool room ratios:

<table>
<thead>
<tr>
<th>Building</th>
<th>Ceiling height</th>
<th>Pool room length</th>
<th>Height to length ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kendal on Hudson</td>
<td>24’</td>
<td>68’</td>
<td>1 : 2.8</td>
</tr>
<tr>
<td>Sun City Park Yokohama</td>
<td>15'-8&quot;</td>
<td>70’</td>
<td>1 : 4.4</td>
</tr>
<tr>
<td>Masonic Village at Sewickley</td>
<td>15'-3&quot;</td>
<td>75’</td>
<td>1 : 4.9</td>
</tr>
<tr>
<td>Buckingham’s Choice</td>
<td>10'-10”</td>
<td>66'-3”</td>
<td>1 : 6.1</td>
</tr>
</tbody>
</table>
Means of entry into/out of the pool:

- All eight pools have one to three ladders, with an average of two ladders per pool. Most pool users reportedly find the ladders difficult to use; and ladder use is disliked, with five of the eight respondents describing the ladders as “unpopular” or “very unpopular.”

- All eight pools have a set of stairs, with one pool offering two sets of stairs. Most pool users find the stairs easy to use, with five of the eight respondents listing the use of the stairs as “easy” or “very easy.” Similarly, using the stairs is well liked, with six of the eight respondents listing the use of the stairs as “popular” or “very popular.”

- Only one pool has a ramp. This one respondent indicated that it is “easy” to use the ramp; and that the ramp is “very popular.” Several other facilities also noted that they would have liked to have a ramp to make access to the water easier.

- Six of the pools have a pool lift. Of those facilities that have a pool lift, the reported ease of use varies: Most pool users are “neutral,” but one Wellness Manager reported that residents find the pool lift “very difficult” to use. Whereas another two Managers said that the pool lifts are “easy” to use. Likewise, the frequency of use varies: Most pool users find the pool lift to be “unpopular” or “very unpopular,” but one facility finds the pool lift to be “popular.”

- None of the pools has a transfer wall.

- None of the pools has transfer steps.

- None of the pools has a zero depth entry (i.e. beach entry).

- One facility (that has a pool ramp) has a water-suitable wheelchair/aquatic chair. This one respondent indicated that it is “easy” to use the water-suitable wheelchair/aquatic chair. However, using the watersuitable wheelchair/aquatic chair is apparently “unpopular.”

- None of the pools has a movable floor.

Pool deck size (for circulation, as well as additional space for furnishings that support socialization):

- At the eight facilities, pool deck widths in areas for circulation range from approximately 3'-6” to 8'-6”. However, at all eight facilities, pool decks expanded in width at certain points to accommodate furnishings, such as chairs and plants. Where the pool decks widened to accommodate space for socializing and furnishings, the pool deck widths are an additional 1'-6” to 11’ wide.

- When asked about what activities occur in the pool room, respondents indicated that the frequency of poolside socialization (without the intention of swimming) varies. At some facilities, it is a daily occurrence; whereas at others it occurs only rarely. Similarly, the popularity of poolside socialization varies, with some facilities finding it very well liked and some not liking it. Poolside social events (e.g. pool parties,
**Means of Pool Access:**

<table>
<thead>
<tr>
<th>Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pool ladder</strong></td>
<td>Attached to the side wall and deck of a pool, swimming pool ladders typically consist of plastic steps and metal handrail bars that support the steps and assist a person getting into/out of the water.</td>
</tr>
<tr>
<td><strong>Pool stairs</strong></td>
<td>Similar to normal stairs found in buildings, pool access stairs have handrails for added support for individuals with disabilities that are ambulatory. The stairs are designed into a pool or added through a separate stair attachment.</td>
</tr>
<tr>
<td><strong>Pool ramp</strong></td>
<td>Similar to ramps that provide access into buildings, sloped entries into pools are either designed into a pool or added afterwards with a separate ramp attachment. Individuals with disabilities may transfer onto an aquatic wheelchair, with an assistant pushing them up and down the sloped entry.</td>
</tr>
<tr>
<td><strong>Pool lift</strong></td>
<td>Pool lifts consist of equipment operating above the pool deck that uses an independent power source to lower and raise a person into the water. People transfer onto the lift seat from their wheelchair on the pool deck.</td>
</tr>
<tr>
<td><strong>Transfer walls</strong></td>
<td>Transfer walls are designed and built into pools. Transfer walls consist of a trough parallel to the pool wall that allows a user to transfer onto the top of the wall directly from their wheelchair. Once on top of the wall, they can then lower themselves into the water.</td>
</tr>
<tr>
<td><strong>Transfer steps</strong></td>
<td>Typically, transfer systems consist of a platform and have either a series of steps or an elevator mechanism. Systems with an elevator mechanism allow a user to roll their aquatic wheelchair onto the platform. The elevator then lowers the entire chair into the pool. Systems that use the transfer steps allow a user to transfer onto a platform. Then, with the use of handrails, lower themselves into the water one step at a time.</td>
</tr>
<tr>
<td><strong>Zero depth entry</strong></td>
<td>Also known as “beach entry,” a zero-entry swimming pool offers a floor that gradually slopes from the pool deck into the water, like entering from a beach into a lake. By code, the maximum slope for a zero-entry pool is 1:12. However, if space allows, a slope of 1:16 or 1:20 is encouraged. When the slope exceeds 1:20, it is considered a ramp and should provide features accordingly (e.g. handrails).</td>
</tr>
<tr>
<td><strong>Water-suitable wheelchair/aquatic chair</strong></td>
<td>A wheelchair specifically designed and built to be used in water, typically made with PVC and stainless steel materials. Aquatic chairs are often used when a pool ramp and/or zero depth entry is available.</td>
</tr>
</tbody>
</table>
Pool decks

