

From Environmental to Social and Cultural Sustainability

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ABSTRACT

While we are excited in pursuing a sustainable environment through advanced technologies design, our consciousness to bring people closer to nature for a healthier habitat less dependent on energy consumption fades.

In this paper, we use the Ko Shan Theatre New Wing as a case study to explore how environmental sustainable design can escalate the social and cultural aspiration of a public venue that benefits both the general community as well as the district neighbourhood.

A theatre in a park

The challenge starts off with the finding of an environmental design solution to dissolve a 30m high theatre bulk, which houses 600-seats and supported with numerous amenities, into the tranquil park treasured by the neighbourhood as a precious communal backyard to their tiny dwellings in the old district. By preserving the mature trees – the old and faithful “companions” of park users – located in front of the site and carefully positioning the building masses according to the approaching view vista, the architect well integrates the building into its environmentally sensitive context.

A new sustainable living experience

Well-being of the park users has never been neglected when we were responding to the functional need of a new theatre. Values are added to the park through introducing a “green trail” around the building envelope from ground level to the “moon lawn” on the auditorium roof. Instead of simply strolling at ground level, park users can now “hike up the building” and enjoy panoramic scenes of the district. This trail together with the roof garden increases the site greenery coverage by 300 per cent.

A park in a theatre

Located on a site originally occupied by just four tennis courts, the theatre’s design adopted an innovative space-creation approach for its interiors. By wrapping the theatre foyer around the auditorium with a transparent building facade, the park’s scenery is “borrowed” into the interior and let the foyer bathed in natural daylight and greenery of the park.

Cultural and economic sustainability

The Old and New Wings aim to create a cultural heritage hub for Cantonese Opera, sustain and promote this traditional arts form. Bringing this mission to life involved the intensive engagement of various stakeholders in the performing arts – from actors to stage technicians and maintenance operators. The input of these stakeholders helped shape the design brief and the design process to ensure that the facilities can be well received by the public, allow flexibility to meet the changing needs throughout its building lifespan and become a value-added cultural venue to the city of Hong Kong.

Keywords: *well-being, green trail, social and cultural sustainability*

1. SUSTAINABILITY IS NOT JUST ABOUT TECHNOLOGICAL INNOVATION, IT IS MORE FOR THE HUMAN WELLNESS

Sustainable design that attracts public's attention is often through the display of its advanced technological innovations in its capability in energy/ water saving and energy renewability. Building systems efficiency performance is becoming the sole yardstick to measure the successfulness of a building sustainability design. While this engineering-based approach to sustainability does encourage people to waste less and recycle more, our consumption-based lifestyle has not altered much.

In this relentless pursuit of innovative design technologies, our design should facilitate people to interact more with the natural environment and to enjoy more the outdoor living habitat for a healthier lifestyle. After all, it is always more economical in capital and long-term running and maintenance costs when the building occupancies depend less on mechanical installations.

2. CLOSER LIVING RELATIONSHIP WITH THE NATURAL ENVIRONMENT TRANSFORMS OUR BEHAVIOUR FOR A SUSTAINABLE LIVING

This paper will look at the design of the Ko Shan Theatre New Wing (the "New Wing"), the first theatre built in Hong Kong to service the needs of the art of Cantonese Opera. It will act as a case study, looking at the transformation of an otherwise typical inward-looking theatre design into an environmentally, socially and culturally sustainable architecture project.

The focus of its sustainable design is more than benchmarking its energy efficiency with an engineering yardstick but to let the architecture socially respond to the park-users expectation for a "humble" design that sits quietly in the park context and environmentally blend in with the greeneries and avoid obstruction to the ventilation paths around the park. In fact, the design also aims to add values to the theatre-goers for them to experience the park's green context even inside the foyer areas. By introducing a new "green" trail up onto the roof of the auditorium, the design adds a new vertical dimension to the park-users for jogging or strolling up to the rooftop moon lawn.

We aim to transform the public behaviour by taking visitors out of an introverted air-conditioned space to outreach the nature and to enjoy fresh air and gentle breezes even here, deep inside the fabric of the city.

By allowing the users to organically experience the park's natural environment, the design helps facilitate a truly sustainable lifestyle and transform to a healthier living behaviour for the well-being of our future generations.

3. A DESIGN DILEMMA OF CELEBRATING CULTURAL HERITAGE WITH A GRAND DESIGN VERSUS CONCEALING THE BULK WITHIN A TRANQUIL PARK ENVIRONMENT

Parks in Hong Kong, regardless of whether they are located in the countryside or the urban area, are precious community resources. For the densely populated residential district of To Kwa Wan, Ko Shan Road Park has always been an irreplaceable breathing space—a "backyard" garden and a "communal clubhouse" for people living in the tiny dwellings in the district.

