



BANGKOK SCREEN HOUSE

Re-imagining Bangkok Scala Cinema



Politecnico di Milano

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Abstract

Bangkok is a city characterized by the coexistence of skyscrapers, cultural landmarks, and the continuous demolition of historic architecture. Over the past decade, economic pressures have increasingly favored large scale commercial development over the preservation of cultural heritage, as conservation is often perceived as financially unviable and obstructive to business interests. This condition forms the central challenge addressed by the Bangkok Screen House project, located on the former site of the Scala Cinema in the Siam Square district, one of Bangkok's most significant centers of youth culture.

The project investigates how the spatial atmosphere and cultural memory of the iconic cinema architecture can be reinterpreted while simultaneously responding to Bangkok's environmental challenges, particularly urban dust and air pollution. Through the integration of architecture and expansive public green space, the proposal aims to create a multifunctional urban environment that supports youth pop-cultural activities, everyday public use, and promotes a lifestyle connected to nature. Positioned at a major urban intersection, the project functions as a new architectural and landscape frontage for the Siam Square district, introducing greenery into one of Bangkok's most densely populated urban areas. The architectural structure and façade are designed with sustainability as a core principle, emphasizing natural ventilation and passive design strategies to enhance human comfort. This approach demonstrates how traditional climatic design principles in Thai architecture can be reintroduced in a contemporary context, reducing reliance on air-conditioning and mechanical comfort systems.

Ultimately, this project proposes an alternative model for urban development in Bangkok one that reconciles cultural memory with contemporary public life and environmental responsibility. By positioning architecture as a mediator between heritage preservation, ecological design, and everyday urban use, the project offers a framework for reimagining how central city sites can evolve without erasing their cultural and environmental significance.

HISTORY OF THE SITE & CONFLICT

What & Where is Siam Square?

Siam Square is a vibrant shopping and entertainment district located in the Pathum Wan district in the central heart of Bangkok, Thailand. Widely regarded as the city's "heart of youth culture," it is a bustling area where fashion trends are born and modern city energy is most palpable. Unlike the massive enclosed malls that surround it, Siam Square is known for its maze-like alleys filled with small boutiques, trendy cafes, and independent shops. It's the only area where this complex gathering space structure exists.







Bangkok district map



Siam Square area

The Hub of Youth Culture and Fashion

Historically developed by Chulalongkorn University, the area has evolved from a residential slum into one of the most expensive and desirable commercial locations in Thailand. Siam Square is the main gathering hub of Bangkok because it caters to such a wide range of needs, from high-fashion enthusiasts to students attending the dozens of tutoring center. This area offers basically everything you need in order to spend a day, youth call the area home.

Uniqueness

Siam Square offers a unique open-air shopping experience that captures the city's creative spirit unlike the other shopping district that are normally indoor :

_Retail Diversity: Features over 4,200 shops, ranging from affordable market stalls to upscale designer boutiques offers in both shop house retail style and in the shopping malls.

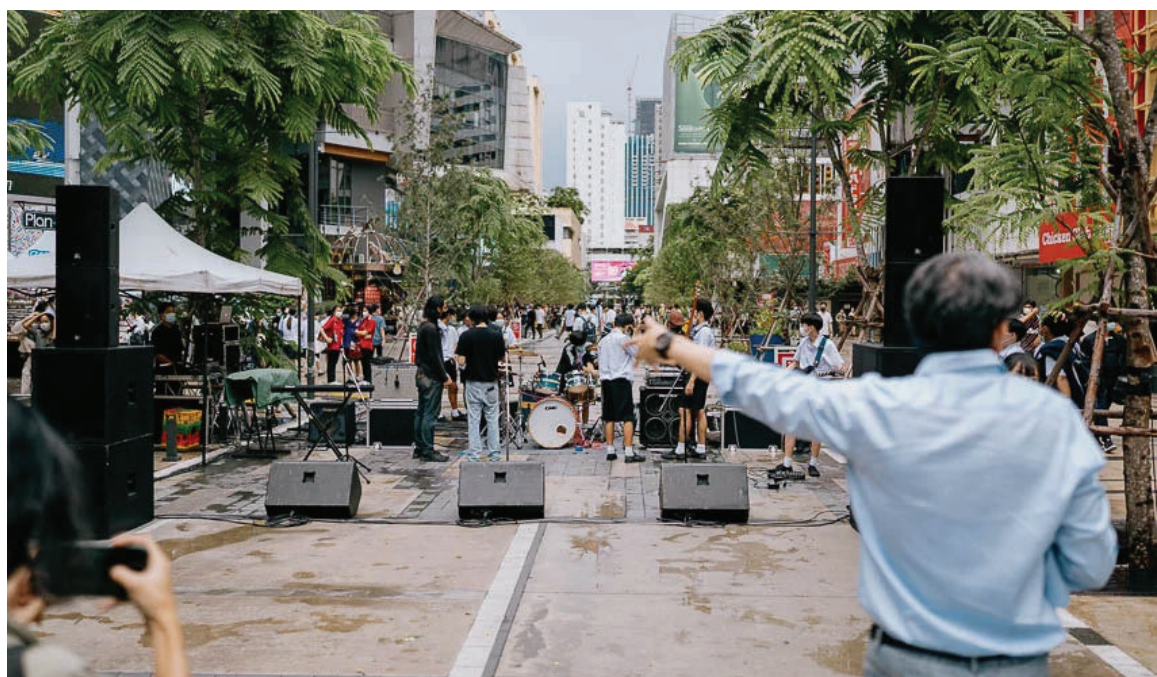
_Educational Hub: Hosts more than 30 tutoring institutions, making it the primary learning center for Bangkok's students including the area for self-studies and co-working space.

_Entertainment Options: Includes diverse attractions such as cinemas, bowling, cafes, restaurant, and the modern shopping complex

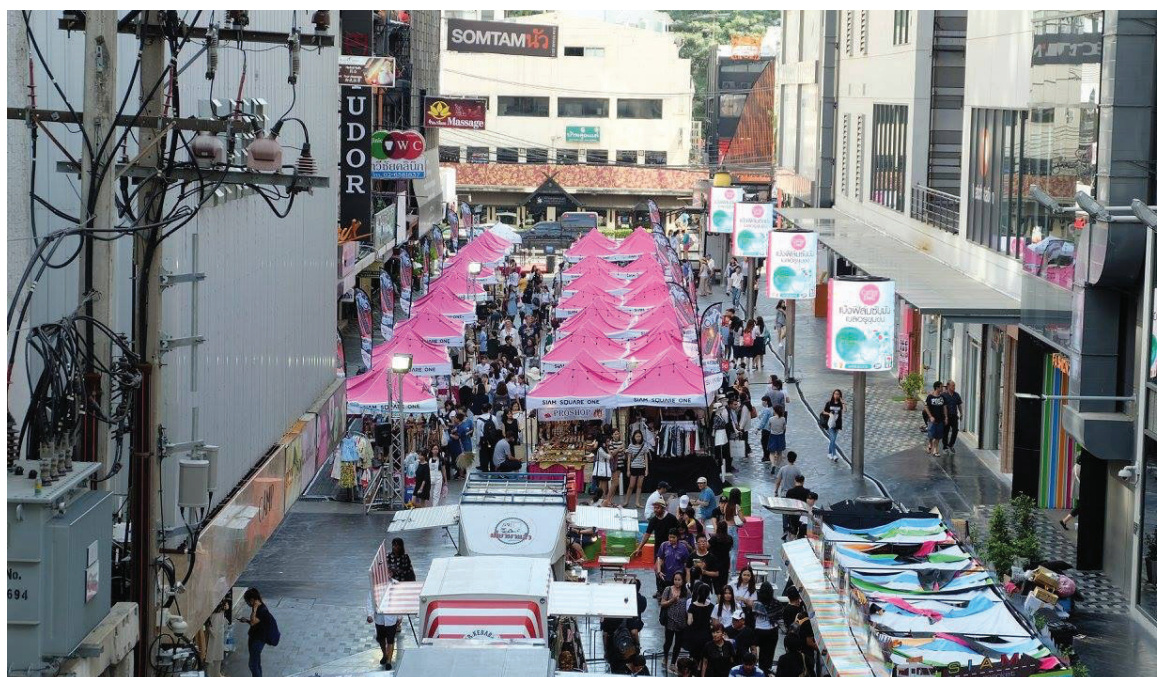
_Vibrant Atmosphere square: Known for its "Walking Street" vibe, especially in the evenings when the area becomes a popular meeting spot for locals and tourists. Consisted of several squares and meeting points, it becomes the area where the teenagers perform there talent and socialize area.



Youth showcase in front of Center Point



Siam Square walking street



Siam Square market

Location and Accessibility

The square is strategically positioned at the corner of Phayathai Road and Rama I Road. Its central location makes it the ultimate traffic hub for the city, with roughly 400,000 people passing through daily.

_Public Transit: It is situated directly in front of the Siam BTS station, the main interchange for the Skytrain's Silom and Sukhumvit lines.

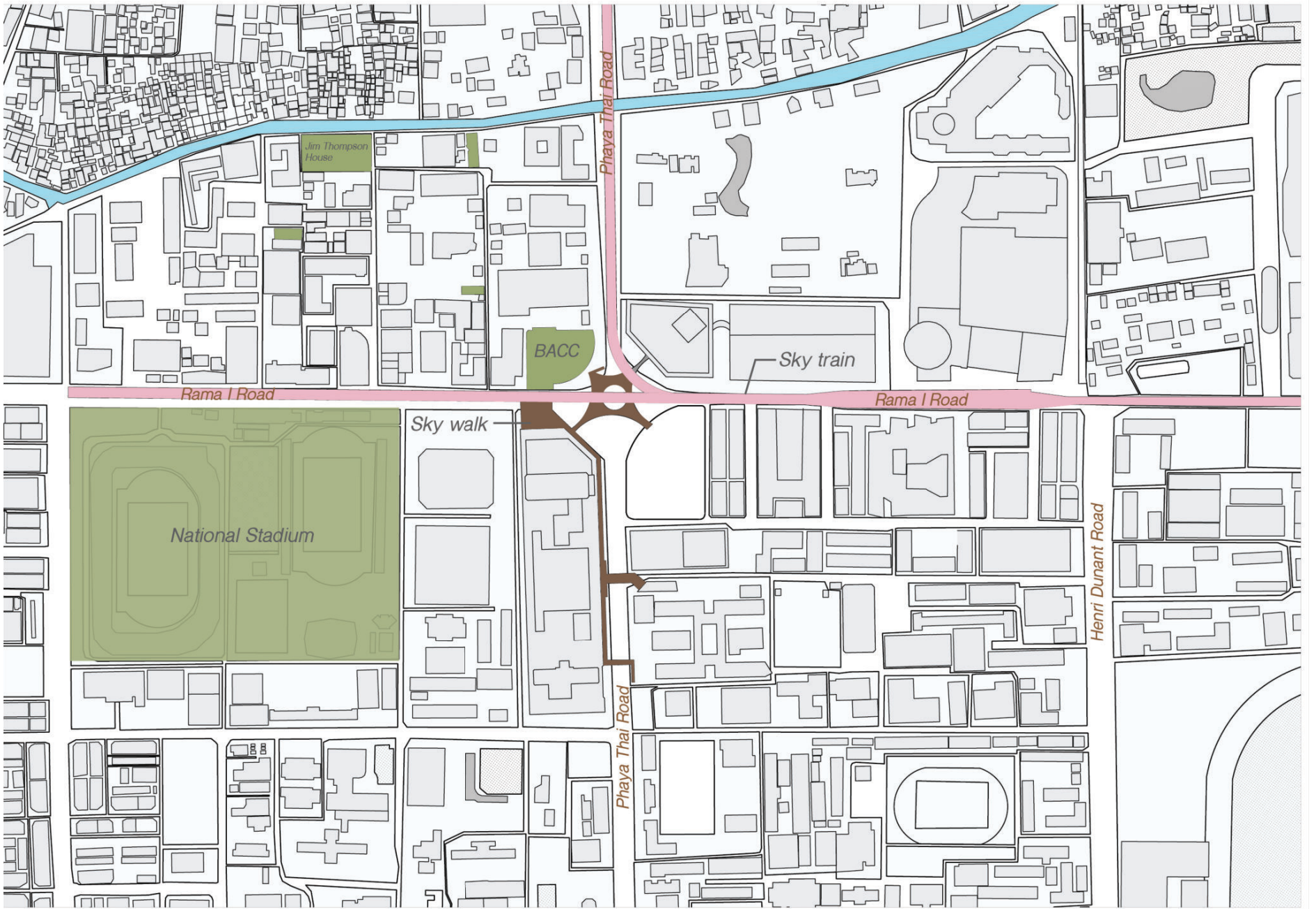
_Skywalk System: Connected by elevated walkways to several other major shopping malls and landmarks, including Siam Paragon, Siam Center, Suphachalasai National Stadium, Bangkok Art and Cultural Center and MBK Center.

_Cultural Proximity: Located within a short walk of the Bangkok Art and Culture Centre (BACC), the historic Jim Thompson House, National stadium (where it held universities/school sport festival) and several small galleries.

_Rama I Road: This is the main road of the district. It runs east-west and separates the openair Siam Square area from the massive "super-malls" like Siam Paragon, Siam Center, and Siam Discovery. The BTS Skytrain (Sukhumvit Line) runs directly above this road.

_Phaya Thai Road: This road runs north-south and marks the edge where Siam Square meets the MBK Center. The intersection of Rama I and Phaya Thai is one of the busiest in Bangkok. Running from the south, you will reach the important Victory monument in the north side.

_Henri Dunant Road: Named after the founder of the Red Cross, this road borders the eastern side of the square. Across this road, there area a Royal Bangkok Sports Club and various faculties of Chulalongkorn University





BTS Skytrain in Slam sqaure



BACC with Skywalk intersection



National Stadium



Jim Thompson museum



Yellow House Gallery



BTS Skytrain and Siam Center building

History of the area

Around 100,800 sqm. of land owned by Chulalongkorn University. With a history spanning over 60 years, it is often referred to as the "Soho of Thailand."

Origins and Early Development (1960s)

_From Slums to Shops: Originally a site of wooden shacks and vegetable gardens, Chulalongkorn University began developing the area in 1964 to generate income for the university's educational missions.

_The Golden Age of Cinema: The area became famous for its three iconic standalone cinemas: Siam (opened in 1966), Lido (1968), and Scala (1969). These theaters turned Siam Square into Bangkok's premier entertainment hub.

The Teen Culture & Fashion Era (1970s - 2000s)

_Trendsetting Hub: By the 1970s, Siam Square had evolved into the epicenter of fashion, music, and youth subcultures. It hosted boutique tailors, record stores, and trendy cafes.

_Center Point: During the 1990s and early 2000s, the "Center Point" area (a plaza between Soi 3 and Soi 4) became the legendary meeting spot for teenagers before the era of mobile phones

Modern Transformation (2010 - Present)

_Siam Square One: Following the 2010 protests that led to the burning of the original Siam cinema, the site was rebuilt into Siam Square One, a multi-story vertical mall.

_The End of Standalone Cinemas: The Lido closed in 2018 (reopening as a multi-purpose art space Lido Connect), and the legendary Scala closed its doors in 2020, marking the end of an era.

_Siam Square Walking Street: In 2022, the Property Management of Chulalongkorn University (PMCU) underwent a massive renovation, moving all electrical cables underground and turning "Soi 7" (Alley 7) into a modern walking street.



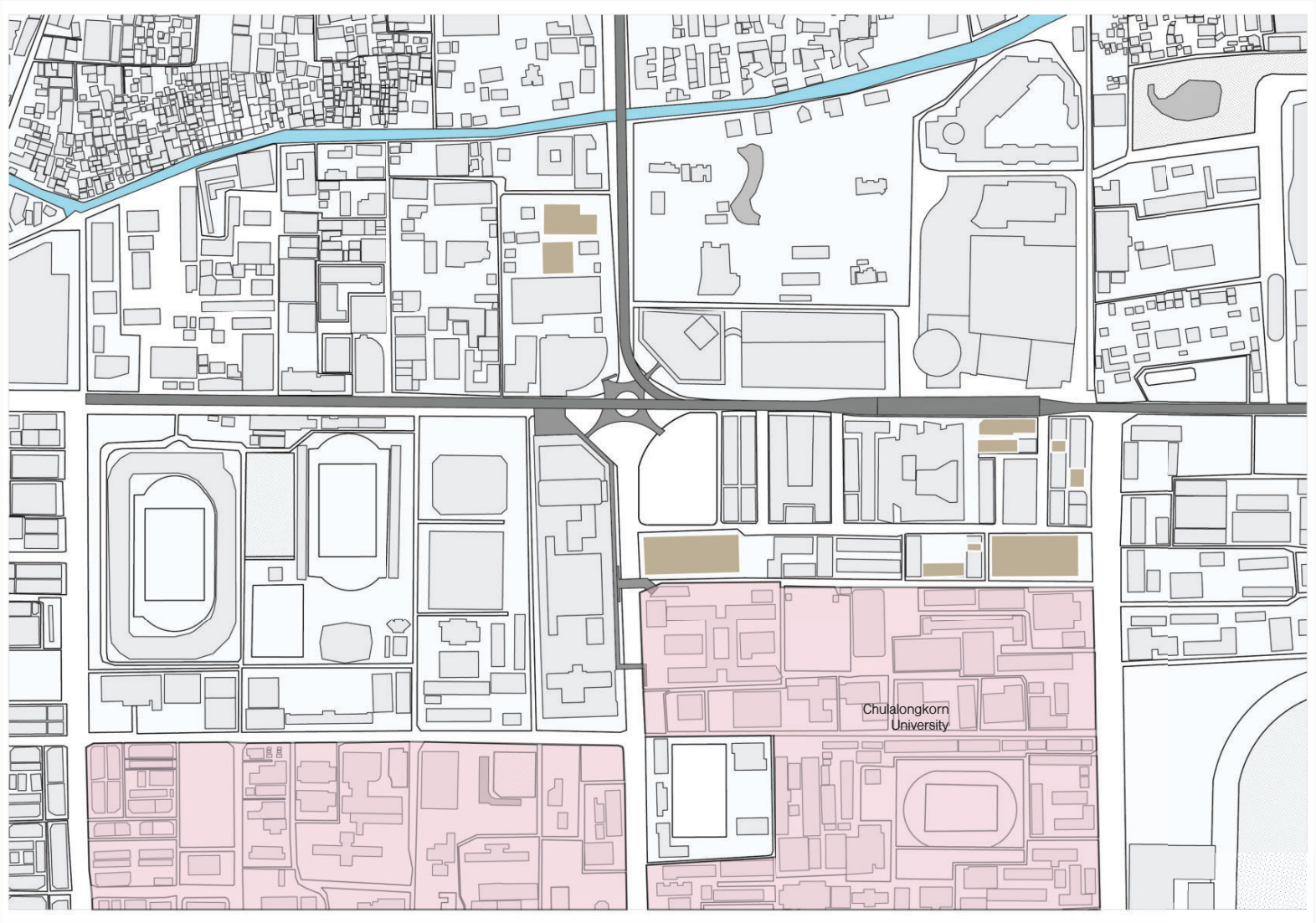
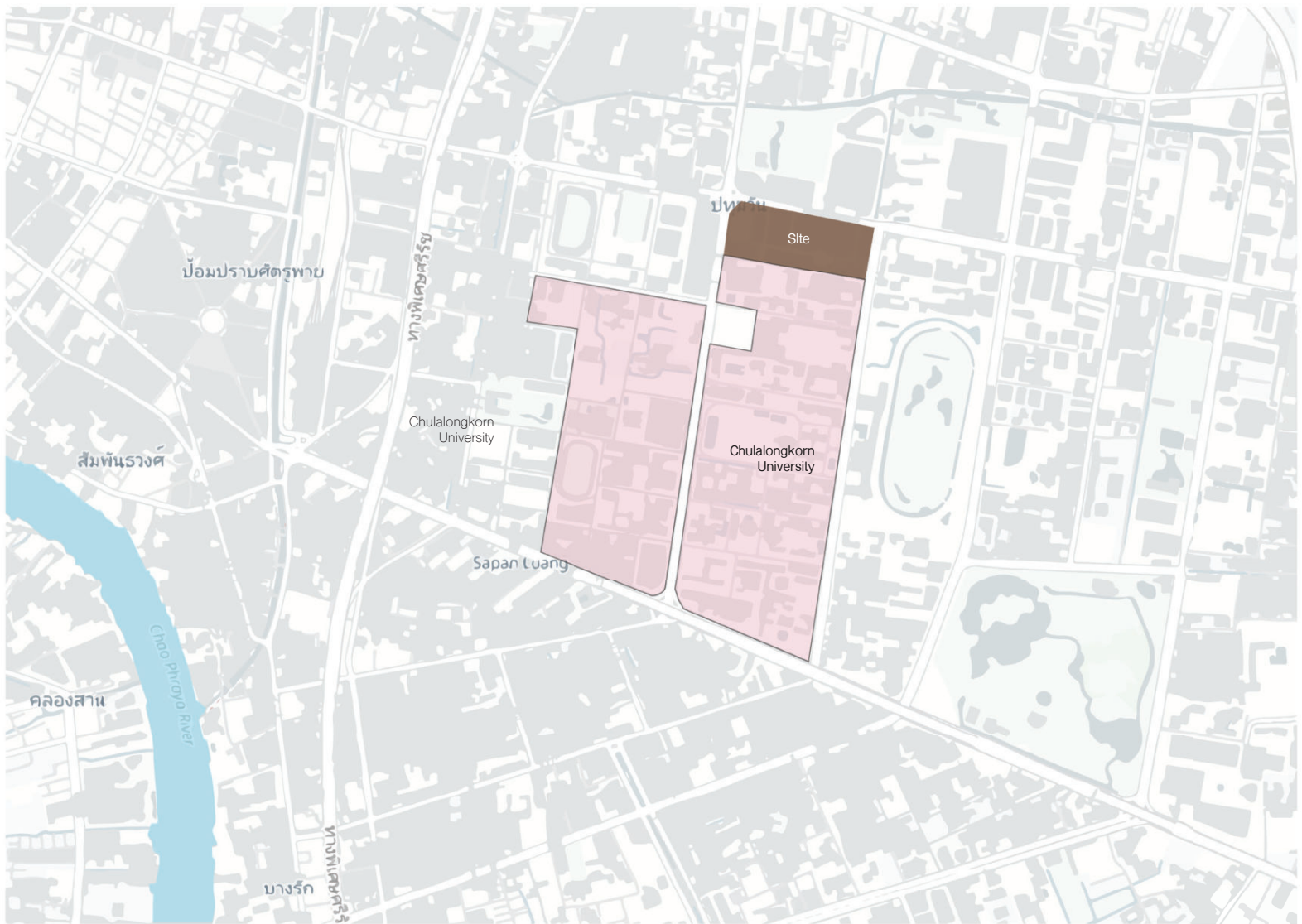
Connection to University area and Educational hub

_Chulalongkorn University (CU): Siam Square is located on the campus of Chulalongkorn University. The land is an endowment managed by the university's Property Management Office (PMCU). Established in 1917, the university is Thailand's first and oldest institution of higher learning. It is a public autonomous research university named after King Chulalongkorn (Rama V) and founded by his son, King Vajiravudh (Rama VI). CU is consistently ranked as the No. 1 university in Thailand. Notable, the campus is noted for its green spaces and a blend of traditional and modern architecture. The campus comprises 19 faculties, a graduate school, and various specialized colleges and research institutes. Educates over 37,000 students, including approximately 26,000 undergraduates and over 11,000 postgraduates.

_SIAMSCAPE Building: A modern building in the area, SIAMSCAPE, was specifically developed to consolidate many of the educational and tutoring businesses, combining office, retail, and learning spaces.

_Siamkit Building: 30-story mixed-use building, it has retail and office space, it is most famous as the tutor capital of Thailand, serving as the primary hub for private tutoring centers.

_Small tutor places: Other scattered small tutoring places around Siam Square area.



Small tutor places
 Chulalongkorn University



Chulalongkorn University



Siamscap building and the plot

Neighborhood district

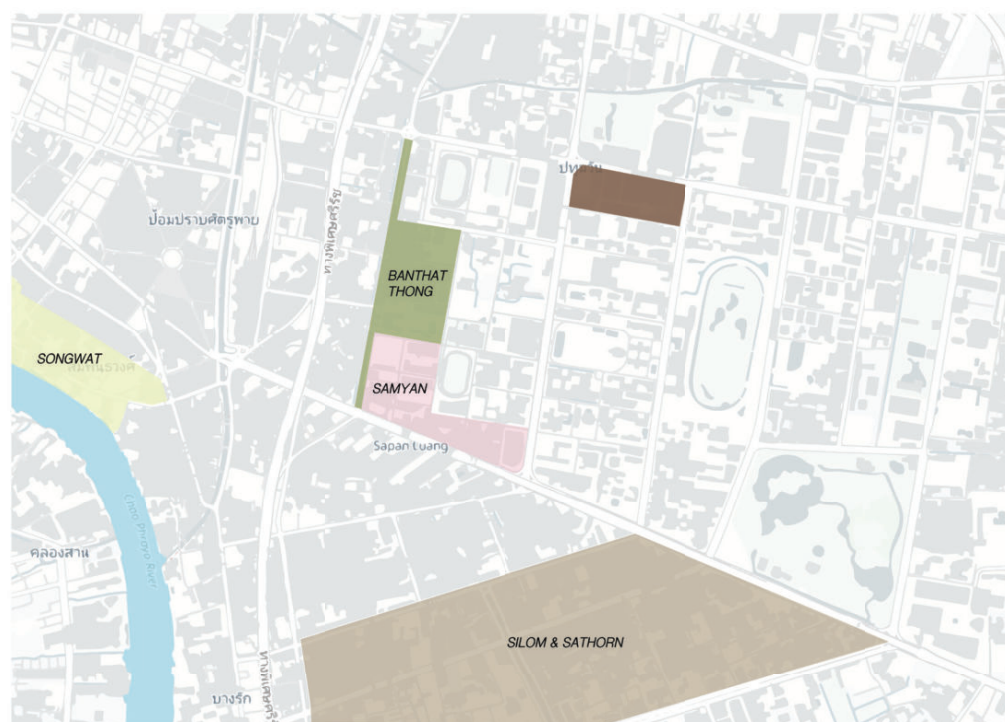
Ratchaprasong: Located just a short walk or a BTS station away (Chit Lom), Ratchaprasong is an upscale commercial area known for luxury malls like Central-World, Gaysorn Village, and Erawan Bangkok. It is also home to major international hotels and the famous Erawan Shrine.

Sam Yan and Suan Luang: Another area on Chulalongkorn University land, near the Rama IV Road intersection. It is home to the modern Samyan Mitrtown mixed-use development, offering a blend of retail, office space, and residential areas catering to students and professionals.

Banthat Thong Road: Directly adjacent to Chulalongkorn University, this area has rapidly grown into a popular culinary hotspot. It's bustling with students and young adults exploring a vibrant mix of local eateries, cozy cafes, and small art galleries.

Silom/Sathorn: A little further south and a few stops on the BTS Silom line, this is Bangkok's main financial district. It features high-rise office buildings, a vibrant nightlife, various dining options, and Lumpini Park, one of the city's largest green spaces.

Songwat Street Art: Located further towards the river, this historic road along the Chao Phraya River is known for its preserved classic shophouses, chic cafes, and cultural spots, offering a different, more traditional Bangkok vibe.





Samyan area



Banthat Thong area



Silom/Sathorn area



Songwat Street art district

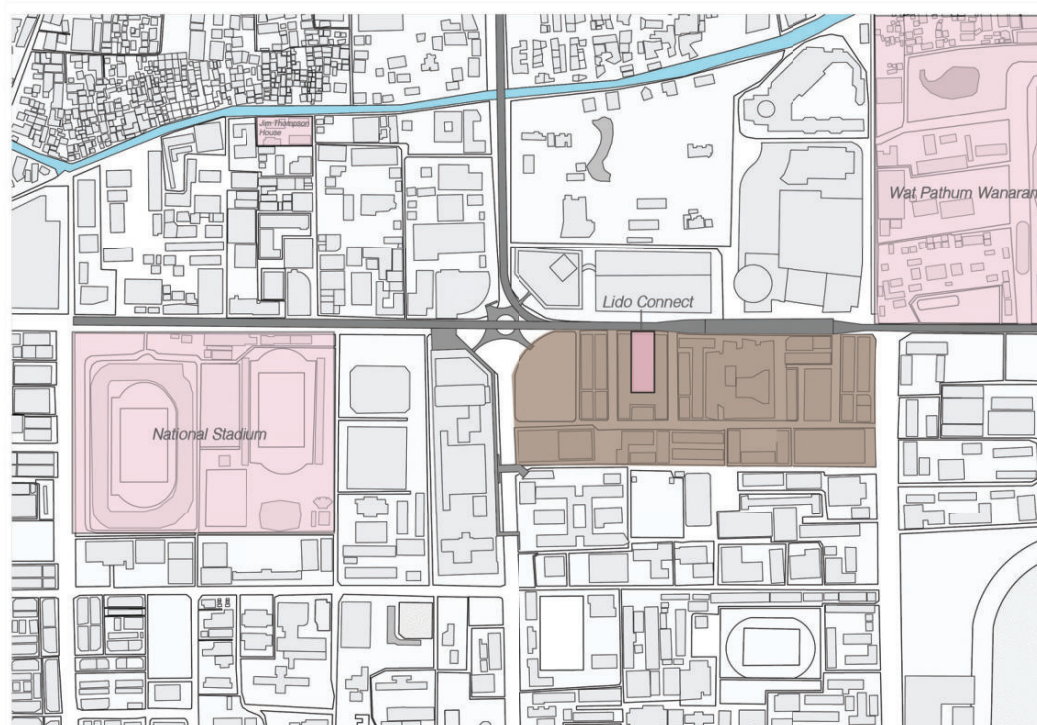
Historical landmark existing

Jim Thompson House Museum: A tranquil oasis near the bustling Siam area, this museum consists of six traditional 19th-century Thai teakwood houses that were disassembled in Ayutthaya and reassembled in Bangkok by American silk entrepreneur Jim Thompson. It showcases an impressive collection of South-east Asian art and architecture.

Wat Pathum Wanaram: This serene Buddhist temple, located between the modern Siam Paragon and CentralWorld shopping malls, provides a stark contrast to the surrounding commercial hustle. It was founded by King Rama IV in 1857 and is still an active place of worship, offering a peaceful atmosphere.

Suphachalasai National Stadium Opened: in 1938, this large arena is a key landmark in the area and a significant site in Thai sports history, still in use for various sporting events.

Lido Connect: is a vibrant multi-purpose art and lifestyle hub located in the heart of Siam Square. It is the result of a major renovation of the historic Lido Theater, which was one of Bangkok's most beloved standalone cinemas.



Mall's Cinema

Paragon Cinemplex: This is the main, high-end cinema complex in the immediate vicinity. Located on the top floor of Siam Paragon, it offers numerous screens, including IMAX, 4DX, and VIP theaters, providing a luxurious movie-going experience.

SF Cinema MBK Center: Located on the 7th Floor, it is one of the most popular movie destinations in the Siam area due to its accessibility and frequent promotions.

Stand-alone cinema

Siam Cinema: Opened in 1966, it was a grand standalone movie palace with an 800-seat capacity. It was the first of the famous "Apex" trio (Siam, Lido, and Scala). The building was tragically destroyed by a fire during political protests in May 2010. Because the structure was beyond repair, it was demolished to make way for the modern multi-story "Siam Square One" mall that stands there today.¹

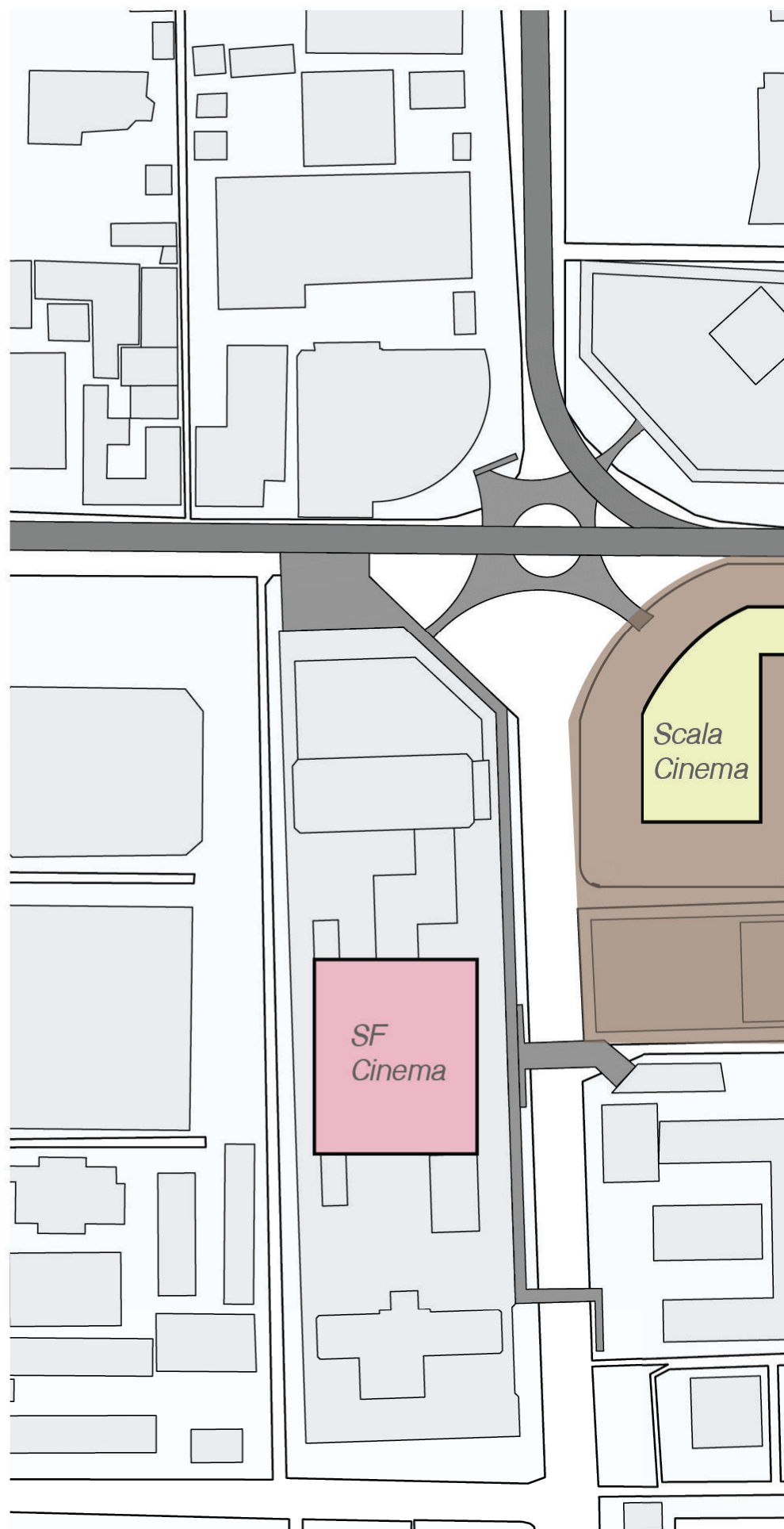
Status : Demolished and Rebuilt into shopping mall

Lido Connect: Initially a single-screen, 1,000-seat cinema, it was converted into a three-screen multiplex after a fire in the 1990s and became known for screening independent and art-house films. It closed in 2018 when its lease expired. The building was redeveloped and reopened in 2019 as Lido Connect, a modern arts and performance venue with only limited, small-scale film screening capabilities.²

Status : Renovated

Scala Cinema: The last and most architecturally significant of the three, the 900-seat Scala was renowned for its late-Modernist design and Art Deco interior, featuring a grand staircase and an Italian chandelier. It was the last single-screen cinema in Bangkok. It closed permanently in 2020 due to the pandemic and changing consumer preferences. The historic building was subsequently demolished in 2021 to make way for future development by Central Group.

Status : Demolished



Old Lido cinema



¹ Jablon, P., Thailand's Movie Theatres: Relics, Ruins and the Romance of Escape. River Books, 2019.

² Bangkok post, A Phoenix Rising: The New Life of Lido Connect. Bangkok post, 2019.



New Lido Connect cinema



The Siam cinema



The Scala cinema

Scala Cinema

Address: 184 216, Rama 1 Road, Siam Square, Pathum Wan, Bangkok 10330, Thailand

The Scala Cinema (1969–2020) was widely considered the most beautiful and architecturally significant movie cinema in Thailand. Designed by Thai architect Colonel Chira Silpakarnok. Its closure and subsequent demolition marked the end of the standalone cinema era in Bangkok (2021).

Architectural Significance: Designed by architect Chira Silpakarnok, the Scala was a masterpiece of New-formalism style architecture with striking Art Deco interior elements. This exterior style was a trend during 1960 inspired from the famous World Trade Center Building in the USA, many Thai bank and cinema buildings got influenced from this style. **The Lobby**, a grand, lofty space featuring a double staircase and a massive five-tiered Italian crystal chandelier. **The Ceiling**, a distinctive vaulted ceiling supported by reinforced concrete "mushroom" columns, decorated with golden 24-pointed star ornaments. **External Features**, the name of the showing film was traditionally displayed in hand-placed red letters on an old-world marquee.

Awards: In 2012, it received the ASA Architectural Conservation Award from the Association of Siamese Architects for its impeccable preservation.

History of Scala Cinema

Opening (Dec 31, 1969): It debuted with the *American Western The Undefeated (Movie)*, starring John Wayne. It was the last and grandest of the three "Apex Group" theaters in Siam Square (the other two being the Siam and the Lido).

Final Act (July 5, 2020): Amid the COVID-19 pandemic and changing consumer habits, it held its final screening—the fittingly nostalgic Cinema Paradiso.

Demolition (2021): Despite public outcries and



The Scala cinema



Interior of the Scala cinema



New-Formalism Northwestern National Life building was designed by Minoru Yamasaki in the mid-1960s.