1" = 20'

Glenmeadow Retirement Community
Pool: 20' by 40'
Pool deck: 6' to 19'-10"'
Spa: 9' by 9'

Buckingham’s Choice
Pool: 20' to 26' by 50'
Pool deck: 3'-8" to 9'

Grand Rapids Dominican Sisters – Marywood Center
Pool: 23' by 13'
Pool deck: 5' to 8'

Sun City Park Yokohama
Pool: 7m to 8.25m by 20m (23' to 27' by 65'-7")
Pool deck: 1.5 m to 3.9 m (5' to 12'-10")
Spa: 2.6m dia. (8'-6" dia.)
Masonic Village at Sewickley
Pool: 39'-6" to 48’ by 61'-4"
Pool deck: 6' to 15'-5"
Spa: 13'-7" by 12'

The Tradition of the Palm Beaches
Pool: 24'-4" by 51'-6" to 59'-6"
Pool deck: 5'-10" to 16'-7"
Spa: 12'-10" by 7'-2"

Kendal on Hudson
Pool: 24' by 50'
Pool deck: 5'-10" to 15'-10"

Meramec Bluffs
Pool: 24' to 28' by 60'
Pool deck: 4' to 15'
Spa: 5' to 7' by 10'
poolside barbecues, etc.) are reportedly well liked and occur at five of the eight facilities, typically a few times a year. Three of the five pools have adjacent outdoor patios, where parties can spill out onto; and one facility has an adjacent indoor lounge that promotes socialization within the fitness center.

Provision of a spa:
- Five of the eight facilities have a spa; and two of the remaining three facilities noted that they wish they had a spa. Respondents from two of the facilities with a spa made particular note of how much their spa is appreciated.
- The facilities’ spas are typically used by less than 10 and up to 20 people each day, for a cumulative range of one to six total hours and a cumulative average of about three hours per day.

**Ask the Expert**

How wide should the pool deck be?

ANSI\(^2\) states, “a deck clearance of three feet (3’) shall be provided around all... deck equipment.” When grab rails extend onto the deck (at a range of 18” to 24”), the minimum deck width should be 5’, which is also a good size for wheelchair users and water aerobics instructors providing poolside instruction. If lounge chairs will be provided, then a width of 8’ or more would be appropriate.

Kendal on Hudson’s expanded pool deck accommodates furnishings that promote socialization and introduces daylight into the pool room.

The spa at Masonic Village at Sewickley acts as a social gathering space; and the large adjacent windows allow people to connect with nature.
Support Spaces
changing/locker rooms and bathrooms, equipment storage, staff offices

In addition to the pool room, several support spaces tend to be located adjacent to the fitness facilities. The proximity, sizing, and amenities included in the pool’s locker rooms and storage areas can influence the experience of using the pool. For instance, if someone has to walk through a public space to get to/from the changing rooms and pool, there may not be an adequate amount of privacy, thereby limiting people’s use of the pool. If there is not enough storage for pool equipment (e.g. water-suitable wheelchairs/aquatic chairs, kick boards, hand buoys, etc.) and these items are left on the pool deck, the pool room may look messy and not show well for prospective residents.

Questions that designers should ask themselves and their client include:
- Are the bathrooms and changing/locker rooms conveniently located?
- What quantity of showers in the locker rooms should be provided?
- Should a family changing room be provided?
- Is there sufficient privacy between the pool and changing/locker rooms?
- Where will pool equipment and leisure items be stored?
- Will a staff office adjacent to the pool room, with visual control of the pool area and entrance, be required (e.g. for a lifeguard)?

