SECTION 5 DESIGN ISSUES

1. General

It was evident, from the site visits made as part of this review that many of the ongoing problems experienced were due to a lack of thought, consideration or knowledge at the pre-design stage. A clear picture of what is required within the proposed aquatic facility in terms of building, amenities to be provided and associated plant needs to be conveyed to the design team. By doing this, the design team can start providing what council and the community want, not what they themselves want.

It would seem that little consideration was given to the ongoing maintenance and running costs of the proposed facilities. The capital cost appeared to be, in many cases, paramount with little regard for the ongoing running costs. (See Section 9)
The review found two cases of heat recovery being omitted due to capital cost overruns, when their inclusion would have had a four year pay back period, reduced the ongoing energy cost, and cost far less than it does now to retrofit.

A comprehensive and realistic feasibility study should give a clear picture of what is required in a community along with accurate predictions of running costs, income and usage. (See Section 4)

Considerations:
A needs assessment study should assist in making the following important decisions;

- What type of facility does your community need?
- What features should be included?
- What activities is the facility to cater for?
- What water depths are required for these activities?

In reference to feasibility studies, it must be remembered that the outcome will only be as good as the quality of data utilized. Section 4 suggests that some of the bold claims for features consistently attracting large numbers of clients are suspect. This has, in my opinion, resulted in many cases of poor feature selections.

2. Common Mistakes

The study identified the following problems within some facilities visited:
Design Stage

- As noted in section 4, the running costs, income and usage at some pools were significantly outside the initial projections. They appeared to be presented to support the building of the facility and were optimistic rather than realistic.
- Heat recovery was removed in two cases to achieve savings in capital costs. Both facilities are now in the throes of adding heat recovery at costs much higher than if they had been included in the original design. One of these sites added heat recovery at a cost of $850,000, the cost of this work within the original design is unclear.
- Two facilities had high temperature water flowing from toddlers or spa pools into leisure pools. It is accepted that the higher the water temperature the likelihood of increased levels of bacteria will be present. These sites therefore could be transferring bacteria into much larger volumes of pool water. Put very simply, the warmer the water, the more it needs to be filtered. A toddler's pool may need to have the entire volume filtered every 30 minutes. NZS 4441 states turnover times for specific pools, these are however, in my view inadequate. I have strongly suggested a total review of this standard. (See Section 10.)

Two examples of high temperature water flowing from the Toddlers' or spa pool to the leisure pool.

- A common fault was a lack of consideration given to staffing requirements in relation to pool design. The two major operational costs are energy and staffing, yet consideration of how many staff may be required would seem to be of little concern to designers - possibly because the designer doesn't pay the wages of poolside staff. An independent feasibility study carried out for the Upper Hutt pool stated that 9 fulltime staff would be required when the actual requirement was twice as many. It is my experience that most new pools have underestimated staffing requirements. Design faults and attractions that affect the line of sight of poolside staff are highly likely to increase staffing costs as increased staffing numbers may be required.

- Two pools which were part of this study and one other outside the study are in the process of providing dedicated learner facilities after initially including this as part of leisure or wave pools. The free form of these pools with islands and beach fronts was found to be impractical to quality learn to swim programmes. While the QE11 leisure pool is a great facility I was surprised at the lack of spectator seating around it. I would suggest that due to the number of pools that originally had learner pools combined with the wave or leisure pool and are now adding stand alone learner facilities, that the concept of a combination leisure/ learner pool is flawed. The reduction of school learner pools makes the lack of stand alone public learner pools difficult to understand. Is this a reason for Water Safety New Zealand's concern at the decrease in children's swimming abilities?