New-Formalism in Thailand , Kasikorn bank at Sathorn road

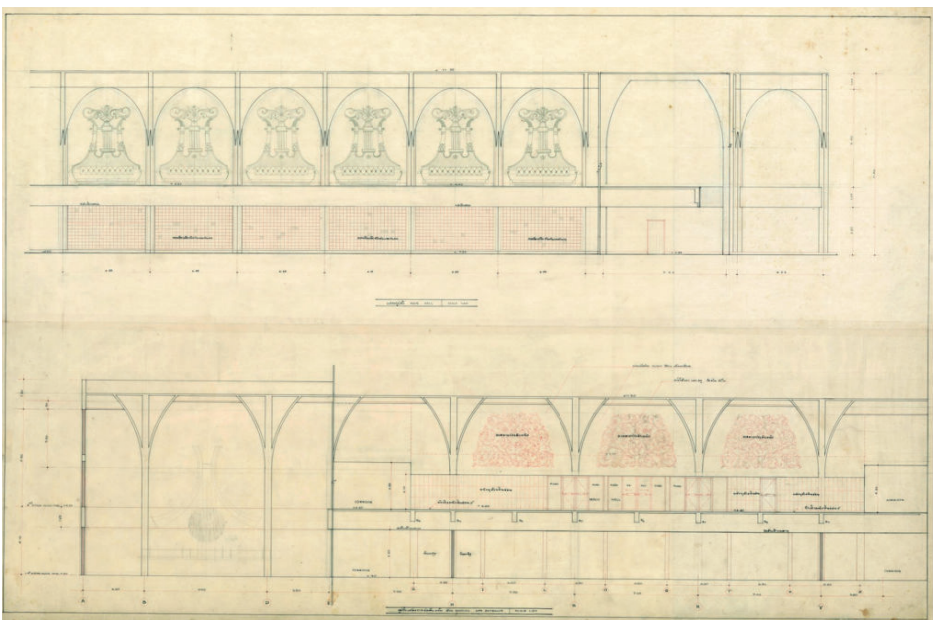
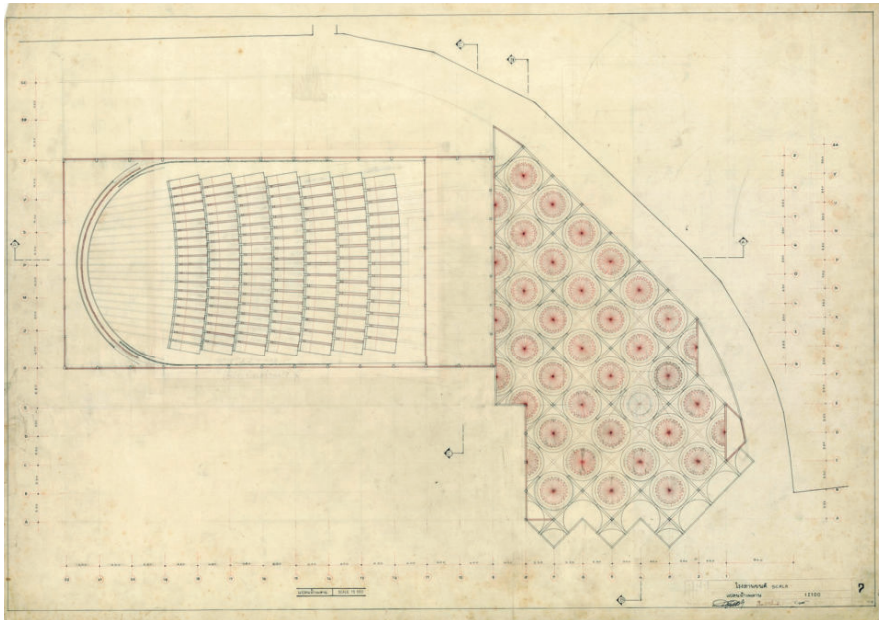
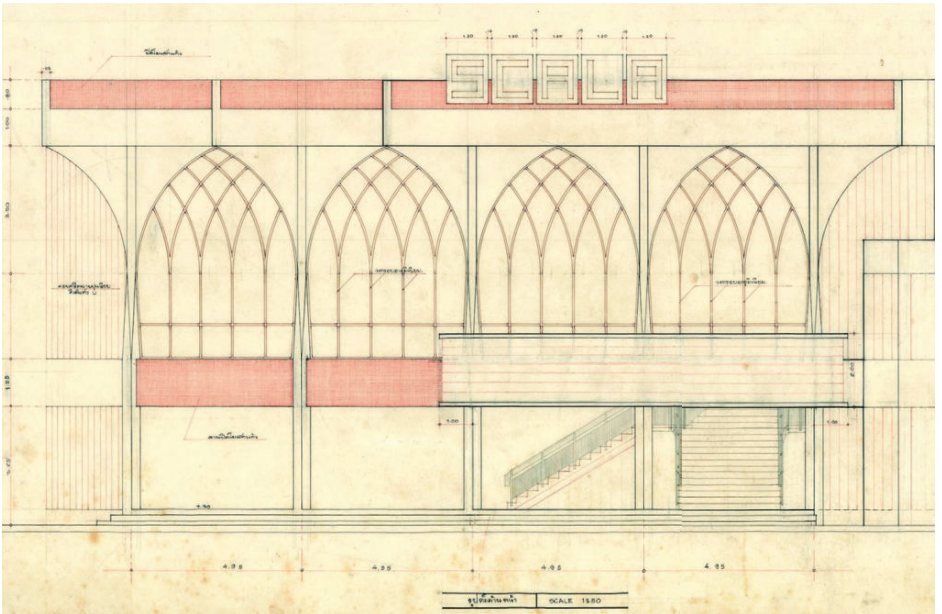
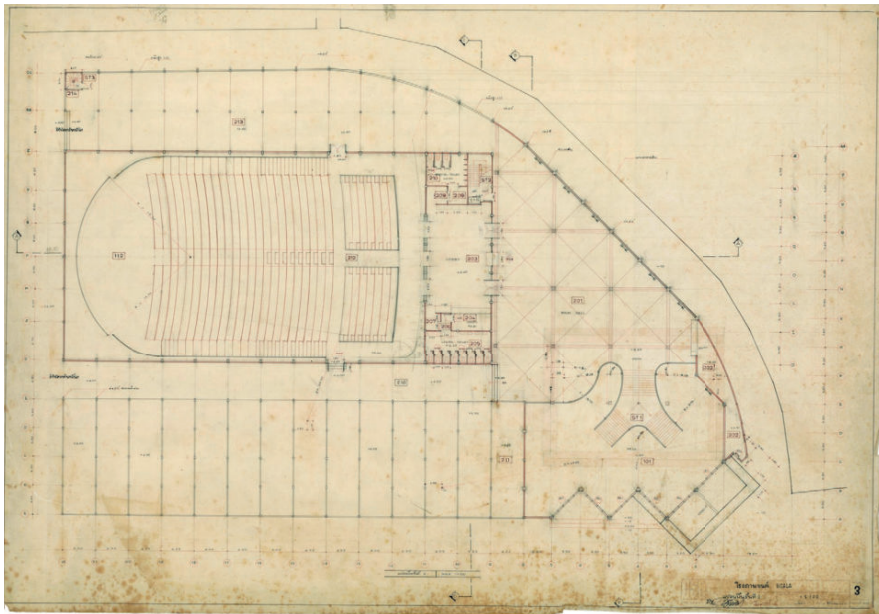
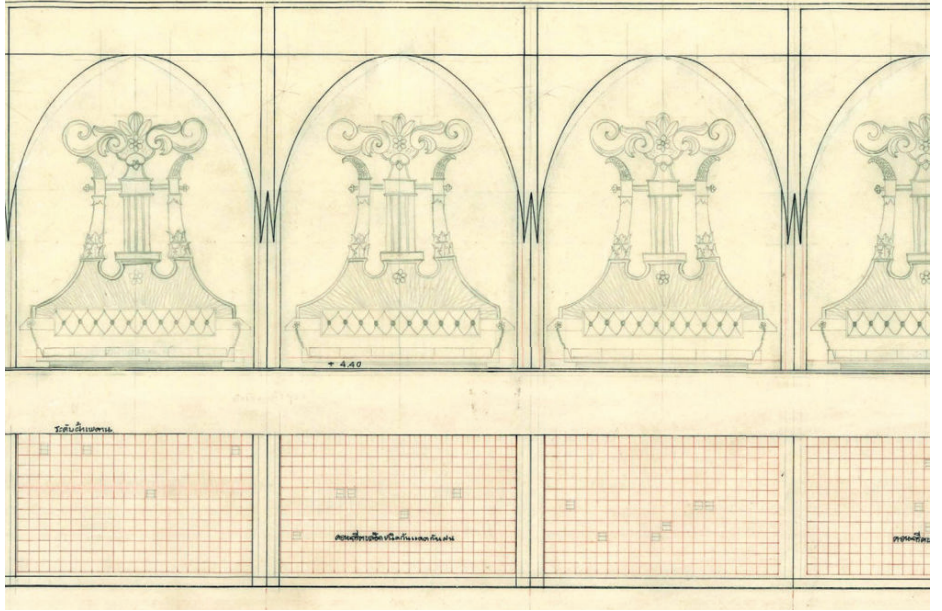
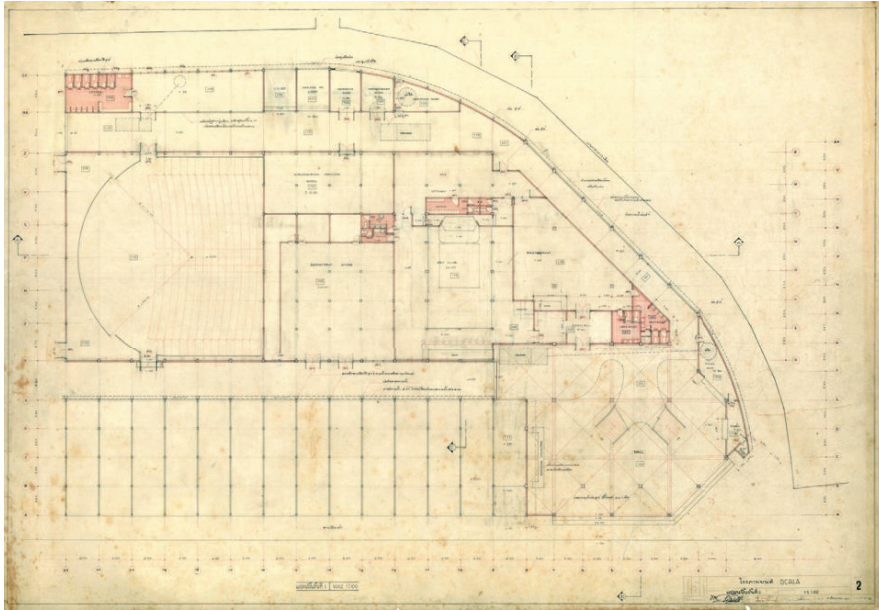
Importance of Scala Cinema

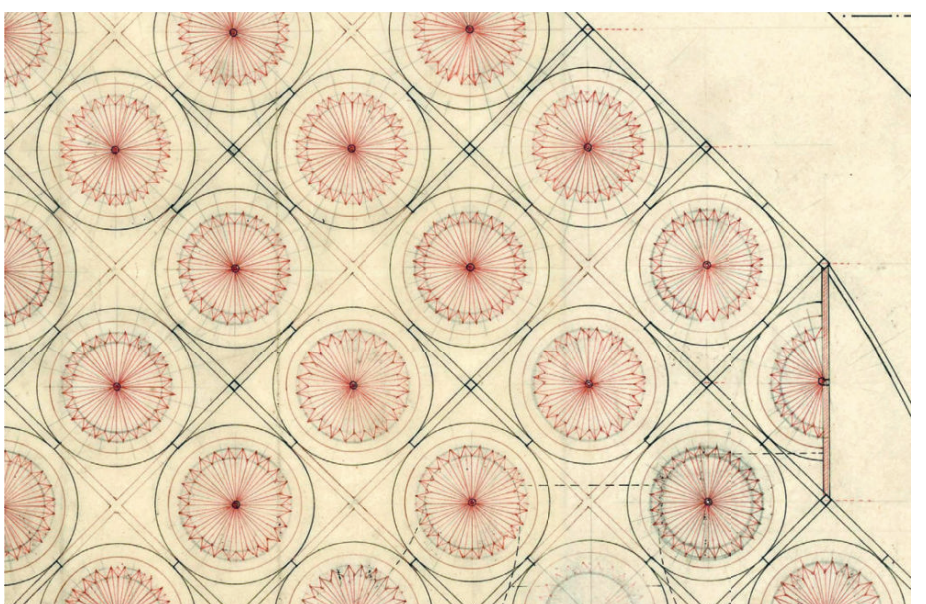
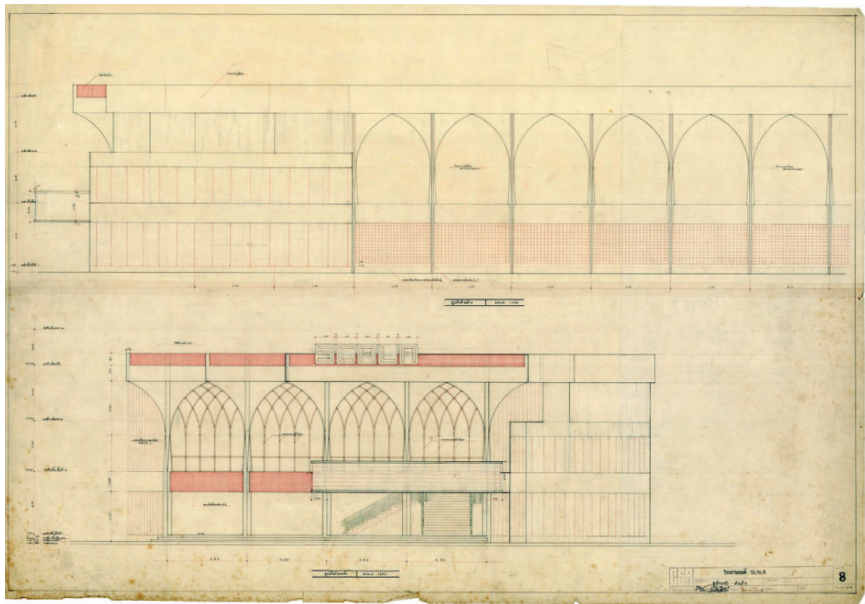
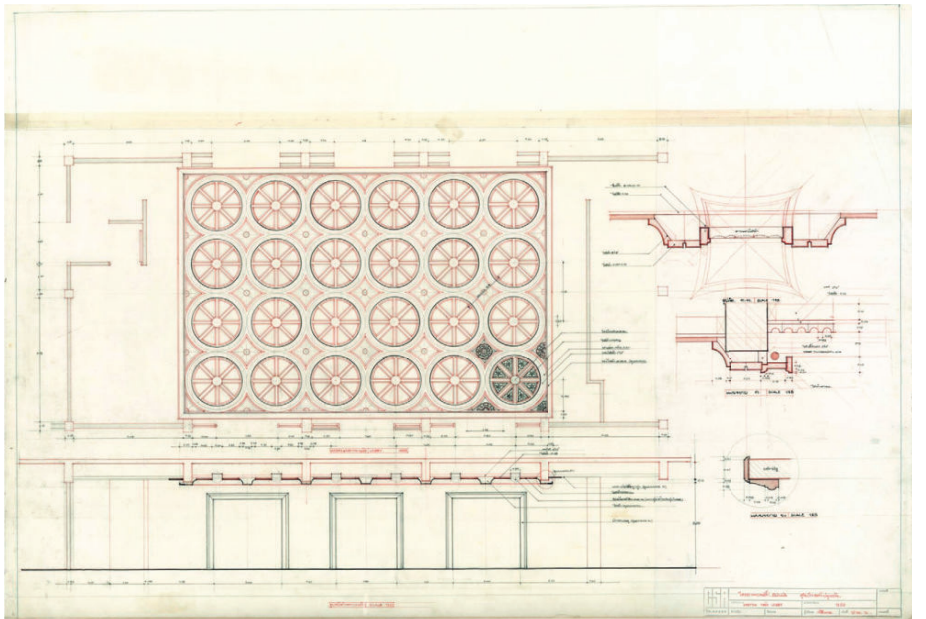
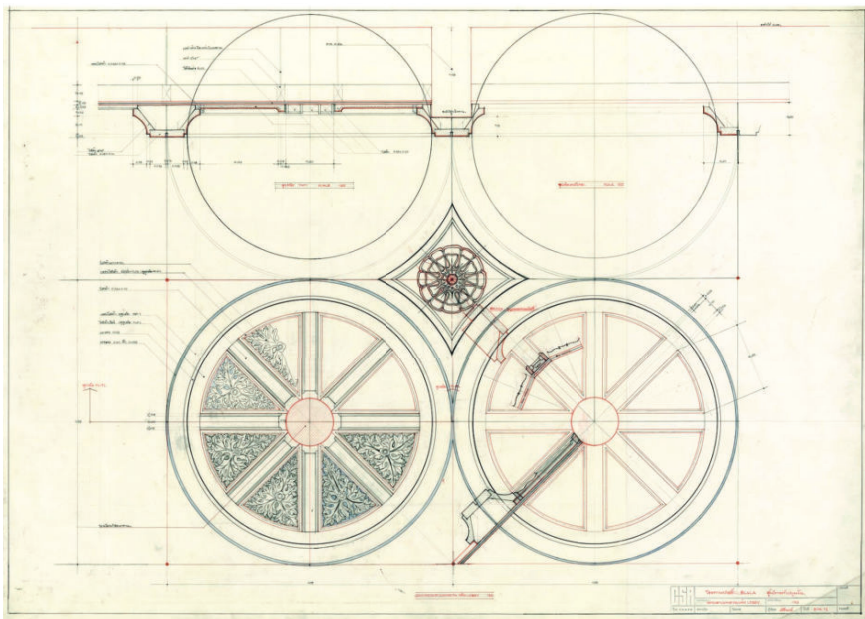
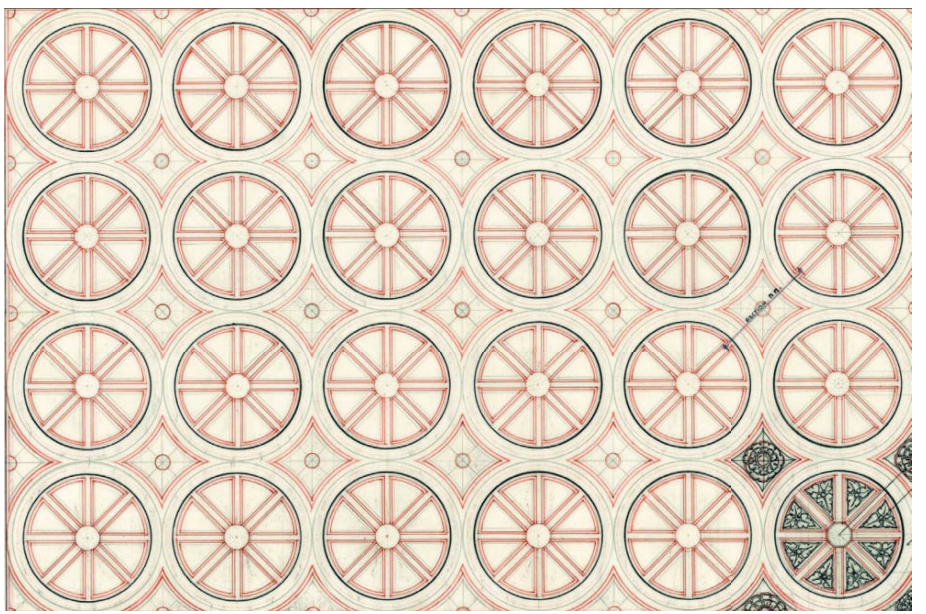
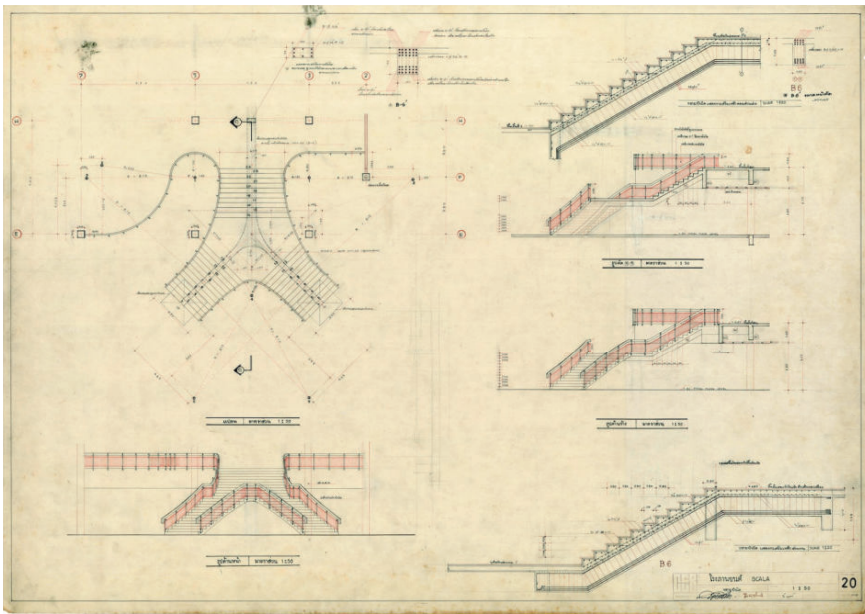
Collective Memory: For generations of Thais, the Scala was more than a cinema; it was a "time capsule" representing the golden age of movie cinema. It is more than the cinema, but the sense of community for visual arts and film-lover. The Scala acted as a notable landmark and meeting point not only among visitor but also including the cinema's crew themselves.

Art House Legacy: Unlike modern multiplexes, the Scala often screened independent, European, and Asian films that were not available elsewhere with the big screening room of 1000 seats. It also served as a primary venue for the Bangkok International Film Festival and the Silent Film Festival.

Soft Power Symbol: Critics argued that preserving the Scala could have turned it into a creative hub similar to the British Film Institute, serving as a symbol of Thai "soft power" and cinematic heritage.







Structure of the Scala Cinema

1. The Material: Reinforced Concrete (RC)

The entire skeleton of the Scala was made of reinforced concrete. In the 1960s, concrete was the preferred material for Thai Modernism because it was versatile enough to create the dramatic, flowing shapes found in the lobby while being strong enough to support the heavy loads of the theater's upper floors.³

2. The Lobby: Mushroom Column System

The most famous architectural feature of the Scala was its mushroom column system (also known as a flat slab with columns). In standard buildings, floors are supported by a grid of beams. In the Scala's lobby, the architect eliminated the beams to create a floating look. Instead, the floor slab sat directly on top of the columns.

The "Mushroom" Shape to prevent the column from punching shear failure of the slab, the top of each column flared out into a wide, polygonal "head." This increased the surface area where the column met the ceiling, spreading the weight of the floor above across a wider point. This engineering necessity was turned into a design triumph. The flared heads were decorated with gold star shaped bronze ornaments, making the columns look like a forest or a series of umbrellas.

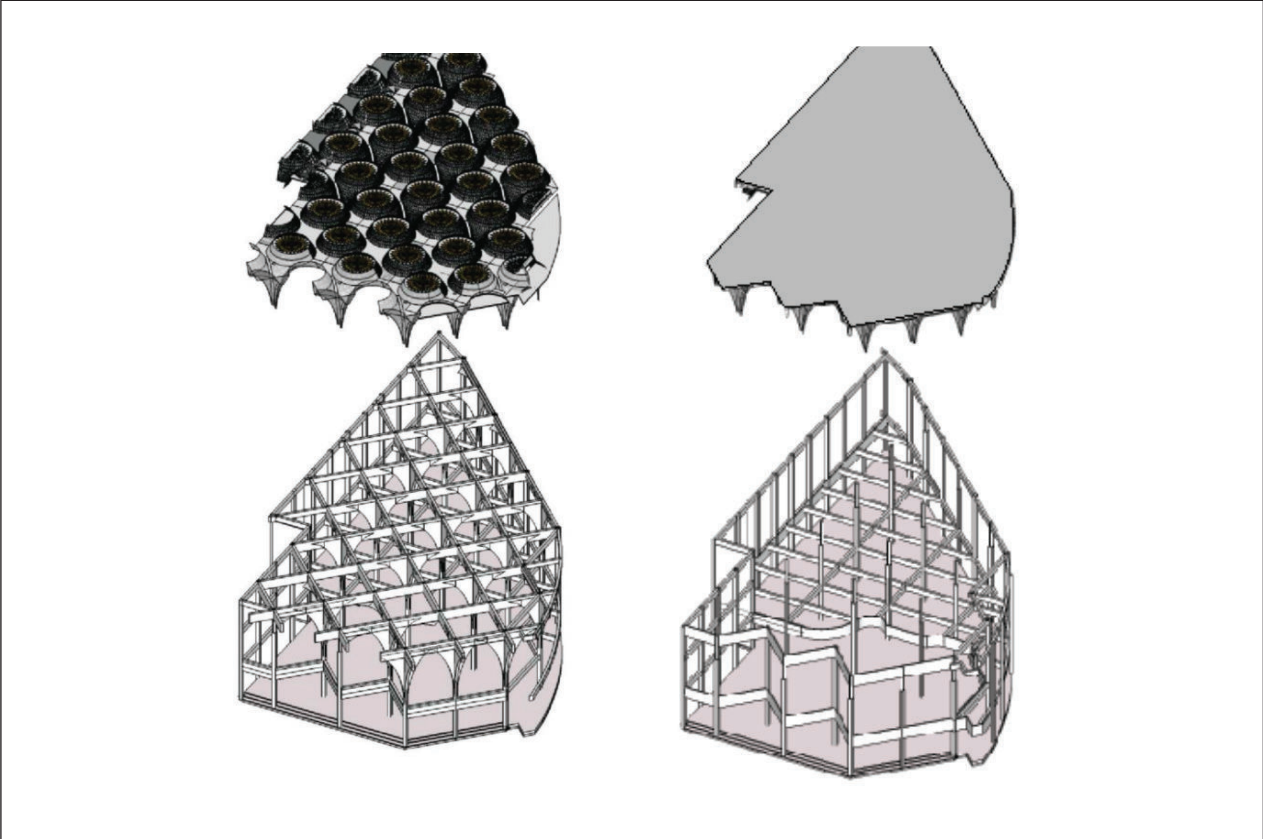
3. The Auditorium: Long-Span Truss System

The theater itself required a different structural logic because no one wants a pillar blocking their view of the screen. To span the massive 1,000 seats hall without internal supports, the Scala likely used reinforced concrete trusses or deep long-span beams hidden above the ceiling. These beams transferred the massive weight of the roof and the theater's upper structure to the thick perimeter walls and the large pillars at the sides of the building. The weight of these structural elements also helped with soundproofing; the thick concrete walls blocked outside noise from the busy Siam Square district.

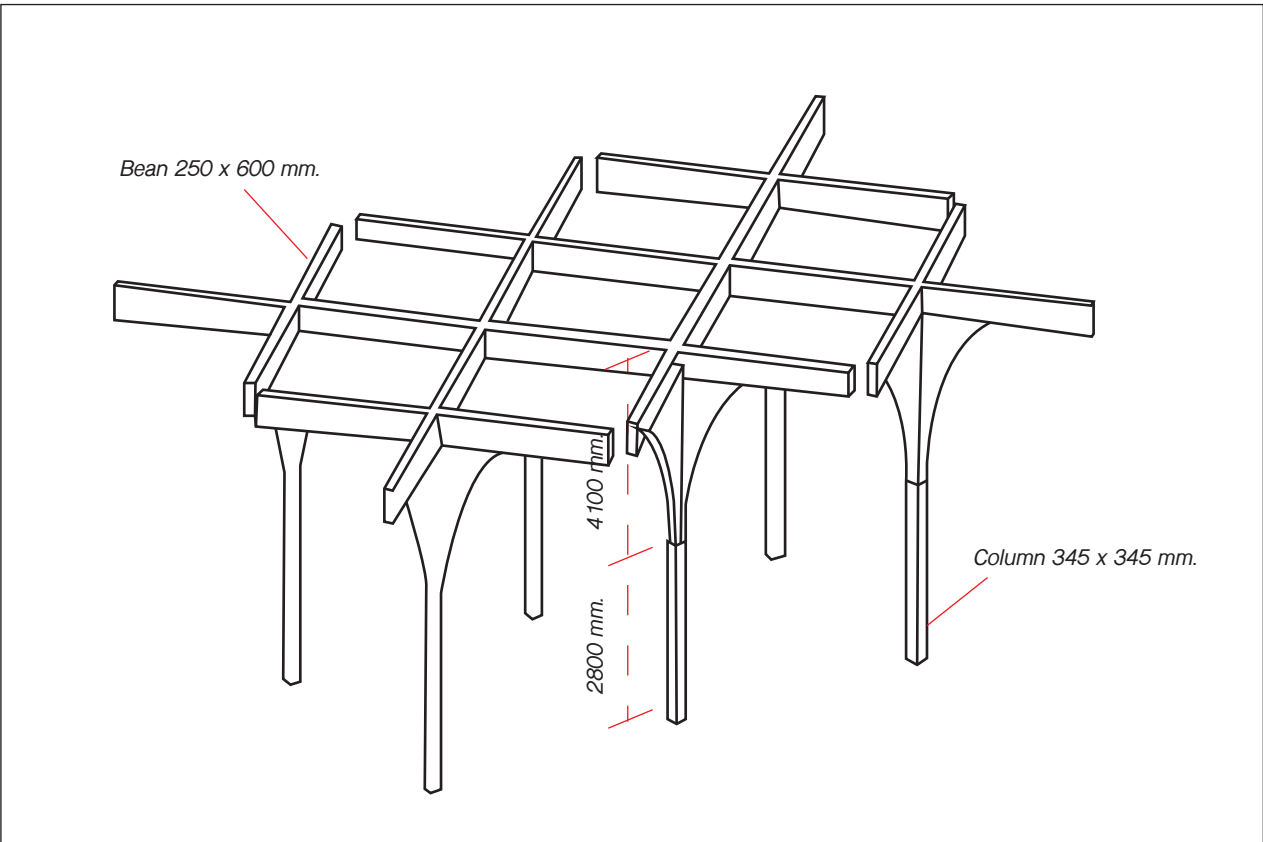
5. Architectural Finishes

Used steel for the decorative ceiling "stars", resemble Thai traditional decorative elements that usually use in the cultural buildings like in the temple or government building. Along with intricate wooden carvings lined the auditorium walls, serving as "acoustic dampeners" to prevent echo.

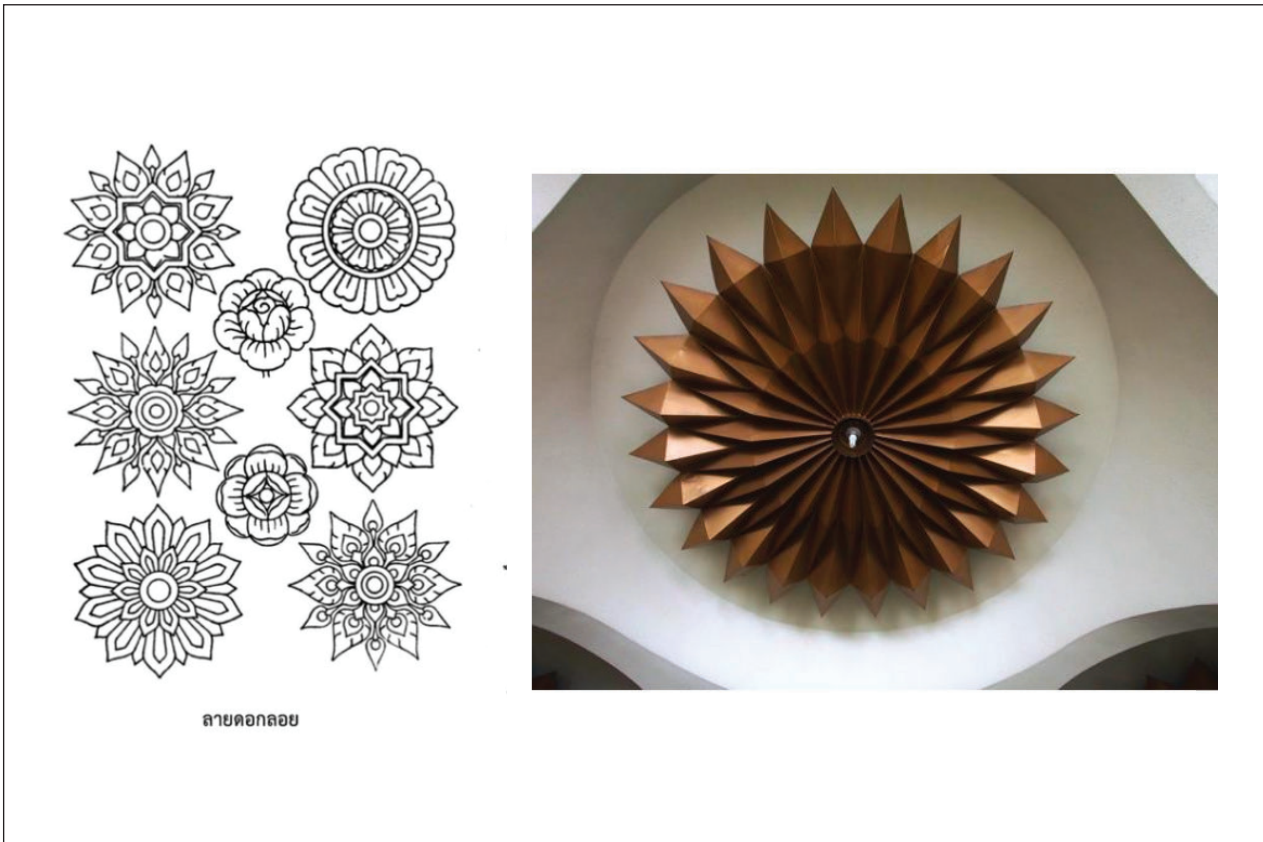
³ Mathurosukhon Sirinda, The preservation of Bangkok Scala Cinema. Chulalongkorn University, 2017.



Reinforced concrete structure of the Scala cinema



Structural size of the Scala cinema



The Thai traditional ornament of the Scala cinema interior

New project on Scala Cinema's site

Site Redevelopment: As of 2025, the building has been completely razed. The land, which belongs to Chulalongkorn University, was leased to Central Pattana (CPN) for a 30-year period.

New Construction: Construction is underway for a new mixed-use commercial development at the site. The project will feature a high-rise tower combining a luxury shopping mall, Grade A offices, and hospitality/hotel spaces. While often referred to in industry news as "Central Siam Square," a final official brand name for the mall has not yet been formally launched.

Relocation of Parts: While the physical structure is gone, the owner of the Apex cinema chain reportedly moved the iconic chandelier, wall panels, and star-shaped ceiling ornaments to a new location in Pattaya (Nong Nooch Tropical Garden) for preservation.

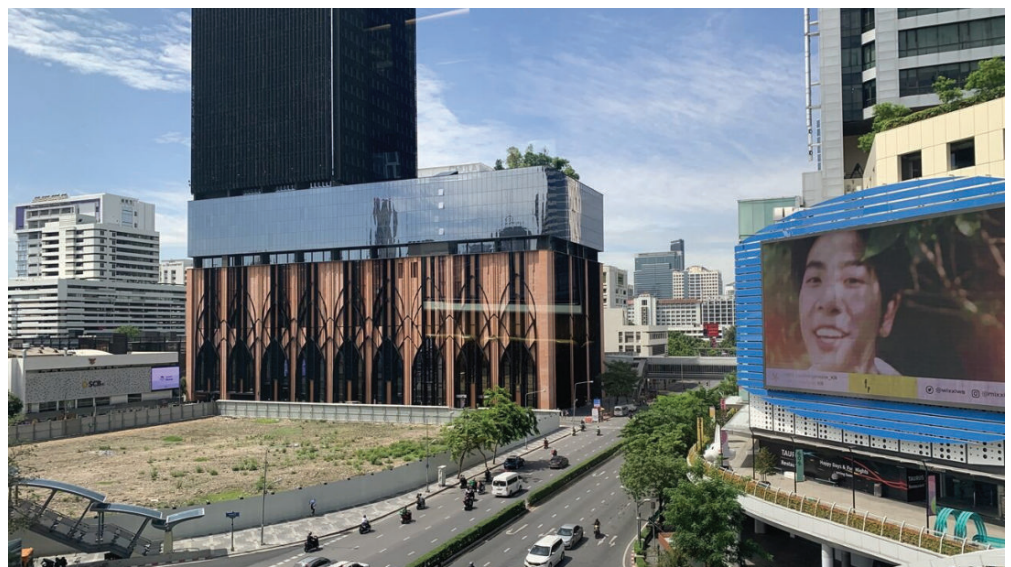
Construction Status: Construction began in late-2024 and is ongoing through 2025. Expect to be open by 2028. Now preparing fo



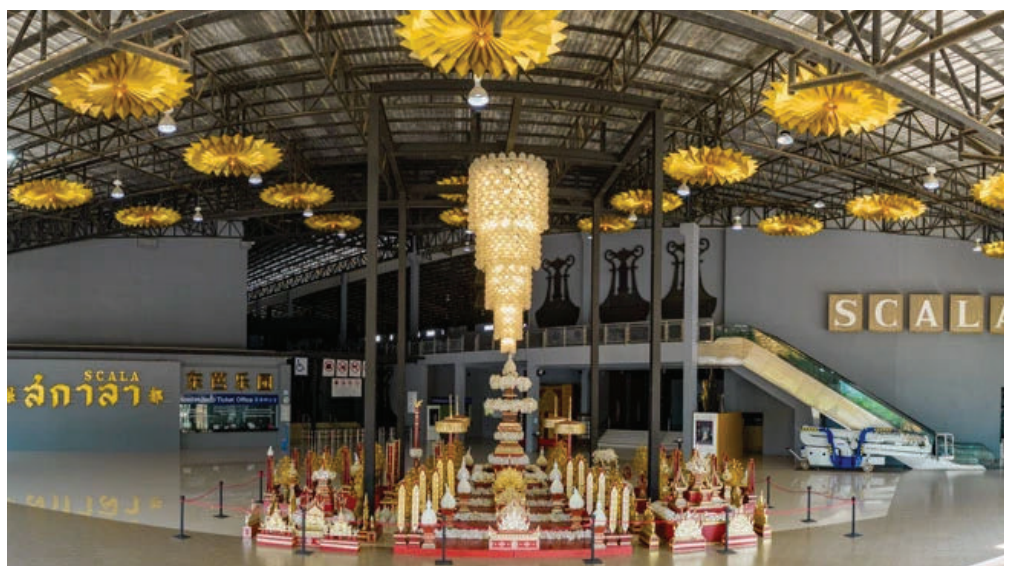
Demolition of Scala Cinema



Central Siam Rendering



Current site condition



Relocation of Scala Cinems Ornaments



Inside of the theater located in Nong Nooch Tropical Garden

Argument on the demolition

Modern Landmark: The new building will replace the single-screen cinema with a multi-story flagship destination designed to compete with nearby malls like Siam Paragon and MBK Center. Making the area focusing more on the shopping as a shopping district rather than the creative side of the area.

Controversy: The demolition of the Scala was met with significant public protest from conservationists and students who viewed the building as a vital piece of Thai cinematic heritage that should have been preserved as a cultural hub. The protests against the demolition of the Scala Cinema were a significant part of a broader cultural and political movement in Thailand between 2020 and 2021. The outcry was driven primarily by students and conservationists who felt the university was prioritizing commercial profit over historical and cultural preservation.

Core Arguments and Demands

"No More Malls": Protesters argued that Siam Square and the university campus were already saturated with shopping centers. They campaigned for the space to be used for libraries, museums, or activity hubs for the general public ⁴

Educational vs. Commercial Priority: Students criticized the Property Management of Chulalongkorn University (PMCU) for its "gentrification" of the area. They questioned whether the university's priority should be managing its vast endowment for education or operating as a commercial real estate developer.

Broken Promises: There was a major public outcry in late 2021 when Central Pattana (CPN) began demolition despite earlier public statements suggesting they would attempt to retain or incorporate parts of the original architecture

⁴ Pibulsiri Patsita, Saving the Cinema – Nethiwit. Urban Creature, 2021.



The manifesto against the demolition of the cinema and construction of the mall

Impact on the Community

A Symbol of Loss: For many, the sudden demolition in October 2021 was "heartbreaking" and seen as a "white elephant" situation where the community's voice was ignored by those in power.

Legacy for Other Sites: The failure to save the Scala energized similar conservation efforts in the neighborhood. Protesters used the #SaveChaoMaeThabThimShrine hashtag to prevent a nearby historic Chinese shrine from facing the "same tragic end" as the Scala.

Political Context: These protests occurred during a period of widespread youth-led pro-democracy rallies in Bangkok, where symbols like the "three-finger salute" were used to demand structural reforms across all major institutions, including universities.



*PROGRAM RESEARCH
& SURROUNDING*

Demolition of the Scala Cinema Surrounding

The demolition of Block A in Siam Square, which included the legendary Scala Cinema and its surrounding shop-houses, was one of the most significant redevelopments in central Bangkok in recent years. As of January 2026, the site has moved from a cleared green plot into the active construction phase for a new mixed-use development by Central Pattana (CPN).

What was demolished in Block A?

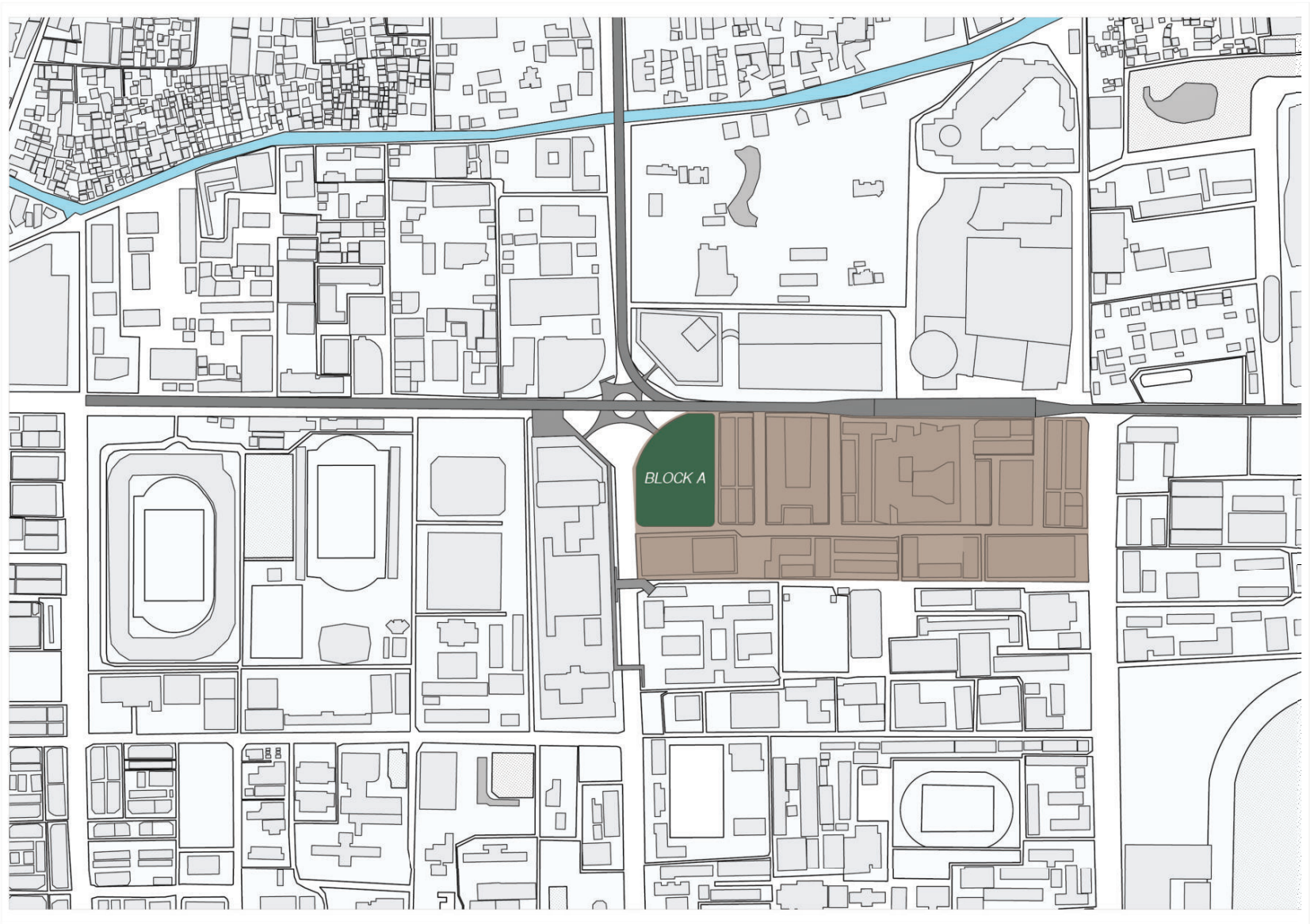
Block A spans approximately 7 rai (around 11,000 square meters) at the corner of Phayathai Road and Rama I Road (near the Pathum Wan intersection). The demolition, which peaked between 2021 and 2022, removed:

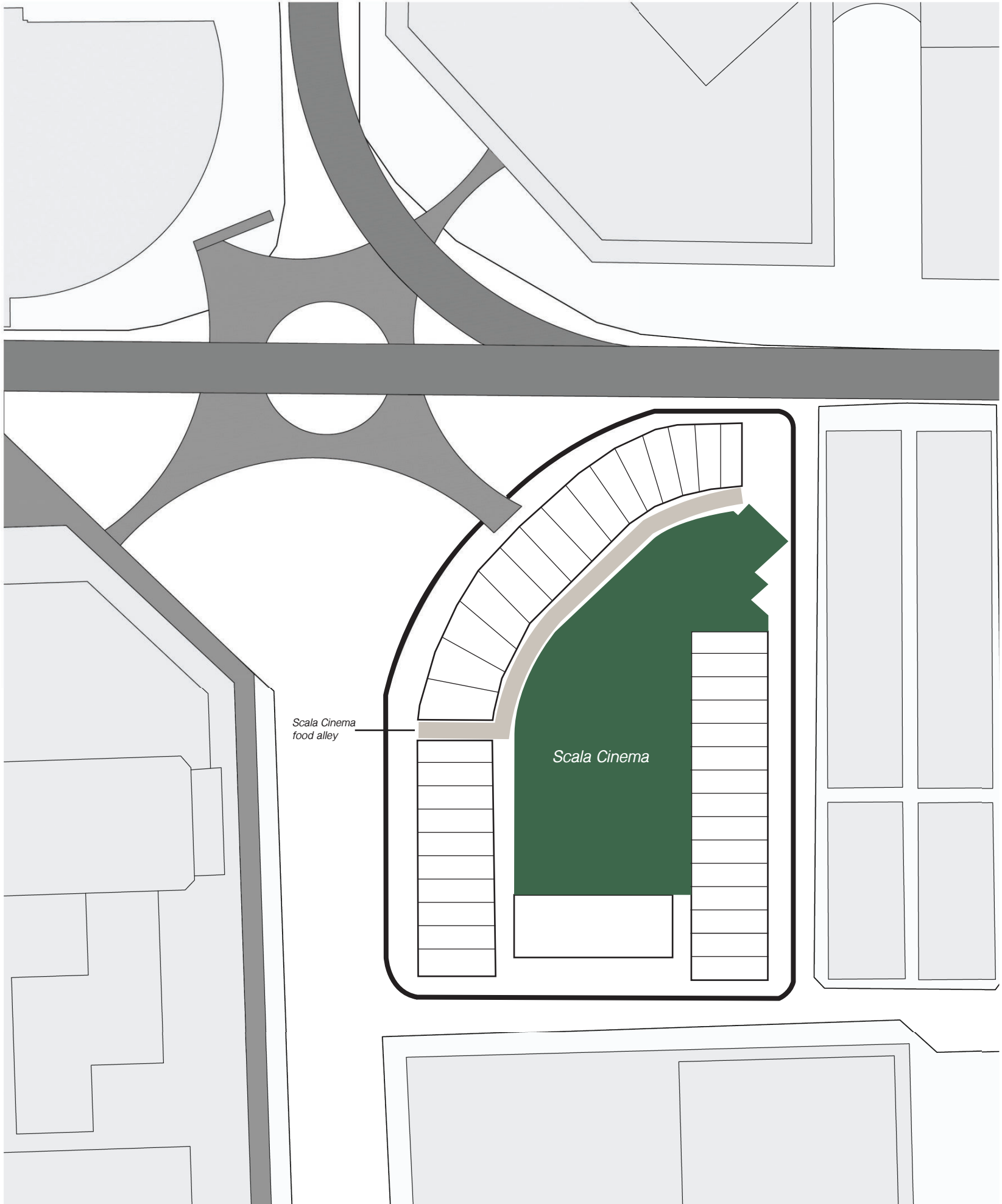
The Scala Cinema: The centerpiece of the block. Despite being the last standalone Art Deco cinema in Bangkok, it was leveled by early 2022.