Study Findings: Support Spaces

Bathrooms and changing/locker rooms locations:
- In terms of the use of the changing/locker rooms, many pool users are reportedly arriving at the pool in clothing and then changing into their swimwear once they arrive (ranging from 0% to 95% of pool users at the different facilities, with an average of 48%). People arriving in clothing over their swimsuit ranges from 5% to 90%, with an average of 26% of pool users; and people arriving at the pool already in their swimsuit ranges from 0% to 95% at the different facilities, with an average of 26% of pool users.
- All eight facilities said that their bathrooms and changing/locker rooms are conveniently located in relation to their pool. As measured from the door of the locker room to the edge of the pool (nearest to the door to the locker room), the men’s and women’s locker rooms are both on average 18’ away from the pool, with a range of about 8’ to 42’ for men’s and 0’ to 50’ for women’s. As measured from the door of the closest bathroom stall to the edge of the pool (nearest to the bathrooms), men’s bathrooms are on average about 40’ away from the pool, with a range of 28’ to 62’ at the different facilities. The women’s bathrooms are on average about 37’ away from the pool, with a range of about 16’ to 65’ at the different facilities.
- Only one of the facilities also offers a family changing room (for one-person use with an assistant, e.g. spouses assisting with dressing).
Quantity of showers in locker rooms:
- In the men’s locker rooms, the quantity of showers range from zero to four at the different facilities, with an average of two. In the women’s locker rooms, the quantity of showers also range from one to four, with an average of two. Typically, the number of showers to the number of daily users is approximately 1:3. In all but one facility (where only a women’s locker room is provided due to the all-female resident population), there are equal numbers of showers in the men’s and women’s locker rooms. For instance, if there are three showers in the men’s locker room, there are also three in the women’s.
- Only one facility offers a rinse shower on the pool deck. Unfortunately, feedback was not provided about whether this shower is used any more or less frequently than the showers available inside the locker rooms.
- One facility noted that they would have liked stainless steel handrails in the changing/locker rooms in addition to in the shower areas. Another facility noted that they would have liked hooks inside the shower stalls or outside the shower units so that residents could hang their towels and robes. This same facility also indicated that they are in need of a place for people to set their shampoo, etc. in the showers.

Storage of pool equipment (e.g. water-suitable wheelchairs/aquatic chairs, kick boards, hand buoys, etc.):
- Four facilities have a room or alcove designated for pool equipment storage. Of those who do not have a storage space, pool equipment is reportedly stored within the pool area (e.g. on open shelves on the pool deck).
- In terms of access to the pool equipment, seven of the eight respondents said that pool users have unlimited autonomous access; whereas one facility only offers autonomous access to certain equipment. None of the facilities indicated that pool users require staff assistance to access pool equipment.

Ask the Expert
How many showers do I need to include in the locker rooms?
The ANSI code, under 19.6.4, requires “two shower heads for the first 100 of each gender.” Local Health Departments, however, generally permit a reduction in fixture counts where the users’ residences (e.g. apartments) are conveniently located to the pool.

What locker room provisions should I consider?
I would suggest a couple of things:
- I can’t emphasize enough that 12” wide lockers should not be used since most pairs of shoes are difficult to fit inside. I strongly urge that lockers be at least 15” wide. If stacked lockers are specified, then 18” wide lockers should be provided.
- Specifying non-corrosive materials is important; and wood has a certain richness to it.
- Handrails in the showers are necessary and should also be considered on the adjacent locker room walls.
- Towel/robe hooks are important to include; and a small stainless steel wall-mounted shelf in each shower stall is very useful.
- Feedback from senior locker room users also indicates that providing seating at the lockers (not just an uncomfortable 12” wood plank bench) and in the shower area is useful.
- A floor drain is also necessary directly beneath the swimsuit water extractor’s drain hose, if it can’t be plumbed directly to the sanitary waste system.

Wood can enhance the appearance of a locker room.

Where should pool equipment be stored?
A storage area directly accessible to the pool deck is a necessity. If there is not enough space for a storage room, then an alcove (roughly 3’ or 4’ deep by 10’ to 12’ wide) with a couple of high shelves should suffice.
None of the facilities has had any issues with privacy in the changing/locker rooms or shower areas. However, one facility (located in Japan) did note that some residents (particularly women) are uncomfortable being seen in their swimwear from the corridor and elevator lobby adjacent to the pool. Accordingly, they have had to add curtains over the large glass windows between these spaces. The curtains are shut when the pool is in use, though they try to have them open when it is not in use.

There is no storage closet near the pool room at Masonic Village at Sewickley, so equipment is stored on the pool deck (as seen in the picture to the right). This compares to Kendal on Hudson, which has a storage closet off the pool room (as pictured in the plan and photograph below).

