POOLS FROM THE GROUND UP

by: D. J. Hunsaker

Indoor swim centers are growing in popularity, but to obtain a sophisticated yet affordable facility, careful attention must be given to design, site and material considerations.

At college and university campuses, cities and towns, health clubs and corporate facilities, and even at high schools, planning committees everywhere are opting to build indoor swim centers.

Why are natatoriums so popular? Demand is the obvious answer. For universities and colleges, this demand may be the result of an expanding student population, lack of an existing facility or competition for new students.

Community aquatic centers are being developed because new cities are developing and focusing on a community center as a badge of arrival. Natatoria are also being created as an addition to existing centers that were built when aquatic activities were considered a low priority.

At high schools, new campus construction –including swim facilities – is often the result of population growth or replacement of aging facilities.

While previous generations may have seen little or no benefit to an aquatic center, today's health and recreation consensus generation sees swimming facilities as a priority.

Indoor aquatic centers are complex buildings that require intensive planning and strict control over costs. Once a decision has been made to investigate the process and develop a funding source for an aquatic center, several steps must be taken. First, a research committee should be formed to provide accurate information to those individuals who will make the decision to place the issue before a funding source.

The first step toward this objective is to develop a needs analysis for the project. This can best be carried out by an individual or individuals with experience in this phase. It is at this time that some owner groups seek the assistance of a design and planning consultant to help take the necessary steps toward such a complex.

The first phase of the needs analysis is a meeting with staff, administration, and user groups. As a means of developing an understanding of the true core needs of users, interviews are given, public meetings are held and existing data is reviewed, including previous programs and efforts. Finally, a consensus must be developed among the various parties interested in the project.

Once the needs analysis has been established and agreed to by all parties, the next step is to develop a design program, an outline of the features that must be provided in the aquatic center and a designation of the area required for each feature. This process not only includes the natatorium but also the necessary support spaces.

Once the spaces have been identified and given surface area values, it's then possible to develop a construction cost estimate. This is done by identifying the square footage involved, estimating the cost per square foot by using a conventional formula, comparing the industry average for recent construction, and comparing this information to similar projects in similar construction market areas. Finally, an escalation factor is added to reflect inflation.

As these numbers are developed, it is essential that a distinction be made between construction and project costs. This distinction is often misunderstood and construction costs are emphasized when, in reality, the total project cost must be determined. The project cost includes the hard cost of construction, plus all of the soft costs of administration and design required for the end product.

Once the project cost has been established and confirmed, it's necessary to move on t the source of financing, which may be a capital fund drive, the state legislature (for public university and college projects), a bond issue, a capital expansion budget, donations, a build/lease back or a combination of the above.

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After the funding source has been identified and a commitment received, the next step is to select an architectural team, a phase where protocol should be observed.

First, develop a request for qualifications, which is a combination to letter form that is sent to a number of architectural firms, as well as advertised in a newspaper. By a specified date, firms will submit a package that reflects specifics about this selected team, as well as past history and experience with projects of all types, including those similar to the proposed project.

These submittals should be reviewed by a selection committee, which chooses a limited number (a short list) for interviews. Interviews of the architectural teams should be scheduled for specific periods of time and the firms given a format for their presentation, which usually includes 60 to 75 percent of the time for a formal presentation, with the remaining time left for questions by the review committee.

The interview committee should be prepared for a methodical evaluation of the teams. The important issue is to create a discipline whereby all teams are given the same opportunity and benefit relative to presentation time and question-and-answer opportunities.

In addition to the interviews, the background and experience of the teams should be researched with former clients.

The first step is to select the architectural and engineering team, and to sign agreements between the owner and the architectural firm.

What are the tasks and scope of services of the chosen architectural team? At this point, an owner's steering committee should be formed, which is made up of individuals representing users, administration, staff and the owner's project manager. Together this group must be qualified to make decisions as the process moves forward.

Much of the programming work was done when the design program was developed prior to determining funding needs. However, at this time, the owner and architects should confirm the surface area needs and requirements developed in the design program stage.

The construction cost estimate should be reviewed and confirmed or changed by the project architect. As a result, there will be a confirmation of the project cost estimate at this time.

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An aquatic center or a community center featuring a natatorium is a very complex building. It is helpful if the owner's steering committee understands that in this type of building, there is very little replication of other facilities and the entire facility is unique onto itself. As a result, the design time is much greater than, for example, an office building. The square foot cost is usually higher because of the special areas and characteristics that those areas must provide.

Once the design program and corresponding budget estimate are approved, the architect will develop a series of bubble diagrams and adjacency priorities. This information should be discussed with the steering committee and a consensus reached.

The next step is to develop a schematic floor plan that reflects the data developed in the step above. It is at this point that floor plans, access points and general operating efficiency will be reviewed.

As the above issues are resolved, schematic plans and elevations (single line drawings) should be developed. The schematics will be reviewed and agreed upon by the steering committee, after discussions and contributions by all members.

At this point it may be necessary for the architect to create a study model. Some architectural teams prefer the use of the models as a means of evaluating and studying the total building, both inside and out. Once the model has been approved, an estimate of construction costs should again be developed.

It the project is on course with both budget and program options, the design development stage can begin and more detailed drawings created. At this point, outline specifications will be developed by the architect and reviewed by the steering committee, as well as the various consultants for the project. The outline specifications and design development drawings will also be used to provide an update of estimated construction costs. A constant monitoring of construction cost estimates is necessary to keep the project in line with the budget.

At this point the steering committee should be required to work closely with the architect until the design development drawings and outline specifications are approved.

Once the design development stage has been completed, the next step is the development of construction documents, which include drawings, specifications and general conditions.

When the construction documents are approximately 50 percent completed, a review should occur with the consultants and steering committee. This is also an effective point to again estimate the construction costs to see if there is any necessity for a mid-course correction.