79 Shophouse Units: These buildings housed a generation of iconic Siam Square businesses, including cram schools (tutors), old-school clinics, banks, and independent tailor shops.

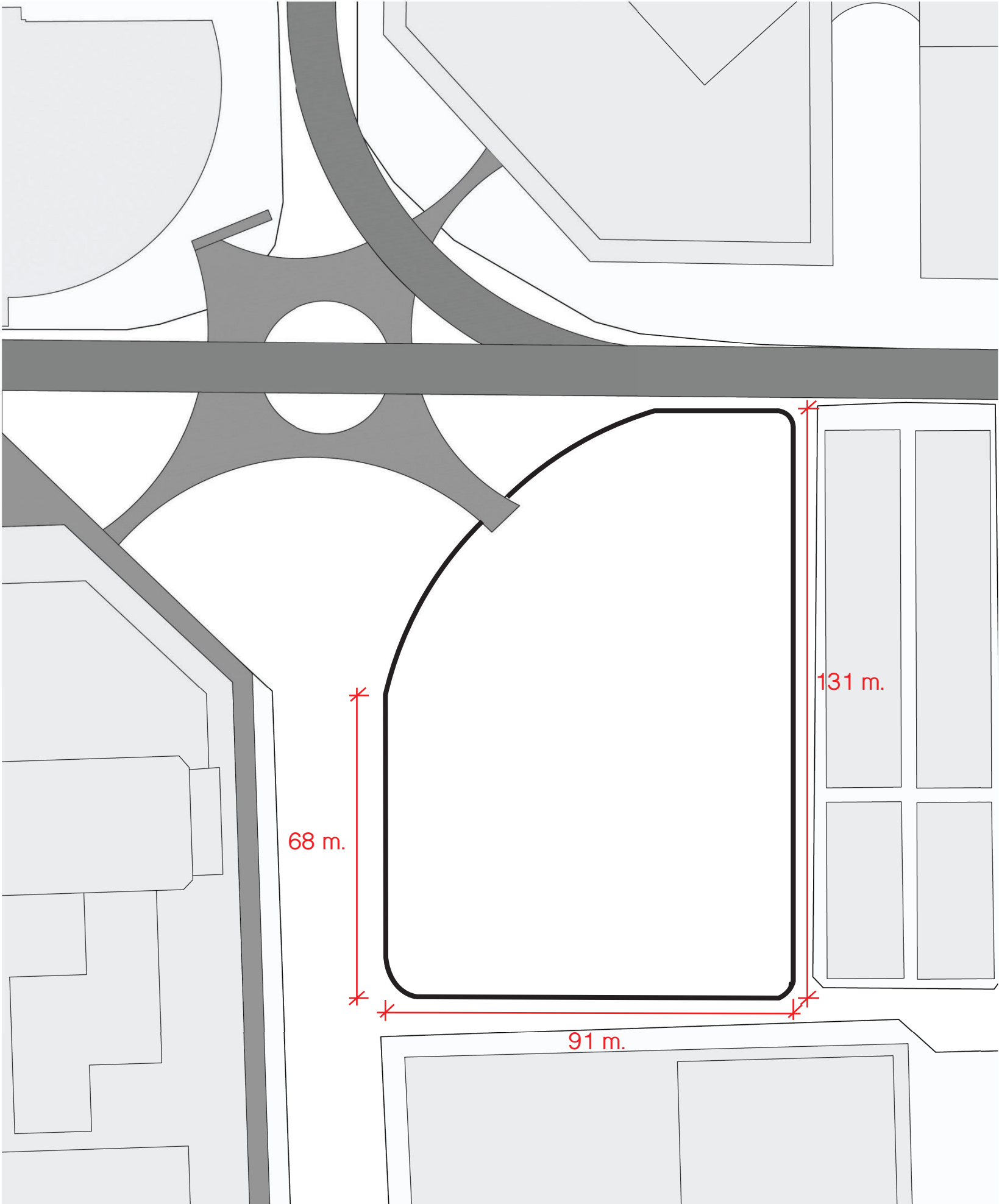
Local Landmarks: Small restaurants and cafes that had operated there for decades were forced to relocate or close permanently.

Potential to use the whole plot in the Scala Cinema area to create the public space not just a another mixed use mall jjust similar to the other buildings in the area.





Block A before the demolition



Block A after the demolition



2022



2025

What was in Block A?

The Tutor School Hub

Siam Square is the "tutor capital" of Thailand, and Block A housed a high concentration of famous tutor schools. Thousands of high school students would flock to Block A every weekend, making it the heartbeat of Thailand's education culture outside of formal schools. Consisted of the school for languages, Science and Maths specialized school.

Heritage Tailors & Boutiques

The shophouses in Soi 1 (which formed the spine of Block A) were home to several high-end tailor shops and independent fashion boutiques. Soi 1 was known for more established, "classic" Siam Square businesses, including long-standing eyeglass shops and pharmacies that had been there since the 1970s.

Beauty Clinics and Beauty related shops

Block A hosted a variety choices of beauty related places including the clinics and supermarket, making block A a main destination for the female teenagers during week-end,

Scala Cinema food alley

A unique alley existed between the shop house blocks behind the Scala Cinema, served as a main food hall for the workers in the area. Mainly actived in during lunch time nad afternoon, the kiosks usually run by the locals with freindly price making this place perfect for both workers and students.



Surroundings (Inside Siam square)

SIAMSCAPE (Height approximately 120 m.)

Completed in late 2021, this 25-story mixed-use tower is the most dominant new feature of Block A. It reflects the "New Siam Square" philosophy:

The L.A.M.P. (9th Floor): A massive public "Learning and Meeting Place" with a stunning view of the city.

Skyscape: A popular outdoor rooftop garden and event space on the 10th floor.

Education Hub: It has replaced the old shophouse tutors with high-tech learning centers spread across several floors including alternative system school which offers full education just like a normal school, the school area spread among several floors served as a series of classrooms for students.

Lido Connect (Height approximately 12 m.)

Just a short walk from the old Scala site, the former Lido Cinema was saved from demolition and transformed into Lido Connect. It is now the heartbeat of Siam Square's indie culture, featuring small-scale concert halls for live music and fan meetings, art galleries and pop-up retail spaces for local designers, a much smaller cinema space that still screens independent films and open broadcast space for T-POP (Thai pop music) programs.

Siam Square Walking Street

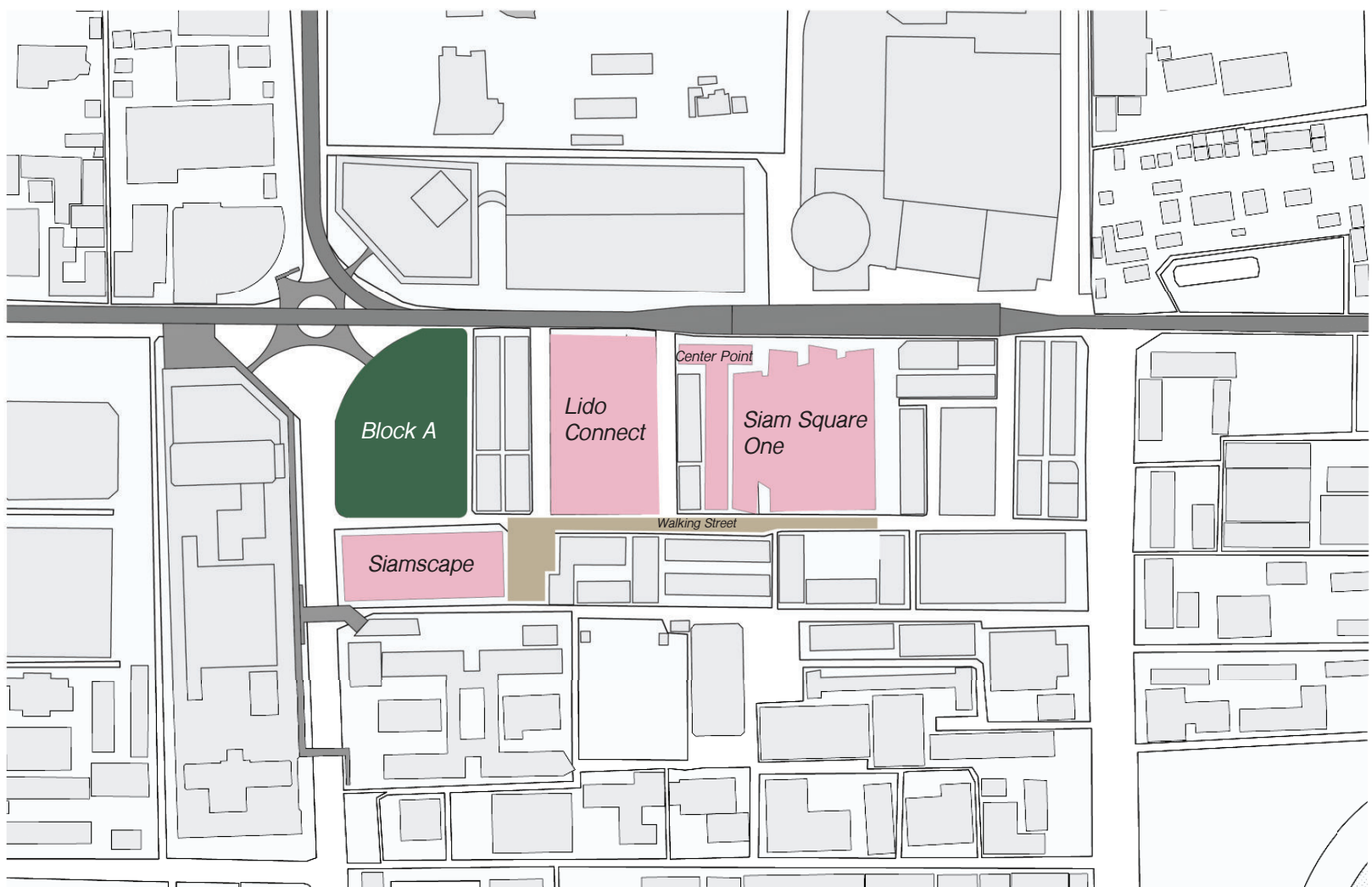
The interior streets of Siam Square (Sois 1–7) have been completely renovated into a permanent pedestrian-only walking street with a huge plaza behind the Siamscape building. The vibe which feels like the Times Square of Bangkok, with massive LED screens, outdoor stages for busking, and a sleek, paved layout. On weekends, this is where the "Street of Dreamz" and various youth festivals happen, replacing the old cluttered feeling with an open air festival vibe.

Centerpoint (Height approximately 25 m.)

Was the open-air plaza where Thai pop stars were discovered. In the 90s era it was an outdoor stage and meeting place where teenagers would gather for mini-concerts and to show off "Harajuku-style" fashion. The Building Phase around 2008–2009, the open plaza was replaced by a building called Digital Gateway, focusing on IT and gadgets. The current status has been rebranded again as Centerpoint Siam Square. It shifted away from purely IT to focus on beauty flagship stores (like Eveandboy), international fashion, and themed cafes. It serves as a vital indoor air-conditioned shortcut for people walking from the BTS to the inner sois.

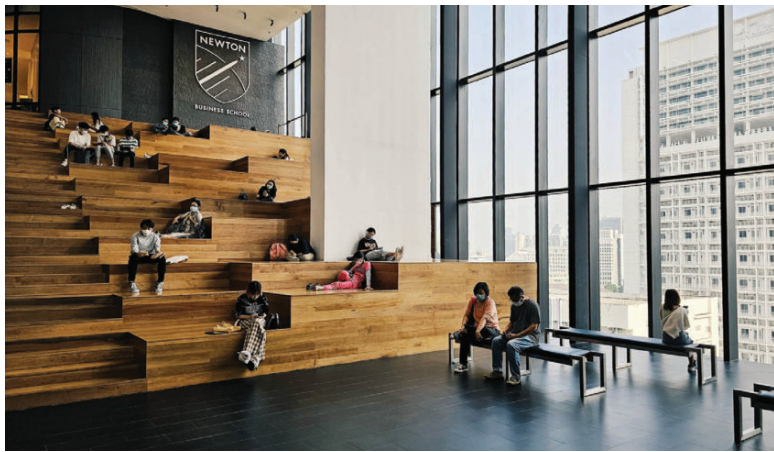
Siam Square One (Height approximately 40 m.)

Siam Square One stands on the site of the Siam Theater, the oldest of the three movie houses (Siam, Lido, Scala). In 2010, the original Siam Theater was destroyed by fire during the 2010 political protests. The site remained a charred shell for over a year before being cleared. Opened in 2014, SQ1 was designed as a Vertical Urban Street. Unlike the neighboring malls, it is largely open-air to keep the street market feeling. It houses the Siam Pic-Ganesha Theater (a major 1,000-seat performance venue) and is arguably the Food Capital of Siam Square, with massive crowds specifically for Korean BBQ and dessert shops.





Centerpoint



Siamscape - The L.A.M.P



Siamscape - Skyscape



Lido Connect



Siam Square Walking Street



Siam Square One

Surroundings (Outside of Siam square)

Siam Paragon (Height approximately 50 m.)

The most famous shopping mall in Bangkok, offering a luxurious experience that combines high-end retail with world-class entertainment. It is the primary location for global flagship stores (Hermès, Chanel, Rolex) and supercar showrooms (Lamborghini, Ferrari), serving as a symbol of Thailand's economic prestige. It manages to appeal to everyone, tourists visit for Sea Life Ocean World (underground), students gather at the high end Paragon Cineplex, and business professionals meet at the Siam Paragon Next Tech hub.

Siam Center (Height approximately 25 m.)

This shopping mall is known as the hub for digital and youth culture. It focuses heavily on local Thai designers, street fashion, and interactive digital art. The top floor houses "The Wonder Room" and "Absolute Siam Store," which are dedicated to unique, avant-garde Thai fashion brands you won't find anywhere else. It is home to "Food Republic," a high-end food court, along with many innovative dessert cafes and themed restaurants that are popular with students.

Siam Discovery (Height approximately 30 m.)

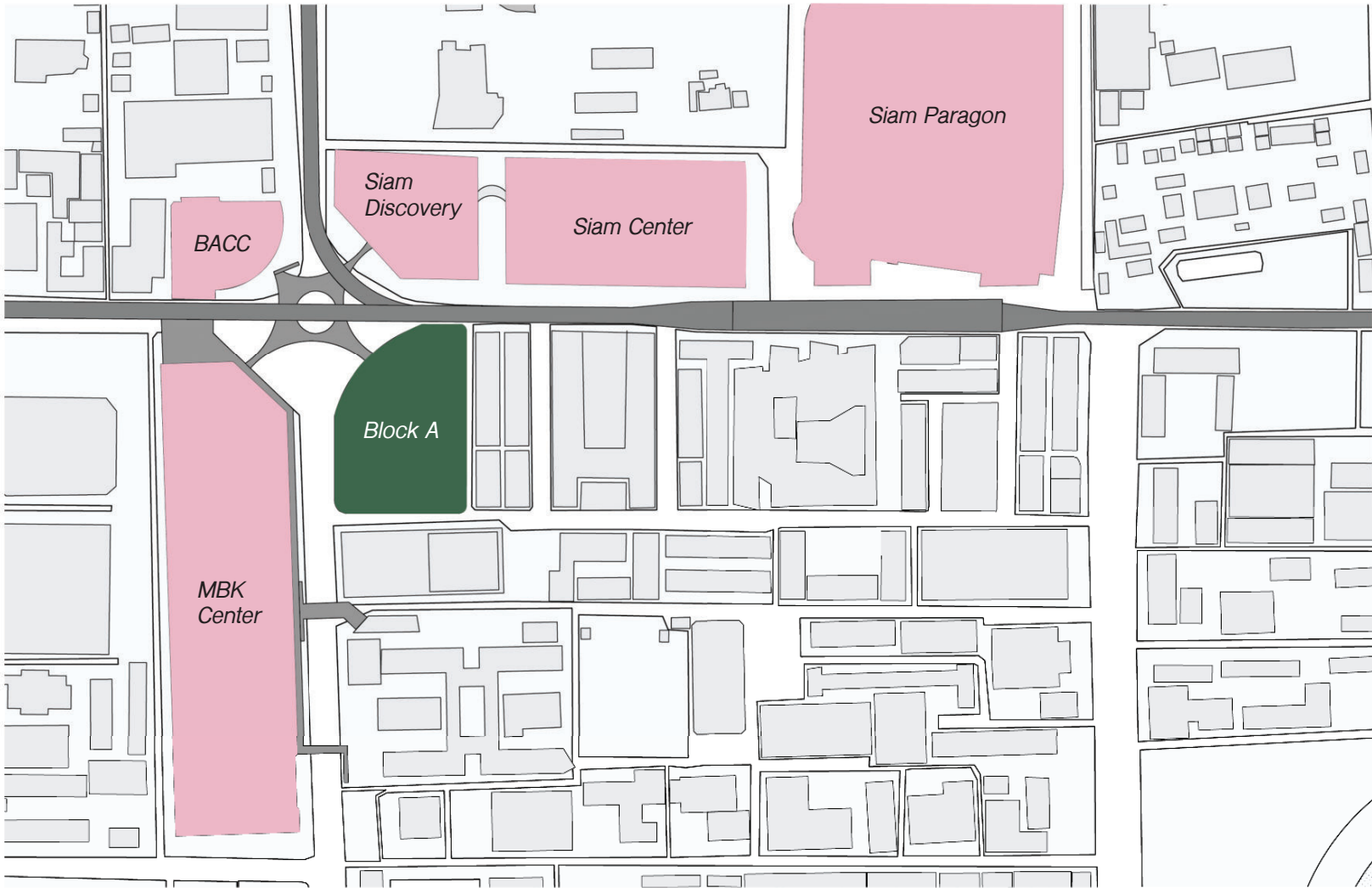
This shopping mall offers a revolutionary lifestyle lab concept where products are grouped by interest rather than by brand, encouraging visitors to explore and discover new items. Instead of individual walled shops, the mall uses an open floor plan designed by Nendo, making it feel more like a massive, curated gallery than a shopping mall. The top floor hosts the world famous wax museum, providing a major entertainment draw alongside the retail experience.

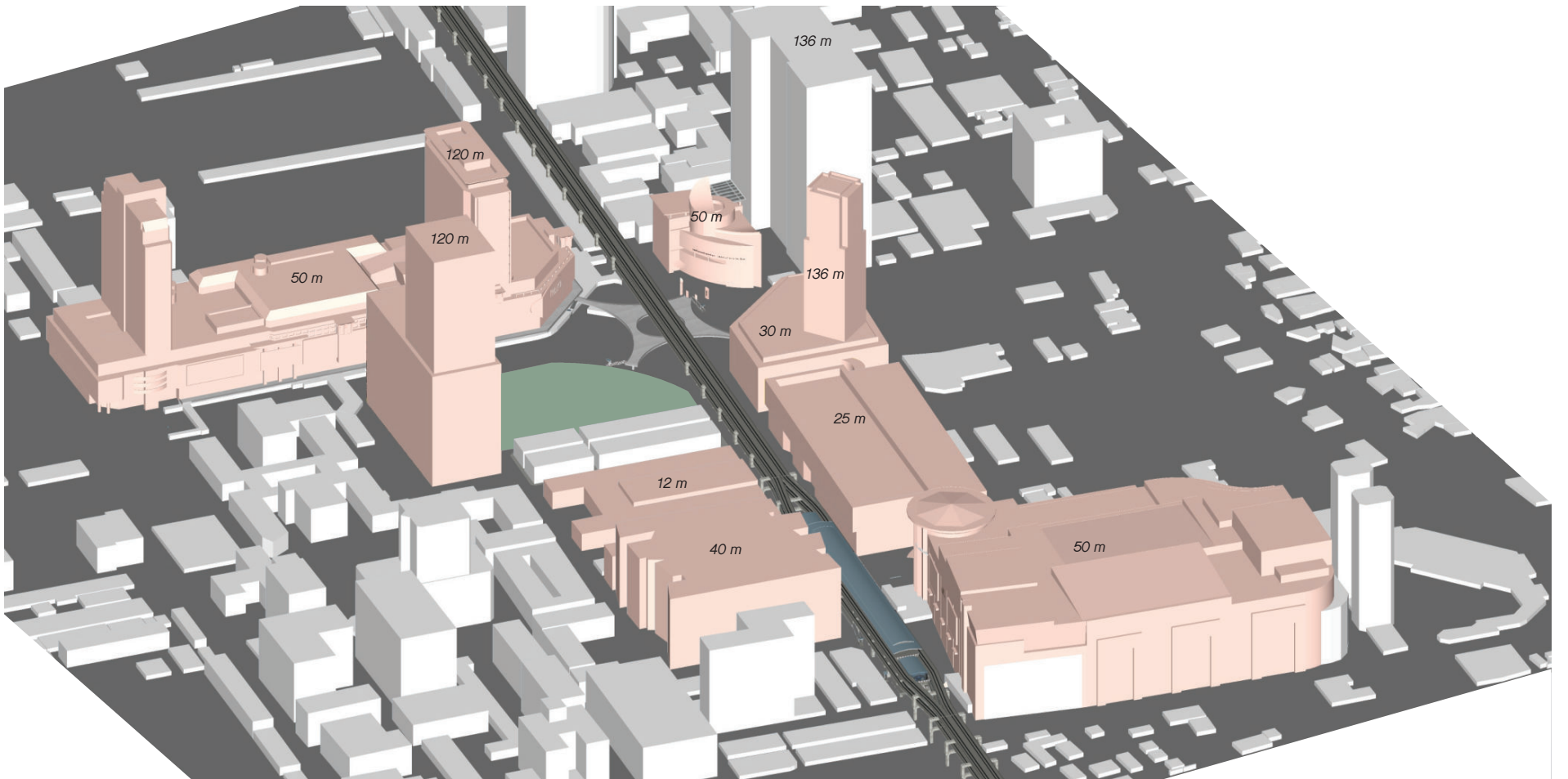
Bangkok Art and Culture Centre (Height approximately 50 m.)

Directly across the street from Block A, the BACC remains the primary cultural anchor of the area. It serves as a spiritual successor to the Scala's heritage vibe, hosting contemporary art exhibitions, local craft shops, and peaceful libraries that offer an escape from the shopping malls. It is the last major non-commercial space in the area where people can gather for free without the pressure to shop. The design known for its iconic spiral walkway (similar to the Guggenheim), which allows you to walk from the ground floor to the top in a continuous loop.

MBK Center (Height approximately 50 m.)

is a legendary eight-story shopping landmark in Bangkok, famous for its "air-conditioned market" atmosphere and massive variety of products. It is a go-to destination for those looking for tech, souvenirs, and a more casual shopping experience compared to its high end neighbors. Making MBK center became the attraction for the foreign tourists, students, tech related people and more.





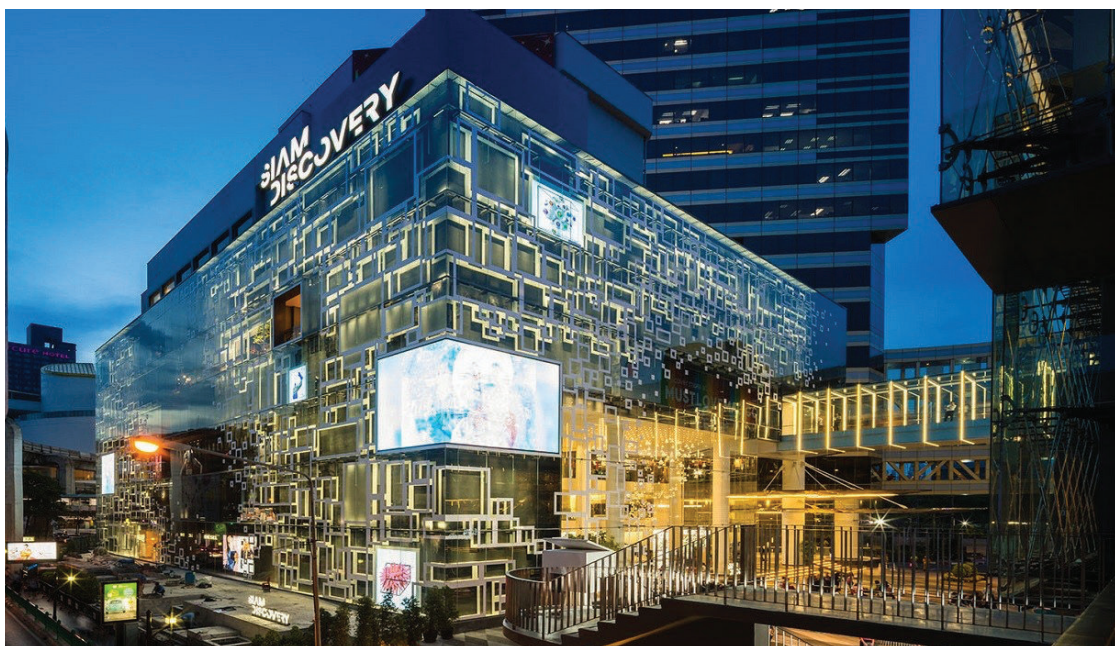
Building Height around Block A area



Siam Paragon



Siam Center



Siam Discovery

Activities in Siamsquare

The main activities in Siam Square have evolved into a mix of digital learning, street culture, and multi-level dining. Because the area is now more pedestrian-friendly, the way people use the space has changed significantly.⁵

1. People-Watching on the Walking Street

The central road of Siam Square is now a permanent Walking Street. People joined together for busking and pop dancing (K-pop and T-pop) are the most common activity. People also come for watching high school and university students perform. You will almost always see Random Play Dance groups or live student bands near the Siam Square One entrance. People also flock here for the massive LED billboards and street art, creating a "Times Square" vibe that is a favorite for Instagram and TikTok creators.

2. High-Tech Learning & Co-Working

With the demolition of the old Block A tutor schools, the student activity has moved upward.

Siamscape (Floors 9–10), this is the hangout heart of the new Siam. People go to L.A.M.P. (Learning and Meeting Place) to study or other small cafes, work on laptops, or sit in the Sky Garden for a free view of the city. During the day, the area is packed with thousands of students moving between tutoring centers around Siam square.

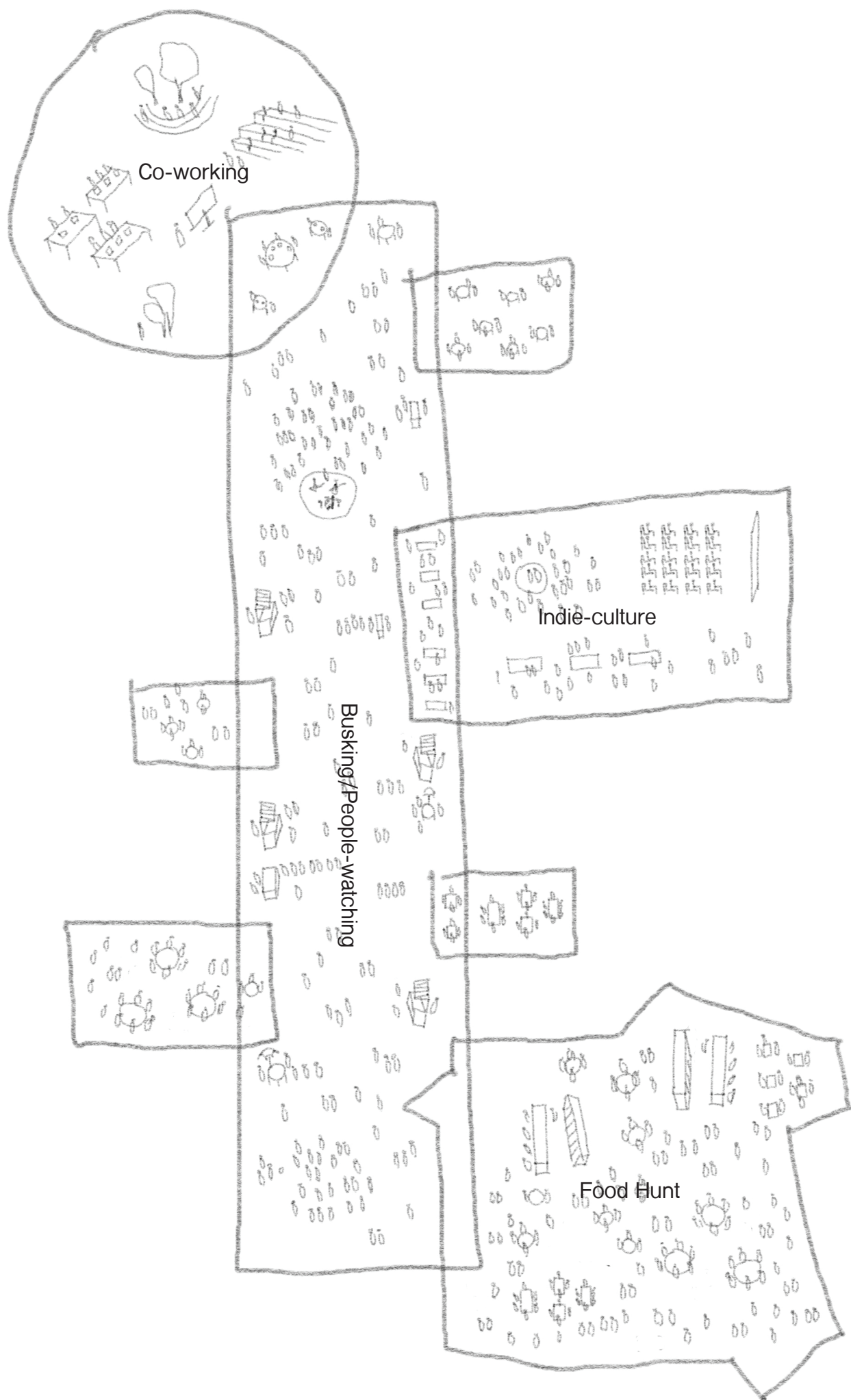
3. Indie Culture at Lido Connect

While the big malls are for global brands, Lido Connect (the former cinema) is where people go for alternative activities for example a **small-scale concerts** and **fan Meets** for T-Pop artists. Furthermore, browsing vinyl records, attending film photography **workshops**, or visiting **small art galleries**. And in the curated cinema, watching independent or foreign films that aren't shown in the big theaters at other cinema.

4. Competitive Dining, The foodie Hunt

Dining has become a primary event rather than just a meal. People spend hours here specifically for Korean BBQ, Japanese Shabu or binge eating restaurant. Many of these restaurants are all-you-can-eat and serve as the main social activity for friend groups. Dessert or Cafe Hopping, walking between small cafes for "Instagrammable" desserts.

⁵ Siam Square Walking Street: The New Landmark of Bangkok. PMCU Official Development Report, 2023



Green Area

Bangkok has a green area coverage of approximately 32% of its total 1,568 square kilometers, according to recent 2024–2025 assessments.⁶ However, there is a significant distinction between **total green area** (which includes inaccessible brush, private gardens, and traffic islands) and **usable public green space**. When looking specifically at public parks and recreational green areas, the ratio is much lower. Current data shows that public parks cover only about 32.2 square kilometers (*roughly 3%*) of the city. This equates to about 7.5 square meters per person, which falls short of the World Health Organization's (WHO) recommended minimum of 9 square meters. Major Green Areas in Bangkok:

Lumpini Park

Often called the "Central Park of Bangkok," this is the city's oldest and most iconic public space. Features a large artificial lake with swan-shaped paddle boats. It known for its resident water monitor lizards and free daily aerobics classes at sunset. Connected to Benjakitti Park via the green mile, an elevated 1.3km pedestrian and cycling path.

Benjakitti Forest Park

A massive expansion completed in 2022 transformed this area into Bangkok's first true forest park.⁷ Utilizes a series of wetlands and ponds to manage stormwater and filter urban pollution. Includes spectacular elevated skywalks that weave through layers of newly planted trees. Features dedicated dog parks and cycling tracks, making it one of the most modern green spaces in Asia.

Suan Luang Rama IX Park

Located on the eastern edge of the city, this is the largest public park in Bangkok, spanning over 81,000 square metre. Boasts beautifully landscaped themed gardens, including French, Italian, and Chinese sections. Home to a large botanical garden and an iconic pavilion with a golden spire dedicated to King Rama IX. Hosts an annual flower festival in December where millions of blooms are put on display.

⁶ OECD, Environmental Performance Reviews: Thailand 2024. OECD Publishing, 2024.

⁷ Arsomsilp, Benjakitti Forest Park: From Tobacco Factory to Living Ecosystem. Turenscape Portfolio, 2022.

The Chatuchak Park Complex

This is actually a massive cluster of three connected parks in North Bangkok. If you combine them, they rival any major park in the world. **Chatuchak Park:** The most accessible, located right at the BTS/MRT hub. Great for people-watching and a quick jog. **Queen Sirikit Park:** A highly manicured botanical garden. It is much quieter and filled with rare Thai flowers and lotus ponds. **Wachirabenjathat Park (Suan Rot Fai):** A former railway golf course. This is the best park for cycling. It also houses the Bangkok Butterfly Garden.

Saranrom Park

Located near the Grand Palace, this was originally a royal palace garden. Have the vibe of high heritage and Victorian style architecture. It's famous for being a hub for traditional Thai dance practice and sword fighting clubs in the late afternoon. It feels much more old Bangkok than the modern forest parks.

Santiphap Park (Park of Peace)

Located near Victory Monument (not far from the Siam area). It is small but incredibly dense and lush. It is known as a silent park. While there is music, the layout is designed to block out the intense traffic noise of the Victory Monument area. It's a favorite for students and office workers nearby.

Chulalongkorn University Centenary Park

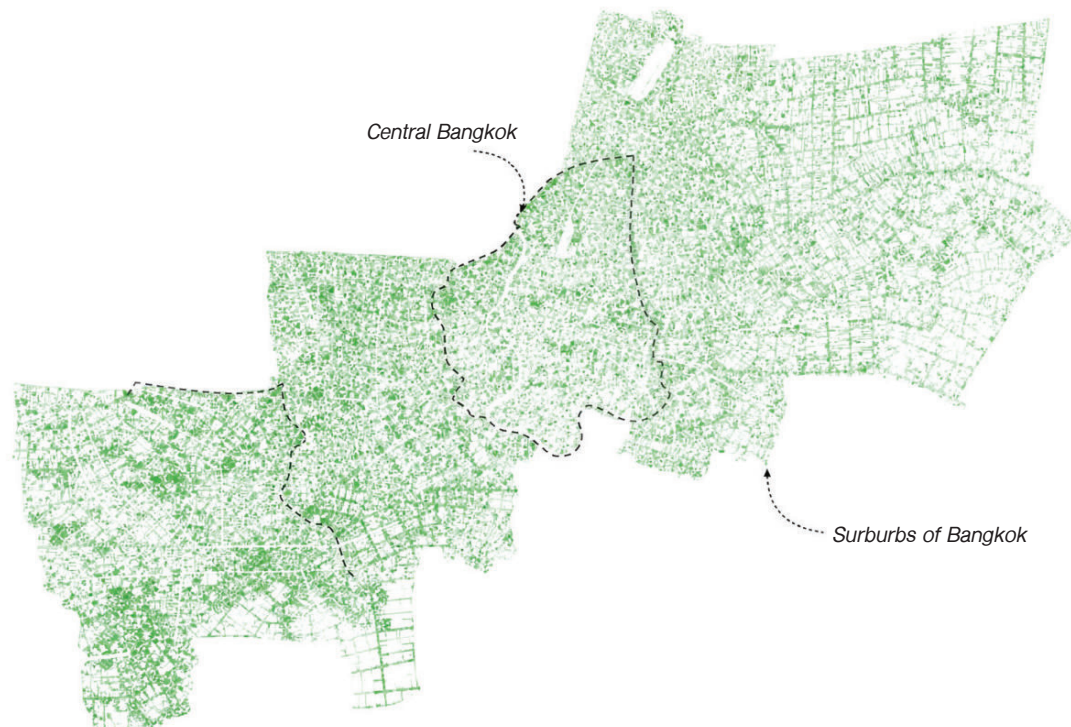
Located in the Siam/Sam Yan area (very close to Block A). It is the award winning modern Ecological Park.⁸ The entire park is built on a slant. This is designed to collect rainwater into a holding tank to prevent flooding in the neighborhood. It has a beautiful wetland zone and a water cycle play area for kids.

Benchasiri Park

Often referred to as the "Queen's Park," is a compact and vibrant green space located in the heart of the Sukhumvit district. Built in 1992 to celebrate the 60th birthday of Queen Sirikit. It is a major hub for sports, offering a swimming pool, a multipurpose outdoor court for basketball and volleyball, a skate park, and a well equipped playground. Located right next to the Emporium luxury mall and the Phrom Phong BTS station, it provides an immediate escape for office workers and shoppers in one of Bangkok's busiest areas.

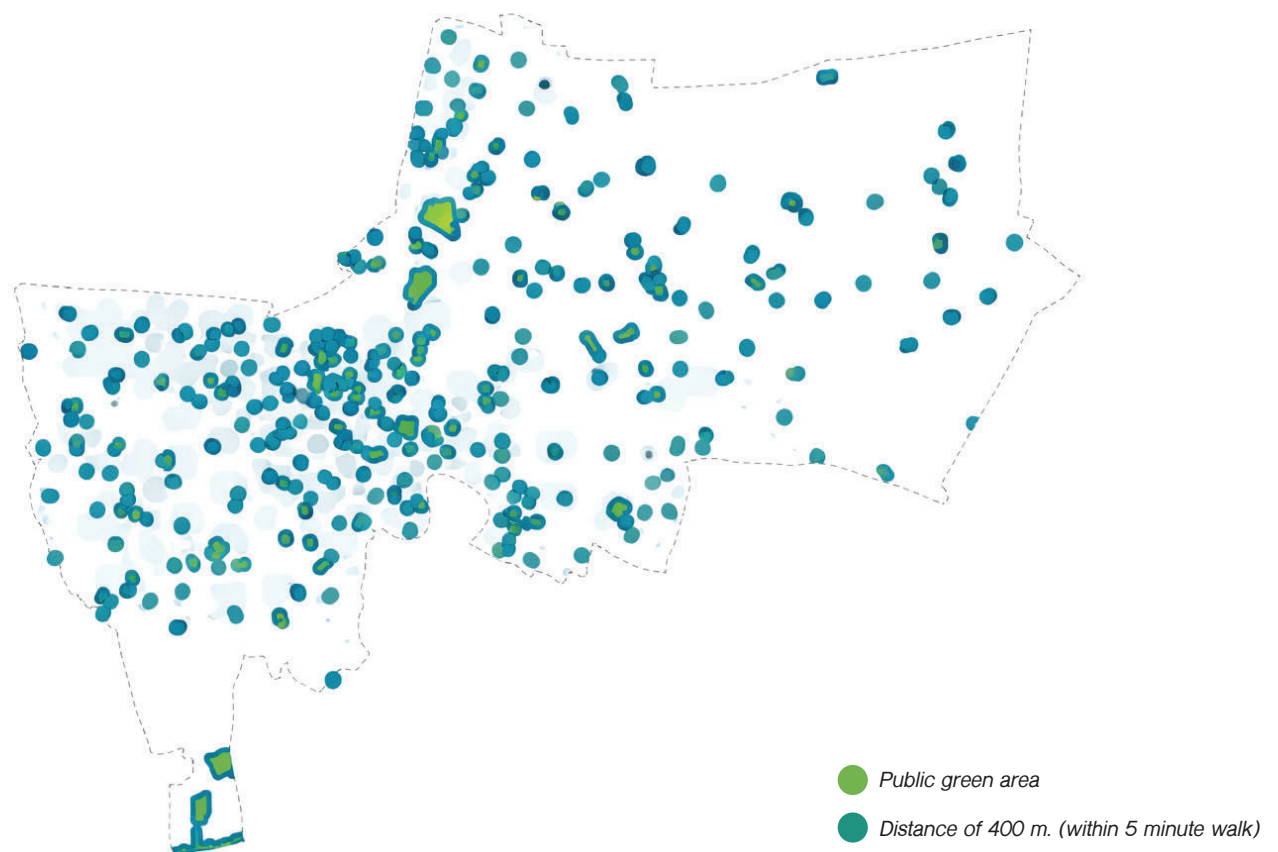
⁸ Chaiwat S., Bangkok is sinking – Here's how a new park can protect the city from flooding. World economic forum, 2018.