Privacy between the pool and changing/locker rooms:

- There is a privacy issue between the pool and adjacent hallway at Sun City Park Yokohama: Curtains had to be added to the glazed opening (pictured in the photograph above and the plan to the left) so that people waiting in the adjacent elevator lobby cannot watch pool users.
Staff office(s):

- Staff supporting the pool and pool services/activities at the eight facilities vary. Full-time staff members range from zero to six employees, with an average of two full-time staff members. Part-time staff members range from one to three employees, with an average of two part-time staff members. Pool-related job descriptions (for both full- and part-time staff members) include:
  - Fitness and/or therapy staff member(s) are employed by four facilities;
  - Maintenance technician(s) are used to check temperature and chemicals daily at three facilities;
  - Janitor(s) clean the pool area at two facilities; and
  - Two facilities contract with an outside company to monitor/manage pool chemicals, teach classes, and/or provide lifeguarding services.

Ambient Environment

*lighting, water temperature, air temperature and humidity, acoustics*

Survey feedback indicates that the systems incorporated into the pool area, from lighting to acoustics to indoor air quality, can be difficult to control. Questions that designers should ask themselves and their client include:

- What kind of artificial lighting will be provided in the pool/pool room; how will it be controlled?
- What kind of natural lighting will be provided in the pool room; how will it be controlled?
- What water temperature will be provided in the pool; how will it be controlled?
- What air temperature will be provided in the pool room?
- How will it be controlled and how will drafts be prevented?
- How will the air humidity in the pool room be controlled?
- How will acoustics be addressed, from ameliorating distracting noises to incorporating a speaker system (e.g. for music or class instructor directions)?

Ask the Expert

Do you have any advice about the staff office? Pools/spas are required to have a Certified Pool Operator (CPO). As noted in ANSI 22.1 “a CPR-certified person shall be on the premises when the pool is in use.” Some jurisdictions, however, don’t require lifeguards for Class C pools which “are pools intended for use for apartments, condominiums, property owners associations, multi-family owned pools, etc.” On the other hand, the facility’s insurance coverage may require a lifeguard to be on duty while the pool is in use for the first 50 swimmers for a pool of up to 6,000 square feet.

As the pool increases in size, so does the lifeguard requirement. For a small indoor pool, a lifeguard’s chair may not be required—though, again, this should be cleared with the local codes and Health Department.

A staff office of about 10’ by 10’ should be sufficient for two people. I also recommend that the office extend 3’ to 4’ onto the pool deck to provide a view up and down the pool deck.
Study Findings: Ambient Environment

Artificial lighting:
- Most of the eight facilities find the artificial lighting satisfactory, both in terms of quality of light and ability to control it. One community did, however, find it difficult to control their artificial lighting since their emergency lights remain on all of the time.

Non-Televised Indoor Lighting Recommendations for Swimming

<table>
<thead>
<tr>
<th>Class</th>
<th>Horizontal illuminance</th>
<th>Uniformity min/ave</th>
<th>Colour rendering</th>
<th>Glare rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>500</td>
<td>.7</td>
<td>&gt;60</td>
<td>N/A</td>
</tr>
<tr>
<td>II</td>
<td>300</td>
<td>.7</td>
<td>&gt;60</td>
<td>N/A</td>
</tr>
<tr>
<td>III</td>
<td>200</td>
<td>.5</td>
<td>&gt;20</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Note: For diving, vertical uniformity should also be considered. Class I: 0.8 Eh/Ev. Class II: 0.5 Eh/Ev. Class III: 0.5 Eh/Ev.

Ask the Expert

Any thoughts about artificial lighting for the pool? For an indoor pool used by a senior population for recreation (i.e. not for televised sporting events), I suggest 30-40 foot candles of illumination (measured at the water’s surface), which is best achieved by placing the lighting fixtures directly over the water. However, maintenance staff tends to frown on this practice since they must erect scaffolding to replace burnt lamps, or the fixtures need to be specified with lowering devices (either manual or powered)—substantially increasing their cost. It is also important to consider the lighting’s uniformity.

When a pool is about 30’ wide or narrower, it can effectively be lit by mounting prismatic acrylic reflector fixtures directly over the edges of the pool. I like the Guth Enviroguard Dual Optical Assembly Metal Halide suspended fixture* since it has both a down- and side-illuminating lens which greatly enhances the brightness of the space; whereas most indirect fixture layouts merely create hot spots on the walls and/or ceiling and do very little to illuminate the water and, most importantly, the bottom of the pool. You may also want to consider specifying fiber optics lighting, which would allow you to have the lamp source in an easy-to-access location that could be a distance away from the pool. In terms underwater lighting: In today’s market, most (if not all) pool light fixtures are designed for wet niche applications. I like the fixtures manufactured by Pentair,* but the lamp type, size, and location should be discussed with your lighting consultant.