Building

- There was a lack of storage space to store necessary pool operational equipment at or near poolside. Equipment such as pool vacuum cleaners, lane ropes, starting blocks, swimming aids, to name but a few, all need to be accommodated off poolside.
- In view of the problems experienced with the contamination of switchboards (chlorine fumes coming from balance tanks or vacuum DE filters) it is worth considering having three separate rooms within the plant area. One each for, the heating and ventilation plant, electrical and filtration and water treatment. The swimming pool environment of water, high humidity, condensation and a corrosive chlorine atmosphere can cause serious problems within the plant room areas in regard high maintenance costs. The separation of the main plant functions in air conditioned rooms will greatly reduce maintenance costs by increasing plant life.
- There was inadequate provision in many plant rooms for the storage and mixing of pool chemicals. These items need to be stored near the delivery point and close to where they are to be used. It becomes a Health & Safety issue when 25kg bags of DE are carried over pipes and around plant rooms. This is both hazardous to staff and unnecessary. Half the sites visited had poor provision for either storage or mixing of chemicals and suggests to me that some designers have little concept of the requirements of water treatment.

An example of poor provision for chemical storage.

- Many electrical switchboards in plant rooms were open to chlorine fumes and there was a lack of ventilation in rooms provided for switchboards. (See Appendix C)
- There were major issues in regard to poor design, or no design at all, with vapour barriers, heat recovery and air heating. (see Section 7)
- Three facilities had no provision for replacing ceiling light bulbs other than the erection of expensive scaffolding. This meant either a loss of illumination as bulbs failed or an extreme disruption to pool operations. This was not a cost issue, as other pools had good lighting that was easily replaced using a simple step ladder. I was surprised and disappointed that more use was not made of natural light. Karori pool did not need any artificial light for extensive periods because of good design.
- While all facilities provided for disabled access, two had doors that were too heavy for disabled people to open. Another had ramp access from the car park to the facility steeper than the required 1:12 ratio. (see photo next page)

Access challenge for pool clients

Plant

- Some pool plant was undersized. In three cases filtration turnover rates did not meet NZS 4441 (see section 6) which, among other things, requires a minimum turnover rate of 3 hours. In two of these cases the mechanical services contractor selected had submitted filtration equipment that did not meet Councils own tender requirements.
- Inadequate air flow in the pool hall was obvious at some sites. At one, pool staff made a complaint to OSH regarding the high temperature conditions they had to work in. The design of windows needs to allow for light but not sun as this is often the cause of uncomfortably warm conditions. This can be accommodated with eaves or awnings.
- Some pools had very cramped conditions within the plant room with no access for replacement plant, other than removing part of the pool roof to allow for crane access. Pool plant probably will not last the life of a building so provision for replacements should be allowed for. The proposed upgrading of the heat recovery plant at one site requires major structural work.
- One pool had no hair and lint strainers prior to filtration, resulting in quickly clogged filters. This requires the filters to be backwashed far more often, resulting in excessive use of staff time and loss of heated treated water. It is much cheaper and more convenient to provide easily accessible and removable strainers, so that hair and other undesirable matter can be trapped and removed prior to filtration, rather than be continually washing sand filters or replacing DE.

Operation

- Two pools had inadequate poolside space for spectator seating and foot traffic flow. The distance from seating or external wall to poolside was in some cases less than a metre, which does not allow much room for pushchairs or wheel chairs. Anecdotal evidence suggests that this limited and cramped space discourages public use. Family changing room doors opening out to block the passage way could have been overcome by installing sliding doors.

Restricted walkway between hand rail & wall.

- There were many examples of poor floor drainage, not enough slope and / or too small drainage outlets. One pool had no drainage provision at all in the family change rooms. Drainage takes on much more importance in the swimming pool environment. Water that ponds will produce rot in all but the most durable materials and fosters the growth of bacteria and disease aided by the warm temperature and high humidity of an indoor pool. Just as important is ensuring that customers don't have to walk through puddles of water on their way to change areas or to poolside.

Poolside pooling of water.
- looks unsightly, discolours tiles, requires continual cleaning and is a safety hazard.

No drainage and poor fall in family change room.

- Many pool surrounds, change areas, toilets and showers lacked proven non-slip surfaces. By proven, I mean tiles that have worked at other facilities rather than accepting the manufacturer's word. One site had to provide matting due to the slipperiness of concrete change room floors which had been causing falls and injuries.

