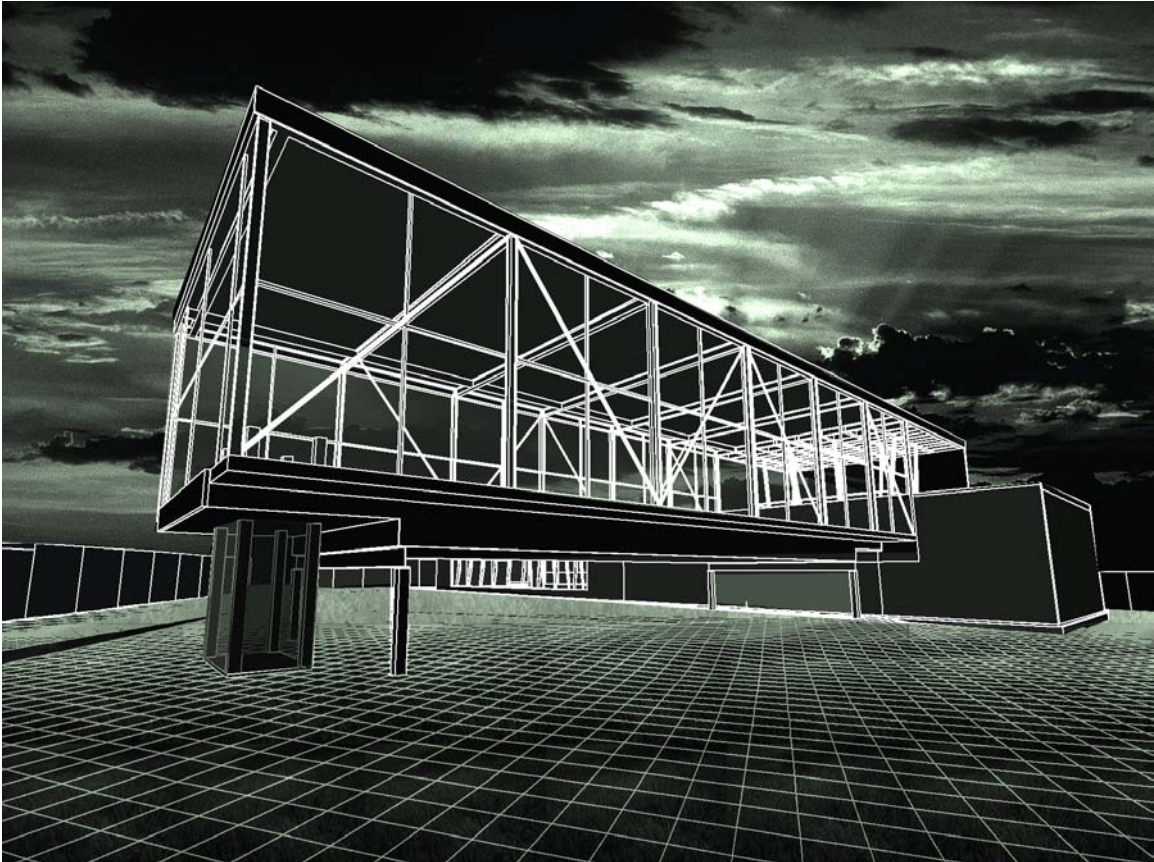


## PAST AND PRESENT TENSE: INFLUENCING DESIGN



Essay by Rebecca Lai

ARCH 384: Competitions Elective  
AISC Aquatic Centre Design

Submitted to Terri Boake

In an age where technology reigns supreme, North American children obesity levels are rising, and there is almost as much hate and war as there are Honda Civics; it is sometimes hard to fathom the idea that beneath the clutter of our fast paced post modern society, there lies the root of an influential past. However, upon closer inspection one will soon realize that the present is merely an evolutionary reflection of the past. Particularly in architecture, it seems that there is almost no such thing as identifiable pure originality anymore; something unmistakably difficult to obtain. The motion through different stylistic periods (e.g. classical to the latter neoclassical) suggests that perhaps originality and creativity lies in the realms of variation and adaptation an idea which was applicable in the design process of the aquatic centre.