* The views expressed on this page are those of the participants, not Perkins Eastman.
Natural lighting:

- Most of the eight facilities find controlling daylight in their pool room to be fairly easy; and most are happy with the amount of natural light in the pool area. Of the two facilities that are “very dissatisfied,” one explained that they receive no daylight because the pool is located below grade. This respondent indicated that it would have been nice to have a pool at grade level so it could have been connected to the outdoors, particularly providing access to a garden. Four facilities made particular note of how much they appreciate the natural light and connection to the outdoors that is available in their pool rooms. In fact, one facility with a glazed roof wishes that their roof could retract so the pool room could be open to the outdoors when the weather permits.

- Half of the evaluated facilities feel “neutral” about the window treatments in their pool rooms; the other half are “satisfied.” It was not clear if any of the facilities had problems controlling the natural light with the window treatments in the pool rooms.

Ask the Expert

How do you feel about daylighting in pool rooms?
Providing natural light in fitness spaces may be the most controversial qualitative aspect to a design. Traditionally lit solely by artificial means (i.e. electric lighting), daylighting has become much more prevalent—especially in aquatic centers. Daylight is free, it is uplifting, and it is environmentally sustainable. I strongly recommend that the longest wall in the pool room be as close to south facing (in the northern hemisphere) as possible, with at least 50% of the wall glazed from the pool deck to as close to the ceiling as possible. Glare is rarely a problem and the passive solar heat gain is usually a plus. Additionally, the ceiling and wall finishes should be light colored to reflect the light.

The pool at The Tradition of the Palm Beaches has a glazed roof, which adds to the profuse natural light in the space.
Water temperature:
- Most of the facilities find the water temperature in their pools to be satisfactory; and most find controlling the water temperature to be fairly easy. Based on feedback from six respondents, the typical water temperature in the pool ranges from 82° to 90°, with an average of about 86° Fahrenheit. Respondents indicated that a water temperature in the mid to upper 80s is appreciated, though several facilities did note that there is a constant debate over what is the appropriate temperature.

Air temperature:
- Most of the facilities find the air temperature in the pool rooms to be satisfactory. However, most also find controlling the air temperature to be fairly difficult. Based on responses from six respondents, the typical air temperature in the pool room ranges from 78° to 92°, with an average of about 85° Fahrenheit—one degree cooler than the average water temperature.

Air humidity:
- Based on responses from four respondents, the typical relative humidity of the air in the pool rooms range from 35% to 60% at the different facilities, with an average of 43%. Most of the facilities find it difficult to control the humidity in their pool room.

Acoustics (from ameliorating distracting noises to incorporating a speaker system for music and/or class instructor directions):
- Most of the facilities are satisfied with the acoustics in their pool room. Of the two facilities that are dissatisfied, one said that it is due to “bad echoes” (likely caused by the shape of and the materials used in the pool room); and the other said that the fans and generators near the pool room make the space too noisy.

---

**Ask the Expert**

**How can I regulate the pool’s water temperature?**

Some systems deliver the exact water temperature shown on the pool’s thermometer, while others are always off. The pool operator will (generally) take that discrepancy into account when adjusting the system. However, to provide both warm water and cool water temperatures for different aquatic activities, two separate pools must be provided (see the previous section regarding why you might want to consider providing more than one pool).

**What should the pool room’s air temperature be set to?**

Generally, the air temperature is set to 4° to 5° higher than the water temperature. However, once the water temperature is set above 85° Fahrenheit, then the air temperature tends to be just a degree or so above the water temperature. When swimmers complain about the air being too cold, it is typically due to air passing over their wet skin. Accordingly, it is very important to think about how and where the air is entering the space—keeping in mind that it needs to pass over the water’s surface to help rid the space of chloramines, which can affect those with breathing problems. (I also like to specify ultraviolet disinfection systems as part of the chemical treatment system to help eliminate those troublesome chloramines.)

**Do you have any advice about controlling air humidity in the pool room?**

Humidity in the pool room is preferably controlled by a dehumidification system—essentially an air conditioning system that is typically set for pools between 50% and 55% relative humidity for swimmer comfort as well as to prevent damage to room finishes. Additionally, combining dehumidification with heat recovery can save on energy costs (though requires a higher initial expenditure).

**How can the acoustics in the pool room be improved?**

The finishes in a pool room are hard; and when you consider water also to be a hard surface, the room tends to be noisy. Retaining an acoustic engineer is advisable, but if that isn’t in the budget, a first step in reducing excessive sound reverberation (i.e. “noise”) is to treat about 30% of the total hard surface with a sound reducing material, such as Armstrong World Industries’ Optima Fiberglass Durabrite ceiling tiles.* This material is relatively inexpensive, easy to wipe down, and attractive looking. It is also important to consider the location of the air moving equipment, which should be in a remote location away from the pool and should be well insulated to guard against distracting motor noise.