~ 32%



Density of Green area in Bangkok, 2025

~ 3%



Density of usable Green area in Bangkok, 2025





Lumpini park



Benjakitti Forest Park



Suan Luang Rama IX Park



The Chatuchak Park Complex



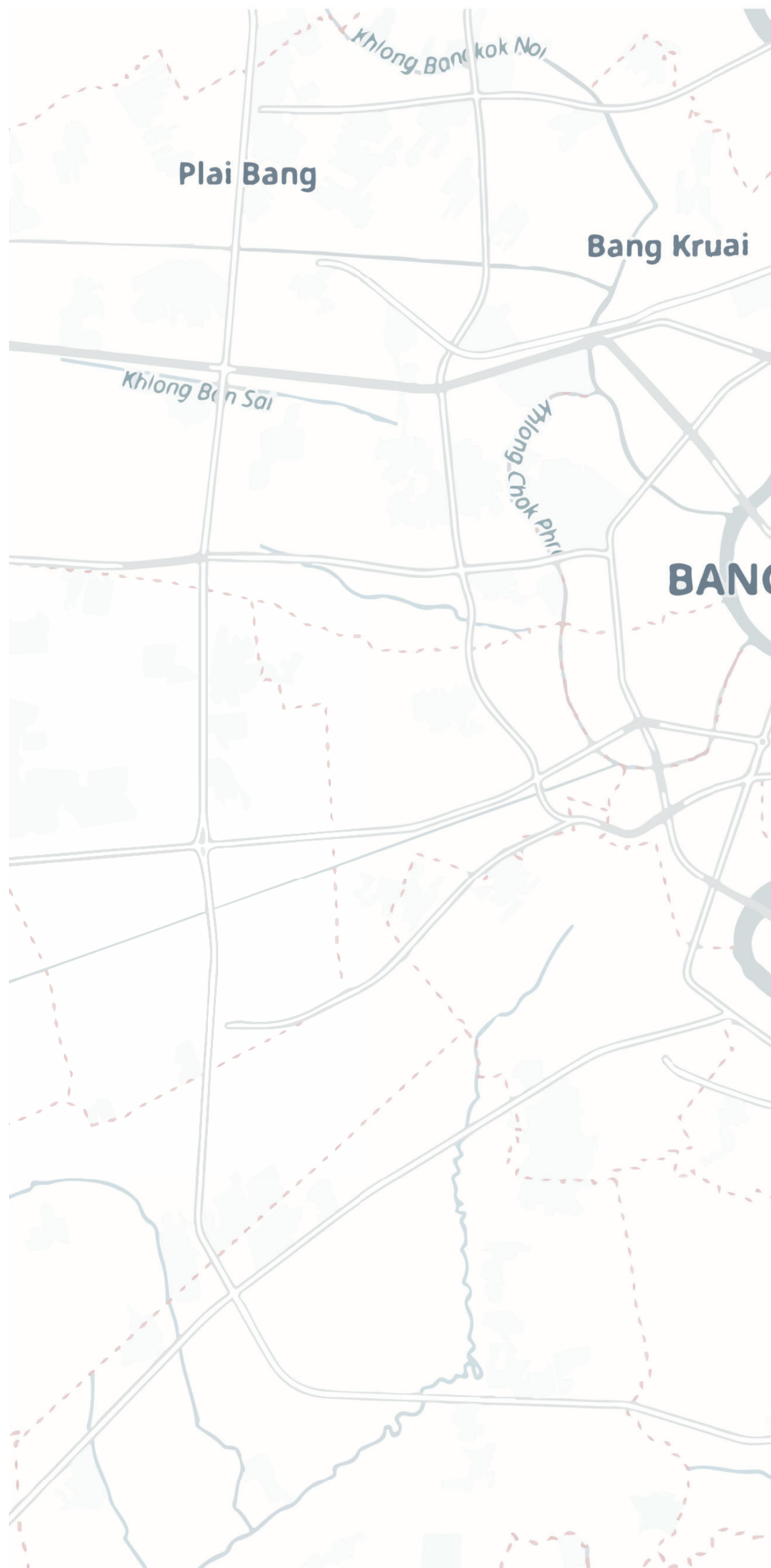
Benchasiri Park

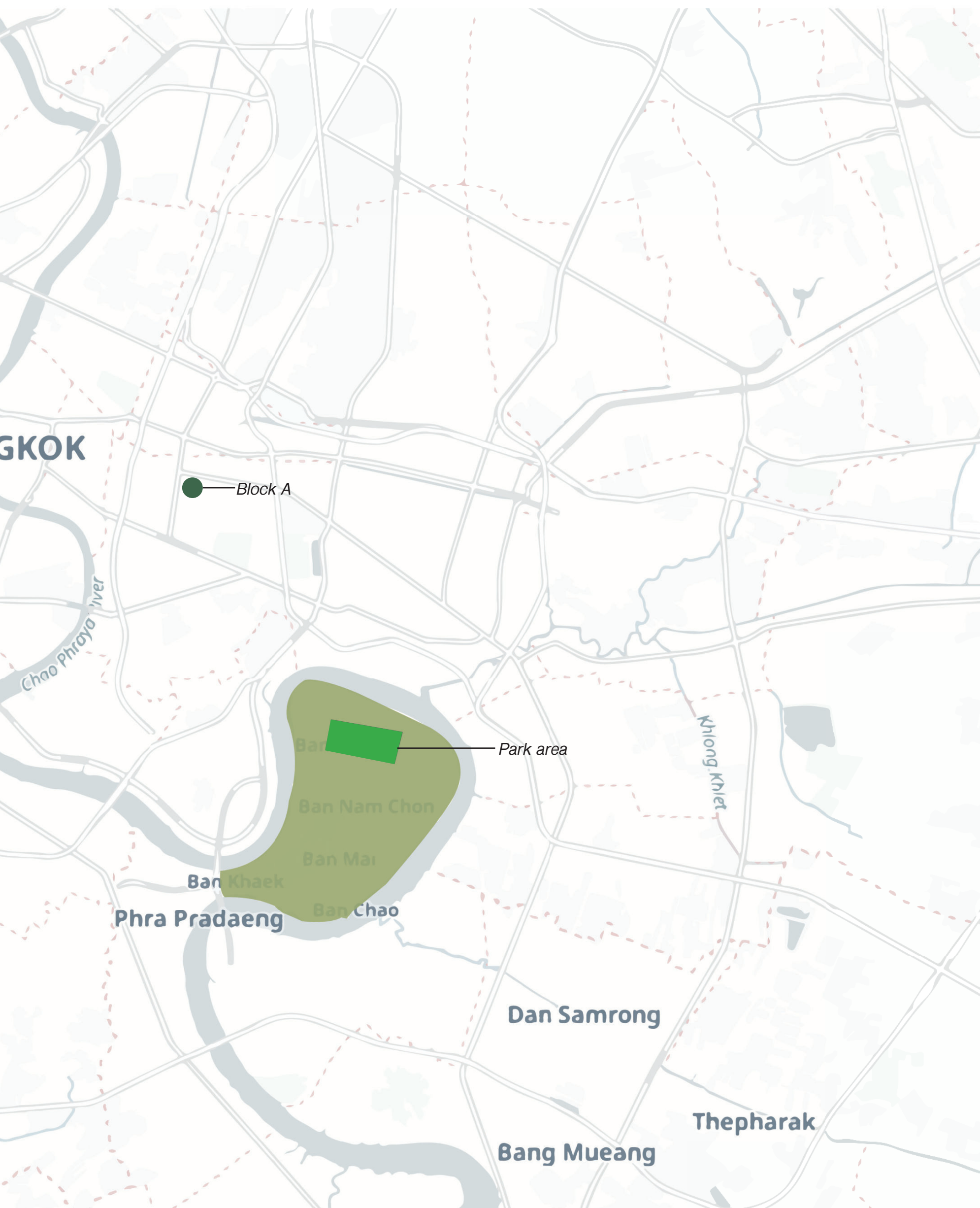


Chulalongkorn University Centenary Park

Sri Nakhon Khuean Khan Park and Botanical Garden (Suan Sri)

Is an excellent addition. It is arguably the most critical piece of green infrastructure for fighting PM 2.5 in the Bangkok area. Located in Bang Kachao (often called the Pig's Stomach due to the river bend), it functions as the true **Green Lung** of Bangkok. Unlike the manicured city parks (like Lumpini), Suan Sri is a **semi-wild wetland** and mangrove forest. Because of its location and wind patterns, fresh oxygen produced here is blown directly into Bangkok's city center across the river. It significantly lowers the temperature of the air passing over it before that air reaches the hot concrete of Sukhumvit and Silom. It is a bird watching haven and preserves native vegetation that is better at trapping dust than decorative city trees. Further than just a park area, the overall space of Bang kachao area is full of natural green









Dust problem in Bangkok

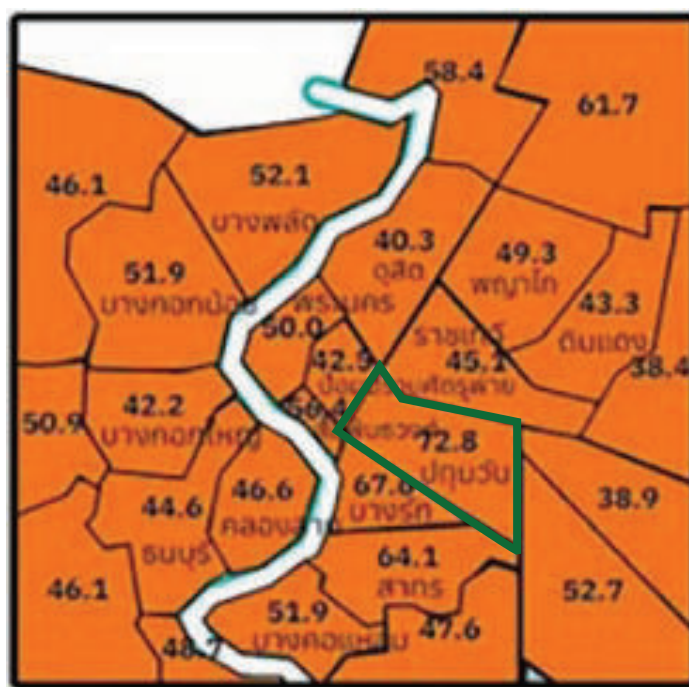
Every year in a period of November to March, Bangkok faces the haze season where stagnant air and weather inversion trap dust near the ground. As of early January 2026, air quality has already hit orange levels (affecting health) in several districts. The relationship between PM 2.5 and green space is more than just aesthetic; it is a critical public health strategy. The problem is even worse and have been more driven by the important factors as weather patterns, **heavy traffic**, and **agricultural burning** that effectively traps toxic particles over the city. While technical solutions like Low Emission Zones are vital, expanding green space serves as a critical natural defense; urban forests and pocket parks act as physical filters that capture fine dust on foliage while simultaneously cooling the city to help disperse stagnant air. By pursuing its goal of 3 million trees and accessible 15 minute parks, Bangkok is attempting to transform its concrete landscape into a living infrastructure that not only mitigates pollution but also provides much needed clean air refuges for its residents.⁹

⁹ Kraiwatit T., Enhancing Urban Air Quality Resilience Through Nature-Based Solutions: Evidence from Green Spaces in Bangkok. MDPI Climate, 2026.

PM 2.5 Highest in Pathumwan District

From the data of 2nd January 2026, the PM 2.5 was ranked high with the citywide average PM2.5 concentration stood at 48.2 micrograms per cubic meter, exceeding the national safety standard of 37.5 micrograms per cubic meter. According to the Bangkok Air Quality Information Center, the highest PM2.5 concentrations were recorded in **Pathum Wan**, Bang Rak, Sathon, Chatuchak, and Bang Sue districts, with readings ranging from about 58 to nearly 73 micrograms per cubic meter. Health officials advised the public to take precautions such as wearing PM2.5 masks outdoors and limiting strenuous activities. High-risk groups were urged to avoid outdoor exertion, follow medical guidance, and seek prompt care if abnormal symptoms develop.¹⁰

¹⁰ Ratanavalachai, T., & Trivitayanurak, W., Application of a PM2.5 dispersion model in the Bangkok central business district for air quality management. DOI, 2023.



PM 2.5 dust data in Bangkok area, January 2026

Future Green Space

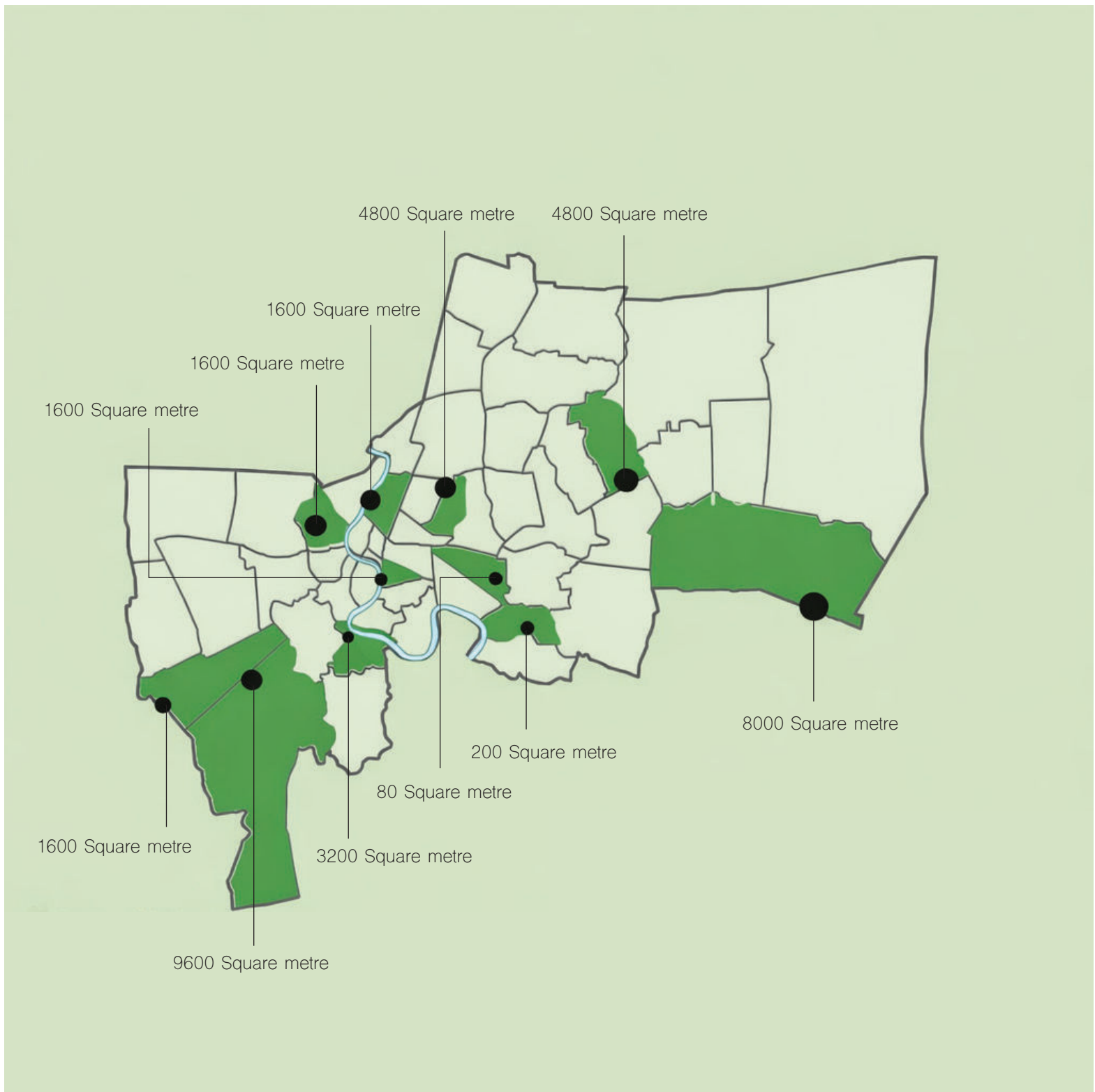
15-Minute Garden

project is a cornerstone of Bangkok's future green space strategy. The goal is to move beyond a few massive parks and instead create a dense network of smaller, high-accessibility green spaces. The primary mission is to ensure that every resident can access a public park within a 15 minute walk, which is roughly a distance of 800 meters. This strategy addresses the historical issue where Bangkok's 36+ major parks were too far away for many residents to use daily.

As of the latest data provided in the report: The city has identified over 107 target locations spanning approximately 1,054,400 square metre. While dozens of gardens are currently in the design or construction phase, the project aims for steady growth with dozens of new openings each year.

The future of Bangkok's green space is focused on low cost, high impact, and community driven design. Instead of spending massive budgets on a single landmark, the city is spending around 30 million THB annually to sprinkle green life into dense neighborhoods. This approach not only provides recreational space but also helps with dust filtration (PM2.5), carbon absorption, and urban heat reduction.¹¹

¹¹ Arifwidodo S. D. & Chandrasiri O., Urban green space visitation and mental health wellbeing during COVID-19 in Bangkok. DOI, 2024.



Future Green Space based on the district

New possibilities

Instead of using the current site of Block A to create the new uprising mall like the other surrounding shopping center. Instead there is a lot of possibilities to propose new programs that did not exist currently in Siam Square area. The possibilities go into 2 categories which are the programs related to the green area and soft-power (pop-culture) related programs

Categories:

1. Thai Soft-power (pop-culture) related program

Following the success of Korean soft power (K-pop), currently it was the issue in Thai society to encourage and promote Thai soft power (T-pop) as cultural product aimed to hit the popularity around the world. Thus, the entertainment related programs combined with the previous stand alone cinema (theatre) would be a possibility on this site. Also to give respect to the demolished Scala Cinema, I proposed new planning to follow the beautiful grid line of the previous architecture and to recreate the old facade integrated into the new proposal.

The program :

- Small scale theaters/cinemas
- Commercial area
- Multipurpose room for events
- Open-air space for socialization
- Broadcast room

2. Green space related program

Due to the aforementioned research about the green area within the surrounding area. It is quite clear that the green spaces are not enough for the people of Siam Square. Thus, this site as it is located in the big junction of Pathumwan area, this is a great opportunity to dedicate a part of this site to produce the green spaces for people in this area. Also in order to promote and create awareness about the green area in Bangkok, we could also propose the other program related to this including the production of the plants and small cultivation program. In order to make it usable for the daily life of people in Siam Square, it is also important to integrate the general activities program this area by creating the building specifically to blend between the daily life activities of Siam Square and the green plants.

The program :

- Greenhouse / Shadehouse
- Cultivation area
- Workshop space
- Free seating area
- Co-working space
- Space for kiosk
- Open Kitchen from the cultivation
- Plant super market and Bar



*GREEN HOUSE, SHADE HOUSE,
SCREEN HOUSE*

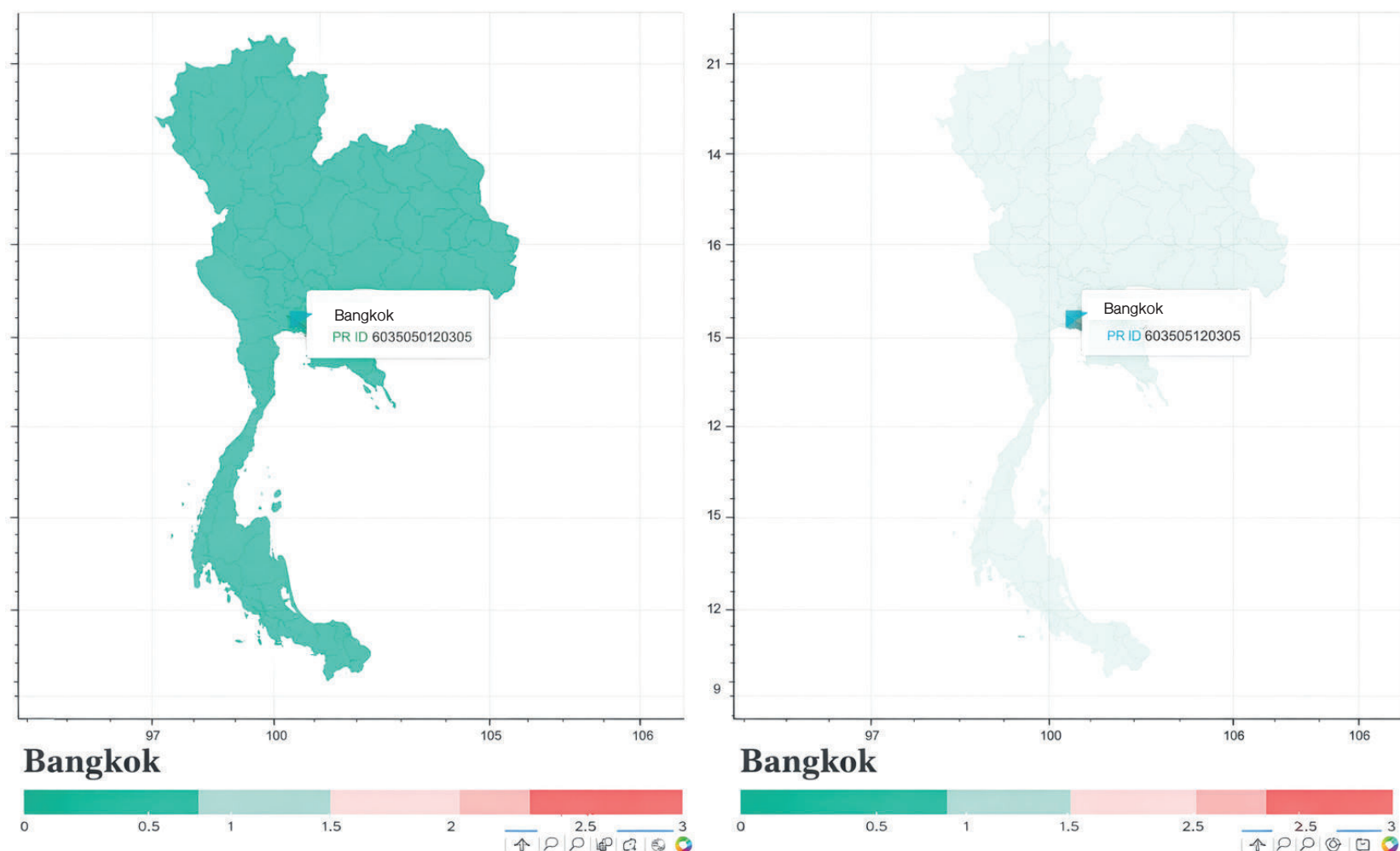
Geographical location of Thailand

Thailand is located in the heart of Mainland Southeast Asia, positioned entirely within the tropics. Thailand receives direct overhead sunlight twice a year, leading to two distinct heat peaks (usually in April and August).

Latitude : Approximately 5°N to 20°N. This proximity to the equator means the sun remains high in the sky year-round, resulting in little variation in day length but high solar energy.

Longitude : Approximately 97°E to 106°E.

Bangkok - 13.7563° N, 100.5018° E



General Climate in Thailand

The general climate in Thailand is tropical and humid, dominated by the monsoon system.¹² Thailand doesn't really have **winter** in the traditional sense; instead, it has three distinct seasons :

1.Hot Season : March – June, Intense sun, temps often 35–40°C. High Risk for cooling and UV shading are mandatory to prevent plant burn.

2.Rainy Season : July – October, High humidity, heavy daily bursts 28–33°C. High Risk for fungal diseases and physical damage from heavy rain.

3.Cool Season : Nov – February, Dry lower humidity 20–30°C. Best for growing window; greenhouses need less active cooling.

Regional Differences

Northern Thailand (Chiang Mai/Chiang Rai) : The most temperate. It can actually get cold at night in December/January (as low as 5–10°C in the mountains).¹³ Greenhouses here sometimes need a way to retain heat at night during these two months.

Central Thailand (Bangkok/Chonburi) : Extremely humid and hot. The Urban Heat Island effect in and around Bangkok means greenhouses require heavy duty ventilation to keep air moving.

Southern Thailand (Phuket/Samui) : Only has two seasons, Rainy and Sunny. It receives significantly more rainfall than the rest of the country. Greenhouses here must have very strong, reinforced roof structures to handle heavy tropical downpours.

Humidity and Sun intensity in Thailand

Humidity : Relative humidity typically ranges from **70% to 90%** during the rainy season. Even in the dry season, it rarely drops below **60%** in central and southern regions.¹⁴ In a greenhouse, this can lead to stagnant air, which breeds mold. The Sauna Effect from this high humidity inside a greenhouse, transpiration from plants adds even more moisture. If the air is stagnant, the wet bulb temperature rises, and plants could stop breathing, which can kill them.

Sun Intensity : The tropical sun is much stronger than in higher latitudes. Greenhouse plastics in Thailand must be **UV stabilized**, or they will turn brittle and yellow within a single year. The UV index in Thailand routinely hits extremely high as **11 to 12+** . In comparison, a very sunnyday in the UK or Northern US might only reach a 6 or 7. Thailand receives an average of **5.0–5.5 kWh/m2/day**.

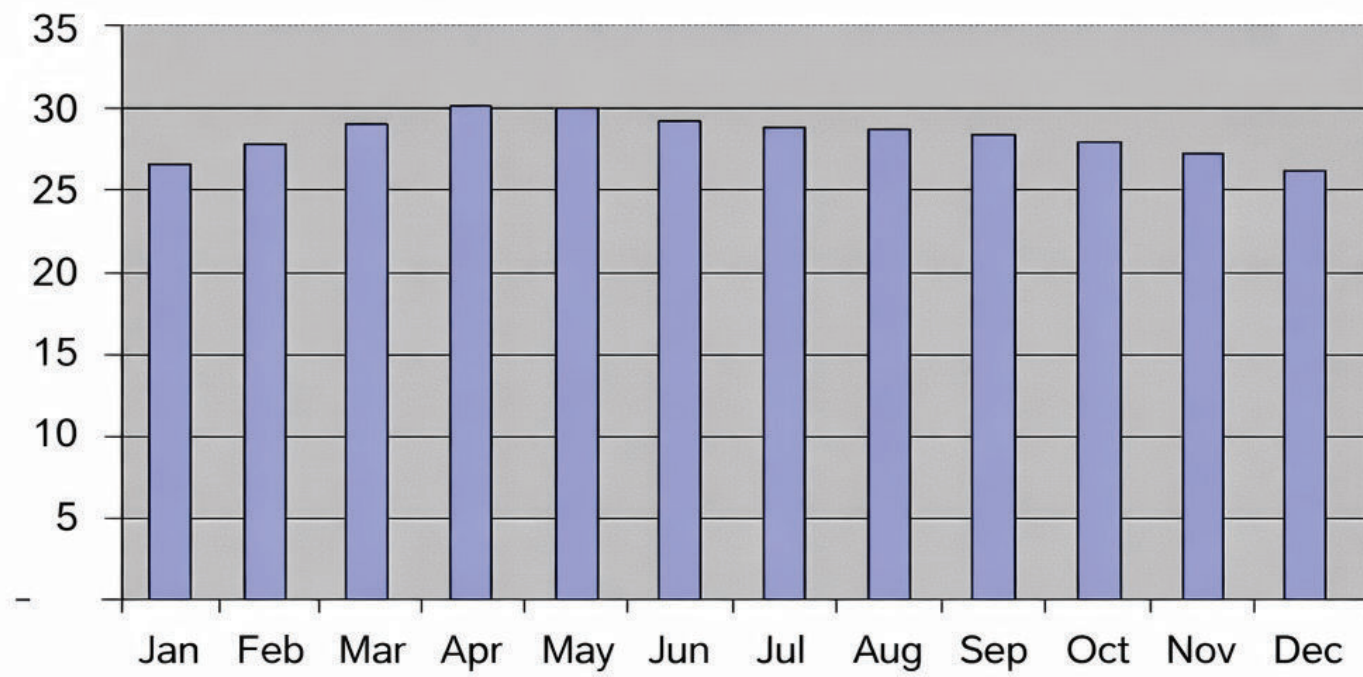
The Southwest Monsoon : Most of the heavy wind and rain comes from the Southwest. Heat over the Asian landmass pulls in warm, moist air from the Indian Ocean. This wind hits the west coast first (Phuket/Ranong) and then moves across the central plains. It brings heavy, unpredictable bursts of rain rather than constant drizzle. Wind gusts can be strong enough to rip greenhouse films if they aren't properly tensioned

¹² Arifwidodo S. D., Seasonal Variations and Thermal Comfort in Thailand. Journal of Tropical Architecture, 2024.

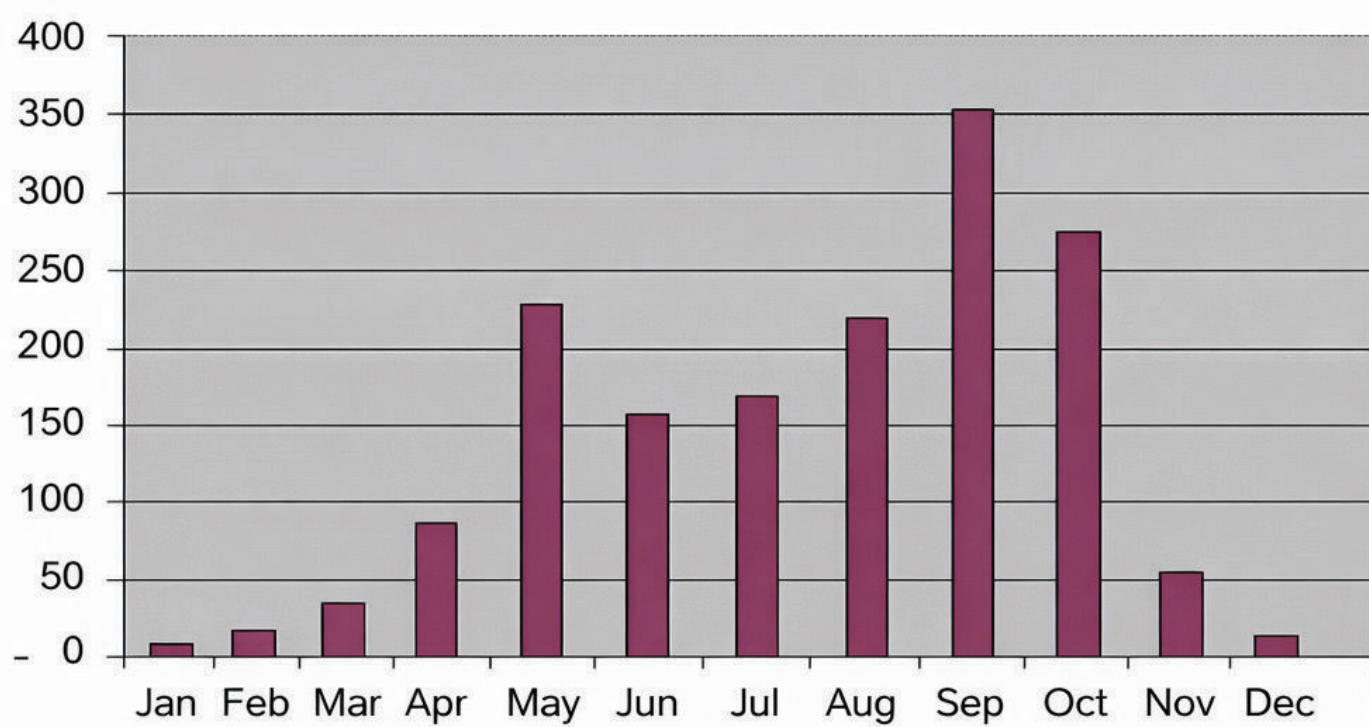
¹³ Tantai A., Southwest House: Embracing Monsoons in Modern Design. Architectural Digest Thailand, 2024.

¹⁴ Urban Heat Island Mitigation: Ventilation Standards for Central Thailand. BMA Department of Environment. 2025.

Bangkok average monthly temperature (C)



Bangkok average monthly rainfall (mm)



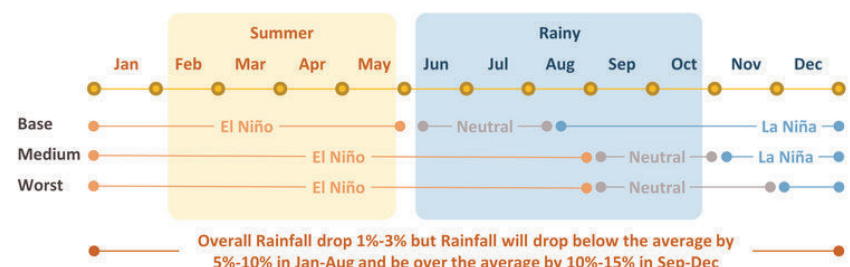
Data from late 2025

Climate change in Thailand

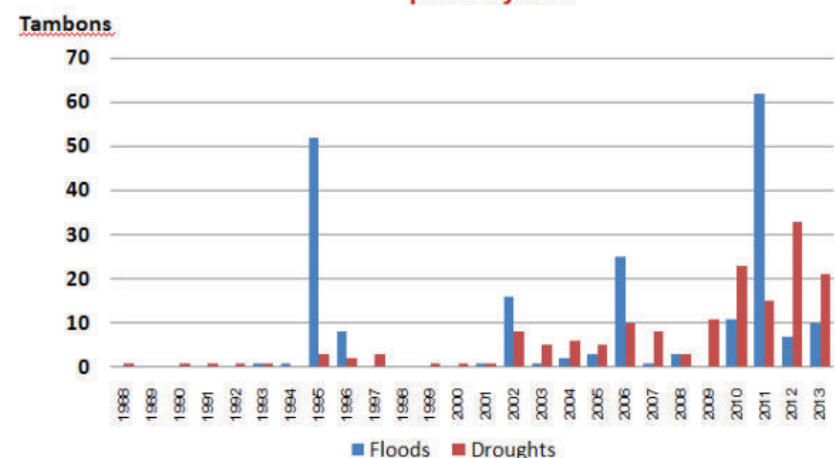
Reported that over 40 years (1970–2009), maximum, minimum and average temperatures in Thailand have increased by 0.96, 0.92, and 1.04°C. The result of increased greenhouse gas emissions, it could also be the result of local factors that are not climate related, such as an urban heat island.¹⁵ The variation of precipitation and the number of rainy days has oscillated over time in Thailand, driven particularly by El Niño Southern Oscillation. In recent years of 2015–2021, the rainfall variation has fluctuated, with the lowest rainfall in 40 years in 2019. The highest annual rainfall in Thailand was recorded in 2017 was 2,017 mm. Estimated by the 2090s, the average temperature is projected to increase by 0.95°C – 3.23°C. The results of this changes are the **Droughts, Forest Fire, PM 2.5 Dust and Floods.**¹⁶

In addition to agriculture, several other key sectors in Thailand are highly vulnerable to the impacts of **climate change, including water management, food security**, health, tourism, natural resource management, and human settlement and security.

Seasonal periods affected by the ONI index in each scenario

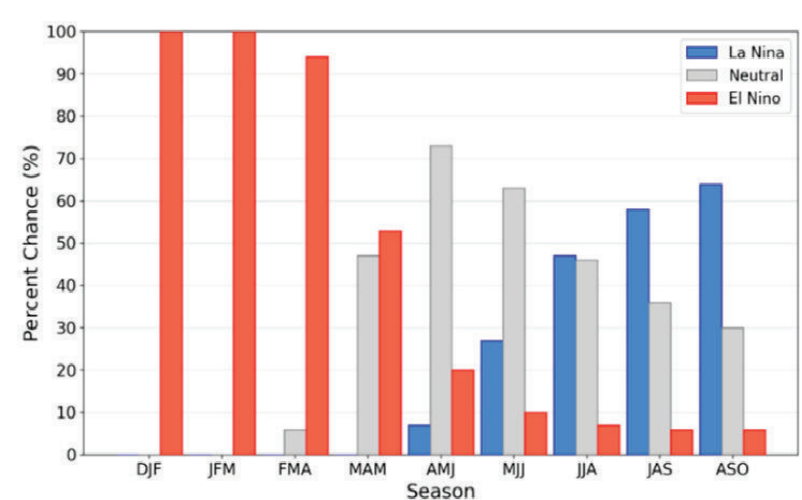


History of floods/droughts in survey provinces in the past 25 years



Official NOAA CPC ENSO^{2/} Probabilities

Based on -0.5°C/+0.5°C thresholds in ERSSTv5 Niño-3.4 index^{5/}



¹⁵ Limjirakan, S., & Limsakul, A., Observed Trends in Surface Air Temperatures and Their Extremes in Thailand from 1970 to 2009. Journal of Meteorological Society of Japan, 2012.

¹⁶ Climate Change / Thailand: Interactive Country Fiche. UNEP Grid, 2024.

Economic lose due to Climate change

Thailand faces significant economic risks in 2024 due to climate driven extremes, specifically the dual threats of drought and flooding.¹⁷In a worst case drought scenario (estimated at a 25% probability), total economic losses could reach as high as 258.6 billion baht, potentially reducing GDP by 0.69%. The agricultural sector is particularly hard-hit by the El Niño phenomenon, with sugarcane and rice projected to see the steepest production declines down to 41.9% and 14% respectively.

Simultaneously, the risk of flooding presents a major parallel threat; even in a base case scenario, floods are expected to cause 55.8 billion baht in damages, while a worst case event could see losses climb to 179.9 billion baht, impacting 0.87% of GDP and driving up inflation. When these factors are combined, the data illustrates a volatile economic landscape where extreme weather variability poses a multi billion baht risk to Thailand's national growth and its primary agricultural exports.

ตารางที่ 1
Expected output losses from the El Nino phenomenon

% Output Losses by Major Products	In 2024
Rice	-6% to -14%
Cassava	-9% to -13%
Sugarcane	-15.5% to -41.5%
Rubber	-0.5% to -2.0%
Oil Palm	-5.0% to -6.0%
Vegetable	-2.5% to -9.0%

ตารางที่ 2
Projection of Economic Losses from Drought

In 2024, Scenario of Drought Risk	Base Case (Expected case)	Worse Case (Stronger El Niño than expected)	Worst Case (Historical high)
Probability	50%	30%	20%
Rice	21.6	36.6	51.6
Sugarcane	18.2	33.6	48.9
Cassava	7.1	8.4	9.7
Oil Palm	2.7	3.0	3.2
Rubber	1.7	3.5	5.2
Economic loss (Billion Baht)	51.3	85.1	118.6
As percent of GDP	0.29%	0.47%	0.66%

ตารางที่ 3
Projected Economic Losses from Flooding

In 2024, Flood Risk under Drought Assessment Scenario	Base Case 1.7 Mn. Rais	Worse Case 1.3 Mn. Rais	Worst Case 0.9 Mn. Rais
Probability	50%	30%	20%
Asset loss (Million baht)	260	195	130
Agriculture loss (Million baht)	4,200	3,200	2,100
As percent of GDP	0.025%	0.019%	0.012%

ตารางที่ 4
Projected Economic Losses from Drought and Flood

In 2024, Scenario of Drought and Flood Risk	Base (Expected case)	Worse Case (Stronger El Niño than expected)	Worst Case (Historical high)
Probability	50%	30%	20%
Economic loss (Billion Baht)	55.8	88.5	120.9
As percent of GDP	0.31%	0.49%	0.67%
Inflation	0.32% to 0.35%	0.36% to 0.41%	0.43% to 0.48%

Economic data from Krungsri bank in 2024

17 Thailand's Economic Outlook 2024. Krungsri bank, 2024.

Green house

In Thailand, a greenhouse is a more permanent, sealed structure with a solid transparent roof (UV-polyethylene or polycarbonate). To gain total control over rain, temperature, and humidity. It is the only structure that can create an environment cooler than the outside air.¹⁸

Features a solid roof to block monsoon rains and usually incorporates an EVAP (Fan and Pad) or misting system for cooling. It is best for seedling phase like plant nursery and high value non-native crops like Japanese melons, strawberries, tomatoes, and medicinal cannabis. It is often called smart houses, these are essential for high yield commercial farming where even a single rain-storm could ruin a delicate crop. In 2026, the Thai greenhouse industry has evolved significantly as part of the country's Bio Circular Green (BCG) Economic Model. Modern Thai greenhouses are no longer just plastic tents; they are sophisticated active climate structures designed to handle the volatile weather.