Many existing projects and structures influenced the esthetic design of the aquatic centre. However, the initial driving design considerations revolved around what the surrounding community seemed to be in need of, what an aquatic centre involves programmatically, and what seemed to be the most appropriate use of the given site. The structural and building components were latter reactions to the identified issues. The immediate response to the site and surroundings was that the community seemed to need a nice usable outdoor public space. Ideally, it should be park-like suitable for all ages; for someone just strolling through or for someone who wants to sit down and relax on a nice sunny day. At first, the idea of community (which can be broken down into come unity), and treating the street corner as a crossroads of rest and gathering drove the project. This thought sparked the possibility of creating a bridging system over the water and program (essentially the pools). The bridge would unify both the interior and exterior spaces at different heights. The elevated height would benefit as some type of viewing platform. Calatrava's spine-like structural elements, bridges and buildings such as the Wettstein Bridge (Fig.1)

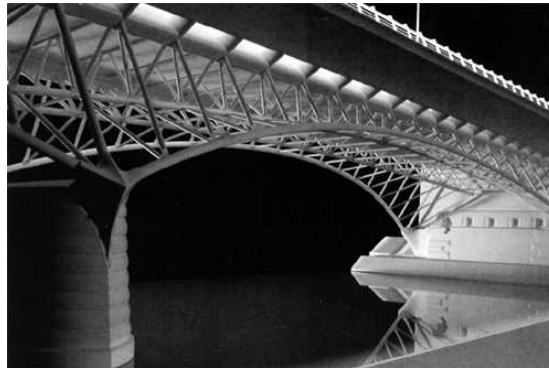


Figure 1. Calatrava's Wettstein Bridge

seemed esthetically and structurally appropriate. The sculptural structure would then also service as some form of integrated architectural landscaping. However, after several phases of designing and brainstorming, it was determined that a bridge-like structure was too large in scale and too grand of a gesture for the size and shape of the site. Basically, much like Calatrava, rather than context integration, it seemed like somewhat of an ego trip in the making. Creating something so big in such a small space did not really seem justifiable.

Another idea for the project, which ran more intimately with the idea of architectural landscaping, was to sink the building into the ground so that it was less of a viewing obstruction and was truly a part of the ground. The main steel structure would then be in an elegant glass and steel canopy roof allowing for sunlight to penetrate into the deep spaces. A spin off this idea was to create some sort of usable roof space with a web-like structure. The rooftop terraces would be layered and possibly curved so that at one end it touched the ground allowing for public access and the other end would be raised as a viewing platform for sitting and tanning etc. Beneath each distinguished roof would then be a particular program (e.g. pool or concession). Some sort of organized looking column structure would also be created to hold up the roof structure, creating a colonnade style division between the program spaces. After arranging the entire required program to fit this idea, it was discovered that once again, the footprint of the building took up too much ground space. It did not allow for the initial desire to free up the area and create a nice outdoor park area.

The question was then posed: how does one free up ground space? The immediate answer to this question is simple: simply raise the program and raise the building off the ground.

In the end, the final design of the aquatic centre involves three main elements: the recreational pool, the competition pool, and the atrium space. Not only is the building programmatically organized in this manner, but these three spaces each have their own individual and unique structural system which relates to the function of the space.

Of course when designing an aquatic centre, there is a desire for long open spaces of great heights (Fig.2)