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* The views expressed on this page are those of the participants, not Perkins Eastman.
Operations and Maintenance

operations, finishes, maintenance

The extreme environment of a pool room (one that is often very warm and very wet) requires special consideration, or frequent maintenance issues can result. Questions that designers should ask themselves and their client include:

- Is the maintenance storage/mechanical room conveniently located?
- Can automated systems make pool operations easier?
- Does the material used for the pool deck (and other wet surfaces) have sufficient traction so that it is slip-resistant, though non-abrasive and easily cleaned?
- How can the pool and pool room be made easy to maintain—are equipment/finishes of good quality and durable?

Study Findings: Operations and Maintenance

Pool operations and the location of a maintenance storage/mechanical room:

- Most of the facilities reported “neutral” or “good” ratings for the ease of operations. The comments received regarding improvements include:
  - Providing floor drains and better ventilation in the pump room;
  - Including an automatic chemical dispensing system;
  - Providing easier access to the equipment room; and
  - Designing for more accurate temperature regulation.

Ask the Expert

Can automated systems make pool operations easier?

Code requires pool chemicals to be monitored on a daily basis (e.g. chlorine and pH levels should be checked several times a day). I often recommend installing an automated chemical dispensing system since they can make pool maintenance more convenient. Some systems can even be designed to interface with a person’s (cell) phone in case of a system emergency as well as being able to monitor the pool’s systems.

If the conditions in the pool are significantly different from the readings on the auto-controller, then the pool’s Certified Pool Operator (CPO) must recalibrate the monitoring system. For instance, if the pH reading in the pool is a constant 7.5 (which is an ideal reading), but the controller in the filter room reads 7.9, then the monitoring system should be recalibrated. (It would be very unusual if a factory representative has not trained the CPO.) Another example would be if the water level is too low or too high, then the auto-fill probe must be reset or replaced. The CPO should also check on a weekly basis the water’s alkalinity and adjust, as necessary. It also might not be a bad idea to have a factory representative come and check out these systems on a yearly basis.

Where should the pool’s equipment/maintenance room be located; and are there other aspects I need to consider?

The storage room (e.g. for pool cleaning/maintenance supplies) should be located directly off the pool deck so that maintenance staff has easy access to the equipment. This room should have an area of about 60 square feet and should include a slop sink with a hose attachment and a floor drain. It is also useful to include in the pool room a hose hydrant (bib) on a wall or floor opposite the maintenance supply room. (This hydrant could also be the one used for the pool lift.)

On the other hand, locating the pool’s pump/filter in a mechanical room off the pool deck isn’t necessarily the most efficient location. Filtering systems work best when the equipment is located one floor below the pool. However, where there is sufficient floor space available, it’s not uncommon to locate the mechanical room immediately adjacent to the pool. When the equipment isn’t located below the pool, a trench may be constructed in the mechanical room so that the pump can operate more efficiently. The mechanical room should also include a floor drain(s); and by code is required to be ventilated—I also suggest that it be air-conditioned (e.g. to control humidity).
Seven facilities indicated that they have a room designated for storage of pool equipment, such as pool cleaning/maintenance supplies. These storage rooms are typically located directly adjacent to the pool room; and range in size from 15 to 155 square feet. Most of these storage spaces are also nearby or a part of the mechanical rooms. One facility, however, noted that the location of their mechanical room makes it difficult to access, since someone must leave the fitness area and travel through a public hallway to access the room.

Slip resistance of pool deck materials:

- Most of the facilities reportedly have average to good traction on their pool deck flooring. However, one facility noted an issue with slips/falls on wet floor tile.

Pool maintenance, including the durability of equipment/finishes:

- Only two of the eight facilities embarked on modifications/renovations since their pools opened: One pool had been repaired and repainted; and the other was caulked and resurfaced.
- Most of the facilities reported positive ratings for the ease of maintenance. However, one general comment was received: It was recommended that plastic or composite materials be used instead of metal for the floor plates, railings, etc. to prevent rusting.

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Ask the Expert

What flooring material do you like to use to prevent slips/falls; and do you recommend sealing grout to prevent mold and dirt build-up?

In addition to encouraging senior pool users to wear deck shoes on the pool deck and in the locker room showers to prevent slips/falls, I strongly recommend specifying 1” by 1” unglazed slip-resistant ceramic floor tile. The closely spaced grout joints are, in fact, what keeps someone from slipping. Accordingly, I don’t recommend sealing the grout since it tends to make the floor slippery. Even though the grout is not sealed, you shouldn’t have a problem—any issues with mold should be prevented by the dehumidification system; and to hide discoloration, I would suggest using a buff- or grey-colored grout.

Another flooring material that is very effective against slipping (though I don’t care for its appearance and it can be a bit uncomfortable to walk barefoot on) is an interlocking anti-skid PVC flooring system, such as the one manufactured by Dri-Dek, Kiefer Specialty Flooring’s Pro-Dek, or Rec Deck made by RenoSys.* I further urge that the pool bottom be a non-slip surface; and include handrails.

Why do some metal fixtures in the pool room rust while others do not?