A professional greenhouse in Thailand is built to be tall, often exceeding 7.5 meters. This creates a massive air buffer that stabilizes temperature and humidity. Unlike screen houses, these use a chimney Effect. Cool air enters from the sides through insect mesh, and hot air is actively pushed out through a permanent ridge vent or piggyback roof. The double roof is the standard for Thailand green house. It allows for natural convection, meaning even if the power goes out, the greenhouse won't overheat instantly.¹⁹

According to the economic data you shared, the worst case climate scenarios could cost Thailand over 250 billion baht. Greenhouses act as economic insurance for the farmer. The green house allow growing the crops year round, greenhouse farmers avoid the price spikes caused by floods or droughts that hit open field farmers. The modern systems can capture and recycle 100% of drainage water, which is critical during the projected 2024–2026 drought cycles.

¹⁸ Thailand Country Planning Framework (CPF) 2022–2026. Global Green Growth Institute, 2023.

¹⁹ Greenhouse Structures: Stabilizing the Internal Environment. NSW Department of Primary Industries, 2024.



What do we build Green house for in Thailand?

In Thailand, greenhouses (often called smart greenhouses) serve a very different primary purpose than they do in cold climates like Europe or North America. Rather than keeping plants warm, they are built to cool plants down and protect them from the tropical environment. The reason why green house is essential for Thailand is because²⁰:

1. Climate Control (Cooling & Humidity)

Thailand's extreme heat and high humidity can stress many high-value plants. Greenhouses use evaporative cooling systems (fan and pad) or mist sprays to lower temperatures by 5–10°C compared to the outside air. Many modern Thai greenhouses use retractable roofs to allow for maximum airflow during humid days and closure during heavy tropical down-pours

2. Protection from Monsoon Rains

Heavy rain during the monsoon season can physically damage delicate crops, wash away topsoil, and drown root systems. A greenhouse provides a physical shield, allowing for year round production even during the peak of the rainy season.

3. Pest and Disease Management

Tropical climates are breeding grounds for insects (like whiteflies and thrips) and fungal diseases. Most Thai greenhouses are wrapped in fine mesh nets. This drastically reduces the need for chemical pesticides, which is crucial for farmers aiming for organic or Good Agricultural Practices (GAP) certification. By keeping leaves dry and preventing rain splash, greenhouses reduce the spread of soil-borne pathogens and fungi.

4. Growing Non-Native and High-Value Crops

Greenhouses allow Thai farmers to grow temperate or specialty crops that wouldn't normally survive the tropical heat. Key crops for example melon, strawberries, lettuce (hydroponic), some type flowers.

5. Year-Round Production

By controlling the environment, farmers can produce crops consistently, regardless of season, increasing income stability.

6. Plant Nursery

Operating a plant nursery in a Thai greenhouse is essentially about environmental buffering. In Thailand's **wet-hot** or **dry-hot** cycles, a nursery's job is to protect delicate seedlings from being scorched by the sun or flattened by monsoon rains.

7. Research and Education

Universities and agricultural research centers use greenhouses to test new plant varieties, study plant growth, and improve farming techniques.

8. Showcase for local business and private house

In Thailand, some commercial space like private gallery, restaurant and cafe usually built the green house to host and maintain the non-native plants and high maintenance plants for a showcase or leisure purpose.



Economic crops that grow in green house

Leafy Greens & Salad Vegetables

Because traditional Thai soil and heat can make lettuce bitter or tough, nearly all premium salad greens are grown in greenhouses using hydroponics (NFT or DRFT systems).

- 1.European Lettuces: Green Oak, Red Oak, Butterhead, Cos (Romaine), and Frillice Iceberg.
- 2.Herbs: Rocket (Arugula), Italian Basil, Mint, and Cilantro/Coriander.
- 3.Asian Greens: High-grade Pak Choi and Kale are often grown in net houses to avoid the hole in the leaves caused by caterpillars.

High-Value Fruits

These fruits are the money makers for greenhouse farmers in Thailand because they require precise moisture and nutrient control.

- 1.Japanese Melons: A staple of Thai greenhouse farming. They are grown vertically in individual pots to ensure the perfect netting on the skin and high sugar content.
- 2.Strawberries: Traditionally only grown in the mountains of Chiang Mai, greenhouses now allow for year round production in central Thailand by using cooling pads.
- 3.Grapes: Seedless table grapes are increasingly grown in greenhouses to protect them from the fungal diseases caused by monsoon rain.

Fruiting Vegetables

While these grow outdoors, greenhouse versions are considered premium because they are uniform in size and free from pesticide residues.

- 1.Tomatoes: Cherry tomatoes and Grape tomatoes are highly popular.
- 2.Sweet Peppers: Bell peppers thrive in greenhouses where the temperature is kept below the outdoor peak.
- 3.Japanese Cucumbers: Known for being seedless and having thin skin, they are sensitive to the erratic humidity of open field farming.

Medicinal & Specialty Crops

- 1.Cannabis: Since legalization, this has become one of the most common crops for high-tech, climate-controlled greenhouses in Thailand to ensure high CBD/THC quality.
- 2.Orchids: Thailand is a world leader in orchid exports. Large-scale nurseries use shade-net greenhouses to simulate the dappled light of a forest canopy.
- 3.Edamame: Specifically grown for export to Japan, where blemish-free pods are required.



Showcase crops that grow in green house

Aside from food and medicine, Thailand has a massive showcase greenhouse industry from the private business. These are built to display botanical art with rare, beautiful, or culturally significant plants that thrive in the controlled humidity of a greenhouse.

The Aroid Craze (Rare Foliage)

Thailand is a global hub for variegated (multi-colored) plants. Collectors build greenhouses specifically to showcase mutations that would die in the direct sun.

- 1.Monstera or Thai Constellation : Originally developed in a Thai lab, this plant features creamy white splashes that look like stars.
- 2.Philodendrons & Alocasias : Varieties like the Pink Princess or Alocasia Frydek are kept in high humidity greenhouses to keep their large, velvety leaves from drying at the edges.
- 3.Caladiums : Known as The Queen of Leaves in Thailand, these are showcased for their incredible heart shaped leaves in shades of deep red, pink, and white.

Exotic Orchids (The National Pride)

While many orchids grow on trees outside, showcase greenhouses are used to display awardwinning hybrids and rare wild species.

- 1.Vanda & Dendrobium : Often displayed in hanging arrangements to show off their trailing roots.
- 2.Slipper Orchids (Paphiopedilum) : These are the jewels of the orchid world. They are very sensitive to temperature and are almost always kept in specialized showcase houses with misting systems.

Caudex and Succulent Displays

A Caudex plant has a fat, swollen trunk used for water storage which look like living sculptures.

- 1.Adenium (Desert Rose): Thai breeders are world famous for grafting Adeniums to create bonsai style trees with massive, colorful blooms.
- 2.Exotic Cacti: Though Thailand is wet, greenhouses are used to create Dry Zones for rare cacti (like Gymnocalycium) that have vibrant purple or yellow variegated bodies. The greenhouse keeps the rain out so they don't rot.

Carnivorous Plants

In certain regions, specialized greenhouses showcase trapping plants.

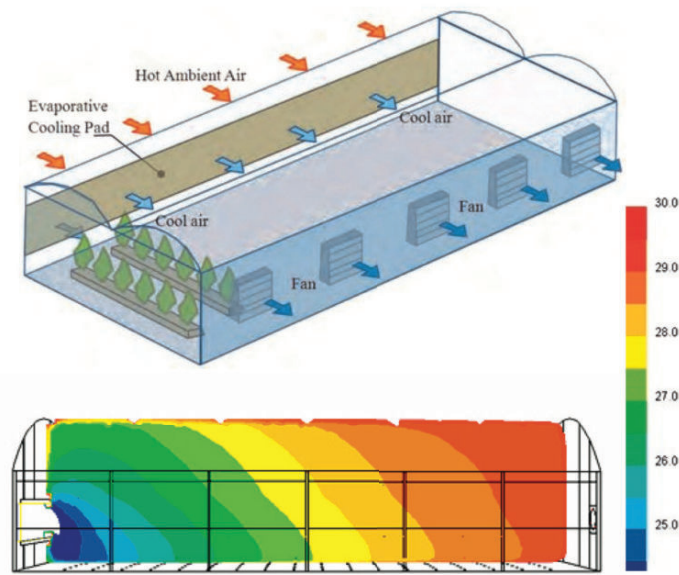
- 1.Pitcher Plants (Nepenthes) : Thailand has many native species. In a showcase, they are often hung at eye level so visitors can see the large, colorful pitchers they use to catch insects.
- 2.Venus Flytraps : Often showcased in smaller, cooler glass box style greenhouses.

Ferns and Moss Gardens

- 1.Staghorn Ferns : Massive, antler-like ferns that can grow to over 2 meters wide.
- 2.Tree Ferns : Used to create a Jurassic feel, requiring constant 80–90% humidity provided by greenhouse misters.



*As the time passed by plants and species in
Thailand may need more coverage and control
due to increasing of natural phenomena and
disaster*



Green house, the system and design for Thailand's Climate

To build a successful greenhouse in Thailand, you must move away from the traditional glass box model used in the West. In a tropical climate, the building system focuses on heat expulsion, monsoon durability, and pest exclusion.²¹

The Tropical Passive Structure

The most common and cost-effective system, often seen in the Royal Projects in Northern Thailand.

_Roof Design : The **Double Roof** or **Piggyback** style. It has a permanent gap at the ridge that allows hot air to escape naturally through convection.

_Materials : Hot-dip galvanized steel to prevent rust from high humidity.

_Covering : 150–200 micron UV stabilized Polyethylene (PE) film. High technology films are now used to diffuse light, preventing hot spots on the plants.

Evaporative Cooling System (EVAP)

commonly known as the Fan and Pad system in Thailand, is the most widely used mechanical cooling method for commercial greenhouses.²²It works by converting sensible heat into latent heat through the evaporation of water. For temperature sensitive crops like strawberries or premium melons.

_Cooling Pad : A honeycomb cellulose pad is installed on one wall with water trickling through it.

_Exhaust Fans : Large industrial fans on the opposite wall pull outside air through the wet pad. As the water evaporates, it cools the air by 5–10°C.

_Automation : Modern Thai systems use **Smart Duration Control** to turn the pumps and fans on only when specific temperature or humidity thresholds are hit.

²¹ Arifwidodo S. D. & Chandrasiri O., Evaluating Passive Design Strategies for Agricultural Structures in Hot-Humid Bangkok. Journal of Tropical Architecture & Sustainability, 2025.

²² TSAE Conference Proceedings. Thai Society of Agricultural Engineering (TSAE), 2024.

Green house, Hydroponic system

In Thailand, hydroponics within a greenhouse is the premium standard for producing clean and premium grade vegetables. Because Thai soil can harbor pathogens and the heat can make traditional farming difficult, soilless systems allow for precise control over the root environment.²³ The biggest challenge. If the water exceeds 30°C, roots will rot. Smart systems often use chillers or underground nutrient tanks to keep water at a steady 24–26°C. The most common hydroponic systems used in Thailand are:

Nutrient Film Technique (NFT)

This is the most popular system for leafy greens (Green Oak, Red Oak, Cos). A thin film of nutrient rich water flows constantly through sloped PVC pipes or gullies. It is highly space efficient and provides excellent oxygen to the roots, which is vital because warm water holds less oxygen. Farmers often use White PVC pipes to reflect the sun and keep the internal water temperature from cooking the roots.²⁴

Dynamic Root Floating Technique (DRFT)

A system specifically developed and adapted for tropical Asian climates. Plants sit on foam boards floating on a deep pool of nutrient solution (10–15 cm deep). The large volume of water acts as a thermal buffer. Unlike NFT, which can overheat quickly if the pump fails, the large body of water in DRFT stays cool longer and keeps plants alive during power outages.

Substrate

Used primarily for fruiting vegetables like Japanese Melons, Tomatoes, and Chilies. Plants are grown in bags filled with Coconut Coir (Coco Peat), which is abundant and cheap in Thailand. A drip line delivers nutrients directly to the base of each plant. Many Thai greenhouses now use the Spacer System, which lifts these bags off the floor to allow air to circulate underneath, preventing the root rot caused by the hot greenhouse floor.

²³ Adapting Hydroponics for the Tropical Monsoon: The Resilience of DRFT – Agricultural Science Review. Chulalongkorn University, 2024

²⁴ Floating Raft vs. NFT: Power Failure Survival Rates in Thai Greenhouses. Suranaree University of Technology, 2025.





Smart watering system

The smart system Greenhouse

Automation system to manage the harsh tropical environment. Normally the local farmers often struggles with the rapid shifts in Thai humidity and heat, these digital systems act as the brain of the farm. The system consisted of²⁵:

The Sensor Network (Real-Time Data)

Smart houses use a mesh of wireless sensors to monitor variables that are invisible to the eye, the sensor including:

_VPD (Vapor Pressure Deficit) : In Thailand, humidity is so high that plants can stop breathing even if the temperature is decent. Smart systems calculate VPD to know exactly when to turn on fans.

_EC & pH Sensors: For hydroponic systems, these sensors monitor the nutrient strength and acidity in real-time, automatically injecting fertilizer as needed.²⁶

_Light Intensity (Lux): Measures solar radiation to decide when to deploy automated shade nets.

Automated Actuators

Instead of a farmer manually opening vents, a central computer (or PLC) triggers mechanical responses

_Smart Shading : External or internal screens that roll out automatically when the sun hits a certain intensity, preventing leaf scorch.

_Precision Misting/Fogging : High-pressure nozzles that pulse for seconds at a time to lower temperatures without making the leaves dripping wet.

_Automated Fertigation : Delivers water and nutrients based on the plant's actual consumption rather than a fixed timer.

Edge & Cloud Computing

_Remote Monitoring : Platforms like Anto or Blynk (in Thailand) allow farmers to view their greenhouse status on a smartphone from anywhere in the country.

_Data Backups : Most systems now sync with Google Sheets or the Cloud, allowing farmers to analyze seasonal trends and improve their recipe for the next year.

_Predictive AI : Advanced systems use Fuzzy Logic or Machine Learning to predict weather changes (like an incoming monsoon burst) and close the roof vents before the rain starts.

²⁵ Kajornrit J., Decision Driver for Automated Ventilation in Lowland Thai Greenhouses. Journal of Agricultural Technology, 2025.

²⁶ Aurasopon A., Integration of IoT Technology in Hydroponic Systems. Acta Technologica Agricultural, 2024.

Shade house

Shade houses are structures which are covered in woven or otherwise constructed materials to allow sunlight, moisture and air to pass through the gaps. The covering material is used to provide a particular environmental modification, such as reduced light or protection from severe weather conditions. The height of the structure will vary according to the type of crop being produced and may be as high as 8 metres. In Thailand, a Shade House often called a Slan House after the popular brand of netting, it is the most common agricultural structure you will see. It is the entry level version of protected cultivation, designed to solve the problem the sun in Thailand. In Thailand, you will see Shade Houses used specifically for orchid farms, a massive hectares of 50–70% black shade houses in Nakhon Pathom and Samut Sakhon.²⁷

The netting used is graded by its shading percentage, which tells you how much sunlight it blocks.²⁸ In Thailand, you must choose based on your specific plant's needs:

_50% Shade (Black/Green): Used for vegetable nurseries, chilies, and sun loving flowers. It allows enough light for growth while preventing leaf scorch.

_70% Shade (Black/Blue): The standard for most Thai ornamental plants, general nurseries, and leafy greens during the extreme heat of April.

_80% Shade (Black): Used for delicate forest plants like Ferns, Moss, and certain Orchids (like *Paphiopedilum*) that would die instantly in direct Thai sun.

The color of the shade house netting significantly affects the temperature and plant health in which black netting is the most popular in Thailand. It is the best at absorbing heat and blocking UV, keeping the area underneath the coolest. It is also the most durable against UV degradation. Green netting is very common for aesthetics, but it changes the light spectrum reaching the plants. Some studies show it can make certain Thai vegetables grow leggy (tall and weak). Silver/Aluminium netting is the premium choice. It reflects heat away rather than absorbing it. It's often used in high end smart shade houses because it keeps the temperature 2–3°C lower than black netting.

Problem:

The Sail Effect, during a tropical storm, a shade house acts like a giant sail. If the netting is tied too tightly to a weak frame, the whole structure will collapse or blow away. The solution, professional Thai builders use high tension wires and spring clips that allow the net to be quickly detached or gathered if a major storm warning is issued. Because a shade house has no solid roof, it has the best natural ventilation of all structures. Heat rises straight through the mesh, preventing the sauna effect common in greenhouses.

²⁷ The Thai Floriculture Sector: Growth and Infrastructure Standards. Thailand Board of Investment, 2024.

²⁸ UV Stabilization and Durability Standards for HDPE Netting in Tropical Latitudes. Thai Poly Net, 2026.



Screen house

Screen houses are structures which are covered in insect screening material instead of plastic or glass. They provide environmental modification and protection from severe weather conditions as well as exclusion of pests. They are often used to get some of the benefits of greenhouses in hot or tropical climates. In Thailand, while the terms are sometimes used interchangeably, each structure has a specific engineering goal based on the local tropical climate. A screen house is a structure completely wrapped in fine mesh without a solid plastic roof. It is especially made for physical pest exclusion to reduce chemical pesticide use. It uses high density polyethylene (HDPE) netting. In Thailand, the mesh count is critical which 16–24 mesh, blocks large insects like butterflies and beetles. 32–40 mesh, blocks smaller pests like whiteflies and aphids (standard for Thai leafy greens)²⁹

Screen house is best for natural ventilation; heat doesn't get trapped because air flows through the walls and ceiling. However it has no protection from rain. During the monsoon, soil borne diseases can splash onto plants, and heavy rain can damage delicate leaves. The primary reason Thai farmers build screen houses is to create a physical barrier against tropical pests:

_Thrips & Aphids : These are tiny but carry viruses that can destroy a whole crop of chilies or melons in days.

_Whiteflies : Major carriers of leaf-curl virus.

_Caterpillars : The Diamondback Moth is a nightmare for Thai kale and cabbage; the screen house blocks the moths from laying eggs.

Structure for screen house

_Flat-Top Box: The cheapest version. It uses simple steel poles and a flat mesh roof. The risk is that heavy Thai rain can pocket

_Gabled/Arched Roof: The professional choice. The angled roof allows rain to slide off quickly and gives the structure more strength against the Southwest Monsoon winds. on top, stretching the net until it rips.

_Double-Door Entry: A smart screen house always has a small airlock or double door entry. This prevents insects from flying in when the farmer enters.



Comparison : Green house, Shade house, Screen house

As the purpose of the building is to be a public space for people to get closer to the green nature while doing the daily life activities of Siam Square. Now we need to compare the system among these three houses if it will be able to host people and the indoor plants with comfort for all day usage.

Green house

_Structure : Fully enclosed with transparent or translucent material (plastic, polycarbonate, or glass). Often completely sealed, sometimes with cooling/heating and irrigation systems.

_Purpose : Controls temperature, humidity, and light for precise growing conditions. Can grow non-native or sensitive crops (e.g., strawberries, melons, hydroponic lettuce).

_Use in Thailand : Mostly in the north or urban smart farms. Higher cost, used for high value crops and research.

_Temperature control : Holds heat inside, creating a cold environment for plants for whole year long.

_Humidity levels : Needs system to lower the humidity level for Thailand's climate.

_Light : Has clear or semi clear walls that let sunlight in while providing some UV protection, allowing more consistent light exposure.

___Pro : Precise water and nutrient control with hydroponics system and drip big water savings system. Can reduce pesticide use within the closed system. Also be able to produce year round with stable yields less risk for farmers.

___Con : High cost for materials, cooling, maintenance and needs a lot of energy like fans, pumps, sometimes cooling which can increase carbon footprint.

Shade House

_Structure: Frame covered with shade net (green, black, or white mesh) to reduce sunlight intensity. Sometimes open sides, allowing free airflow.

_Purpose: Protects from excess sun, rain, and wind. Reduces plant stress in hot climates.- Cheaper than a greenhouse.

_Use in Thailand: Common for orchids, ornamental plants, nurseries, leafy vegetables. Very popular because it's affordable and fits tropical crops.

_Temperature control and Humidity : Natural Ventilation, no system control , could still use sprinkle to increase humidity in some occasion.

_Light : Natural sunlight according to the shade percentage of the material.

___Pro : Very low cost with simple materials and reduces crop stress. Saving water by lowering evapotranspiration makes no energy needed for cooling by natural ventilation. Very accessible for small farmers, especially for orchids, nurseries, leafy greens, but less eco-friendly if pesticides are heavily used.

___Con : Limited control of climate not suitable for non native crops. Shade house offers no protection against insects often leads to more pesticide use.

Screen House

_Structure : Similar to a shade house, but covered with fine insect proof mesh (instead of just shade net). May still allow light through, but blocks pests.

_Purpose : Screen the insect and pest exclusion without heavy pesticide use. Useful for crops highly vulnerable to insects.

_Use in Thailand : Increasingly used for pesticide free vegetables (hydroponic lettuce, herbs). Important for sustainability and organic farming.

_Temperature control : Doesn't trap heat; it allows natural air to flow freely, so it doesn't get as hot.

_Humidity levels : Humidity is closer to the outside environment, which is better for cropsthat prefer drier air.

_Light : Light is filtered through the mesh, so sunlight may not be as direct. It offers some shade but isn't as effective for sun-loving plants.

___Pro : Inexpensive compared to greenhouses, but more protective than shade houses. Be able to prevents pests reduces or eliminates pesticide use. Also allows natural airflow and light no heavy energy input. This is a very strong option for organic and pesti-cide-free vegetables, balancing low cost and environmental protection.

___Con : Still less control over temperature and humidity compared to greenhouses.

The **most suitable model** for the building would not be only one type, but two. This, **Green house and Screen house** are the most suitable for the green purpose activities building in Bangkok as they serve both the protection for the harsh climate while still reeive sunlight from the from the green house model, in the meanwhile the natural ventilation and the screening of the insects can still happen throught the model of Screen house. The mixture between these two models might be the best for the for the building purpose. The other thing that we need to look at is how to merge these two models together in the design phase.

Feature	Greenhouse	Shade House	Screen House
Cover material	Plastic film or glass	Shade net	Fine insect-proof mesh
Climate control	Full control of temperature, humidity, and light	Partial control through shading	Limited climate modification; primarily pest exclusion
Relative cost	High	Low	Medium
Primary function	Weather protection and environmental control	Protection from sun, rain, and wind	Protection from insects and pests
Typical crops in Thailand	Strawberries, melons, hydroponic crops, export flowers	Orchids, leafy vegetables, nursery plants	Lettuce, herbs, cucumbers, tomatoes (pesticide-free)

*Case study for Green house
and Screen house*

PTT-LNG Exhibition Hall - Rayong, Thailand

is a unique, sustainable greenhouse located at the Nong Fab LNG Receiving Terminal in Rayong, Thailand. It is famous for growing winter flowers in a tropical climate by repurposing waste cold energy from the industrial process of Liquefied Natural Gas (LNG). It serves as a learning center for energy and forest conservation, as well as a public tourist attraction. The hall's most impressive feature is its cooling system. During the regasification process, LNG must be warmed up to return to a gaseous state. Instead of letting the cold energy dissipate, it is used to chill water. This chilled water is piped into the exhibition hall's air conditioning system. The result is a consistent indoor temperature of about 15 degree, allowing temperate plants to thrive year round without the high electricity costs of traditional refrigeration. The main purpose of the hall is to display the winter flowers such as tulip and lillies, within this area the researchers are also testing the cultivation of high value crops like wasabi and strawberries.

Sustainable Architecture

The building itself is a masterpiece of eco-design and has been awarded the Platinum Green Building Award (TREES-NC). Glass Dome are designed to resemble an LNG storage tank, the circular structure uses natural light to reduce energy consumption. The roof is covered in vegetation to provide natural insulation and blend the building into the surrounding landscape with Integrated solar cells help power the facility.



Khanong Phra Campsite - Nakhon Ratchasima, Thailand

PHTAA Living Design

is a 16 hectare development in Nakhon Ratchasima. The project is organized as a spatial journey where visitors encounter different architectural programs that blend modern infrastructure with the natural highlands. The site integrates functional agricultural elements and wildlife spaces as part of the initial visitor experience consisting of :

_Goose House: Positioned next to a pond near the entrance, this structure allows guests to observe animals in a natural setting before moving further into the site.

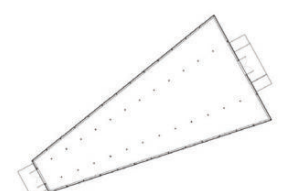
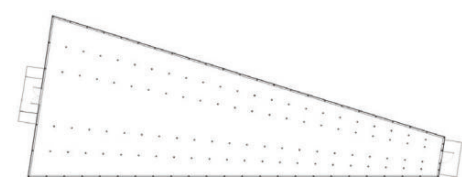
_Agricultural Greenhouses: These staggered roof structures are designed to optimize sun and wind exposure. They grow various plants, from ground covers to climbers, which supply fresh produce directly to the on site canteen and local restaurants.

The midsection of the campsite features architectural shelters built with local materials to provide respite from the mountain elements, this consisted of :

_Shelter 01: A semi-outdoor resting area that uses lightweight shading nets and parasols crafted from slings. It is shielded from strong winds by walls built from locally sourced stone, offering a quiet space with panoramic views of the greenhouse zone.

_On-site Canteen: Tucked behind protective stone walls, this canteen serves both day visitors and overnight guests. It focuses on using ingredients grown within the site's own greenhouses.

The highest points of the terrain are reserved for the most private and scenic programs of the development which have a mountaintop Campground, this area features six private overnight units. Each is a self contained station equipped with its own toilet, pantry, dedicated tent space, and private car parking.

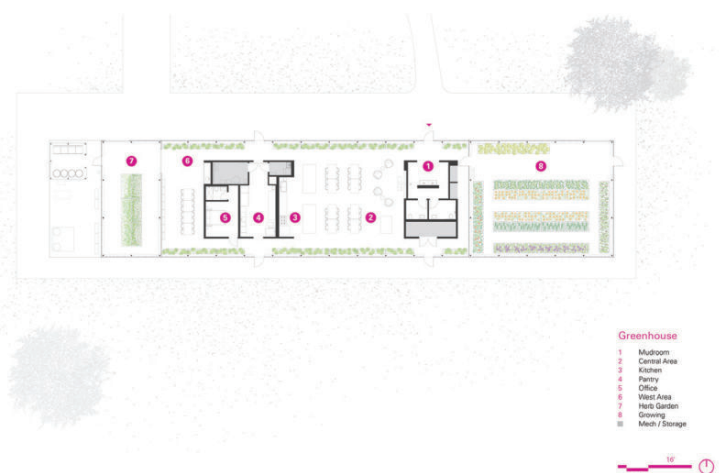


The Granor Greenhouse - Michigan, USA

Wheeler Kearns Architects

is a sophisticated hybrid that places high end residential and hospitality programming inside a professional grade agricultural structure. While not a permanent private residence, it is often described as placing living rooms inside a greenhouse because it incorporates intimate, wood clad social spaces within a 7,336 square foot glass envelope. The project was designed for Michigan's first certified organic vegetable farm. The goal was to create a space where the "farm to table" process is literal, where diners sit among the very seedlings and herbs they are eating. The Structure utilizes a Dutch Venlo greenhouse system, a **modular kit** of parts common in industrial farming, but elevated with high design finishes.

The project consisted of three zones : Center Zone, the heart of the building, featuring a professional commercial kitchen and a flexible dining area with polished concrete floors. The central living room, made with the glass structure feel like a home or a high end restaurant rather than a laboratory, Wheeler Kearns inserted two Douglas Fir clad volumes. The volumes wood boxes house the warm functions of the building: the chef's office, a pantry, a mudroom, and washrooms. The vertical Douglas Fir slats provide a visual and acoustic softness, contrasting with the galvanized steel and glass. East and West Zones, dedicated to production (germination and seedling growth) using translucent glass to provide optimal light for plants. Adjacent to the greenhouse is a converted Brock grain bin which serves as a Schoolhouse for children's farm camps, featuring a plywood-clad interior and a central skylight.



The Wooden House - Muiden, Netherlands Moke Architecten

Completed around 2023–2024, this house is a standout example of landscape architecture as a home, designed specifically for the founders of la4sale who wanted their residence to reflect their profession. The concept of the **Pulled Apart House**, the house is not a single block; instead, it is split into two staggered square volumes that have been **pulled apart** to maximize views and privacy.

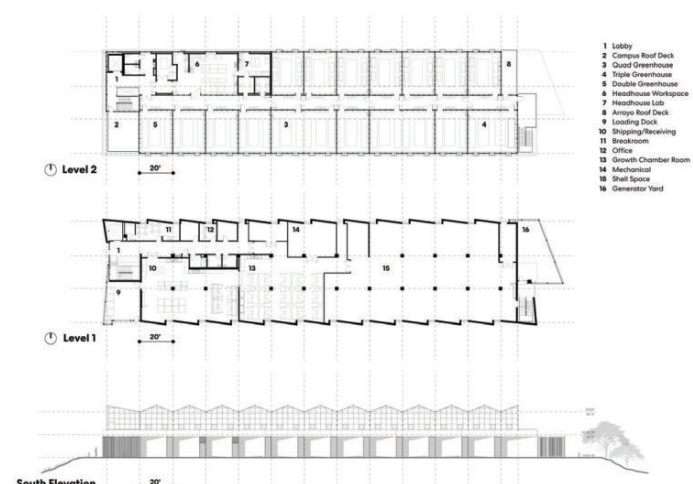
The Front House, opens up toward the garden and the IJmeer lake. It contains the social spaces: a kitchen on the ground floor and a living room on the first floor. The Rear House, a more private, closed volume containing a workspace/studio on the ground floor and the master bedroom above. The Connection, the two volumes are linked at the corners by wooden pergolas. These pergolas feature adjustable slats that residents can open for views or close for total privacy, creating a soft transition between the interior and the landscape. The Rooftop Greenhouse, is located on the roof of the front volume, the greenhouse acts as a semi climate extension of the living space. It is used to grow plants and flowers that wouldn't survive the standard Dutch wind and salt spray from the nearby lake. The glass roof of the greenhouse is integrated with transparent PV (solar) cells, allowing the building to generate its own electricity without blocking the light needed for the plants below. Like the BIAS project in Taiwan, this greenhouse helps regulate the temperature of the floors below by acting as a pocket of warm air in the winter.



California Research Center - USA Perkins&Will

Completed in 2021, this \$22 million facility is a **living machine** that continues UCR's 100 years legacy in agricultural science. It is the first new greenhouse built on the campus in nearly 40 years. The building is a striking two story structure that contrasts a heavy, grounded base with a light, transparent top. The Concrete Base, on the ground floor features serrated concrete walls. This isn't just an aesthetic choice; the concrete provides massive thermal mass, helping to stabilize the internal temperatures of the sensitive potting rooms and growth chambers located inside. The Elevated Greenhouses, sitting atop the concrete base are 16 high technology greenhouse modules. By elevating them, the architects ensured they receive maximum, unobstructed sunlight while also making the university's research visible to the surrounding campus.

Unlike a standard greenhouse, this facility is designed for high precision scientific experiments. Each of the 16 glass modules operates as its own independent laboratory. Researchers can wirelessly adjust the temperature, humidity, and lighting for each module to simulate different global environments from tropical jungles to arid deserts. To combat the intense Riverside heat, the building uses a specialized evaporative cooling system. This allows the greenhouses to maintain much lower temperatures than older facilities on campus, which is critical for studying how plants react to extreme heat stress. The modules are encased in double panel polarized glass, which optimizes light transmission while reducing glare and heat gain. The scientists use the facility to develop crops (like rice and citrus) that can survive with significantly less water, research is conducted on plants that can naturally clean or decontaminate soil. The controlled modules allow for the study of bee behavior and pollination across varying climate conditions.



The ReGen Villages - Danish Pavilion at the Venice Architecture Biennale EFFEKT, James Ehrlich

In 2016, the project reimagines the home as a self-sustaining ecosystem rather than just a shelter. The exhibition, titled Art of Many and the Right to Space, showcased ReGen Villages as a solution to the global housing and food crisis. It proposed a new model for off-grid living that could be scaled globally. The project was dubbed the Tesla of ecovillages because it uses an integrated operating system (VillageOS) to manage the community's resources autonomously. The model featured a circular neighborhood design where homes are clustered around central high yield farming zones. The architectural heart of ReGen Villages is a hybrid structure where a traditional living space is wrapped in a glass greenhouse envelope. This design serves three critical functions:

Climate Buffer

The glass skin creates a temperate microclimate around the house, significantly reducing the energy needed for heating during winter and allowing for natural ventilation in summer

Vertical Gardening

Every home has an attached greenhouse where families can grow their own high yield organic produce (fruits, vegetables, and herbs) directly at their doorstep.

Resource Loop

The greenhouse is part of a closed loop system. Kitchen waste is composted to feed soldier fly larvae, which in turn feed fish in an aquaponic system. The nutrient-rich fish water then fertilizes the greenhouse plants.

Key Sustainable Systems

The project integrates five core pillars of self sufficiency in which the houses are equipped with solar panels and managed by smart grids to produce more energy than they consume. Combines traditional seasonal gardens with high technology vertical farming and aeroponics, along with systems for harvesting rainwater and recycling greywater for irrigation. With waste to Resource concept, the use of on site biogas plants convert non compostable waste into clean energy. Lastly, a software platform that uses AI to optimize the distribution of energy, water, and food across the neighborhood.

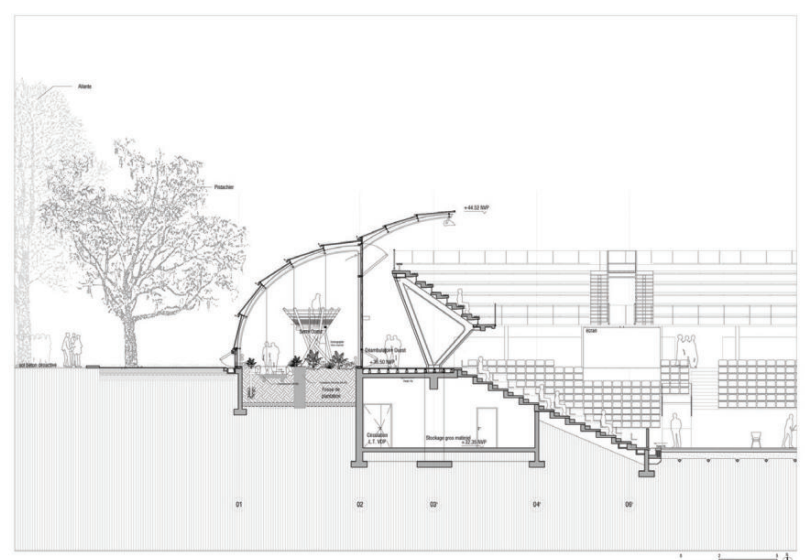


Court Simonne-Mathieu - Paris, France, Marc Mimram

completed in 2019, it is a high performance sports venue integrated into a historic 19th century botanical garden. It is famously known as the Greenhouse Court. The challenge for the architects was to expand the famous Roland Garros tennis grounds into a sensitive, protected botanical site. The solution was to sink the tennis court below ground level and surround it with architecture that mirrors the historic 19th century glasshouses nearby. The court consisted of 5,000 seats, by placing the court 4.5 meters below ground level, the stadium remains low profile, respecting the skyline of the surrounding gardens. The seating area is enclosed on all four sides by a crown of glass greenhouses.

The Four Botanical Greenhouses

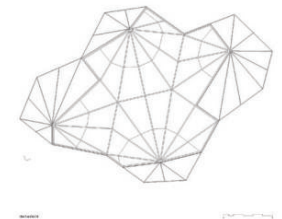
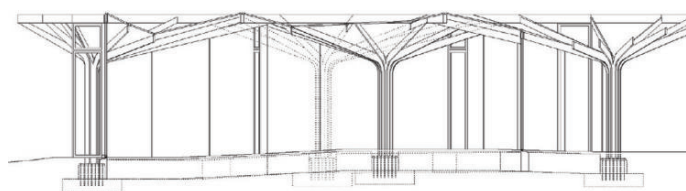
The most striking feature of the building is that the spectators are essentially sitting inside a massive botanical conservatory. The glass galleries are open to the public even when tennis matches are not taking place. Each of the four sides of the court houses plants from a different continent: Africa, Asia, Oceania, and America. Unlike a standard greenhouse that might overheat, this building uses a sophisticated double skin glass system and natural ventilation to protect the plants while keeping the spectators comfortable. The greenhouses house rare and exotic species curated by the Botanical Garden of the City of Paris, ensuring the building serves a scientific purpose year round. The structure uses a lightweight high performance steel frame that mimics the delicate ironwork of the historic Jean Camille Formigé greenhouses (built in the 1890s) located just a few meters away. Double glazing high transparency, low iron glass is used to ensure the plants get the maximum amount of light needed for photosynthesis while providing thermal insulation. From the inside, the glass allows spectators to see the surrounding lush greenery of the Auteuil gardens, creating an atmosphere of tennis in a forest.



Greenhouse at the Botanical Garden - Grüningen, Switzerland
idArchitekt.innen SIA AG

This award winning pavilion is famous for its **biomorphic** design that mimics the structure of the surrounding forest. The hallmark of this greenhouse is its structural system, which was inspired by the natural growth patterns of trees. The building is supported by four large steel trees. These columns grow vertically for about 5 meters before branching out into a complex network of steel limbs. These branches support a geometric roof membrane. The layout was designed using Voronoi tessellation (a mathematical pattern often seen in cell division or the veins of a leaf) to determine the most efficient placement for the trunks relative to the existing forest outside.

While the steel trees provide the strength, a secondary glass construction is suspended from the branches. This creates a transparent envelope that encloses the inner space while appearing to float. The goal was to make the greenhouse feel like an extension of the forest. The irregular, organic shape of the roof ensures that the building doesn't look like a standard industrial greenhouse, but rather a natural shelter. The interior is divided into different planting areas using glass screens, allowing the garden to host a variety of subtropical plants like bananas and papayas in the cold Swiss climate.



The Schoolgarden De Buitenkans - Roosendaal, Netherlands RO&AD Architecten

Completed in 2017, it is a striking example of how architecture can foster social inclusion and sustainable education. The project was created for Het Da Vinci College, a school for students with special needs who study animal care and horticulture. The most unique aspect of De Buitenkans is its construction story. Faced with a limited budget and a redundant plot of land donated by a local family, the architects designed a building that could be built by the community itself. The building is an exceptionally long and narrow timber structure, 100 meters long and only 6 meters wide. To save money, the architects eliminated all hallways. Every room as classrooms, animal pens and greenhouses is placed in a single row, and you move from one to the next or step outside to reach different sections. It uses a repetitive system of timber trusses held together by basic metal nail plates, making it easy for non professionals to assemble.

Programs and Layout

The 600 square meter building is a hybrid of a schoolhouse, a barn, and a greenhouse. It is divided into specific functional zones:

_The Greenhouses : Integrated directly into the timber frame, allowing students to practice horticulture year round.

_The Animal Room : Spaces for small livestock and animal care training.

_Classrooms and Workshops : Functional indoor learning areas that open directly onto the garden.

_The Community Path : A public path runs alongside the building, encouraging locals to interact with the students and their work.



Inside the Flower - Heilbronn, Germany *LAVA (Laboratory for Visionary Architecture)*

For the BUGA 2019 (Federal Garden Show) in Heilbronn, Germany. LAVA transformed a standard, industrial greenhouse into a breathtaking, immersive journey that allowed visitors to experience the world from the perspective of a pollinator, essentially walking inside the biological mechanisms of a flower. The design was an exploration of Bionics (the study of mechanical systems that function like living organisms). The project was divided into three chapters that mirrored the anatomy of a flower:

1. The Petals (The Entrance)

As you enter, the space is defined by sweeping, translucent fabric structures that mimic the delicate, overlapping petals of a flower. The fabric diffuses the bright greenhouse light, creating a soft, ethereal glow that makes the industrial steel frame of the greenhouse disappear.

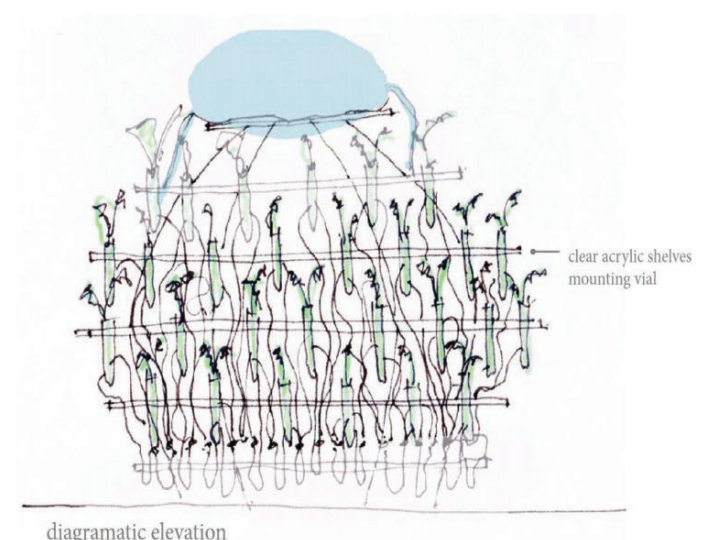
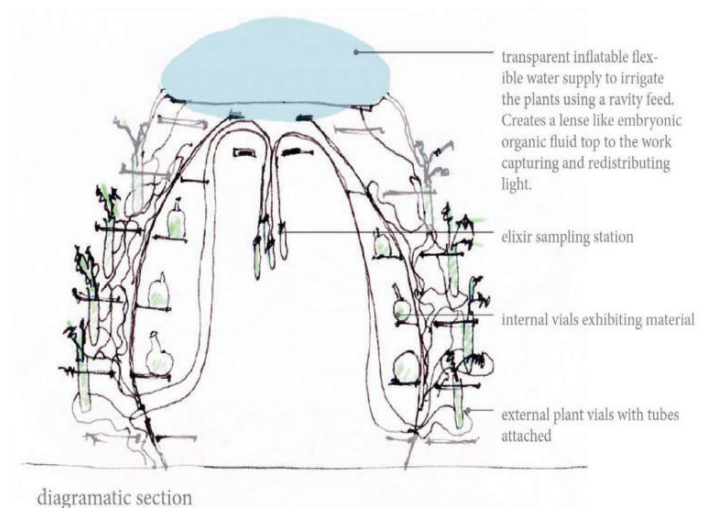
2. The Stamen (The Central Hub)

The heart of the exhibition features a series of vertical, glowing structures that represent the stamens (the reproductive organs of a flower). This area served as the primary learning zone where visitors could interact with displays about nature's inventions, such as how lotus leaves repel water or how bird wings inspired aviation.