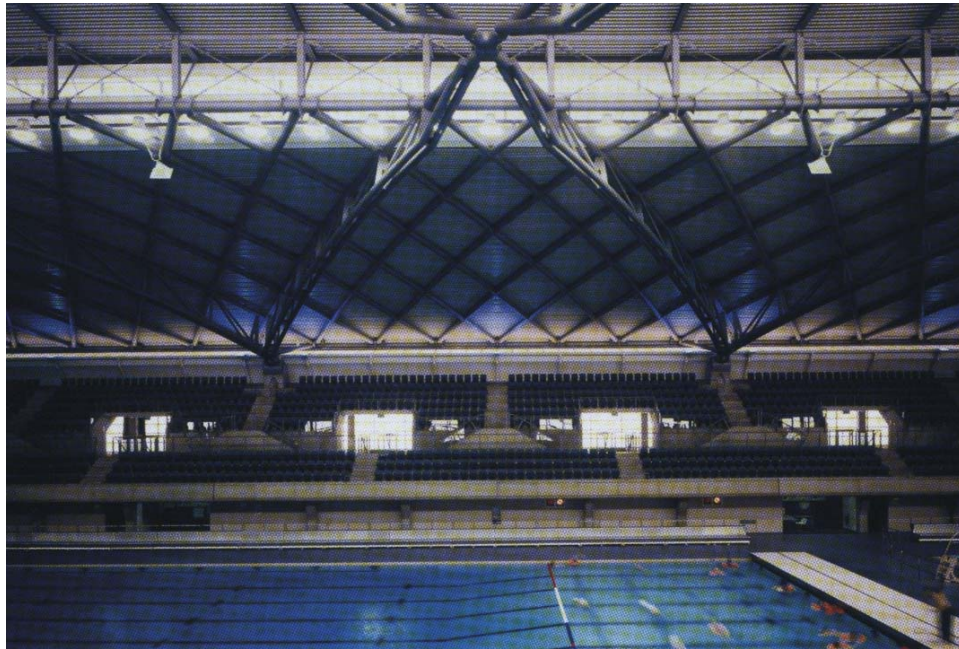


Figure 2



. The structure plays a very important role in achieving this.

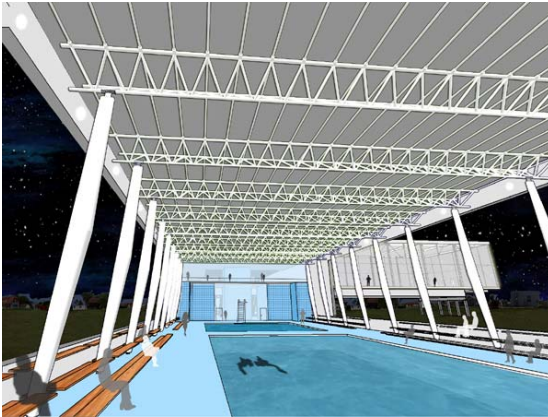


Figure 4

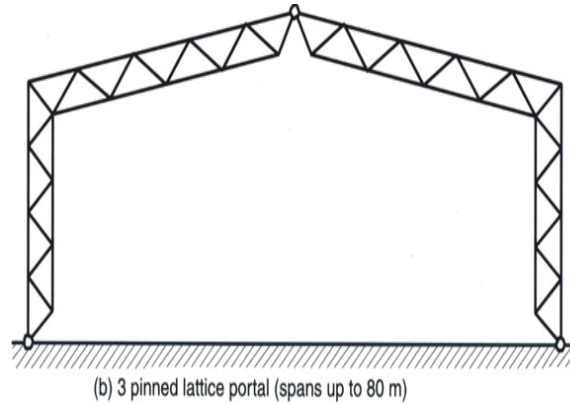


Figure 5

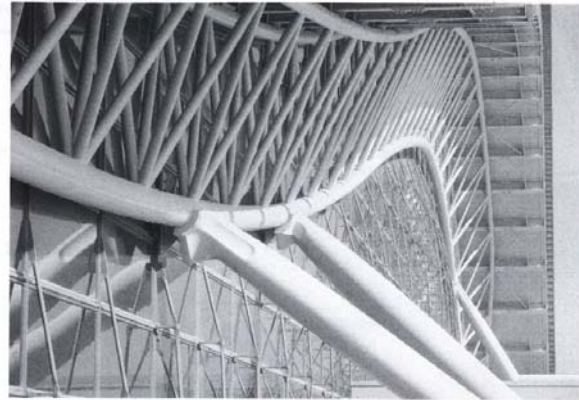
The first component of the aquatic centre, the competition pool, was kept at ground level because of the deeper pool and amount of program area required for seating, diving and teaching. The structure in this area is essentially a tubular truss frame system which holds up the roof and allows for great open spans (Fig.4). Still influenced by Calatrava's spine-like bridges, the design is an integration of a three pinned long span lattice portal frame (Fig.5) and a tubular 'tree' column structure. The truss itself was influenced by the Toyota truss and (Fig.6) Renzo Piano's tubular trusses at the Kansai Airport (Fig.7).



