Guan Yin Pavilion at Rangsit University

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Abstract

The purpose of the Chinese-Thai Institute is (1) to represent a marriage of the Chinese and Thai cultures not through iconography or symbolic senses but through the study of materials and making, and (2) to respond to recent flooding in the area. The design of the building achieved this through simple displacement—the building would only float in the event of a flood, otherwise, it would sit firmly on a concrete foundation. Unfortunately, the Owner was not willing to invest in this proposal. The building was built anyway, save for the floating exhibition hall.

Keywords: *Guan Yin pavilion, Chinese and Thai culture, bricks, floating*

1. Introduction

Rangsit Univeristy had plans to build a home for the Thai-Chinese Institute, which is a campus organization that develops working relationships with Chinese universities and organizations. Up to this point, the Institute was sort of a transient entity, a series of people and laptops moving from one building to another, but its increasing scale and significance meant it needed to have a physical presence within the campus. The president of the university, Dr. Arthit Ourairat, was eager to create an architectural symbol of this cross-cultural alliance (Ourairat, 2015).

The building's site was pre-determined: it was to sit on a pond at the north entrance of the campus. The water feature was meant to be a symbolic gesture; a contextual placement that gave the building its name: Guan Yin Pavilion.

Early visualizations of the building (shown on next page) incorporated three elements which still remain in the building today: a curved roof line, a grey-colored brick, and a bamboo forest. The entire building was placed in a 1,500 square meters natural water pond. A bronze sculpture of Guan Yin, the deity of mercy and compassion, was to stand tall within the building's perimeter. Her sculpture would also incorporate Thai and Chinese characteristics. The building, in many ways, would represent a marriage of two cultures. It could be neither distinctly Chinese nor Thai; rather a hybridized concentration of the two.

2. Design Process

As architects, we don’t usually start a project from iconography or symbolism-- for us form is always a bi-product of other decisions and relationships, but this was an important gesture to our potential client, so we had to shift our approach a bit. Our conversations always begin with material and making, and we started thinking about bricks.

We visited the brick factories about two hours north of Bangkok where bricks have been made for centuries. The wood-fired kilns can no longer keep up with current production demands, but they’re cavernous and beautiful and from another galaxy. Most of the modern factories use their old wood fired kilns for storage.

Thai bricks are red while Chinese bricks are grey-- it has to do with the nature of the soil. We wanted to use a grey brick but weren’t interested (of course) in producing the bricks in China and shipping them to Thailand. We found a factory that was doing experiments in double-firing bricks, and we learned that by double-firing, the clay color shifts from red to grey. We liked this option—that the soil would be Thai, but the color would be Chinese.

Our early massing studies began from this idea of a classically symmetrical building. There would be two volumes, placed under a single roof, and we wanted them to be unified in material but differentiated in detail. Our idea was to use a single brick in two different ways—to create a solid wall and a perforated wall. We experimented around with lots of different shapes and configurations in search of a brick that would give us the most variations in building texture and transparency.

In order to achieve our solid volume and our perforated volume we designed the brick to be used both horizontally and vertically. Horizontally, they form a solid wall. The orientation of the brick allows the peaks to be aligned in certain areas creating a crisp shadow line and offset in other areas creating a heavy texture, almost a turbulence. Vertically, they stack to form tightly-spaced columns that function as a screen. The peaks align and alternate to create sinuous solids and play with the solid-void nature of the screen.

The brick itself became the building block of the project-- both literally and conceptually. As an architecture material, it symbolizes a method of construction that is centuries old. (Xinian et al., 2002) The knowledge of this material is primal. The tradition of brick firing and masonry is shared by both Thai and Chinese builders. The only difference is the raw material and the technique, and these differences are, indeed, quite nuanced.

The shape of the final brick echoes the actual roof line of the building. We derived this curvature from studying sweeping Chinese roof lines found in Chinese temples and palaces (Xinian et al., 2002), as well as Thai roof lines, and merging the two. This was, of course, not a standard profile that was readily available. We collaborated with A.P.K. Daokoo brick factory in Angthong province, 2 hours north of Bangkok, to custom-extrude a hefty brick for this project. The bricks were then double-fired in oxidation to produce their grey color. This technique also required quite a bit of experimentation on the manufacturer's part. Color nuances and shape variation are difficult to control when it comes to bricks. The process is quite dependent on many unstable conditions-- from soil quality, to heat, to moisture, to atmospheric conditions of the factory.

In 2011, Thailand was devastated by massive flooding in the through northern and central part of the country. This was foremost on the university's mind as we were moving into schematic design on this project. Despite popular belief that this was a natural disaster, these floods were actually caused by mis-management. Trillions of gallons were moving down the country, overwhelming rivers and canals, and eventually the floodplains, until it reached suburban Bangkok.

The university was severely impacted by the flood since it sits in low area. The entire university was inundated with nearly 3 meters of water—classrooms, offices, storage rooms, auditoriums, workshops, and laboratories underwater for two months, the destruction was tremendous. In the aftermath the campus development office announced that all new buildings would have parking garages on the first floor to mitigate further damage, should another flood occur. It was a logical decision, but not a creative one. It did not seem elegant that in 10 years, the likely campus pedestrian experience would be completely defined by a sea of dark parking garages, blank walls and steep stair cases.