- There were some poor colour choices of flooring surfaces. (See section 8) Many had hard-to-clean surfaces or light colour finishes which over time give the impression of never having been cleaned despite more than normal maintenance being applied. Tiles with deep groves proved to be a major cleaning problem at one of the sites visited.

Management

- Many reception areas were open to noise from the pool or pool features. One was so bad, it was difficult to hear phone conversations or customers at reception.
- Three of the most experienced managers expressed the need to have the pool manager appointed prior to construction so s/he can be involved from day one. Two managers were appointed so as to have early input and were able to oversee the building operation. While the third manager was not so fortunate and had the exasperation of working with the poor design and layout of plant. A lack of space around plant making servicing difficult.
- Three facilities did not allow enough time for commissioning to be completed prior to hand over and official openings. Once the mechanical services contractor has commissioned the pool operational plant, then pool staff has to be trained in its operation. For safety reasons, neither of these should take place once the pool has opened. I have personal experience of political pressure to open a new facility on its completion without the necessary staff training or in fact commissioning being complete.

3. The Design for Your Community

Generally, the only organised group of swimmers in a community is a swimming club. These people have a view of pools as places for competitive swimming and while their view should be considered, it is important to obtain many other views. This study has found that it is difficult to get accurate information from local authorities in regard to pool usage, pool income, running costs and design faults. Therefore, any information sought needs thorough investigation and should not be taken at face value. Key officers leave and their replacements have difficulty knowing background information that is often not recorded in filing systems. I was surprised at the poor information systems in place and given the immense effort put into making Council operations transparent, consider it to be unsatisfactory.

Seeking the views from a wide range within your community by means of surveys, meetings with community groups and seeking feedback on draft designs helps to ensure the right fit for your community needs. Questions should be asked, with explanations, in regard to the implications of including or omitting wave pools, river rides, water slides, therapeutic pools, spa pools and learner pools and deep water. Both the capital and operating costs of each need to be considered carefully, as a community can be seduced by “cool” or “trendy” attractions. As mentioned earlier, 3 sites are now retrofitting learner pools after initially having them incorporated as part of the wave pool.

4. Selection of Specialists

Pool design is a specialist area, due to the corrosive environment of most water treatments and the atmosphere created by large volumes of water and warm humid air. Rust and condensation are the outcomes if the design and/or choice of materials used are wrong. Two examples were found of mild steel used in pool water features with disastrous results. Steel fittings and fixtures must be stainless steel 316 grade, the use of anything else will require early replacement. This entails not only the cost of replacement but possible pool closure to carry out the repairs.

In my experience, many designers are quite ignorant of many of the issues and problems that arise in the design and operation of swimming pools. Too many have had too little experience and the simple fact is that they have learned on many pools in New Zealand and the ratepayer has had to pick up the bill for their shortcomings.

In selecting the design team, consideration needs to be given to visiting previous work done by your potential design team. This needs to be carried out by people with some experience and knowledge in the operation of swimming facilities. Enthusiastic but inexperienced council officers, in regard to pool knowledge, are easily fooled by what looks a pleasant and effective facility but in reality hides many design faults. These faults can prove to be expensive in terms of ongoing customer safety and satisfaction, staff working conditions, operation and in remedial work once the flaws start to bite. It was obvious to me that some of the project advocates and managers that I met were not as knowledgeable as they thought they were.

It is interesting to note that the two facilities with the least amount of ongoing problems (Naenae and Karori) not only had experienced pool managers involved from the beginning of the process, but the weighted attribute regarding price was around 30% in each case. Unfortunately information on a weighted attribute system of tender evaluation was not available at many sites.

LESSONS:

1 Take advantage of any opportunity SPARC offers for support and advice from an independent expert to advise and critique on any design.

2. Ensure your design specialists have a proven track record and sufficient experience to carry out the role. Double check their performance at pools they have worked on in the past.

3. Use natural light as much as possible and have lighting that can have bulbs changed without having to close the pool.