Figure 6



1.12 Stuttgart Airport Roof using tubular column 'trees' — see also Colour Plate 9 (architect: Von Gerkan Marg & Partners)



1.13 Tubular trusses at Kansai Airport, Japan (architect: Renzo Piano Workshop)

Figure 7

Because of this truss frame, the need for columns in the middle of the space is avoided. All the columns are located at the side of the pool deck and are directly a part of the truss framing system. The tube effect creates a smoother, cleaner connection joint while maintaining structural integrity and strength. The tapering of the columns creates a more slender more elegant appeal. The columns are placed directly under a point where the tree tubes intersect. This allows for the load to transfer from the truss to the columns accounting for shear. Also, where possible, especially at the connections, “Reinforcement was added to tubular sections to increase their local resistance to forces from the bracing members” (Fig.8). Pin joint connections were used at the base (Fig.9). The competition pool area also has large windows for a direct visual relationship with the exterior environment. There is one direct line of vision. From the interior, one can view out towards the outdoor park area or towards the road. This way, at ground level people who are on the outside are also able to have a visual relationship with the interior of the space as well. People in the community are able to see what is going on inside their community centre and be attracted to take the next step further by going inside and being a part of the experience themselves. The ground level is truly for the spectators at heart.

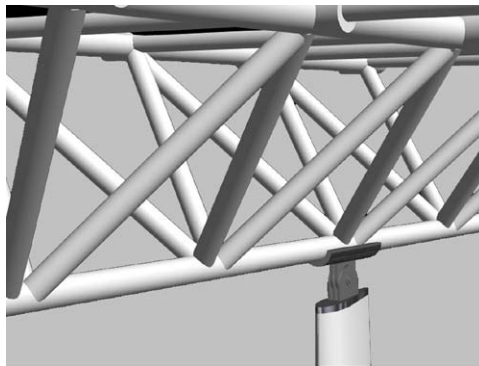


Figure 8

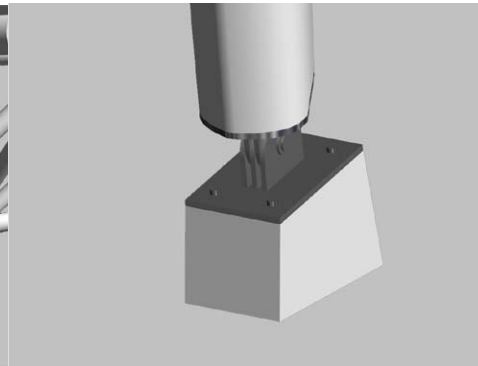


Figure 9



View played a key role in the design of the recreational pool area. The idea for the recreational pool area was that it was completely open and the users could see all of their exterior surroundings (Fig.10).



Figure 10

In order for the ground space to be freed up, it was decided that part of the building program had to be lifted off the ground high enough so that the space under the building could be usable space. Since the recreational pool has a shallower depth, it was the pool which was raised because less structure is needed to hold up its weight. There is also a different viewing experience at that height level and because of the raised floor, there is also a more private feeling of enclosure to allow people to enjoy their recreational time and not be distracted by what is going on outside (on the road and in the park area). The structure of the recreational pool is simply an exterior box framed vierendeel truss with thin steel cables used as tension members (to minimize viewing obstructions) with full panel glazing set on the interior of the structural frame; showcasing the truss frame and making the glass volume a light box similar to the Printing Centre in Rendsburg (Fig.11).



Figure 11

Several other truss types were investigated; however this truss type seemed the most suitable for the purpose of achieving such long open span of space. The concrete pool

deck is deep and wide enough such that it acts as a structural slab. It sits on two large steel girders which are tied to structural elements at either end. Wide flange beams and girders were used in the framing system because they provide the most efficient section. Wide flange roof joists are also used to provide lateral stability and to support the roof. At one end of the recreational pool the structure of the fire egress stairs is used to support the long spanning truss. In the end this structural system has created a nice transitional space between the entry parking, front entrance, and the park area. Upon entry, one must walk under the building and experience the floating volume overhead (Fig.12)