It is important to understand that stainless materials “stain less” and by no means are “stain- or corrosion-proof.” The areas most prone to corrosion are those where pool water splashes onto the stainless material and is allowed to air dry—as opposed to those stainless areas where swimmers’ hands rub against the material, such as occurs when a swimmer either enters or leaves the pool. A person’s body oil, in effect, dries as well as protects these stainless surfaces—which is why you will find corrosion on grab rails and hand rails only where hands never touch. Materials also not exposed to air won’t corrode (e.g. a stainless steel gutter that is always immersed in water). To prevent corrosion, I urge maintenance staff to wipe periodically, with a soft cloth and mild liquid cleanser, all of the stainless surfaces.

How can I be sure that the pool and pool deck are well supported in order to prevent future cracks and uneven floors?

One preventive measure is to design the pool deck as a structural element. Another method is to ensure proper soil compaction along with sufficient expansion and control joints. A meeting with the soil engineer and the concrete and tile sub contractors before commencing this phase of the work should prove beneficial.

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Endnotes


Acknowledgements

Perkins Eastman would like to thank James P. Goldman, AIA, for his comments and content, as well as Pattye Stragar for providing access to the Carnegie Mellon University pool. Furthermore, this study would not have been possible without the help of the participants of the study:

- From Buckingham’s Choice: Collier Baird, Executive Director; and Gary Greene, Director of Buildings and Grounds
- From Glenmeadow Retirement Community: Tim Cotz, Executive Director; Laura Lalumiere, Director of Resident Programs; and Everett Brown, Assistant Director of Plant Operations
- From Grand Rapids Dominican Sisters – Marywood Center: Laurie Sefton, Director of Clinical and Life Services; Monica Anderson, Occupational Therapist/Activity Department; and Glenn Dells, Maintenance Manager
- From Kendal on Hudson: Patricia Doyle, Executive Director/CEO; Cathy DiSomma, Fitness Coordinator; and Todd Neavin, Director of Facility Services
- From Masonic Village at Sewickley: Robert W. Kocent, Executive Director; and Mark Cerneskie, Wellness Manager
- From Meramec Bluffs: Terry Etling, Campus Administrator; Kay, Fitness Director; and John W. Von Fange, Director of Environmental Services
- From Sun City Park Yokohama: Aritomo Kanazawa, Executive Director
- From The Tradition of the Palm Beaches: Linda McClamma, Executive Director; and Chiara Bochnia, Health and Wellness Director
### Buckingham’s Choice (see plan on page 24)

<table>
<thead>
<tr>
<th>Facility location</th>
<th>Adamstown, MD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Buckingham’s Choice, Inc.</td>
</tr>
<tr>
<td>Location</td>
<td>At ground level, within the main building</td>
</tr>
<tr>
<td>Size</td>
<td>18’ x 48’ (864 NSF)</td>
</tr>
<tr>
<td>Depth</td>
<td>3’ to 4’ at greatest depth</td>
</tr>
<tr>
<td>Pool deck</td>
<td>Width ranges from 4’ to 8’-11”</td>
</tr>
<tr>
<td>Points of entry</td>
<td>1 ladder, 2 stairs, 1 pool lift</td>
</tr>
<tr>
<td>Spa</td>
<td>No</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>10’-10”</td>
</tr>
</tbody>
</table>

### Glenmeadow Retirement Community (see plan on page 24)

<table>
<thead>
<tr>
<th>Facility location</th>
<th>Longmeadow, MA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Daniel O’Connell’s Sons</td>
</tr>
<tr>
<td>Location</td>
<td>On the ground floor, with a glazed ceiling</td>
</tr>
<tr>
<td>Size</td>
<td>20’ x 40’ (800 NSF)</td>
</tr>
<tr>
<td>Depth</td>
<td>(Unknown)</td>
</tr>
<tr>
<td>Pool deck</td>
<td>Width ranges from 6’-9” to 19’-10”</td>
</tr>
<tr>
<td>Points of entry</td>
<td>2 ladders, 1 stair</td>
</tr>
<tr>
<td>Spa</td>
<td>Yes</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>(Unknown)</td>
</tr>
</tbody>
</table>

### Grand Rapids Dominican Sisters – Marywood Center (see plan on page 24)

<table>
<thead>
<tr>
<th>Facility location</th>
<th>Grand Rapids, MI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Grand Rapids Dominicans</td>
</tr>
<tr>
<td>Location</td>
<td>In a lower level, with windows onto a back courtyard</td>
</tr>
<tr>
<td>Size</td>
<td>13’ x 23’ (299 NSF)</td>
</tr>
<tr>
<td>Depth</td>
<td>Ranges from 3’-3” to 4’</td>
</tr>
<tr>
<td>Pool deck</td>
<td>Width ranges from 5’ to 10’</td>
</tr>
<tr>
<td>Points of entry</td>
<td>1 ladder, 1 stair, 1 pool lift</td>
</tr>
<tr>
<td>Spa</td>
<td>No</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>10’-8”</td>
</tr>
</tbody>
</table>