When the construction documents are 90 to 100 percent completed, they should be reviewed again by the consultants and the steering committee. If all team members are in agreement and there are no omissions or errors, the architect will then assist the owner in advertising for bids.

When the bids are opened, one of three things will occur: The project is under budget and the design team will proceed ahead or add any "add alternates" that may have been called out in the construction documents; the budget is the same as the accepted bid and the project can proceed into the next stage; or the low budget is over budget and "deduct alternates" will be deleted.

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In the event there is a significant over-budget situation, even after deduct alternates, a common process is to submit the overall design for value engineering and develop a priority of deletions. This is sometimes done in concert with the low bid contractor.

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When the construction contract has been signed between the owner and the general contractor, the project then moves into the construction phase. At this time it should also be noted that the owner has an alternative to hiring a general contractor. This is the use of a construction management firm, a management team that serves as a contractor for the owner. In this case, the construction management firm is paid a fee for its expertise, and as the owner's agent, the firm negotiates directly with the subcontractors.

Before the natatorium is constructed, several site situations must be considered.

The ideal site for an aquatic center is level with good quality soil. Many times, however, the site is not level and there are subsoil problems, such as too much rock, poor soil type, compaction, a high water table, or the need for the removal of soil and replacement with compacted fill.

A swimming pool or natatorium may feature several below-grade designs, including a full basement, a tunnel around the pool shell, a pool shell backfilled with no below-grade space, or a combination of any of the above.

When a full basement is specified, it can provide a storage or equipment area, piping and plenum location, access for maintenance and elimination of hydrostatic pressure on the pool shell.

The problem of hydrostatic pressure under a swimming pool is significant. If there is a high water table, and no means have been created for relieving this pressure, it is possible that the swimming pool can lift out of the ground at a time when it's empty because of construction or maintenance. For this reason, special considerations must be made and appropriate designs engineered.

The disadvantages of a below-grade space are greater cost, delivery problems for equipment used in the below-grade areas, remote chemical rooms relative to the filter equipment, and more difficult access for maintenance personnel.

The swimming pool shell construction can include cast-in-place or pneumatically applied concrete. Advantages of cast-in-place concrete are that the structure can be built above grade and no backfill is required, it can be included in the conventional concrete work by the concrete contractor and it's advantageous for tile and paint finishes.

Disadvantages of the cast-in-place pool shell include its cost when designed in a free-form configuration, possible water stop and honeycombing leaks, and the wall-to-floor cove is more costly to build as compared to pneumatically applied concrete.

Pneumatically applied concrete is a relatively economical form of pool shell construction when it's constructed against a soil cavity. Irregular shapes can be constructed efficiently and at a relatively low cost compared to cast-in-place concrete, and the wall-to-floor cove is simple and effective. Its monolithic construction has advantages over the cast components in a cast-in-place pool, which must

depend upon water stop at joints. In addition, pneumatically applied concrete is compatible with tile and marble plaster adhesion.

It is, however, costly and difficult to build a pneumatically applied pool with no earth cavity. The necessary forms needed for this type of construction erode the cost benefit of the process. In addition, it's sometimes difficult to apply tile to the swimming pool interior and, when painting is required, a multistep preparation procedure is necessary.

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Because of cost, most natatorium roof structures are made of mild steel beams, joists and trusses. When these steel components are used, they must be coated with high quality epoxy coating systems. The roof and ceiling systems must be carefully designed to withstand corrosion created by condensation.

Wood roof structures are effective if humidity is controlled and air circulation in the space is properly engineered.

A concrete roof structure has many advantages over steel and wood, as it's non-corrosive and durable. Its cost, however, is greater than the two lighter-weight options.

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When designing windows and doorways (fenestration), skylights or top-lighting clerestories are advantageous for location of a light source and control of reflective glare on the water. Fenestration relative to spectator areas, lifeguard locations and teaching stations is important.

Wall and room penetrations for skylights, exhaust ducts and overhead light fixtures can be a source of problems. As a result, they must be carefully designed, engineered and constructed.

Dehumidification is also important. It is now known that relative humidity inside a natatorium should be maintained between 50 and 60 percent. This can best be done in most areas with the use of mechanical dehumidification, which must control the dew point, be operated on a 24-hour basis, control condensation and control the air velocities in the space along the fresh air mix for needed ventilation. Creature comfort is most noticeable in this phase of the building system.

Because of the high humidity potential and possible aggressive conditions that may occur in the natatorium space if mechanical systems are shut down either on purpose or by accident, materials and finishes must be durable. Choices include tile, steel (stainless steel where possible), glass, concrete and anodized aluminum.

Maintenance considerations re also important in the design process and should include plans for daily custodial needs as well as scheduled, emergency and future repair and maintenance of such items as pool filters, and the HVAC and dehumidification systems.

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During the construction process, a system of inspection and monitoring should be carried out by the owner or its representative. This process is necessary to watch for errors and omissions, incorrect installation or improper components.

Upon the completion of the construction phase and after a final checkout (punch list), an orientation of the owner's management and operation staff should take place. This is a step that is often overlooked or minimized. With a multimillion dollar complex, it's understandable that a thorough and professional set of instructions – including start up procedures, troubleshooting and daily operation procedures, as well as periodic maintenance tasks -–should be provided in a well-documented, written operations manual. In addition, a resource contact, should be provided for working with the operator as the owner takes over and puts the new facility into use.

There are many steps to the creation of a successful natatorium. Each of these steps should receive the knowledgeable input of the professional design team, consultants, staff and the owner's administrators. A natatorium is a complex building. If it is to be functional with low operating costs over a period of 50 years or more, careful planning must take place.

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(O/pools from ground up)