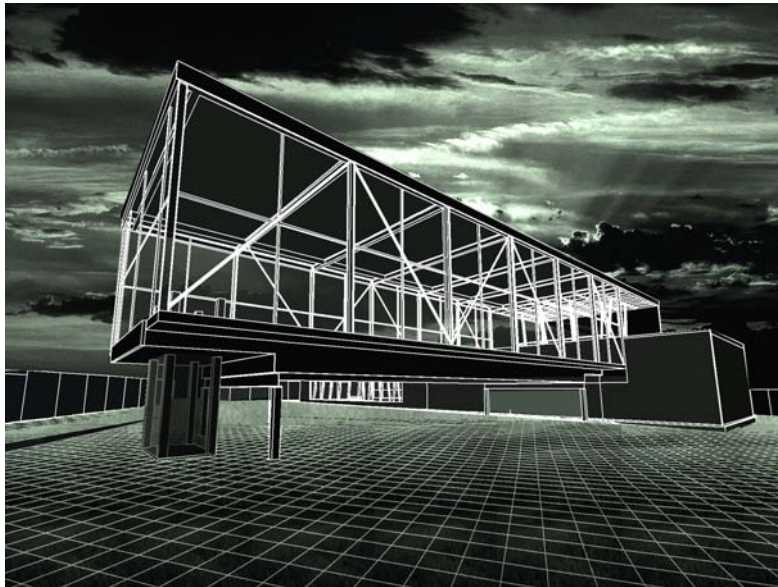


Figure 12

The third conceptual component of the building is the double height atrium. The atrium is the junction and the anchor of the entire building. It is the point at which the two pools meet. The atrium space is multi-purpose: used for viewing, lounging, dining, socializing, and also contains back of house as well as administration. The concept for the atrium space is to really emphasize the height of the space without using perfectly vertical elements, as well as to incorporate the element of water. Upon entry, there is a large water fountain as well as a feature water fall wall. Large cylindrical skewed columns penetrate the space and water fountain, reaching up to the large skylight above. These unifying vertical elements are spaced at a generous distance apart in order to create a very open feel in the center of the atrium space (Fig.13).



Figure 13

Under the walkway, smaller skewed cylindrical columns mimic the larger ones holding up the skylight. However the smaller ones create a dense “forest of columns” underneath the space. Underneath the second floor slab a bulkhead has been dropped in order to highlight the intersecting volume of the truss frame which ties back to the back wall of the atrium. Pot lights are placed in the bulkhead to illuminate the space. The columns are placed on footings which reduce bulk. The atrium is a transitional space which seeks to entice and initiate. Its serene atmosphere provides the comfort and amenities which will not only make it a transitional space, but also a destination (Fig.14).

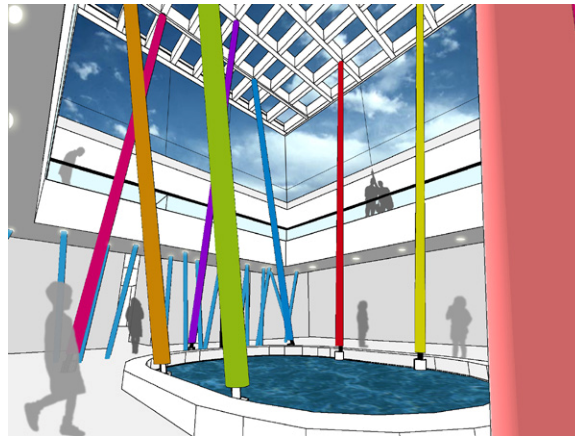


Figure 14



From the origin of architecture, the medieval hut, to Calatravian feats, one cannot deny that architecture has always been influenced by society, culture, and the past. It should be of no surprise that what is built in this current age will strongly influence what is to come in the near future. Is there room left for originality? Is creativity success? As art is subjective and esthetic make up is merely the architectural afterthought, perhaps true success lies in the realms of one's ability to tailor space to the context which it is intended for. Adaptation, interpretation and evolution – it is the game of survival of the fittest. Originality can be rejected, demolished and forgotten. Real success is the ability to withstand the test of time and influence the next generation of landmarks.

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## **Images**

Fig. 11

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Fig. 13

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Fig. 2, 5-7

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Fig. 1

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