Built in the 1980s as an amenity facility in the Ko Shan Road Park, Ko Shan Theatre (or the "Old Wing") gradually became a popular Cantonese Opera performance venue for Hong Kong. Over the past decade, there were increasing calls from the cultural groups and general public to foster this traditional performing arts form. Eventually, the government confirmed that it would build a new wing next to the existing Ko Shan Theatre as a commitment to preserve this intangible cultural heritage and to promote the venue as a cultural and tourism asset of Hong Kong.

Performing arts groups as well as district council have eagerly anticipating this new theatre and expecting it to provide advanced theatrical installations and various ancillary services that the Old Wing cannot support. These include a fly tower for the stage, properly-sized dressing rooms, rehearsal rooms, singing practice rooms, an exhibition gallery, a souvenir shop, a tea house, a VIP lounge and more. However, only a tiny site of 4,000 sq. m., previously occupied by just four tennis courts, is available for the annex. After all, the tranquil park environment, strict zoning height restriction, high bedrock ground condition and presence of mature trees around the site have imposed unprecedented challenges to the design team to come up with a feasible design, not to mention a sustainable design solution.

This assignment was not only a design challenge, it also posed a design dilemma to the architect: whether to take this as a rare opportunity to design a landmark building which celebrates this piece of intangible cultural heritage for Hong Kong, or to design a building that rests humbly within the tranquil “backyard” which the local residence treasures so deeply.

Our desire to create sustainable, people-centric designs along with our commitment to design excellence led us to our final decision: we would attempt to address both sides of the dilemma by delivering on the expectations of stakeholders and theatre-goers for a landmark theatre, and give park users an enhanced leisure garden experience which would blend in with the park environment.

Essentially, we decided to create “A THEATRE IN A PARK” through the seamless integration of the theatre building with the park, and “A PARK IN A THEATRE”, whereby the park environment blends into the theatre’s interior.

4. A THEATRE IN THE PARK: A CONVERGENCE WITH THE PARK ENVIRONMENT

Trees are vital to a park environment. They soften the hard edges of any structure within the park and create an atmosphere of leisure and relaxation. Old mature trees in parks are often considered by park users as their old faithful companions and commonly become the landmark and remembrance in the community.

Despite the already-small site, we sacrificed the precious buildable footprint by setting the building’s perimeter back and adopting a curvilinear shape for the auditorium and foyer space to preserve most of the existing mature trees in-situ in front of the site and thrive hard to keep them in healthy condition throughout the construction period. These mature trees now embrace the building and serve as a visual screen for the building bulk behind, preserving the sound of wind through the tree leaves and birdsong high in the tree branches.

Our green design approach has not stopped at tree preservation. We create accessible green terraces at various levels of the building and we link them up to form a green trail that culminates at the moon lawn on the roof of the auditorium. This trail is an innovative extension of the park: a new, elevated exercise ground which gives park users a fresh experience and the moon lawn provides a spacious open roof garden where morning exercise classes can be held and events can be celebrated on festive days. This trail together with the roof garden has contributed to the park beyond the design brief requirements and figuratively has increased the site greenery coverage by 300 per cent.

Shared “green” space is also created at ground level – a naturally ventilated entrance foyer covered with a skylight. It is a cosy semi-outdoor plaza where people can meet before show time or gather as a pre-function area extended from the air-conditioned main foyer during intermissions. On non-performance days, it is used as an extended park amenity – a grand trellis that provides shelter for ad-hoc park activities in hot or rainy days. This is truly a people and space connector where the park and the theatre meet and a place where both park users and theatre-goers can utilise at different times of the day.

5. A DESIGN FOCUSING ON ENVIRONMENTALLY PASSIVE APPROACH

In addition to creating “green spaces”, sustainable building design should also start with a passive environmental approach, using strategic orientation and positioning of the building mass to minimize solar heat gain, while encouraging the use of natural daylight and ventilation into interior space to lower building’s energy consumption. The following “green passive” design approaches are adopted in the New Wing:

5.1 Building massing disposition and orientation

The building is oriented so that the main foyer faces east and south, drawing natural daylight into the common circulation space in the morning. The tower portion of the complex is treated with a solid surface façade and positioned on the west of the building composition shading the lower auditorium portion and the roof garden during the afternoon. With the rock slope behind the site lending its assistance, the building heat gain originating from the low-angle setting western sun is greatly reduced.