It was during this time that we began discussing the possibility of floating the building as a means of dealing with future flooding.

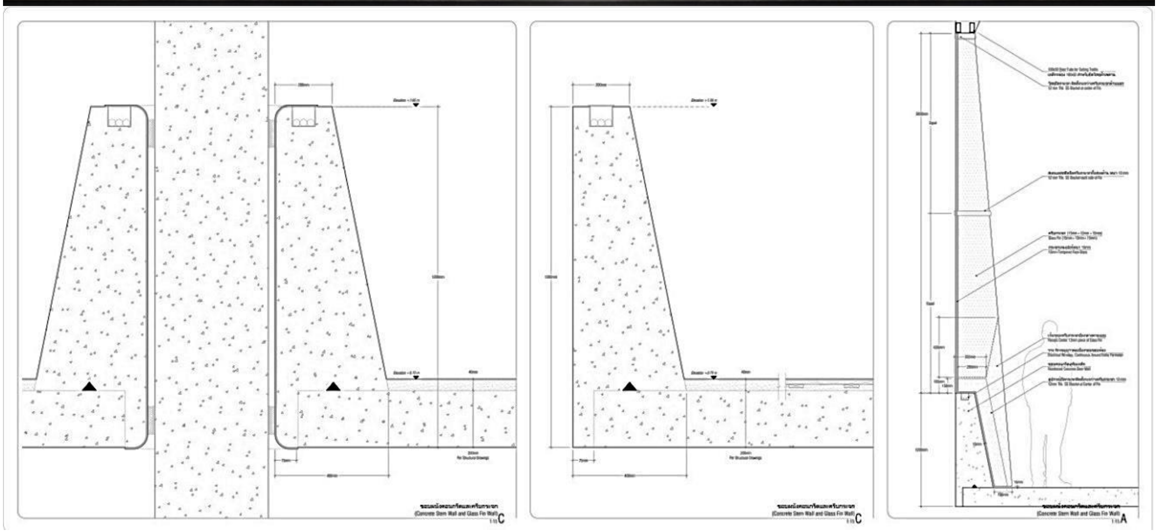
The entire building is situated in an existing pond and is comprised of two masses, symmetrical in volume. The area to the left is the exhibition hall. The area to the right is a two-story office building with conference rooms and a café. Each has a building footprint of about 500 square meters.

Given the scale and complexity of the program and the risk involved, it was decided early on with the structural engineer that only one mass needed to float. The exhibition hall is essentially a large, open volume, and its contents are temporary. It was the better candidate for experimentation precisely because it didn’t really need to float.

Rangsit University was enthusiastic about this and saw this project as many things—innovation, publicity, a chance to spearhead technology that could really be fine-tuned and developed for use in other situations across the country.

There are many ways to float a building, the most common post-flood solutions being explored in Thailand at the time focused on single family residences sitting on empty oil drums or sealed plastic tanks. This system unfortunately requires constant maintenance to guarantee an air tight volume. This specific project needed a system that was more foul-proof, maintenance free, and our solution was to float the building through simple displacement. In typical conditions the building would sit on its grade beams and only come "active" in the event of a serious flood. This construction was similar to piers, in which the pile foundation is attached to the ground, but the raft moves up and down depending on the tide.

We had many conversations with engineer and hydrologist Dr. Seree Suparathid and determined that the university had reached its maximum water level in 2011. This was the worst case scenario, and we could design directly for that. It wasn't necessary to float the entire building, only the floor slab and walls needed to float—the roof, the columns, and the foundation could remain fixed.



The exhibition space was designed as a floor slab with a tapered concrete perimeter wall and collars around each internal column.

In order for this concrete tub to float, the composite density of this volume needed to be less than the density of water. According to calculations, the entire tub would weigh about 235,000 kilograms. Because of the massive weight of the tub and the nature of flooding in this area, the tub would rise slowly and be as steady as a rice barge.

On top of the perimeter walls sits a glass wall that has a vertical cantilever of about 4 meters. It is braced by tapered fins and connects to a fabric ceiling above. The fabric ceiling would have a crumple zone which would allow the tub to rise and settle with no intervention.

As for the office portion of the building, flood mitigation would be dealt with by raising the building well above flood level. Experientially, we wanted this elevation change to be gradual, beginning at the entrance of the building, which would be 2.30 meters taller than the existing sidewalk level. A drastic elevation change such as this required delaying the process of arrival, so that the slope would be gradual, leading up to the main entrance door of the office area. Therefore the entrance to the building would not be a direct path, but a slow and gradual one that wrapped around the back of the building. This arrival betrayed the classical set-up of the symmetrical building, but offered a much slower, measured approach.

The concrete used in this building's foundation was to be a special mix used in dam construction. It would contain water stopping "crystals" that would enlarge when saturated with water. Along with mortar water-stop connectors embedded in major slab connections, this would prevent the high-strength concrete from leaking. This type of construction is common at a small scale-- usually in docks and piers-- but this project would be the first time it would be used at this large scale.

3. References

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