### Kendal on Hudson (see plan on page 25)

<table>
<thead>
<tr>
<th>Facility location</th>
<th>Sleepy Hollow, NY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>The Kendal Corporation</td>
</tr>
<tr>
<td>Location</td>
<td>In a two-story space on a lower level, with doors out to a terrace and views of the Hudson River</td>
</tr>
<tr>
<td>Size</td>
<td>24’ x 50’ (1,200 NSF)</td>
</tr>
<tr>
<td>Depth</td>
<td>4’ at each end and 4’-6” in center</td>
</tr>
<tr>
<td>Pool deck</td>
<td>Width ranges from 5’-3” to 15’10”</td>
</tr>
<tr>
<td>Points of entry</td>
<td>2 ladders, 1 stair, 1 pool lift</td>
</tr>
<tr>
<td>Spa</td>
<td>No</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>24’</td>
</tr>
</tbody>
</table>
### Masonic Village at Sewickley (see plan on page 25)

<table>
<thead>
<tr>
<th>Facility location</th>
<th>Sewickley, PA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Masonic Homes of Pennsylvania</td>
</tr>
<tr>
<td>Location</td>
<td>At ground level, within the 12,000 square foot fitness center</td>
</tr>
<tr>
<td>Size</td>
<td>39’-5” x 61’-4” (2,418 NSF)</td>
</tr>
<tr>
<td>Depth</td>
<td>3’ at each end and 4’ in center</td>
</tr>
<tr>
<td>Pool deck</td>
<td>Width ranges from 5’-9” to 10’-1”</td>
</tr>
<tr>
<td>Points of entry</td>
<td>2 ladders, 1 stair, 1 ramp, 1 pool lift, 1 water-suitable wheelchair/aquatic chair</td>
</tr>
<tr>
<td>Spa</td>
<td>Yes</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>15’-2”</td>
</tr>
</tbody>
</table>

### Meramec Bluffs (see plan on page 25)

<table>
<thead>
<tr>
<th>Facility location</th>
<th>Ballwin, MO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>ACI/Boland, Inc.</td>
</tr>
<tr>
<td>Location</td>
<td>On the ground level</td>
</tr>
<tr>
<td>Size</td>
<td>Approximately 25’ x 62’ (1,550 NSF)</td>
</tr>
<tr>
<td>Depth</td>
<td>Approximately 3’-9” to 4’-3”</td>
</tr>
<tr>
<td>Pool deck</td>
<td>Width ranges from approximately 3’-6” to 13’-1”</td>
</tr>
<tr>
<td>Points of entry</td>
<td>1 ladder, 1 stair, 1 pool lift</td>
</tr>
<tr>
<td>Spa</td>
<td>Yes</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>(Unknown)</td>
</tr>
</tbody>
</table>

### Sun City Park Yokohama (see plan on page 24)

<table>
<thead>
<tr>
<th>Facility location</th>
<th>Yokohama City, Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>Half Century More Co., Ltd.</td>
</tr>
<tr>
<td>Location</td>
<td>On a lower level</td>
</tr>
<tr>
<td>Size</td>
<td>7 x 20 meters (approximately 23’ x 65’-6”; 1,507 NSF)</td>
</tr>
<tr>
<td>Depth</td>
<td>Approximately 4’-6”</td>
</tr>
<tr>
<td>Pool deck</td>
<td>Width ranges from 6’-2” to 15’-10”</td>
</tr>
<tr>
<td>Points of entry</td>
<td>3 ladders, 1 stair</td>
</tr>
<tr>
<td>Spa</td>
<td>Yes</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>15’-8”</td>
</tr>
</tbody>
</table>

### The Tradition of the Palm Beaches (see plan on page 25)

<table>
<thead>
<tr>
<th>Facility location</th>
<th>West Palm Beach, FL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner</td>
<td>MorseLife</td>
</tr>
<tr>
<td>Location</td>
<td>On the ground floor, with a glazed enclosure</td>
</tr>
<tr>
<td>Size</td>
<td>24’-4” x 51’-6” (1,253 NSF)</td>
</tr>
<tr>
<td>Depth</td>
<td>Approximately 3’ to 3’-6”</td>
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<tr>
<td>Pool deck</td>
<td>Width ranges from 5’-10” to 11’-7”</td>
</tr>
<tr>
<td>Points of entry</td>
<td>1 ladder, 1 stair, 1 pool lift</td>
</tr>
<tr>
<td>Spa</td>
<td>Yes</td>
</tr>
<tr>
<td>Ceiling height</td>
<td>(Unknown)</td>
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</table>