5.2 Building profile to optimize urban air ventilation

The stepped building profile follows the prevailing wind direction from east to west. Despite being the tallest part of the theatre – at almost 30m above ground – the tower portion is situated at the rear of the site close to the cut slope and merges well with the site topography and creates no adverse effects on the district's ventilation corridor.

The curvilinear building form of the auditorium block which faces towards the windward side also allows air to flow easily through the park and around the building perimeter and avoids creating undesirable wind gusts which could affect park users.

5.3 Solar reflectivity of the building envelope

White-washed walls are adopted for the tower's large vertical wall surfaces providing effective solar reflectivity and reducing solar heat absorption through the building envelope. This plain wall surfaces are easy and economical to maintain.

These passive sustainable strategies and the creation of shared "green spaces" help this new comer to be perceived as a park companion that accomplishes the cultural characteristic of the Ko Shan Road Park than an invader depriving the space and green resources of the Park. Such positive social interaction with the neighbourhood and the users gives an equal weight to the importance of environmental sustainability for a civic building.

6. A PARK IN THE THEATRE: AN INTEGRATED BUILDING ENVELOPE FOR A SUSTAINABLE INTERIOR SPACE

Besides being a Park companion, the park's greenery is welcomed into the theatre foyer through full-height glazing. External views of the park are "borrowed" into the interior through window frames or gate openings and reveals like a row of traditional Chinese landscape paintings through the window segments, a technique often used in traditional Chinese landscape design.

The following elements amplified this design:

6.1 Building facade

Through a high-performance glazing system which uses low U-value insulated glass units ($1.5\text{W/m}^2/\text{K}$), the entire theatre foyer can be bathed comfortably in natural daylight, incurring neither high thermal transmission nor high cooling load demand. The overall thermal transfer value of the building envelope is only 17.17W/m^2 –51 per cent lower than the baseline standard for a local office building.

The glazing panels of the full-height curtain wall are electrically operated and work with the main foyer's free cooling mode ventilation system under favourable weather conditions, minimising the air conditioning system's power consumption.

External sun-shading fins, which detach from the glazing panels to form an external shading "skin" for the envelope, serve as an effective solar shield, minimising direct solar impact on the east- and south-facing glass façades. A maintenance gap is reserved between the glass façade and the fins to ensure easy access for cleaning and repair work.

6.2 Rooftop thermal insulation

The urban heat island effect is mitigated by incorporating green roof system at multiple levels of the building. The greenery acts as an insulation layer, reducing heat gain through the building envelope and providing extra protection to the roofing system from direct radiation attack. This also reduces the temperature of the local area and the energy consumption of the air-conditioning system operating in the space below.

6.3 High greenery coverage

The total planting area covers 34.6 per cent of the site. More importantly, majority of these landscaped areas are not only designed for visual pleasant, these green terraces are also accessible and can be integrated with the adjoining rooms to form an expandable function area.

6.4 Acoustic insulation

Acoustic separation is achieved in a number of ways: through sound barrier ceiling, isolation partitioning and floating slab. The isolation elements are suspended by isolation hangers or spring fixing with neoprene separators, allowing the room interiors to be isolated from building structure.

Such design integration of the interior atmosphere with the exterior park environment reinforces its companionship of its natural setting in the park and the traditional Chinese cultural arts form through its close spatial interaction with the Nature.

7. CULTURAL AND ECONOMIC SUSTAINABILITY

Sustainability should be interpreted multi-disciplinarily. Environmentally, a low-carbon building enables the building operations to be economical and friendly to our earthly environment.

In the design process, the architect has always been conscious on its social sustainability aspect of the development and fully engaged its design with the environment to let it be a companion of the park setting and its neighbourhood.

Besides, intensive engagement and partnering workshops (20 nos.) with stakeholders from various disciplines and consultation meetings at district level (10 nos. of District Council meetings) as well as professional level (50 nos. of Cantonese Opera Advisory Committee Meetings) were conducted.

The aim is to ensure that the facilities can be economically sustainable as a well-received arts venue by the performers and the audiences and can accommodate flexibility to meet the changing needs throughout its building lifespan. After all, the project can gradually become a value-added cultural venue to the city of Hong Kong.

8. CONCLUSION

The heart of the design approach to the Ko Shan Theatre New Wing involved a re-evaluation of the basics of sustainable design: instead of focusing solely on technology-based sustainability innovation, we sought to create a design that well integrates with the green environment, encouraging all users – theatre-goers as well as park users – to reach out and embrace nature.

In a wider sense, our search to achieve building sustainability should not be limited to economic and environmental sustainability, but should also incorporate intangible social and human values which service the well-being of our future generations to achieve cultural sustainability.