3. The Pollination (The Interactive Core)

Visitors move through the space like bees or butterflies. LAVA used interactive lighting and soundscapes to simulate the process of pollination. Using UV light and neon colors in which visible to many insects but usually hidden from humans, the design revealed hidden tracks within the flower that guide pollinators to the nectar.

The project utilized lightweight architecture to achieve high visual impact with minimal material. The petals and stamens were designed using complex algorithms to ensure they fit perfectly within the existing greenhouse structure while maintaining organic, flowing shapes. The primary material was a high technology, semi transparent fabric. This allowed for a play of shadows and light that felt organic rather than architectural. Because it was an exhibition for a garden show, the entire structure was designed to be easily disassembled and repurposed, adhering to the sustainability goals of the BUGA festival.



Green house as a home - Taiwan BIAS Architects

is an award-winning experimental installation first unveiled at the 2018 Taoyuan Green Expo in Taiwan. It challenges the traditional concept of a house by replacing rigid walls and typical rooms with climatic zones where humans and plants coexist. The project treats climate as the primary building material, using agricultural technology to create a living space that breathes. Rather than a kitchen or a bedroom, the 336 square meter structure is divided into five distinct environments, each with its own temperature (ranging from 16 degree to 29 degree, humidity level, and biological inhabitants. Five spaces :1.Fern Living Room : Shady, Humid, Fresh climate. Features hundreds of ferns hang from a steel grid, creating a forest entrance that cools the air naturally.

2.Farm Dining : Windy, Moderate Humidity climate. The main social hub featuring a massive collective table for visitors to gather.

3.Photosynthesis Kitchen : Climatically Stabilized. A vertical hydroponic farm where vegetables are picked and cooked in realtime in a demonstration kitchen.

4.Sun Garden : Hot and dry climate. The space modeled after traditional courtyards, used for sunbathing and naturally drying/desiccating vegetables.

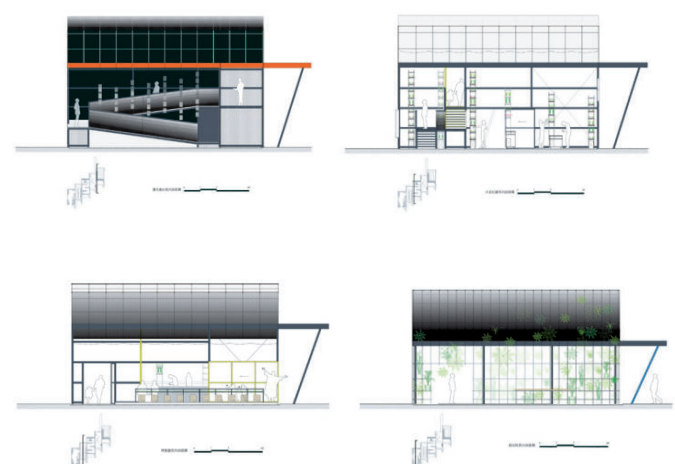
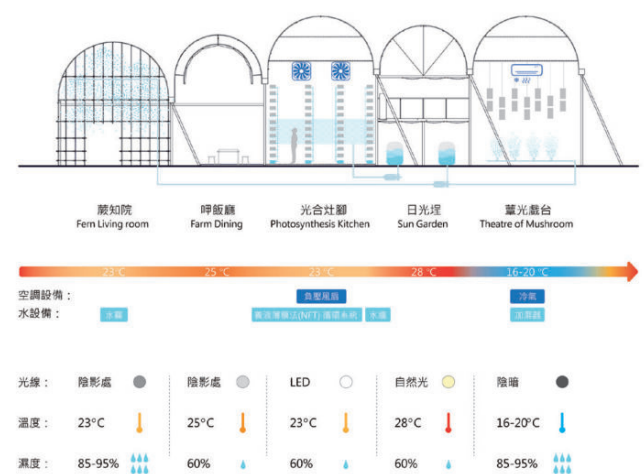
5.Theater of Mushroom : Hot, humid, dark climate. A fungus farm paired with a sensory theater featuring light and sound performances.

Architectural Concepts

Agricultural Materials : The wall and roof are made of common agricultural components such as steel grids, plastic films, and varying densities of shading gauze. This makes the architecture lightweight, affordable, and permeable to the environment.

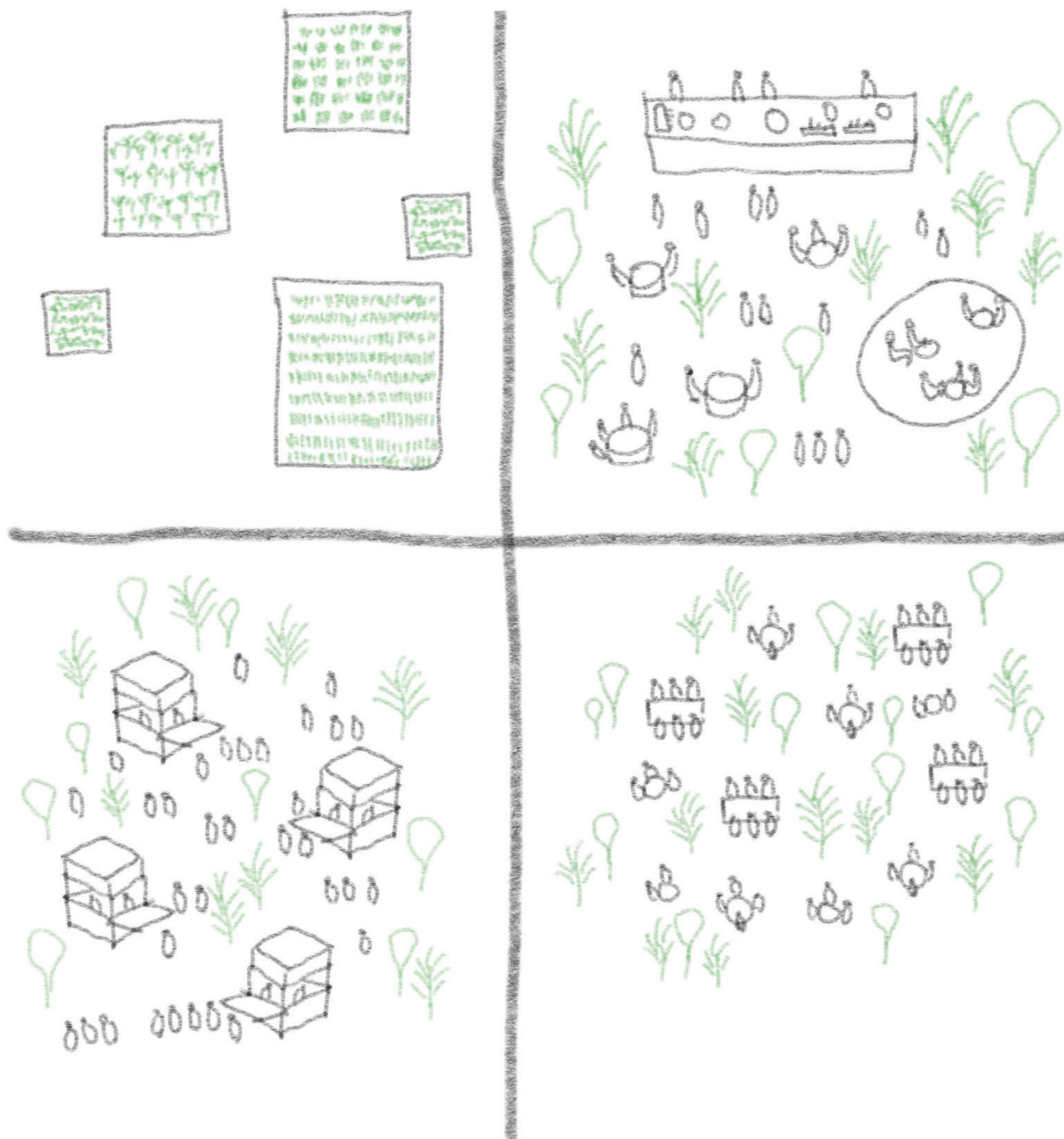
Intertwined Life : BIAS Architects moved away from the idea of plants being just a decoration. In this home, the plants provide the air quality, the food, and the cooling, while humans provide the care and CO2 the plants need to thrive.

Technological Management : While the materials are simple, the distribution of water and energy is managed by smart systems to maintain the precise microclimates needed for the specific plants in each zone.



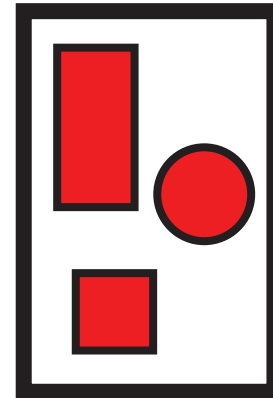
Green space side program

From the case studies, there is a possibility to link the program about the green space and the green house with the dining and production programs. Relating to the culture and the habit of Thai people, “Foodie Hunt” activity is the evidence that the people in the area would be interested in the dining experience and food related program. Thus, I would like to propose the program of the **production of the green ingredients, open dining area, the free standing kiosk and the co-working cafe** into the building of this site in order to promote the importance of the cultivation and what we can do with the products from it while experiencing in the refreshing green space.



Space arrangement for Green House

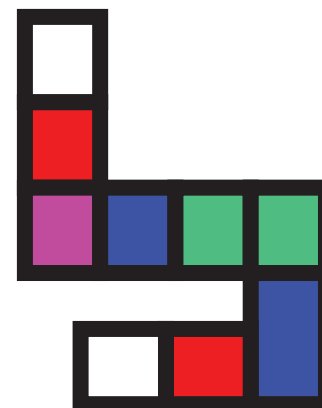
From the research and case study, the Green house/Screen house structure could be arranged by several ways. Here is the coincided version of the most functional arrangements for this type of space. Firstly, arrange the function as a geometrical boxes inside the main structure, this boxes could help support the main structure as a structural core while still functional. Secondly, linear arrangement as each functions might need different climate conditions, this way of arrangement helps separate each space while still be unite in the same architectural language. Lastly, Linear arrangement with internal court, this is just similar to the second choice but it could be made to integrate the public function as a courtyard if the linear spaces are long enough to wrap up the space.



Closed room inside
Translucent structure



Adjacent arrangement



Adjacent arrangement
Central Outdoor space

Indoor and Outdoor Programs

The programs should be separated according to the suitability of the functions, the indoor program should include the spaces for the services and maintenance functions such as the control room for watering and more. Here is the list of the functions for indoor, indoor services and outdoor programs :

Indoor

- Plant display / Exhibition
- Recreation / Free seating area
- Workshop space
- Plant lab (Working table and nursery lab)
- Open kitchen bar
- Food kiosk area
- Plant supermarket and cafe
- Co-working space
- Vertical Hydroponic wall

Indoor Services

- Storages
- Toilet
- Staff office
- Mechanical room/Water pump room
- Control room

Outdoor

- Cultivation area for crops
- Amphitheater
- Open grass area



Foundation

Many types of foundations can be used. Base your selection on the style and location of the greenhouse, whether the green house is permanent or temporary. Here are the types of foundation can be use for the green house³⁰:

Concrete Slabs

A concrete slab makes a convenient base for a greenhouse offer the highest level of stability and pest protection, though they require a floor drain to handle excess water. For an attached structure, the finish floor is generally placed level with or one to two steps below the house floor. For a freestanding greenhouse, the floor should be several inches above the finish outside grade. It is extremely stable, easy to clean, and prevents pests/rodents from burrowing, but expensive, requires professional leveling, and has poor drainage unless you install a floor drain.

Concrete Perimeter

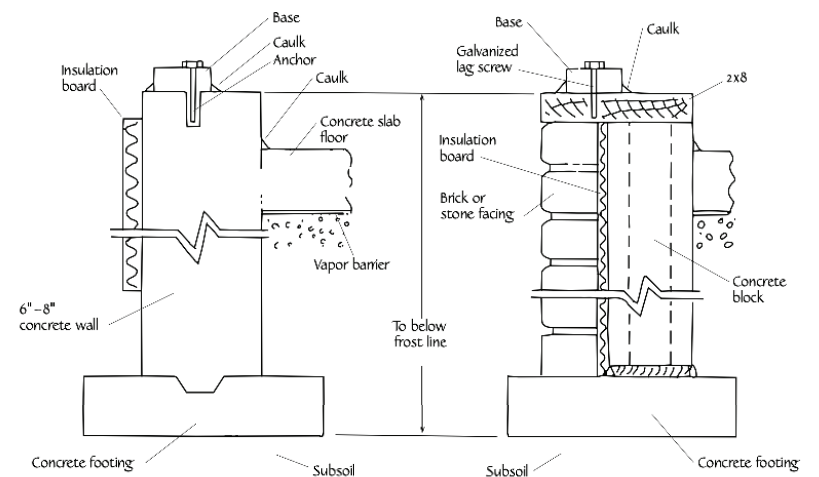
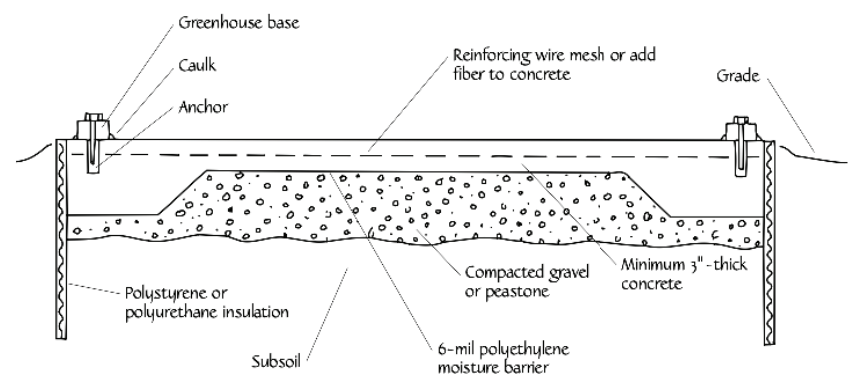
Is frequently used for permanent glass glazed greenhouses. A concrete wall around the edge, leaving the center as bare earth or gravel. The wall is set on a footing below the frost line and gives good support for heavier structures. The greenhouse can also be set on a kneewall to raise the height of the greenhouse above grade. It provides a rock solid anchor for the frame while allowing you to plant directly into the ground inside, however this requires more labor and precise measuring.

Concrete Piers

are an excellent middle ground foundation. They provide the rock solid stability of a concrete slab without the high cost, drainage issues, or the need to level your entire yard. This type of foundation involves digging deep holes at key stress points, usually the corners and every few feet along the walls and filling them with concrete to create pillars that support the greenhouse frame. The benefit is because the center of the greenhouse remains open soil or gravel, water from your pots and hoses can drain naturally into the earth.

Chosen for the project

In this case, **Concrete Piers** is the most suitable choice for the project with the drainage issues that could be a problem in Bangkok Flooding period , while this type of foundation still provide adequate strength for the overall building.



Framing Structure

The greenhouse frame supports the glazing, some equipment, and hanging plants. It must be able to withstand snow and wind loads.³¹ Galvanized steel, aluminum, and wood are common framing materials. Hoop and Gothic style houses are generally made using galvanized steel tubing, which is low in cost and easy to bend. Most kit greenhouses use extruded aluminum members that may be painted or left bare. Plans are available for many wood frame structures. These are easy to build for the do it yourselfer.

Galvanized Steel

Steel is the heavy lifter of greenhouse materials. It is most commonly used in large scale commercial operations or high wind/heavy snow regions. The best steel members are hot dipped in galvanizing solution after the frame is bent and drilled. This ensures a more complete coverage and reduces the potential for rusting, it can last 25–50 years. If the tubing is galvanized before cutting and drilling, a galvanizing spray or rust resistant paint can be used to protect uncoated areas. Galvanized Steel is the strongest material available. A steel frame can support much wider spans (up to 10–15 meter) without internal support columns, maximizing your growing space.

Aluminium

Aluminum is particularly well suited for greenhouse frames, as it can be formed into complex shapes to fit the glass and provide drip edges and support for shade or blanket systems. High strength to weight ratio. While not as strong as steel, it is more than sufficient for most glass or polycarbonate greenhouses. Naturally forms an oxide layer that prevents deep corrosion. Most frames are anodized or powder coated (in green, black, or white) for extra protection and style. It is virtually immortal and will not rot or rust.

Chosen for the project

In this case, **Galvanized Steel** is the most suitable material due to the climate condition of Thailand and sizing of the building as it may require the big spans in order to create the public space for the centermost area of Bangkok.



Glazing

In the Thai climate, where the primary goals are heat rejection, humidity management, and storm resilience, each glazing material performs differently. These options of glazing offer specific advantages depending on whether you are building a luxury display greenhouse or a commercial production farm.

Glass

Glass is still the most common glazing for home greenhouses and the standard by which other materials are judged. Its clean appearance and transparency are good qualities for today's brightly lit homes. Its light transmission is also high, so it promotes good plant growth. Glass is the most durable and aesthetically pleasing option, but it requires the most cooling infrastructure in Thailand. It is very heavy and requires a professional steel or aluminum frame to survive monsoon winds. Without 70% shading, it will cook your plants during the day.³²

Double Pane Glass (Insulated)

Many home greenhouse manufacturers use double pane glass to reduce heat loss and moisture condensation. Excellent at keeping heat out if you are using an air conditioned (AC) system for temperate plants (like strawberries or tulips). If it is available, welded glass, which has two panes that are fused together, is usually a better choice than fabricated panels, which use a spacer and sealant. For Thailand context, generally not recommended for passive greenhouses. It is designed to trap heat, which is the opposite of what you want in Bangkok or Phuket. It is also extremely expensive and heavy.

Acrylic

Acrylic structured sheets are available in 8 and 16 millimeter thicknesses. Acrylic yellows slowly with age. It is often used in place of curved pane glass and in areas that might be subject to breakage. It has 92% light transmission (clearer than glass) and is much more UV-stable. It rarely yellows. It is more brittle than Polycarbonate. While stronger than glass, it can crack if a large tree branch falls on it during a storm. Excellent for display greenhouses where you want a crystal clear view of your orchids or cactus.

Fiberglass

Fiberglass is a medium cost glazing material available in several grades with a 10 to 15 year lifespan. Its large sheet size makes installation easy. It is available in flat and corrugated forms, but the corrugated material provides better edge sealing and strength. Fiberglass panels are reinforced with glass fibers, making them incredibly strong. Very affordable and handles Thailand's high humidity without expanding or contracting much. It naturally diffuses light, which protects leaves from hotspots. Over time, the fibers can become exposed, which traps dirt and turns the panels yellow or brown, significantly reducing light.

Polycarbonate

Polycarbonate structured sheets are one of the most recent materials developed for greenhouses. Their large size and readily available aluminum fabrication systems speed up the glazing of a greenhouse. They can also be adapted for reglazing older glass green houses. These materials are lighter in weight than glass, so they require less structural framing. Polycarbonate is widely used in Thailand because it is lightweight, impact resistant (essential for monsoon storms), and provides UV protection. The suitable version for Thailand’s climate would be Heat-Reflective (IR-blocking). These panels contain additives that reflect Infrared (heat) radiation while allowing Photosynthetically Active Radiation (PAR) for the plants to grow. It can reduce the internal temperature by 3–5°C compared to standard clear polycarbonate.³³

Film Plastic (Polyethylene)

Improvements in film plastics continue to flow from manufacturers’ research centers. Increases in strength, clarity, life, and energy conservation are some of the recent developments. Because most films do not have as long a life as rigid glazings, they are not used as often for home greenhouses. On the other hand, most new commercial greenhouses are film-covered, mainly due to lower construction costs and lower taxes. Film plastic is a great choice for hoop houses and tunnels, because it is flexible, comes in large sizes, and is easy to attach. Greenhouse plastics with a life of 2–4 years are stronger than the low-cost construction grade plastics, which break down in sunlight in about 9 months. Greenhouse plastics combine polyethylene with 1–5% ethyl vinyl acetate.

Chosen for the project

In this case, the polycarbonate is the most suitable choice because of the lightness of the material, the durability and the UV protection feature.

Comparison table

Compare properties of different materials that are commonly used for the development of built/constructed shade structures.

Type of Material	Suitability	Approximate Ultraviolet Protection Factor (UPF)	Waterproof	Light transmission	Solar heat gain	Structural implications	Lifespan	Maintenance requirements
Glass	Good windbreak where visibility and light are required	Depends on thickness. House window glass absorbs 90% of UVR	Yes	High depending upon presence of tinting	Less heat gain if tinted	Need to select glass appropriate to the site	Long life if it does not sustain impact	Needs regular cleaning
Polycarbonate and fibreglass sheeting	Roofing, walling louvre, awning, skylights, canopies	Very high	Yes	High - but varies according to thickness, colour and profile	High	Need to incorporate wind uplift considerations into design	About 10 years Discolouration may occur sooner	Low maintenance impact resistant
Canvas/tightly woven cloths	Good for small, low-budget jobs	Very high when new, lower if material deteriorates over time	Yes, watertight up to saturation point	Light colours allow more light	Dark colours are hotter	Guy ropes (if present) can cause obstruction	Limited. Susceptible to breakdown due to UVR exposure	Without specific treatment is not mould resistant
Knitted polyethylene or woven PVC shade cloth	Canopies	Moderate UVR protection. Double knits or double layers may give higher protection	Porous, lacks rain protection	Light colours allow more light but reflect and scatter more UVR	Darker colours are hotter but reflect less UVR	Wind drags through porous material	5-10 years	Susceptible to mould growth and dirt accumulation
Timber	Pergolas, Trellis, screens	Very high. Direct barrier to UVR	Depends on detailing and use	Depends on detailing	Does not conduct heat	Need to incorporate wind uplift consideration into design	Long life if maintained well	Guard against termites
Steel roof sheeting	Roofing, walling. Steep or low pitches	Very high. Direct barrier to UVR	Yes	No light transmission	High if not insulated	Need to incorporate wind uplift consideration into design	Long life if maintained well	Subject to moisture and condensation conditions

32 Built Shade materials and structure. Department of Health Queensland, 2016.
33 Vacharotayan S., Aesthetic Greenhouse Design in Bangkok: The Use of Low-E and Laminated Glass. 2024.

Aluminium mesh facade

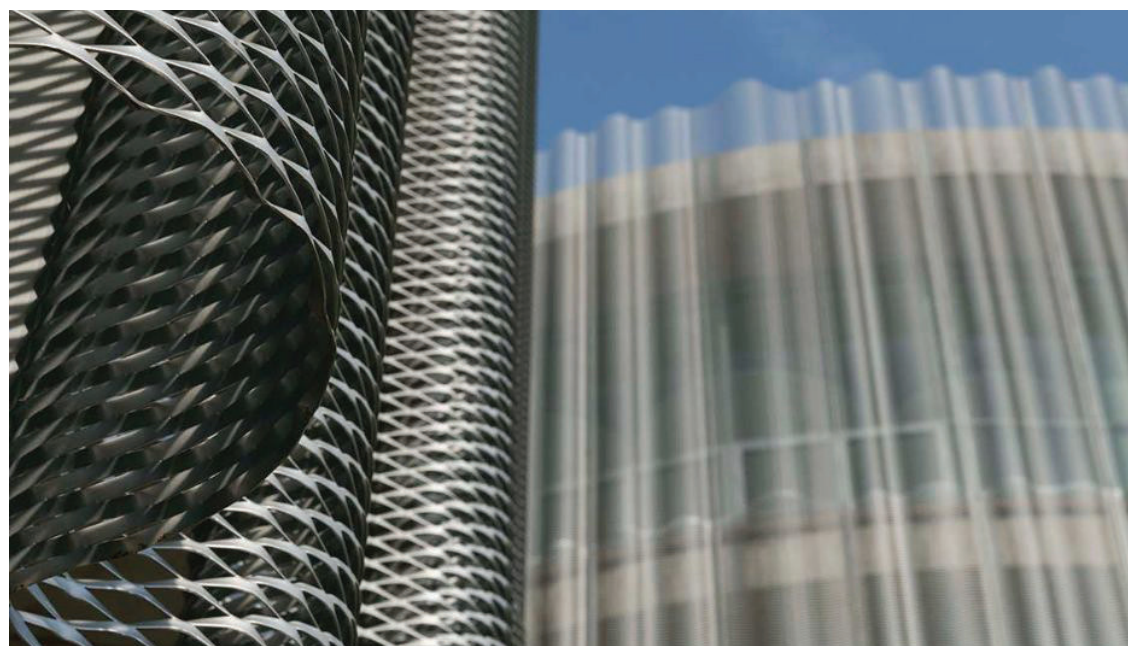
Aluminium mesh facade is often referred to as expanded metal mesh or perforated panels, it is a highly effective way to balance industrial aesthetics with functional building performance.³⁴Aluminum is the industry standard for exterior screening due to several key properties: Corrosion Resistance, Lightweight and Malleability. This material allows the building to breathe, reducing the load on air conditioning systems by preventing heat buildup behind the screen. There are several type of the aluminium mesh :

Expanded Metal Mesh

This is created by slitting and stretching a single sheet of aluminum. It results in a 3D diamond pattern. Excellent for privacy because the strands are angled, which can be orient the mesh to block views from the street while allowing those inside to see out. With the opening area of the mesh, it still allow natural ventilation.

Perforated Aluminum Panels

These are flat sheets with holes punched of circles or squares, or custom shapes. For the privacy depends on the open area percentage. Smaller, staggered holes provide better screening. Also with the designed hole, it allows natural ventilation. This option offers a cleaner, more two dimensional look. This can even create pixelated images by varying hole sizes.



Insects screening mesh

In Thailand, insect screening for a screen house or greenhouse is a delicate balance. You need the mesh to be fine enough to block tiny tropical pests but open enough to allow airflow, or your plants will quickly overheat. In the tropic climate, mesh refers to the number of holes per linear inch. Choosing the wrong size is the most common mistake in greenhouse builds.

16 to 32 Mesh (Standard) : Best for general protection against fruit flies, mosquitoes, and moths. Excellent for air flow, this is the best choice for passive ventilation in Thailand.

40 Mesh (Thai Standard) : Best for blocking aphids, leaf miners, and most whiteflies. Moderate air flow, you need large surface areas of this mesh to keep the interior cool.

50 Mesh : Complete protection, including tiny thrips which is a major problem for Thai peppers and melons. Poor air flow, if you use 50 mesh, you almost certainly need exhaust fans to force air through the screen.

With the high humidity and UV intensity in Thailand, the material choice determines how often you'll be repairing the structure. Thus, comparing the material choice of the mesh is a must in designing the facade.

SUS 304 Stainless Steel : 25+ years durability. Best for permanent architectural screen houses, pest proof and fire resistant.

HDPE (High Density Poly) : 5–8 years durability. The white net used in commercial Thai farms as it is cheap and effective. Can be degraded after exposed to UV.

Vinyl-Coated Fiberglass : 5–10 years durability. Best for window style vents or DIY frames.

Aluminium Mesh : 10–15 years durability. Lightweight and rust resistant with good middle ground. Good for reflecting heat.

Furthermore, the insects often follow you inside. A small foyer with two sets of screen doors ensures that the main growing area remains pest free when you enter.

Chosen for the project

In this case, the **32 Mesh SUS 304 Stainless Steel** would be the most suitable for the project as the building is not specifically for the crop producing but the showcase, so the most important thing is the ventilation with a decent moderate pest screening. An insect net provides **moderate mechanical protection from rain**. While most water will eventually pass through, a standard insect net can reduce the volume of water entering by 30% depending on the mesh density.

Additional Rain Protection

In Thailand, architectural facades like Louvres, Fins, and Egg Crates are Passive Cooling elements. They are designed to let the greenhouse breathe while blocking the two biggest enemies: Direct solar heat and Horizontal monsoon rain.³⁴

Horizontal louvre

These are angled slats that allow air to move upward (natural convection) but block rain falling from above. It is excellent for vertical rain protection. The overlap between each blade should be at least 0.02m so that a rain-drop falling straight down cannot see the floor.³⁵

Blade Width : 0.10m to 0.15m / Spacing : 0.08m to 0.12m. / Angle: 30 degree to 45 degree downward.

Vertical louvre

These are upright slats. In Thailand, these are best for East and West walls to block the low, hot morning and afternoon sun. This is superior for wind driven rain (sideways monsoon). They catch the water and channel it straight down to the ground. The perfect aspect ratio should be 2:1 (Depth should be twice the Spacing) to block rain at a 30 degree side angle.

Depth : 0.20m to 0.40m. / Spacing : 0.15m to 0.30m.

Egg crate

A 3D grid that looks like a honeycomb. It provides a shaded feel without blocking the view completely. In order to protect the rain, the depth needs to be deep.

Cell Size : 0.10m×0.10m. / Depth (D): 0.10m to 0.15m.

Egg crate slant

This is the most effective design for a Thai greenhouse wall. It combines a square grid with tilted horizontal slats. With high rain protection. It acts as a shield against both vertical and angled rain.

Horizontal Tilt : 45 degree downward / Depth : 0.15m. / Cell Size : 0.10m wide.

Material

For a professional Slanted Egg Crate or Louvre Facade in Thailand, the standard is to use aluminum extrusions. Here is a material list for a 3m×3m wall section.

For Louvres

Structural Frame (Outer perimeter frame) : 50mm×100mm (2"×4")

Aluminum Mullion (Vertical supports every 1m.) : 50mm×50mm (2"×2")

Aluminum Z-Blade (horizontal / Vertical slats) : 100mm width

For Egg Crate

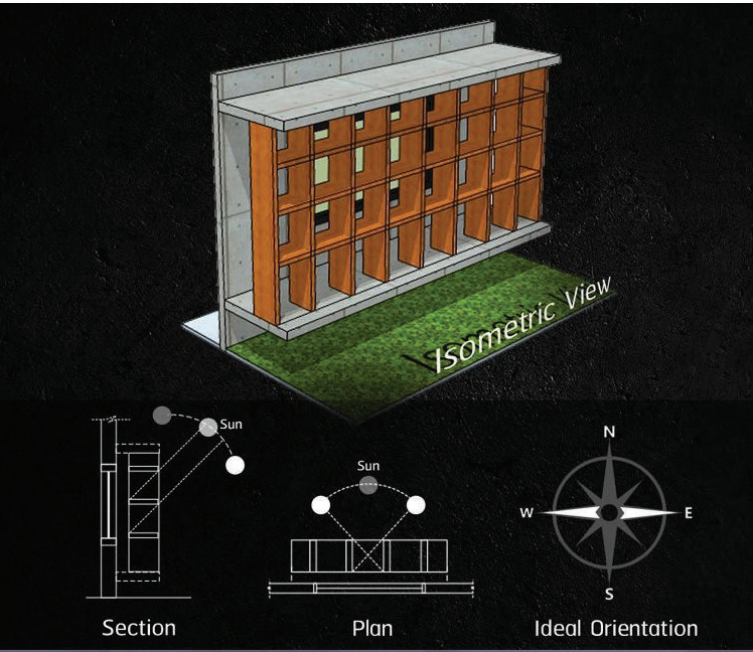
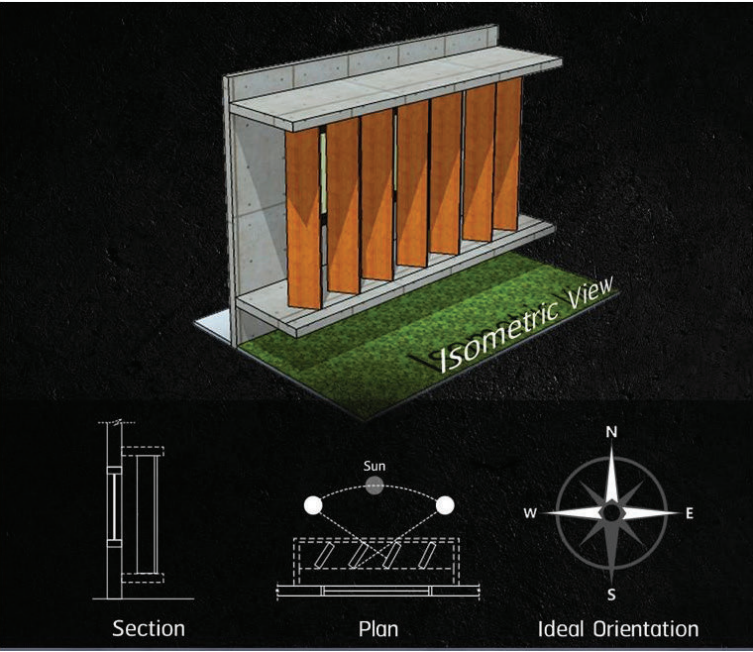
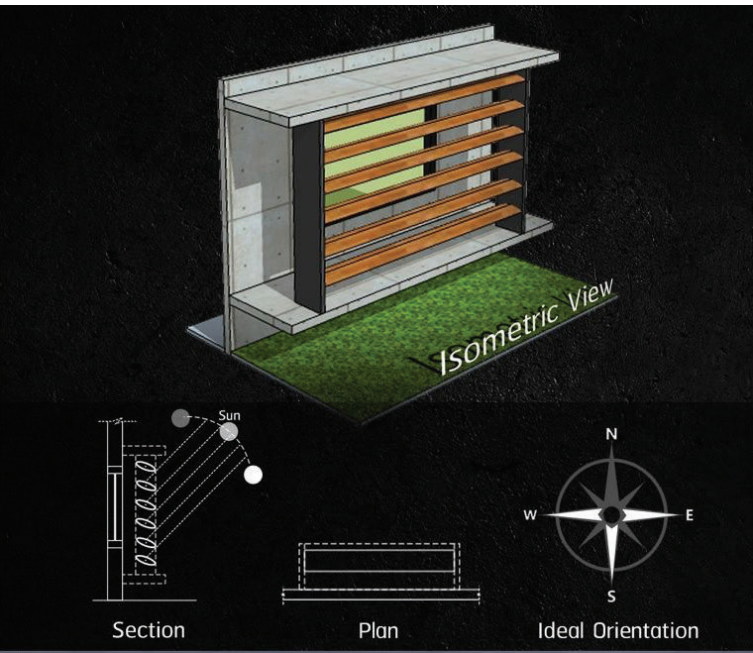
Aluminum Box Section (Outer perimeter frame) : 100mm×50mm (4"×2")

Aluminum Flat Bar (Creating the horizontal and vertical slats) : 100mm×3mm (4"×1/8")

Alternative – Aluminium egg crate grill : size depending on suppliers

³⁴ Sun Shading Catalogue – Adequate shading: Sizing overhangs and fins. The urban energy unit/UN-Habitat, 2020.

³⁵ Types of sunshade fins, canopy and facade. Wazzadu, 2019.



Type of shading and sun-blocking orientation

Plant in the building

Since you have superior airflow but high humidity, you can grow plants that typically struggle in stagnant indoor air. We may need the plants that are non toxic, low mess , and provide visual cooling. For co-working program, we need the plants that act as natural sound dampeners and air purifiers, with colors that reduce eye strain. While in seating areas, we want a soft plants that create a sense of privacy without blocking the breeze.

Snake Plant (*Sansevieria*)

Indestructible in the Thai climate. They are great for partitioning desks because they grow vertically and don't take up much floor space

Monstera Deliciosa

It has a large, waxy leaves thrive in the bright, indirect light provided by your louvers. It gives the space a high end, modern tropical office feel.

Zanzibar Gem

Very low maintenance. It has glossy leaves that look great under artificial light during evening co-working sessions

Golden Pothos (*Epipremnum aureum*)

Use these as Green Curtains in some parts of the green wall.

Areca Palm (*Dyospis lutescens*)

These create a soft, feathery screen. They transpire a lot of water, which actually helps cool the air around the seating area.

Philodendron Burle Marx

A classic Thai landscaping plant. It grows in lush, low mounds, perfect for placing around the base of seating or along walkways.

Bird of Paradise (*Strelitzia nicolai*)

This plant provide a dramatic, tall jungle backdrop for the building.

Spanish Moss (*Tillandsia usneoides*)

This hanging plant doesn't need soil and look ethereal as they sway in the breeze, while also helping to catch dust and fine rain mist.

Pandan (*Pandanus amaryllifolius*)

The plant that thrives in humid shade, and its fragrance is naturally sweet and calming.

Thai Basil & Holy Basil:

These plant love the bright, filtered light from the shading facade. They are practical for cooking and have beautiful purple/green textures.

Kaffir Lime

The leaves are essential for Thai cooking, and the citrus scent is refreshing for a kitchen environment.

Mint

Use a lot in Thailand. Mint loves the high airflow mist that comes through your screens during rain.



How to water on display area

Capillary / Self-Watering Systems

In a hybrid space that combining a co-working area and an open kitchen, a capillary or self watering system is the most logical choice. It reduces daily maintenance for busy users and, crucially for Thailand, it helps prevent mosquito breeding by keeping the water reservoir enclosed. This system is useful for the show case area within the building for the plant to stay fresh for long period. However, the visible irrigation equipment is undesirable.³⁶ The method is to put the capillary mats under plant trays that draw water from below. Water is absorbed by capillary action through the drainage holes in the bottoms of the pots. This keeps the display dry, clean, and easy to maintain, this is ideal for the project space.³⁷

Microirrigation system - Spaghetti

is the technical term for a drip system that uses thin, flexible 6mm distribution tubing to deliver water precisely to individual plants. In hybrid building, this is often preferred over a capillary system because it allows you to water different species with different needs using the same main line. Water is administered only to the soil in the bed without splashing on the plants, which reduces the chance for disease spread.³⁸

Automated drip irrigation system

An automated system consists of the controller, the solenoid valves, and the distribution network. In the project, automation is a huge advantage, it ensures plants stay lush even when no one is in the building. The automation system could be adjust according to Thai wet and dry season : A Smart Controller can automatically pull weather data from the internet and skip watering on rainy days. This system allow us to set the timer making the water to soak in before the Thai sun gets hot, reducing evaporation and preventing leaf burn.

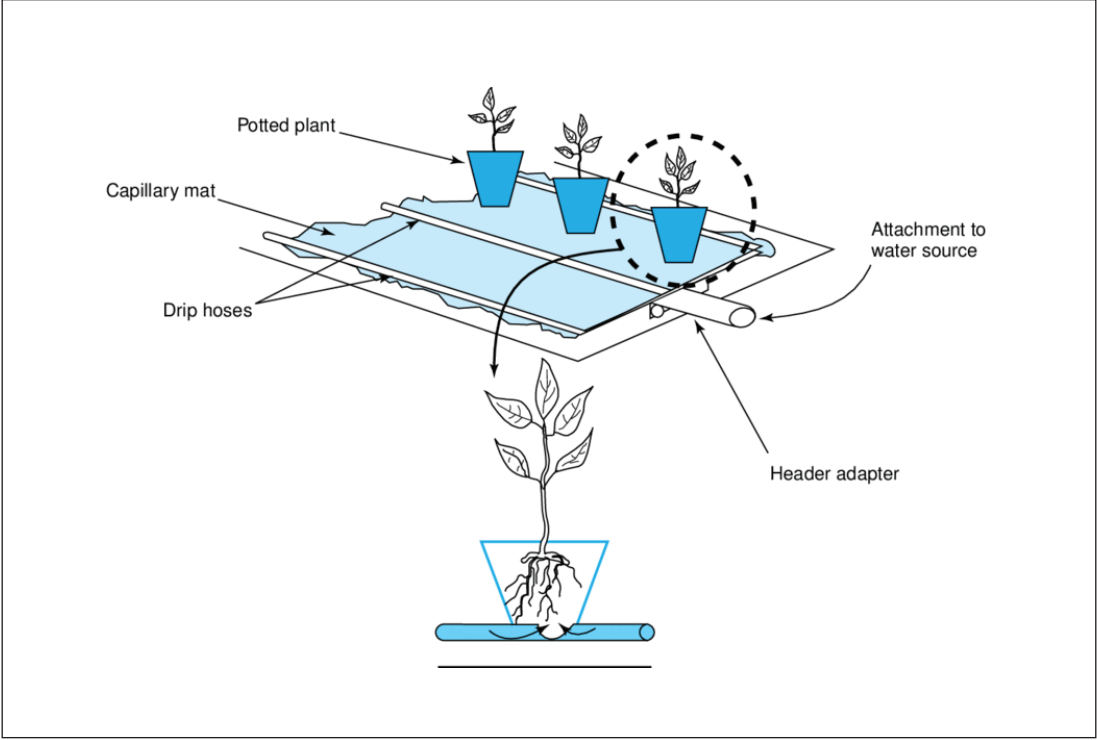
Chosen for the project

In this case, **the automated drip irrogation system** is the most suitable for the big public building in which the plants need a precision to maintain.

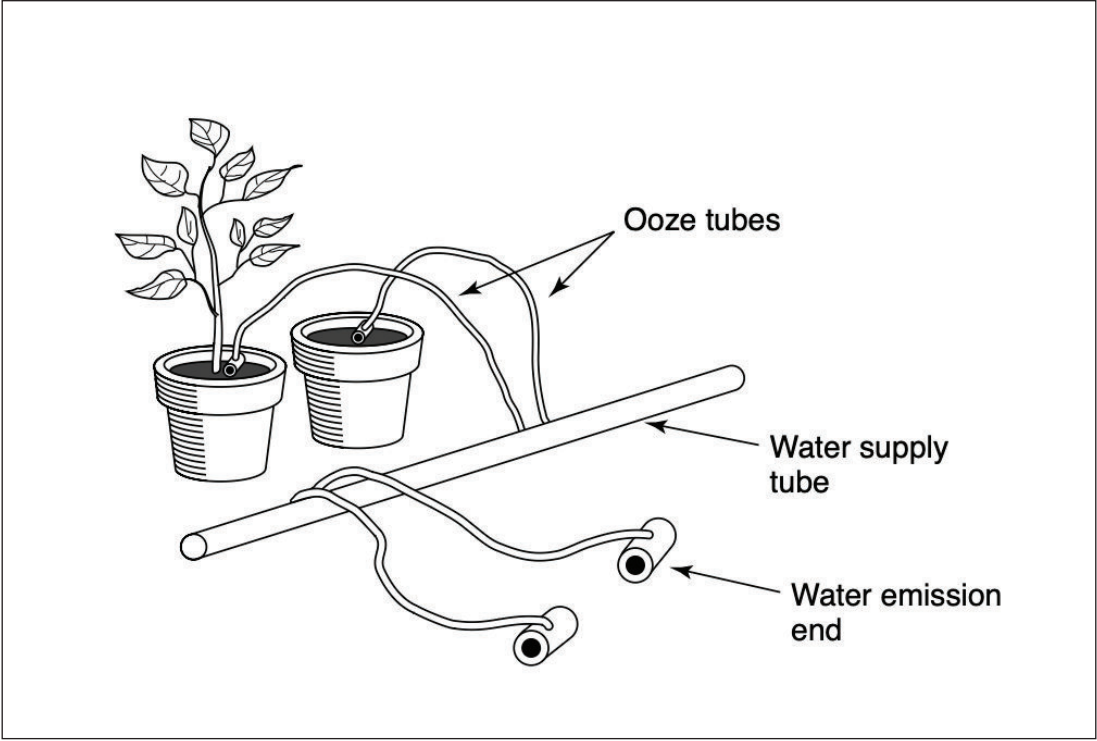
³⁶ Ames M., Sub-irrigation for Interior Landscaping: Efficiency and Mosquito Mitigation. Journal of Urban Horticulture, 2024.

³⁷ A.J. Both & D. R. Mears, Building and maintaining greenhouses for energy savings. Research Gate, 2008.

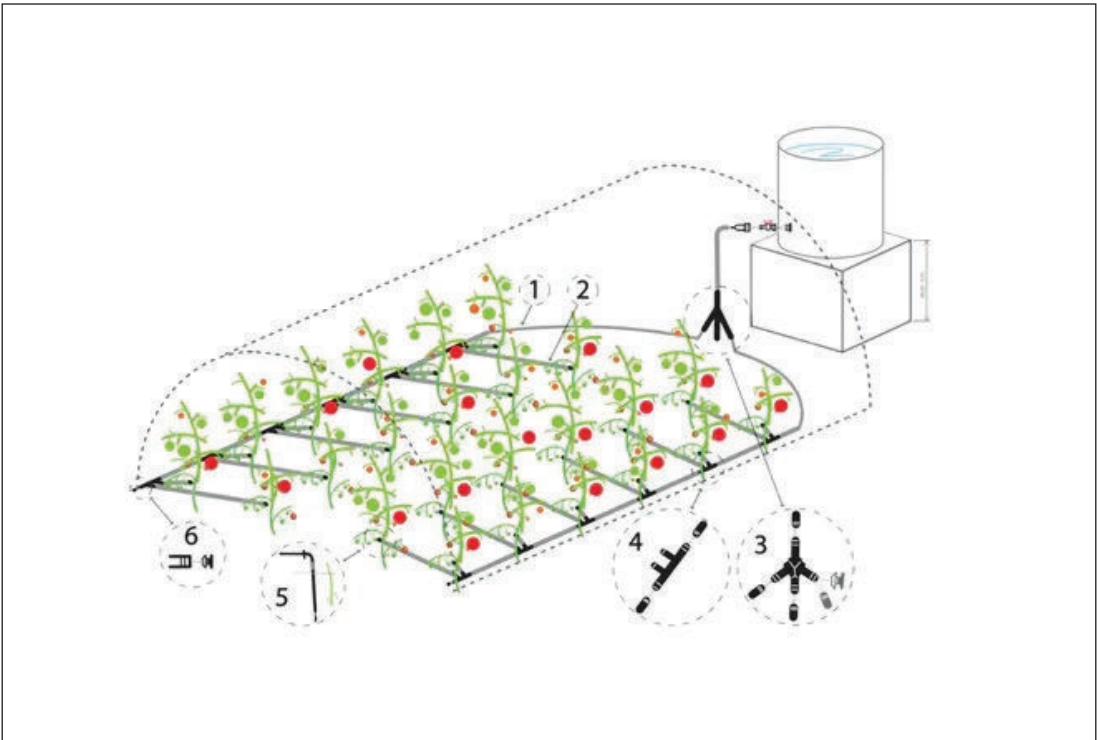
³⁸ The Micro-Irrigation Design Guide: Precise Water for Diverse Landscapes. Hunter Industries, 2024.



Capillary System



Microirrigation system



Automated drip irrigation system

*Case study for Structure
& Facade*

*Isabella Stewart Gardner Museum -
USA
Renzo Piano*

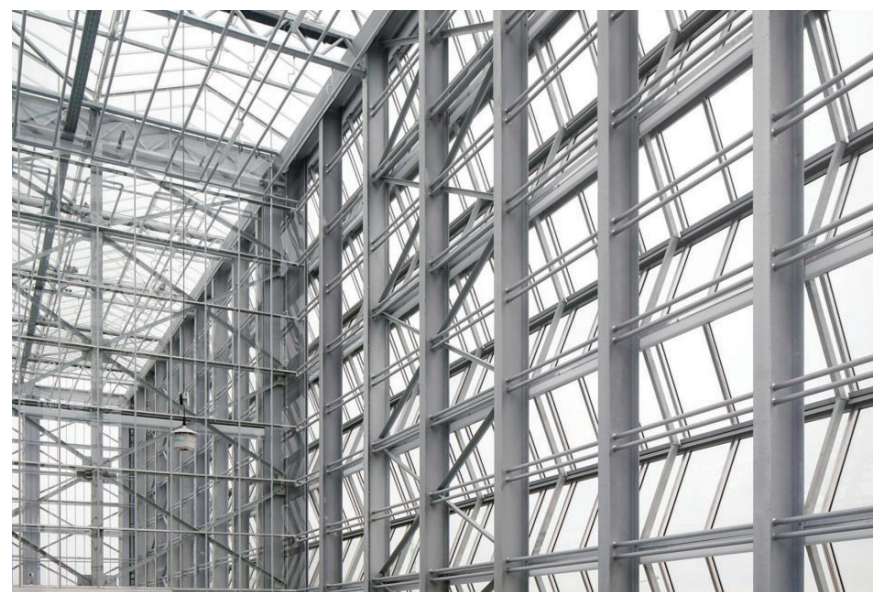
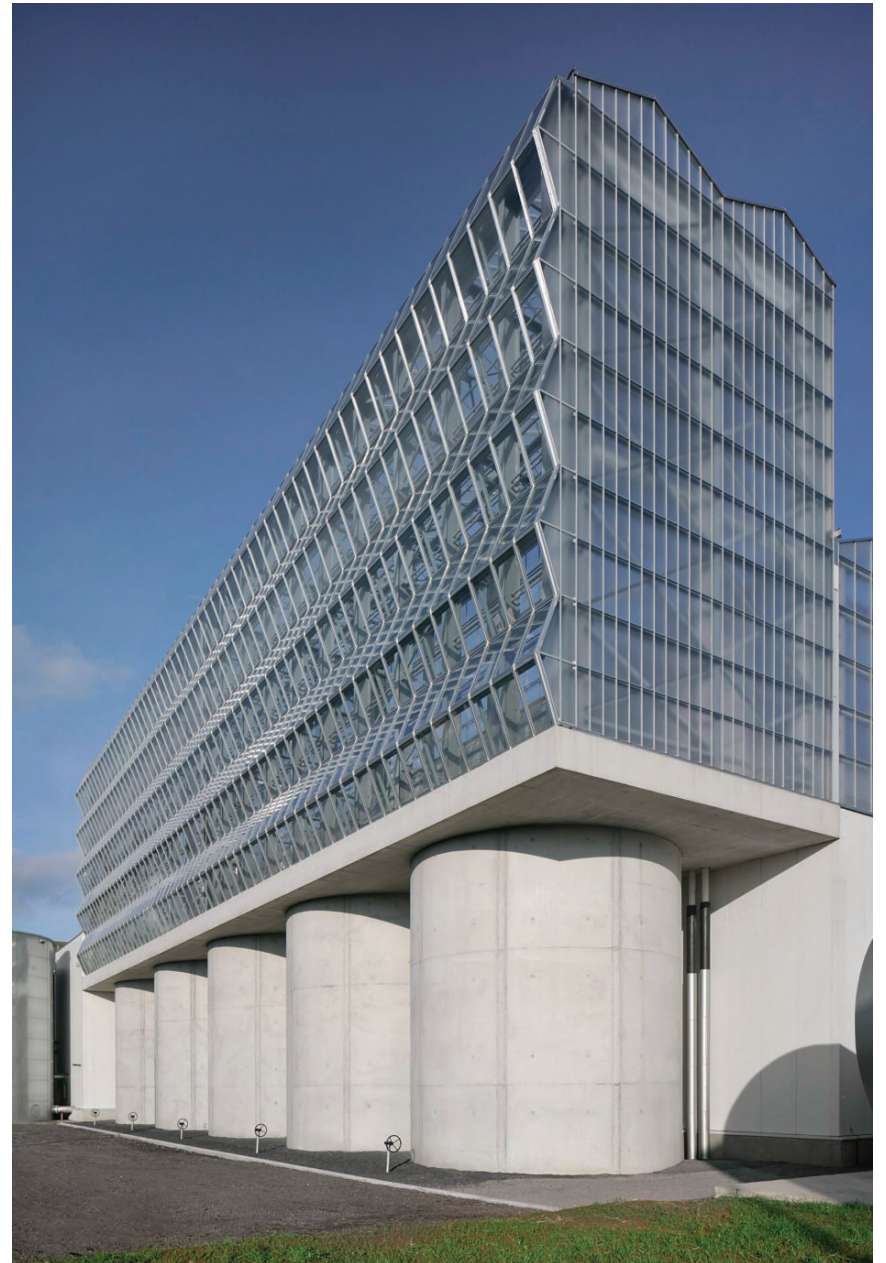
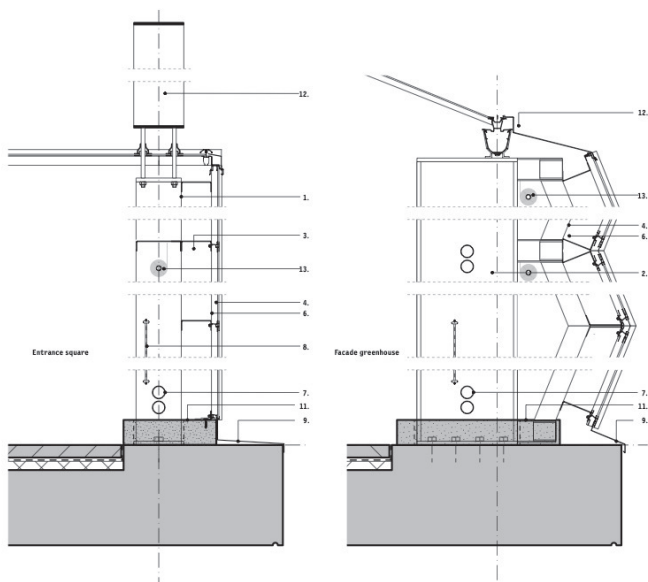
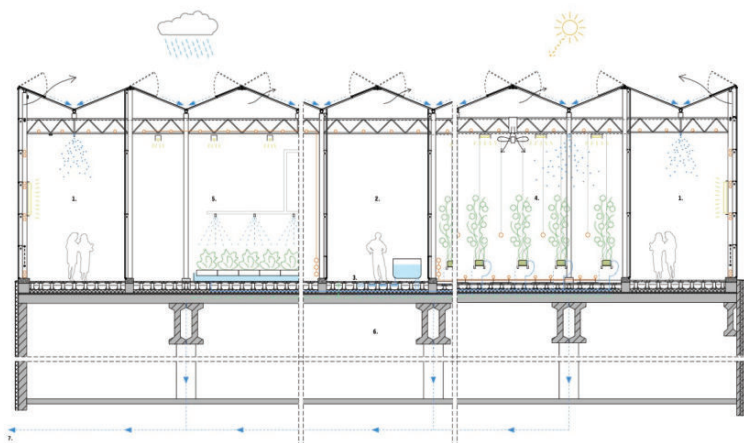
In Renzo Piano's expansion of the Isabella Stewart Gardner Museum, the concept of the glass house manifests in two primary ways as a functional working greenhouse and as a broader architectural theme of transparency that defines the ground floor and the link to the historic palace. The design of the greenhouse situated at the new entrance facing Evans Way Park, the greenhouse features a striking sloping glass facade that stands two stories tall. It is not merely aesthetic; it is a working space where the museum's famous floral displays, which rotate seasonally in the original Palace's courtyard. The glass walls allow passersby and museum visitors to see the behind the scenes work of the horticulturalists, reinforcing the theme of the new wing as a workshop.

For the structure, the primary support comes from a precision engineered steel frame. Piano worked with Buro Happold to ensure the steel members were as thin as possible to maintain the lightness of the glass volumes. To keep the glass areas completely open, the heavy engineering as HVAC ducts, electrical systems, and primary structural bracing, it is tucked into the walls and floors of the upper copper volumes or hidden within acoustic voids in the concert hall. Further more using the concrete core by poured concrete is used for the bones of the building of the internal circulation (stairs and elevators), providing the necessary lateral stability for the building while maintaining a clean, industrial aesthetic.



Agrotopia - Roeselare, Belgium *Van Bergen Kolpa Architecten*

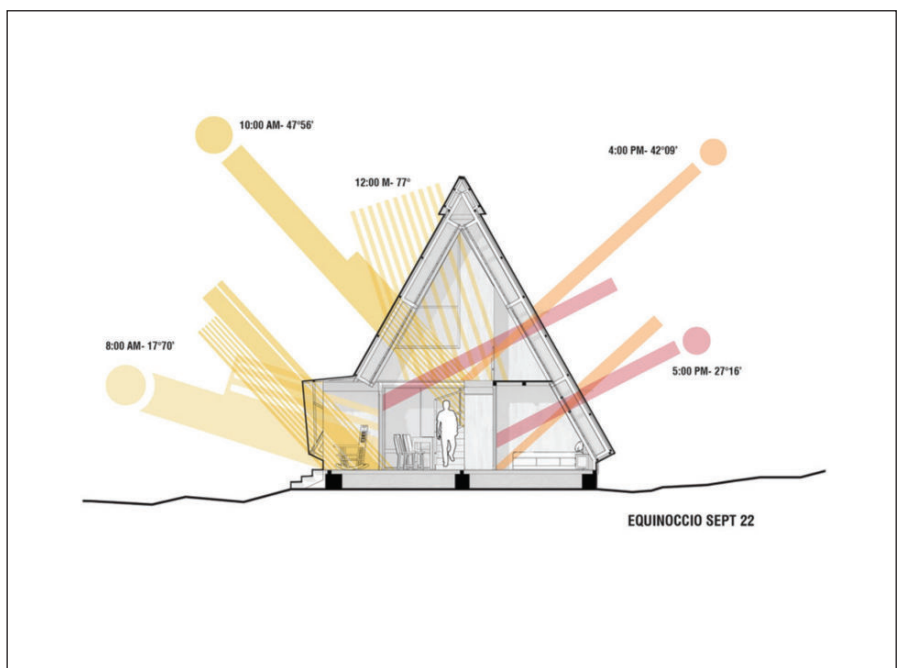
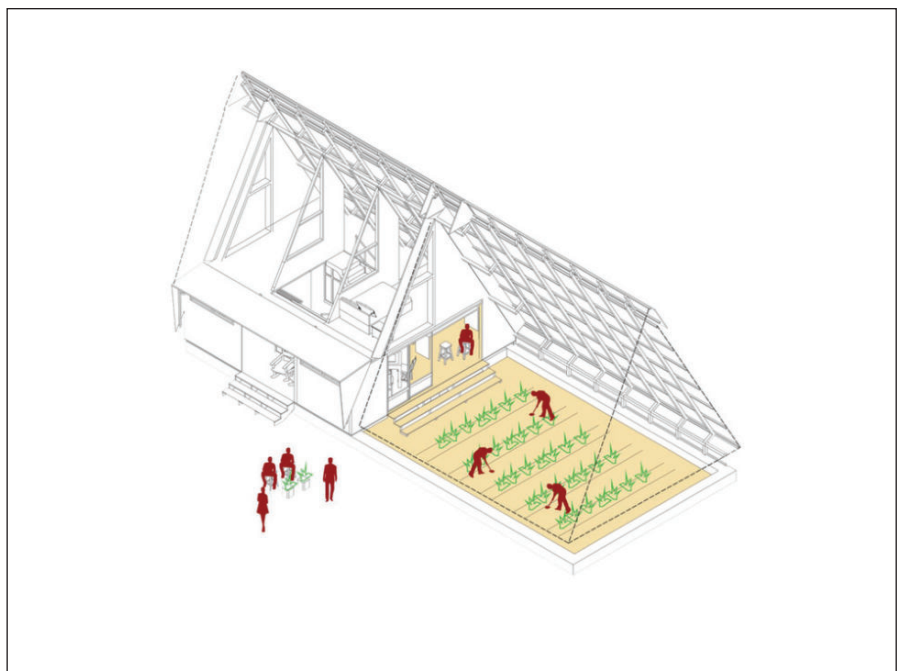
This project shows how to handle a large scale hybrid urban conservatory. Instead of a flat wall, Agrotopia uses a pleated glass facade. The angles of the glass are designed to catch sunlight at specific times of the day while providing natural shading at others. Agrotopia is not just a farm; it is an educational and social space. It features a public trail that winds through the building. Agrotopia is a model of circularity of automated irrigation. The massive roof collects every drop of rain, stores it in large tanks, and uses it for the hydroponic systems. The building uses advanced versions of the spaghetti systems to deliver nutrient rich water to thousands of plants simultaneously. The Material using hot dip galvanized Steel which dipped in molten zinc, protecting every surface from the moisture of the plants and the rain. Use a portal frame design, this creates a wide, open plan interior without middle columns. Angle the main columns slightly to create the V shapes, this increases the wind resistance of the building.



Vernacular Greenhouse - Colombia

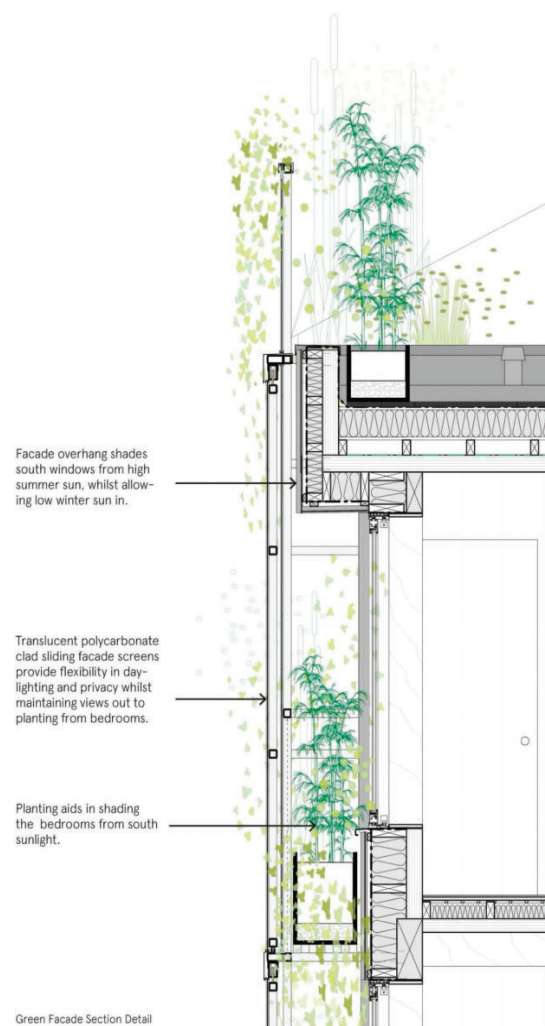
Estacion Espacial Arquitectos

is an award winning sustainable housing project designed to support rural farmers living in high altitude regions (above 3,000 meters) of the Colombian Andes. The design features an inner timber volume for living, encased in a translucent polycarbonate envelope. This A-frame structure acts as a greenhouse, creating a thermal buffer that maintains an indoor temperature of approximately 20°C, even when outside temperatures are near freezing. The space between the inner house and the outer shell serves as a semi-outdoor garden. This allows families to grow vegetables and fruits year round, ensuring food security and a source of income in a region where traditional outdoor farming is difficult.



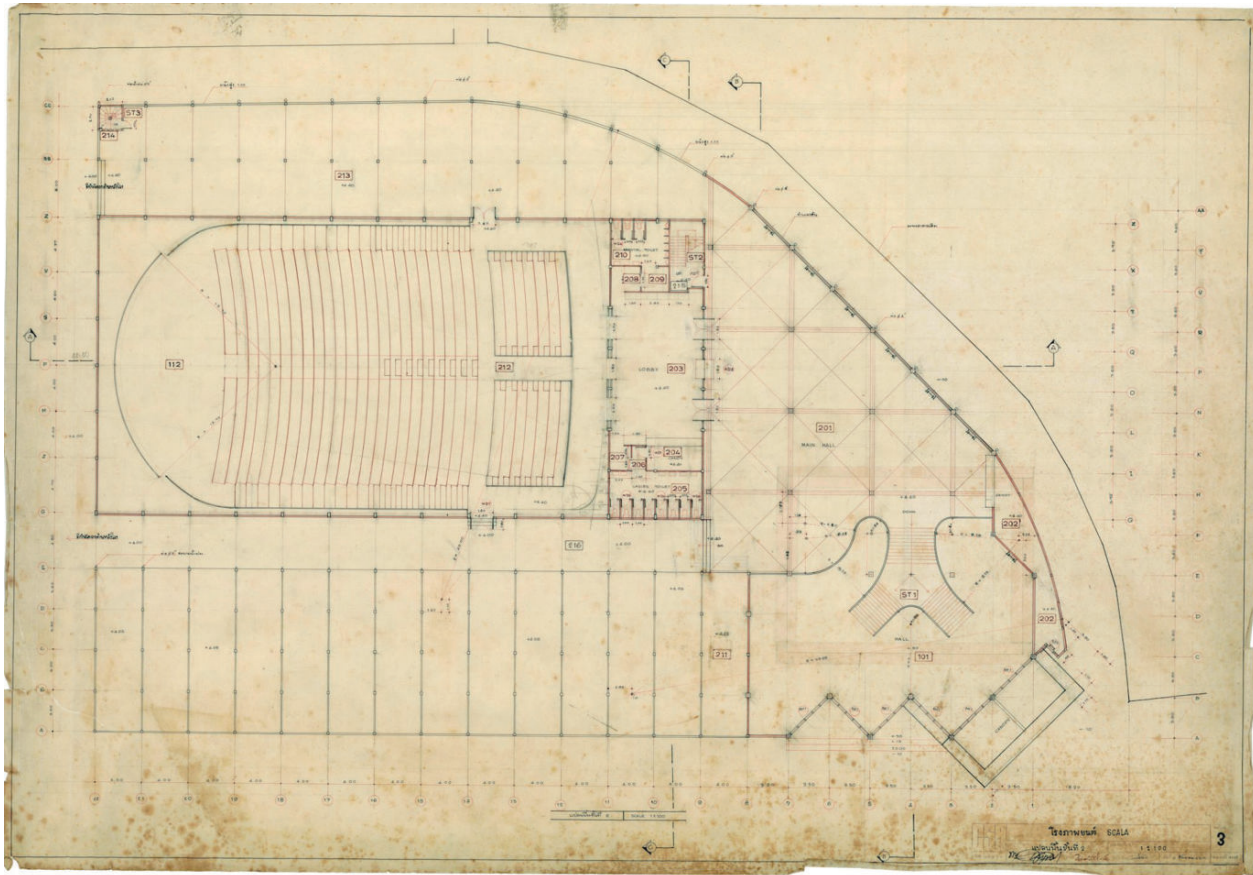
Green House 2 - London *Hayhurst & Co*

Is a masterpiece of biophilic architecture. It won the 2023 RIBA House of the Year because it proves that a home can function like a lung for breathing, filtering light, and integrating nature into every room. The most striking feature is the front elevation. It doesn't use traditional walls; instead, it uses a multilayered system : The outer skin consists of sliding polycarbonate panels. These block rain 100% and provide privacy by blurring the view from the street while allowing a massive amount of diffused light to enter. The steel shelves are built into the facade. These hold climbing plants that grow up the building, creating a natural green screen. The facade has built-in irrigation which fed by a water rain barrel to keep the bamboo screen healthy, similar to the automated drip systems.





CINEMA DESIGN



The old Scala Cinema interior and Plan

Scala Cinema seating

The Scala Cinema in Siam Square, which was the last standalone movie theater in Bangkok, had a seating capacity of approximately 1,000 seats. The theater featured a single large screen with red velvet seats arranged in a curved, tiered layout that included a mezza-nine/balcony style section typical of classic mid-century cinema architecture.

Lido Connect seating

The nearby renovated cinema spaces the venue has a very different seating configuration than its original one. While the original Lido was a 1,000 seats theater, later split into three screens of about 200 seats each, the space was completely repurposed in 2019 into a multi use cultural hub as the other cinemas in the area already provided a huge cinemas.

Lido 1 (The Cinema)

Approximately 147 seats. This is the only room that remains a traditional movie theater. It focuses on independent and documentary films, often in partnership with the Documentary Club. It is also used for small press conferences and seminars.

Lido 2 (The Live House)

Approximately 250–300 people, depending on configuration. This space can be transformed into a Live House for music performances and concerts. All the original fixed cinema seating was removed to create a flexible floor space for standing crowds or temporary seating, allowing for more intimate interactions between performers and the audience.

Lido 3 (The Black Box)

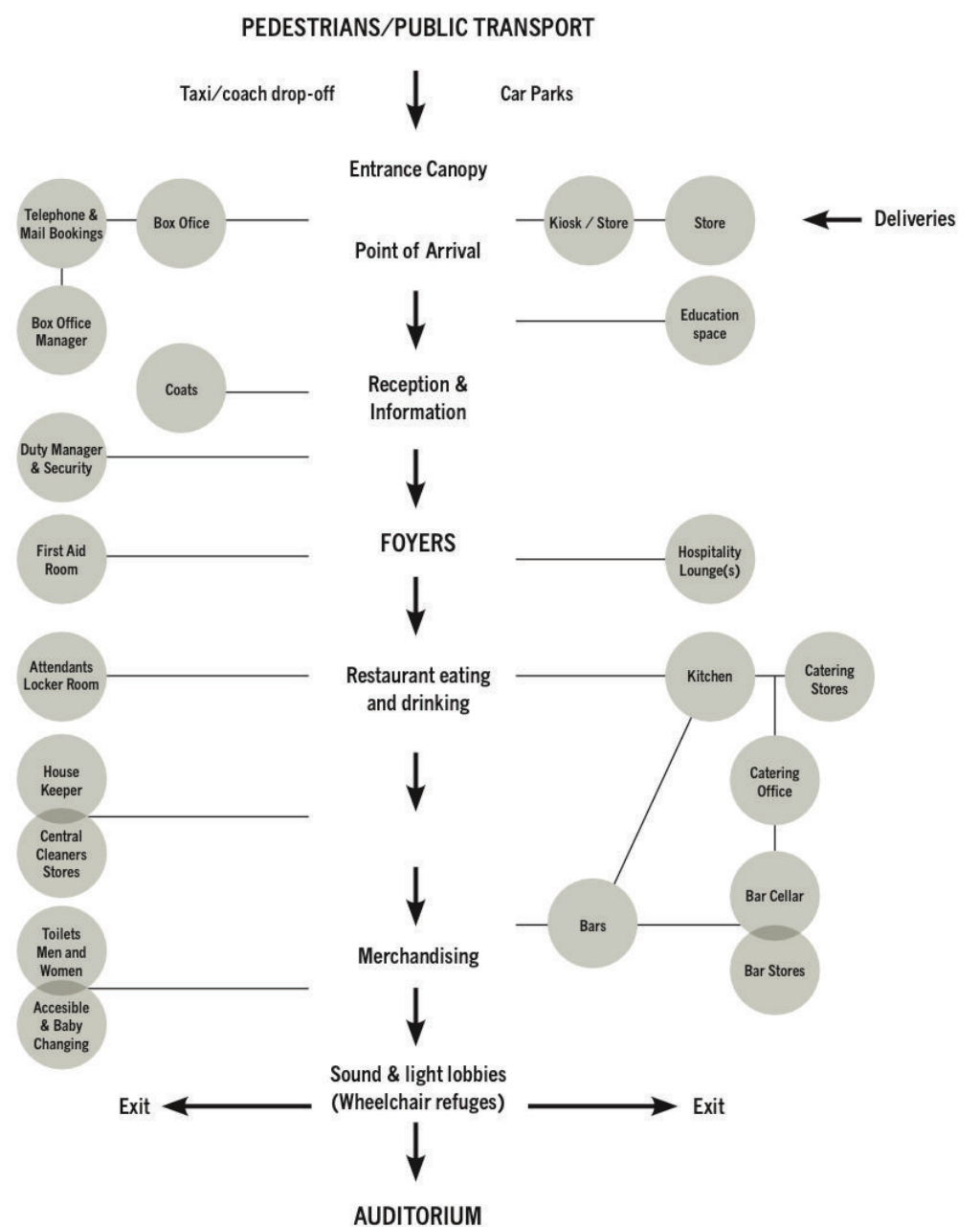
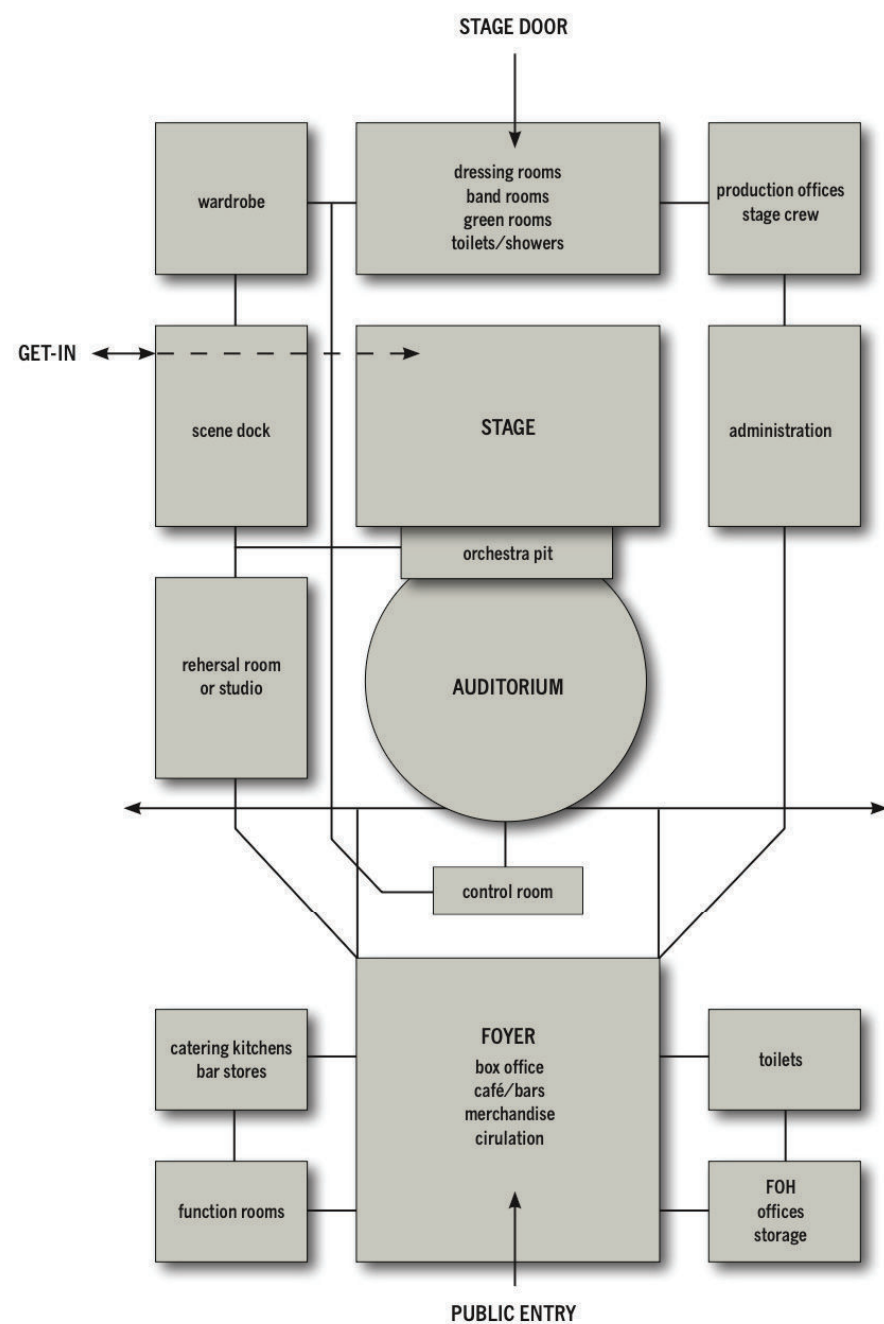
Flexible capacity, typically accommodating small audiences. This room was converted into a Black Box theater. Like Lido 2, the original tiered seating was removed to create a versatile space for performing arts, fashion shows, e-sports, and experimental theater.



Lido Connect current condition with the events

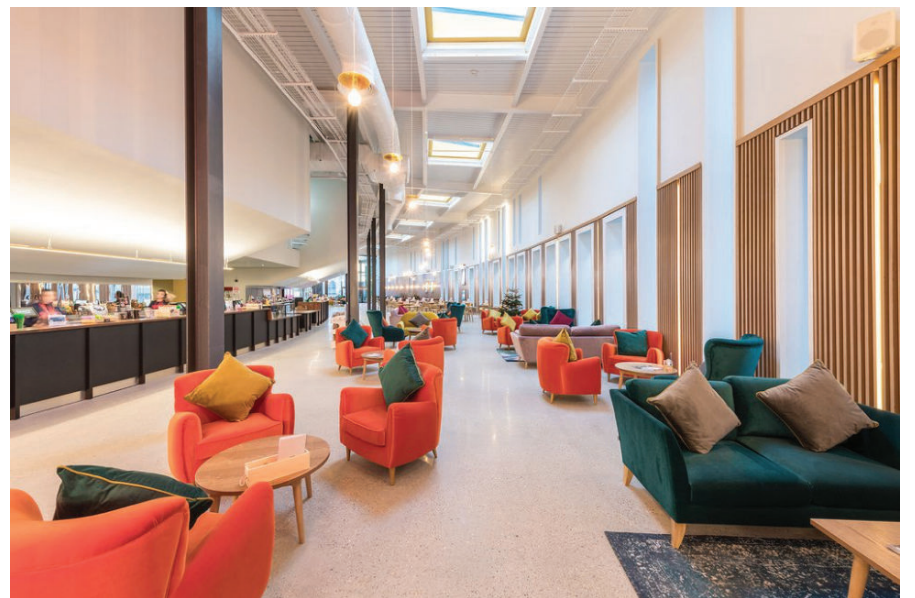
Cinema - Live House space management

For Thai soft power hub building which consisted of the cinemas and live house program. It is essential to know the journey and the other spaces required for the these theatrical architecture. This including the foyer for the public entry area, the box office, toilets, screening area and the other services part. The diagram shows here the space the journey of public and private space until it reach the main auditorium room.³⁹



Foyer Design

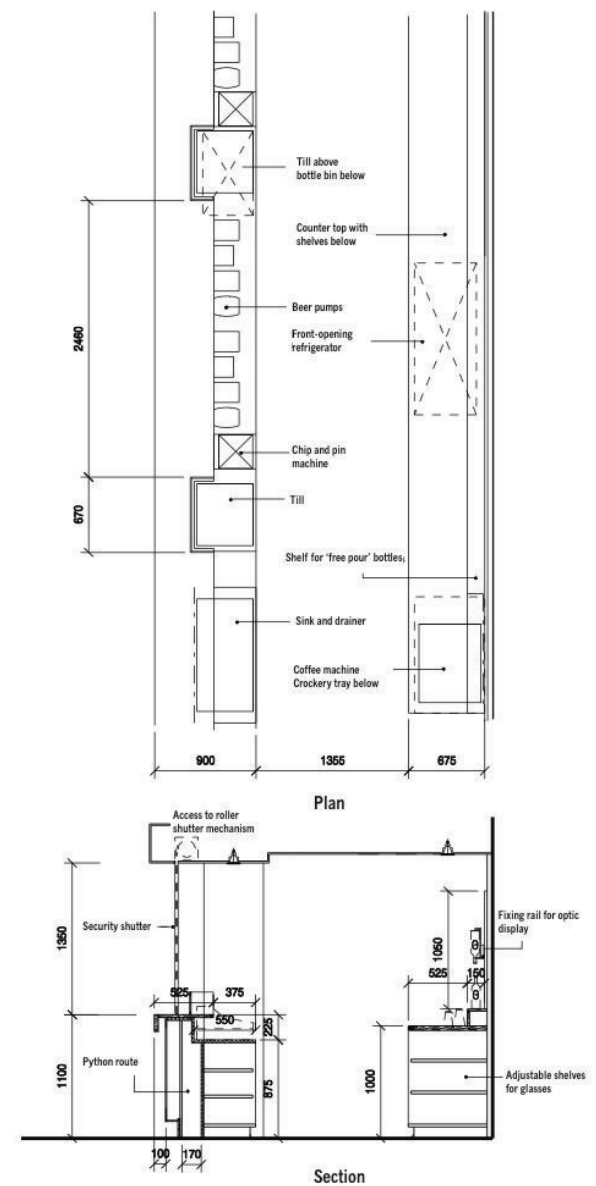
Foyer is the important introduction space of the building for the public impression, thus there are some rules that we need to be strict on. To contribute to the social and economic sustainability of the building, all parts of foyer need to be adaptable for alternative purposes which may include the specialist bar, educational activities, festival events, sponsor recognition, merchandising opportunities, catering, business events, conference registration, reception area, local facilities. Also depending on the proposed business model for the venue through needs to be given to the inclusion and location of Public bar, Cafe, Restaurant, meeting rooms, commercial spaces, exhibition spaces. For the environment, the foyer is a transition zone between the street and the events on stage. It should provide an environmental gradient between the outside noise and bustle and the controlled environment within the auditorium. While daylight is desirable, foyers should avoid stark contrasts of light and excessive differences in temperature with the auditorium.



Ashford picturehouse by Panter Hudspith Architects

Bar and wet sales

The location is a matter of choice of each cinema, To maximise sales, audiences need to be confident that it will be served quickly enough to enjoy their drinks. The venue have a short duration demand in the half an hour pre-show and during the interval. It is therefore usual to keep product choice narrow. The detail design of the bar front counter and back bar and local storage will vary or need to be adaptable to work with the type of venue and genre regularly staged, however the general requirements of design needs to meet : the ergonomics of the staff task in reaching and walking within the bar area, the correct counter heights is important for those working behind the bar and for wheelchair users, Electronic point of sale systems are popular with customers and increasingly cinema are taking credit cards for bar sales.



Seating Design

Row Spacing : The minimum back-to-back dimension between rows of seats with backs is 760mm. A good practice minimum is between 850mm–900mm. The unobstructed vertical space between rows (seatway or clearway) should be a minimum of 300mm.⁴⁰

Width of seat : The minimum width of seats with arms is 500mm centre of arm to centre of arm. A good practice minimum is between 525mm–550mm. The minimum width of seats without arms (individual seats or benches) is 450mm. A good practice minimum is 500mm.

Vertical Viewing Angle : To prevent neck strain, the vertical angle from the front row to the center of the screen should not exceed 45 degrees.

Aisle Access : If a row has access to an aisle from both ends, there is usually a maximum limit of 30–50 seats per row. If there is an aisle on only one side, that number is cut in half typically between 14–22 seats.

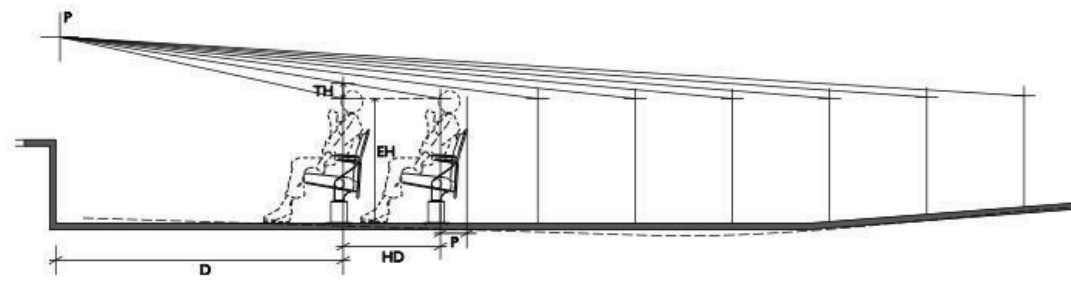
Point of sight (P) : This is the lowest point to be clearly visible on the stage area. Its position can vary considerably both vertically and horizontally. The stage can be a flat floor, a riser can vary from 300mm to 1100mm, Point P can be located on the leading edge or on the setting line. Point P can also be set at the level of the stage.

Horizontal distance (HD) : This is horizontal linear distance between the eye positions of the audience members in consecutive rows. The dimension normally equates to the row dimensions.

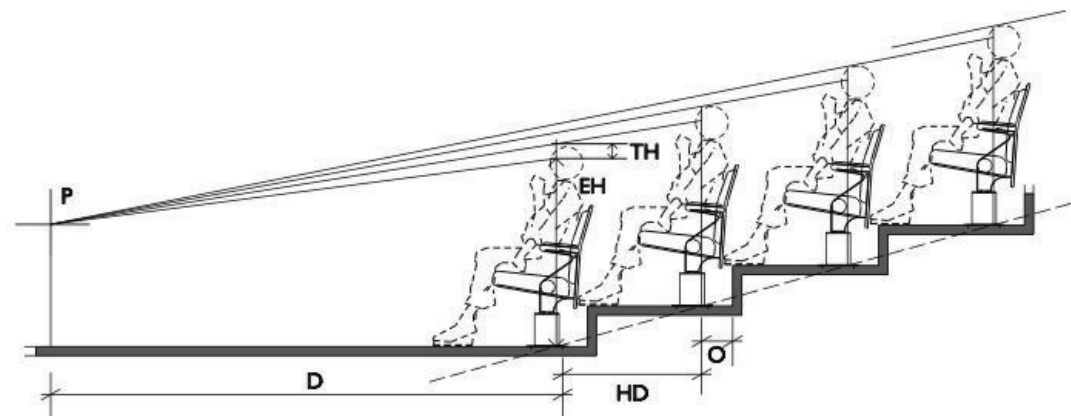
Average eye height (EH) : A theoretical working height of 1120mm is normally assumed. The final eye position ultimately depends on the seat design.

Top of head (TH) : Distance taken from the centre line of eye to the top of the head normally 100mm for the basis of the sightline calculation. Enhanced allowances can be made up to 125mm. However, it is normally argued that an angled, between heads view combined with 100mm provides a good basis.

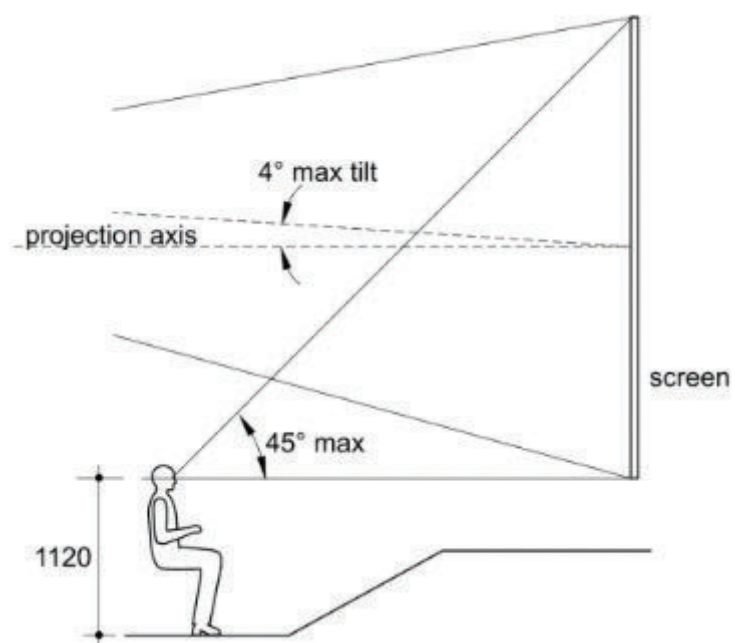
Distance front row eye position to Point P (D) : Using the above guidance, working from Point P back through the auditorium establishes the theoretical rake of the stalls seating. This gives a parabolic curve to the seating profile, getting steeper as the distance from Point P increases. Each member of the audience achieves a similar viewing condition.



4.5.1 Vertical sightline with high-level viewing point (P)



4.5.2 Vertical sightline with low-level viewing point (P)



Lighting

The different types of lighting which need to be provided within a cinema auditorium are :

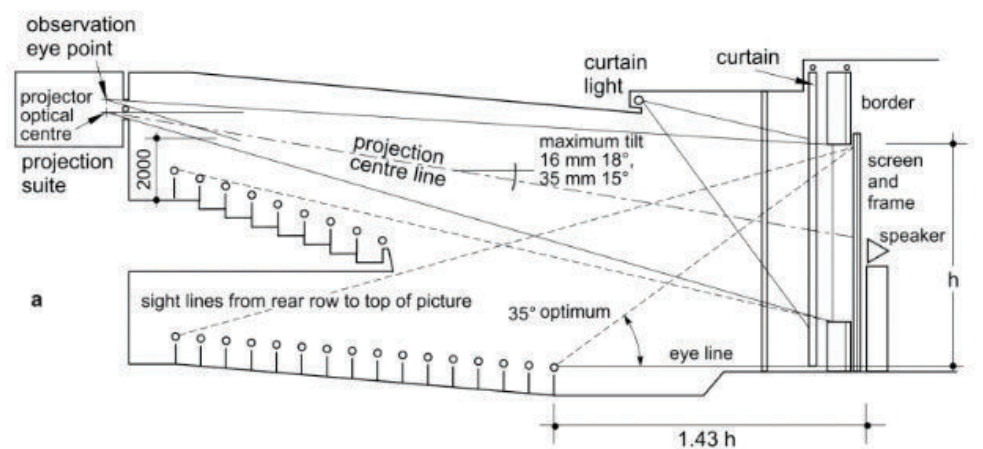
House Lights – These are the decorative lights which set the ambience of the auditorium when the audience enters and are gradually dimmed before the screening.

Curtain Lights – These highlight the screen curtains/screen surface prior to the screening and often have coloured gels.

Primary Lighting – These are mains powered and provide a low level of lighting during screening, equivalent to the level of lighting by the secondary emergency lighting in the event of mains failure. It is essential that they are no brighter than required to meet statutory requirements in order to avoid distractions during screenings.

Secondary Lighting : These are powered by a central battery or local battery packs and provide a low level of illumination in the event of mains failure.

Illuminated emergency exit signs : These are dual fed, that is mains powered and powered by a central battery or local battery packs and remain illuminated during screenings and in the event of mains failure and an emergency exit signs within the same plane or in close proximity to the screen. Illuminated exit signs should be selected to minimise disturbance through light spillage during screenings.



Acoustic for film

The sound track is an integral part of the audience experience and the quality of sound reproduction has vastly improved. Cinemas are now equipped with stereophonic sound systems which require acoustically dead auditoria; the ideal is a zero reverberation time. Thus, all finishing of floor, wall, ceiling and seats may need to be sound absorbent. Side walls should not be parallel, and a fan shape is preferred. The auditorium should be structurally and enclosure wise insulated from external noise. A suitable ambient noise standard for cinemas is NR30 to NR35.

Control room

Today, with digital cinema, the control room is often split into two areas:

The Projection Portal : A small, glass enclosed space at the back of the auditorium housing the DCI (Digital Cinema Initiatives) Projector which use to decodes the encrypted movie files. In this room also hosted the Cinema Processor (Audio) Units like the Dolby CP950 or Q-SYS manage the routing of sound to the various amplifiers and speakers

The Rack Room/Server Room : A climate controlled space often located elsewhere in the building, housing the LMS (Library Management System), which stores all the movie files (DCPs), and the audio processors.

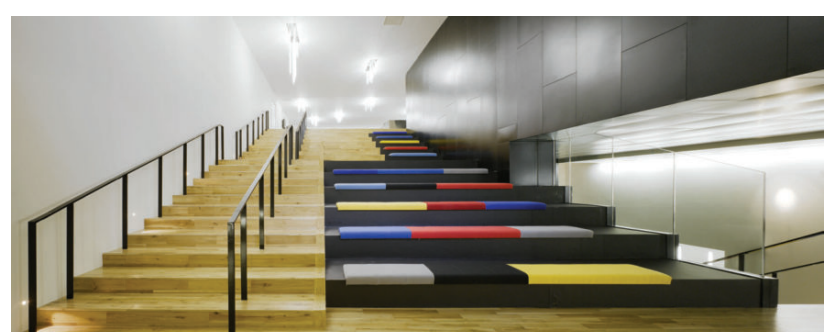
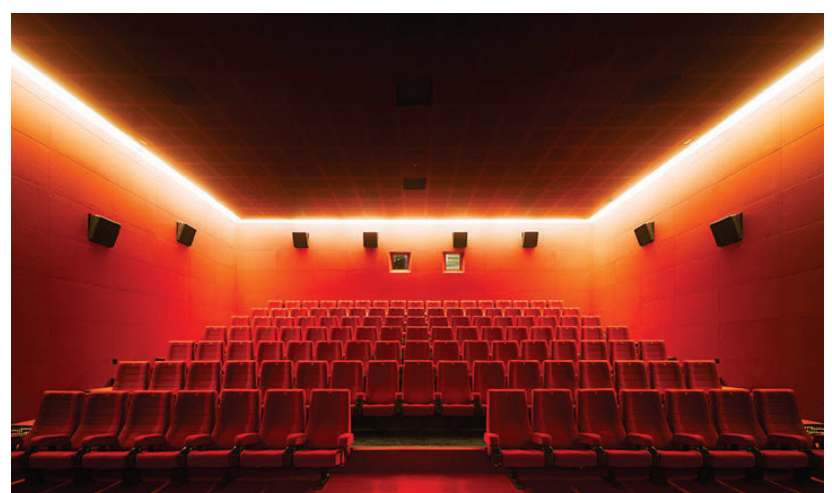
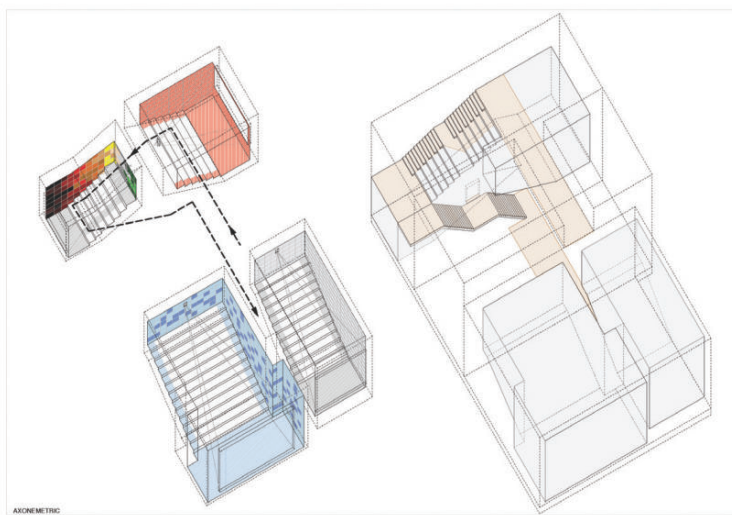
In order to design a cinema control room requires strict adherence to technical standards to ensure the performance isn't interrupted. Digital projectors generate immense heat which often requiring ducted exhaust directly from the projector head. The room must stay between 18°C and 24°C to prevent server failure. Normally using the projection port glass, this isn't regular window glass. It is water white, anti-reflective optical glass. It must be tilted at a slight angle of 5° to 7°, to prevent the light from the projector reflecting back into the lens. Further more, the control room must be soundproofed so the hum of cooling fans doesn't leak into the auditorium.



Case study for Cinema

The Light House Cinema - Dublin, Ireland DTA Architects

Completed in 2008, it is widely celebrated for its innovative use of space, as the entire cinema is inserted into the basement voids of a large scale urban regeneration development. The design is defined by the challenge of moving patrons three levels below ground while maintaining a sense of drama and light. The four cinema screens are designed as distinct architectural volumes suspended within a large underground cavern. This allows patrons to walk around, under, and over the theater forms. The architects created a dramatic circulation path that guides visitors from the street level entrance and café down into the subterranean social spaces and bars. The four cinema screens consisted of : Screen 1 - 277 seats, Screen 2 - 153 seats, Screen 3 - 116 seats, Screen 4 - 68 seats.⁴¹



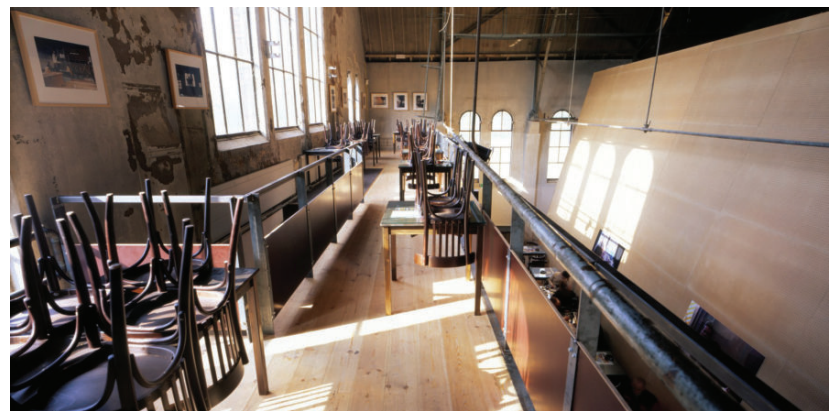
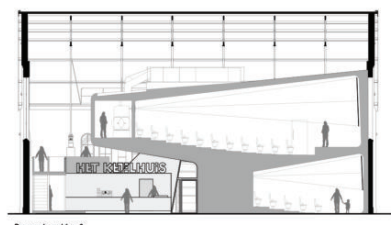
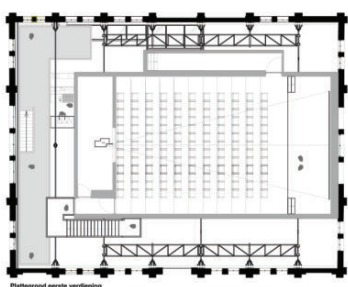
⁴¹ Chris Van Uffelen, Cinema Architecture. Braun, 2009.

Cinema het ketelhuis - Amsterdam, Netherlands

Studio ramain visch

is a renowned arthouse cinema located in the vibrant Westergasfabriek park in Amsterdam. Housed in a former industrial boiler house, it is celebrated as the home of Dutch film while also screening a wide selection of international independent cinema, documentaries, and classics. The venue features a cozy, industrial style café and bar area where visitors can enjoy drinks or a meal before or after their film. It houses three screening rooms that maintain an intimate feel, catering to cinema goers who prefer a curated experience over a multiplex setting. Beyond regular screenings, the cinema frequently hosts film festivals, director Q&As, and special events centered around the Dutch film industry.

The exterior features the classic red brick masonry typical of Dutch industrial architecture from the late 19th century. Large arched windows originally designed to provide light for workers, now offer views into the bustling café. Inside, the cinema retains its original steel beams and high ceilings, preserving the cavernous feel of an engine room. For the cafe bar, the central social space uses wood, vintage furniture, and soft lighting to counteract the cold industrial materials. It is designed to feel more like a neighborhood pub than a traditional cinema lobby. The building houses three screens with a total capacity of roughly 250 people. The rooms are deliberately small to create an intimate atmosphere for Q&As and festivals. To fit three theaters into a relatively small footprint, the architects utilized the height of the boiler house, stacking seating banks and using clever acoustic insulation to prevent sound bleed between the historic brick walls.

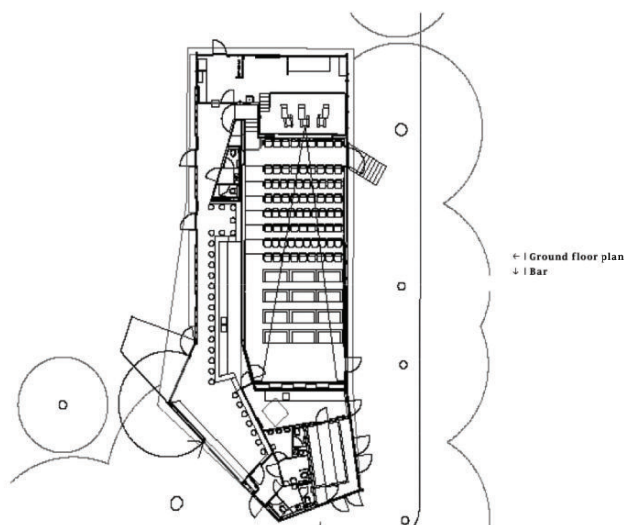


Bar Xenix -Zurich, Switzerland

Frei + Saarinen Architekten

Is a cultural landmark in Zurich', functioning as a hybrid of an arthouse cinema and a bustling community hub. Since its origins in the early 1980s protest movements, it has evolved from a temporary project into a permanent fixture of Zurich's alternative creative scene. The building is a unique example of adaptive reuse, originally constructed in 1904 as a temporary wooden school pavilion. In 2007, it underwent a significant transformation by Frei + Saarinen Architekten, who focused on a strategy of unification to blend the century old structure with modern needs. The architects extended the building by blurring the lines between old and new. For example, the bar ceiling features replicas of the original 1904 beams that vary in cross section to match the new sloping roof. A major modern addition is the sculptural roofscape clad in an extra large riveted aluminum sheets, which stretches over both the old corridor and the new extension. A standout feature of the bar is a massive window that can open 250 degrees. During summer, this allows the building to open up almost entirely to the surrounding gravel square. The cinema auditorium is famously known for its unconventional seating; the dodgy secondhand sofas of the 1980s have been replaced by custom designed sofas that maintain the cinema's living room character. For the program, unlike mainstream theaters, Xenix presents monthly thematic programs ranging from geographic retrospectives to social political focuses and remains one of the few cinemas in Switzerland equipped for both high end digital and traditional analog film.

CINEMA AND BAR XENIX



Architecture Project

Bangkok Screening House

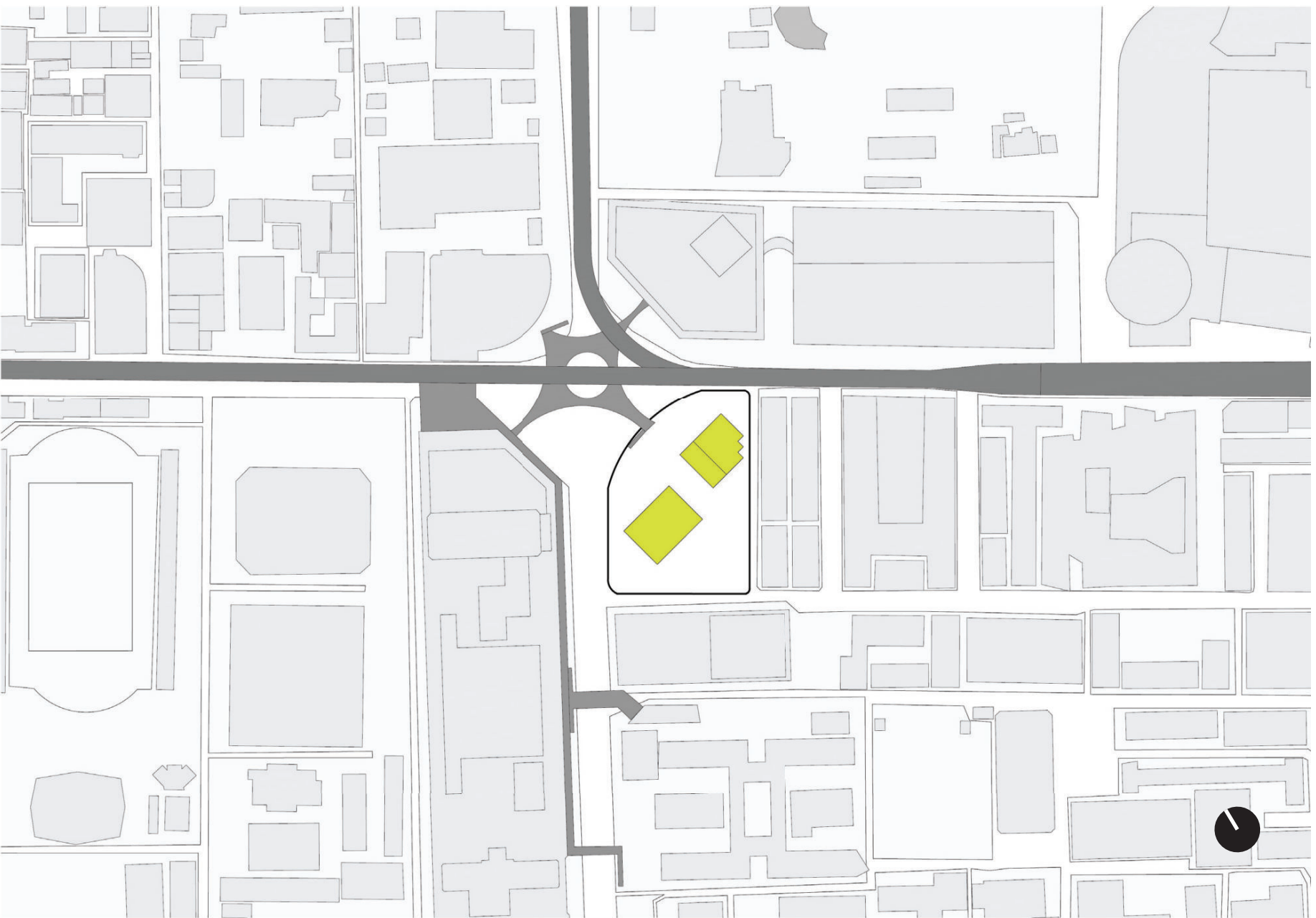
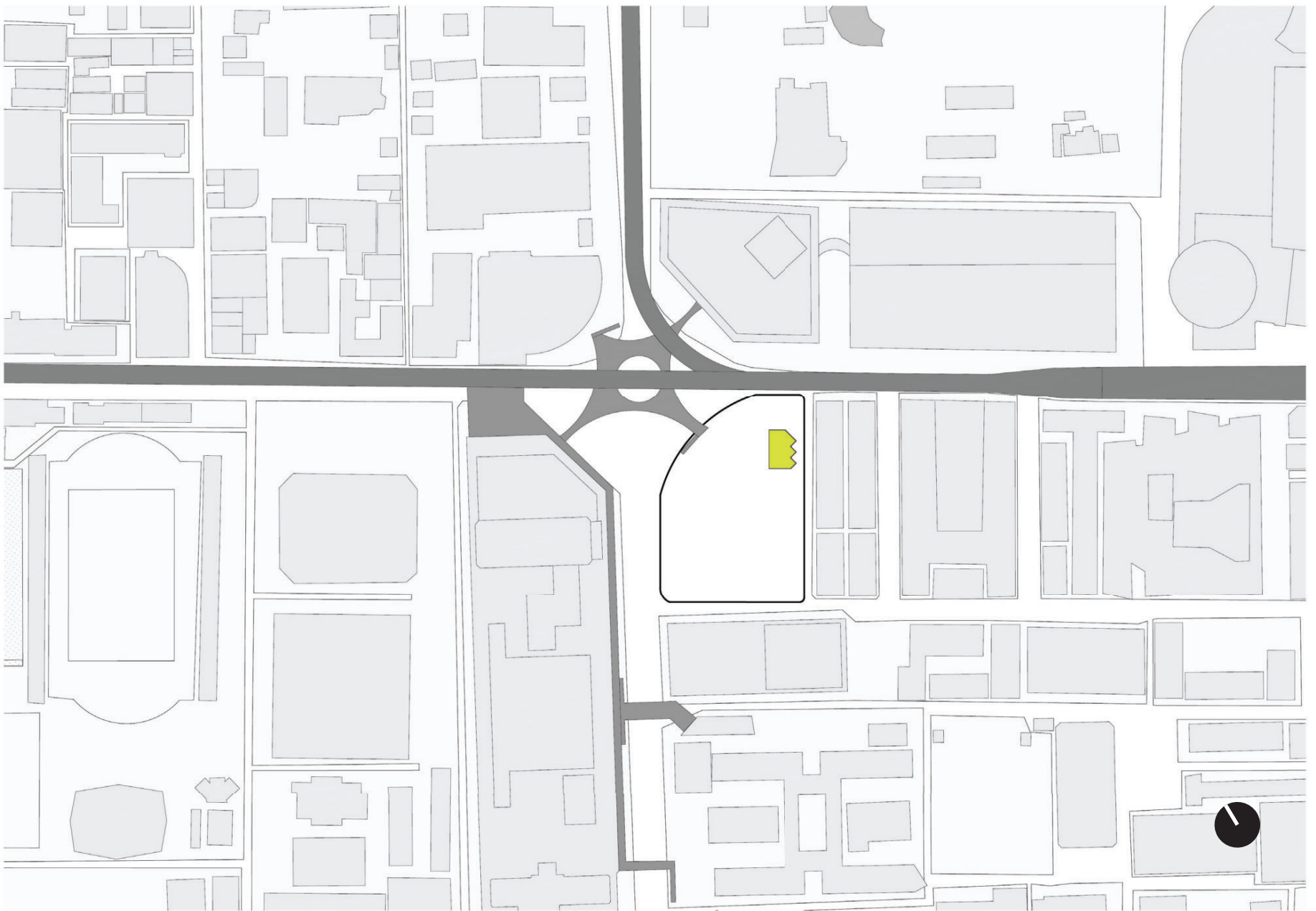
The project name refers to the combination of two fundamentally different programs within a single site: the Screen/Green House and Cinematic Thai soft power. By merging pop culture oriented public programs with expansive green areas, the project creates an everyday civic space for the central district. Rather than serving only teenagers, the site is envisioned as an inclusive urban environment accessible and meaningful to people of all ages and backgrounds.

Rebuilding Scala Cinema Facade

With respect to the demolished cultural landmark of Siam Square, this design proposes the reconstruction of the building's front portion, including its façade. The intention is to preserve the collective memory of the site while reinterpreting the former landmark through new public programs. Drawing from the original architecture of Scala Cinema, the clarity of its structural grid becomes a guiding principle for the project, allowing selected grid lines to be extended and employed as a primary rule for spatial organization and planning.

2 Buildings

Referring to the aforementioned analysis and the two categories of programs as Thai soft power related programs and green space related programs, the site is clearly divided into two main parts: two building zones and a shared landscape space supporting both program types. This proposal situates the Thai soft power programs within the rebuilt Scala Cinema area, with an extension to accommodate new functions, while the green space related programs are placed on the opposite side of the site. These two programmatic zones are connected through a continuous outdoor public space and integrated landscape design. The landscape is intended to occupy approximately 70% of the site area, reinforcing the preservation of open land and emphasizing the presence of green nature within the urban context.



Sun Direction

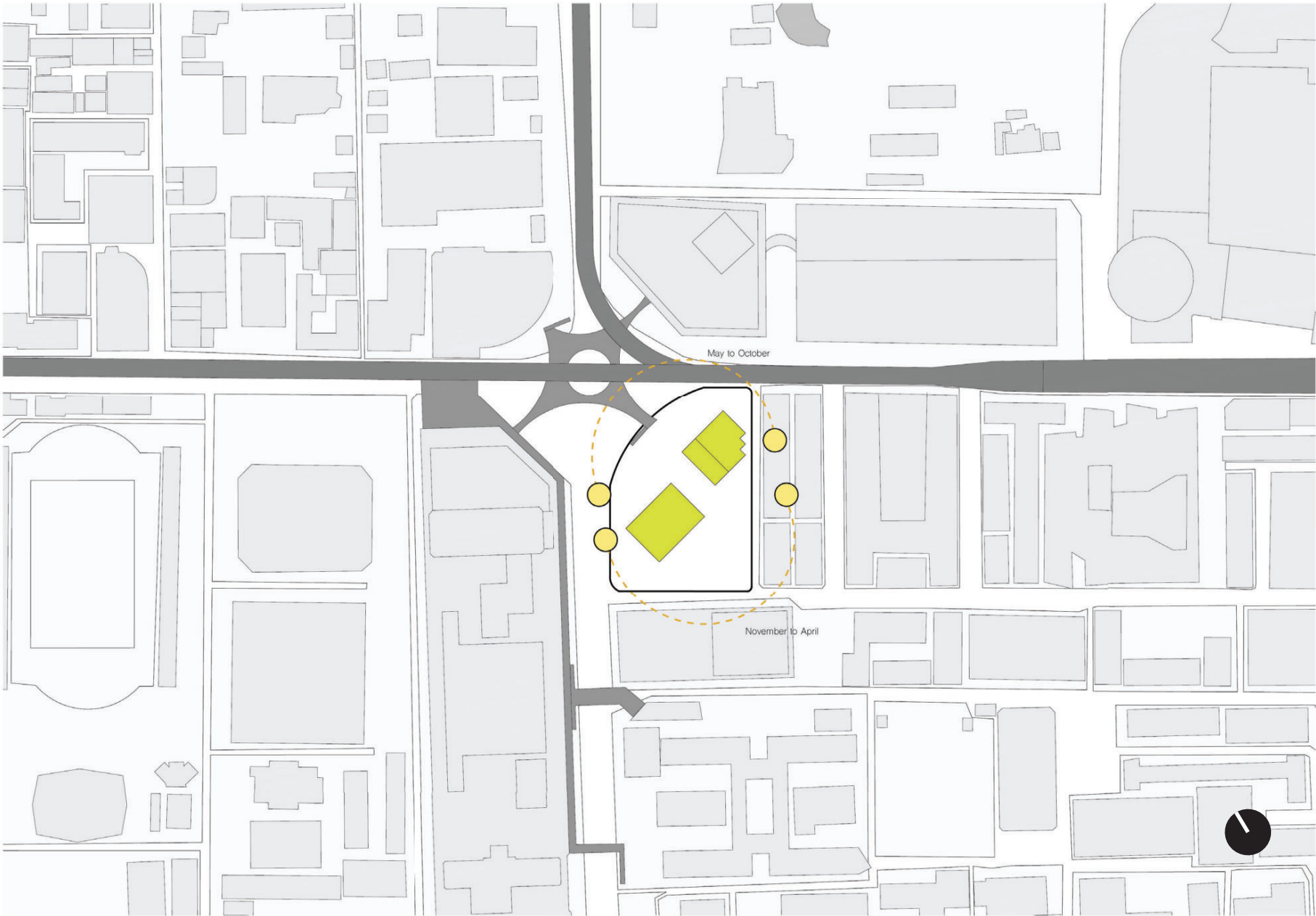
Bangkok is at 14°N latitude, which means the sun is almost directly overhead most of the year, but its path shifts significantly between seasons. South and West sides are the most sun receiving side of the year which is significant for the green/screen house.

May to October : Sun travels in the Northern sky.
November to April : Sun travels in the Southern sky.

Wind Direction

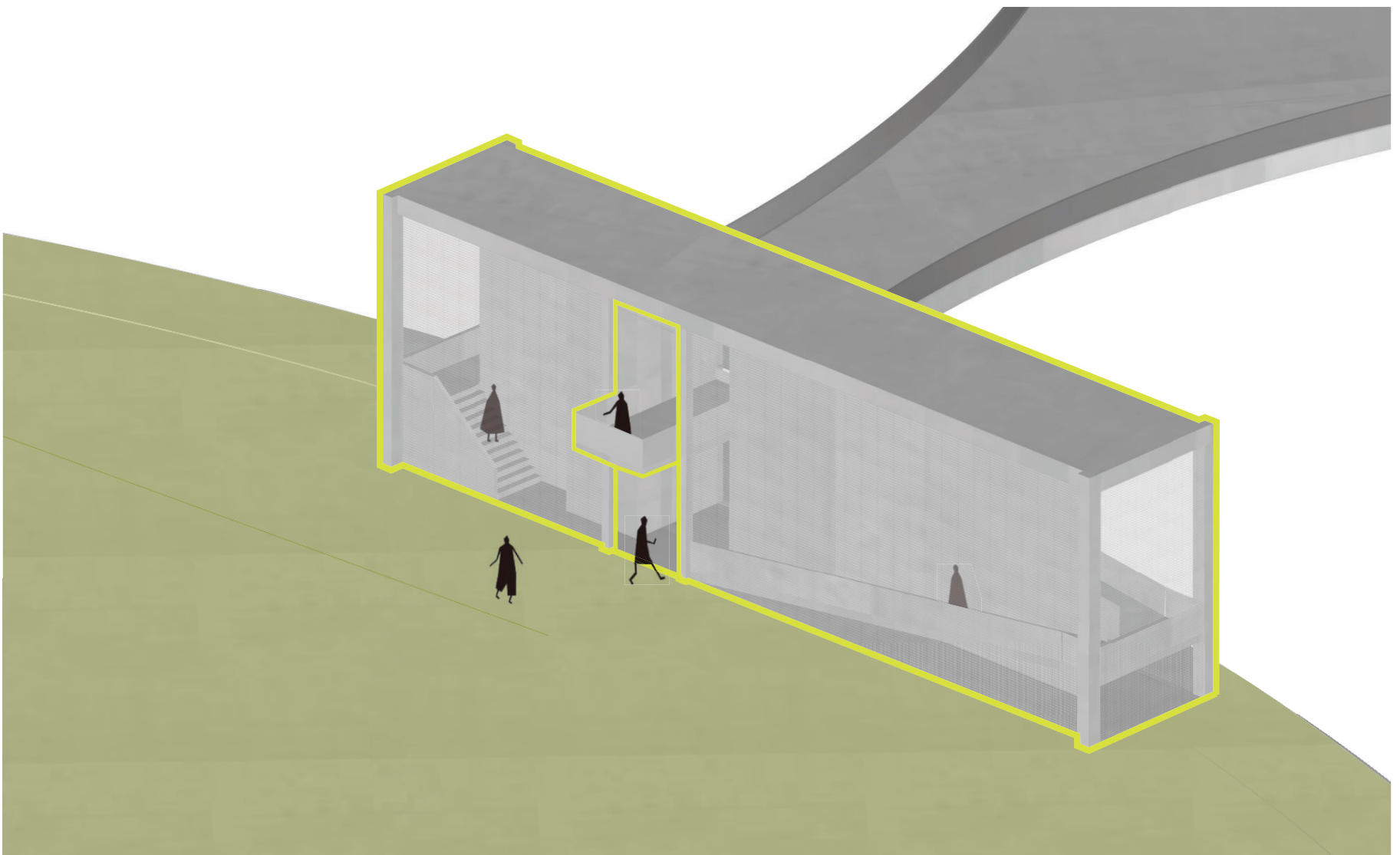
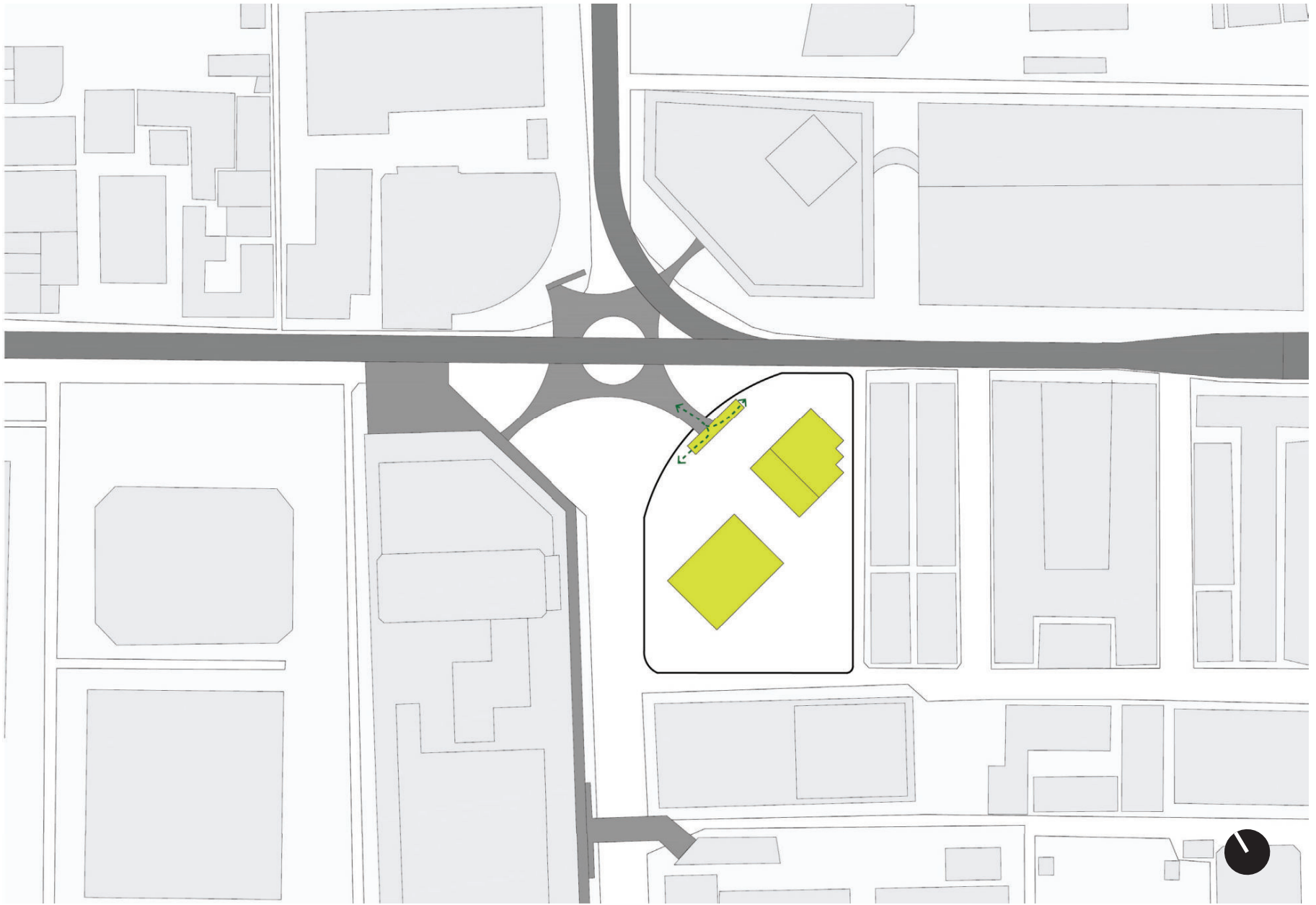
South-West Monsoon (May to October): This is the primary source of cool but humid breezes. If the facade faces South or West, the building can capture this wind for natural cooling.

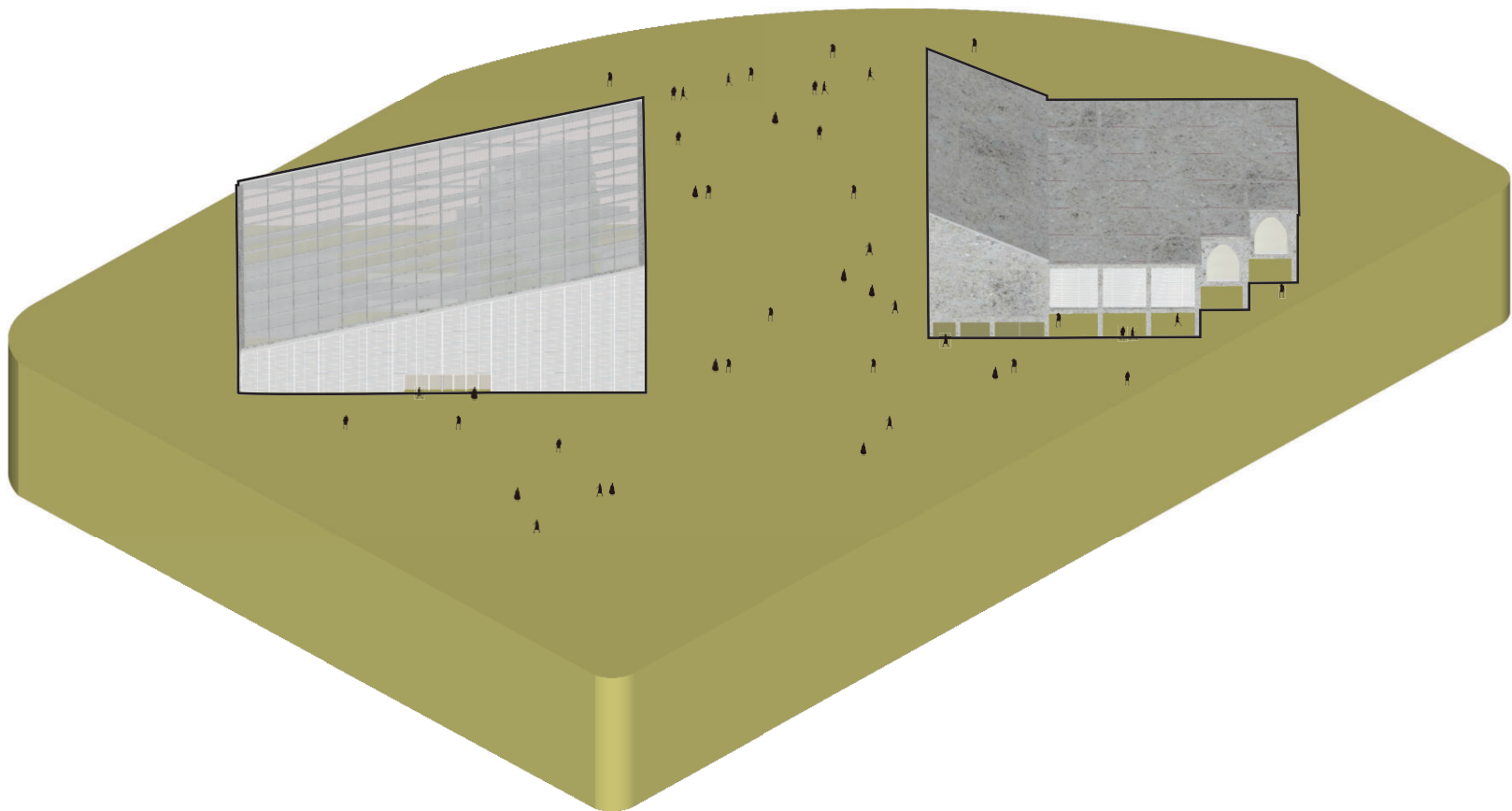
North-East Monsoon (November to April): This side brings drier, slightly cooler air from the North/North-East.



Connection from the Sky walk

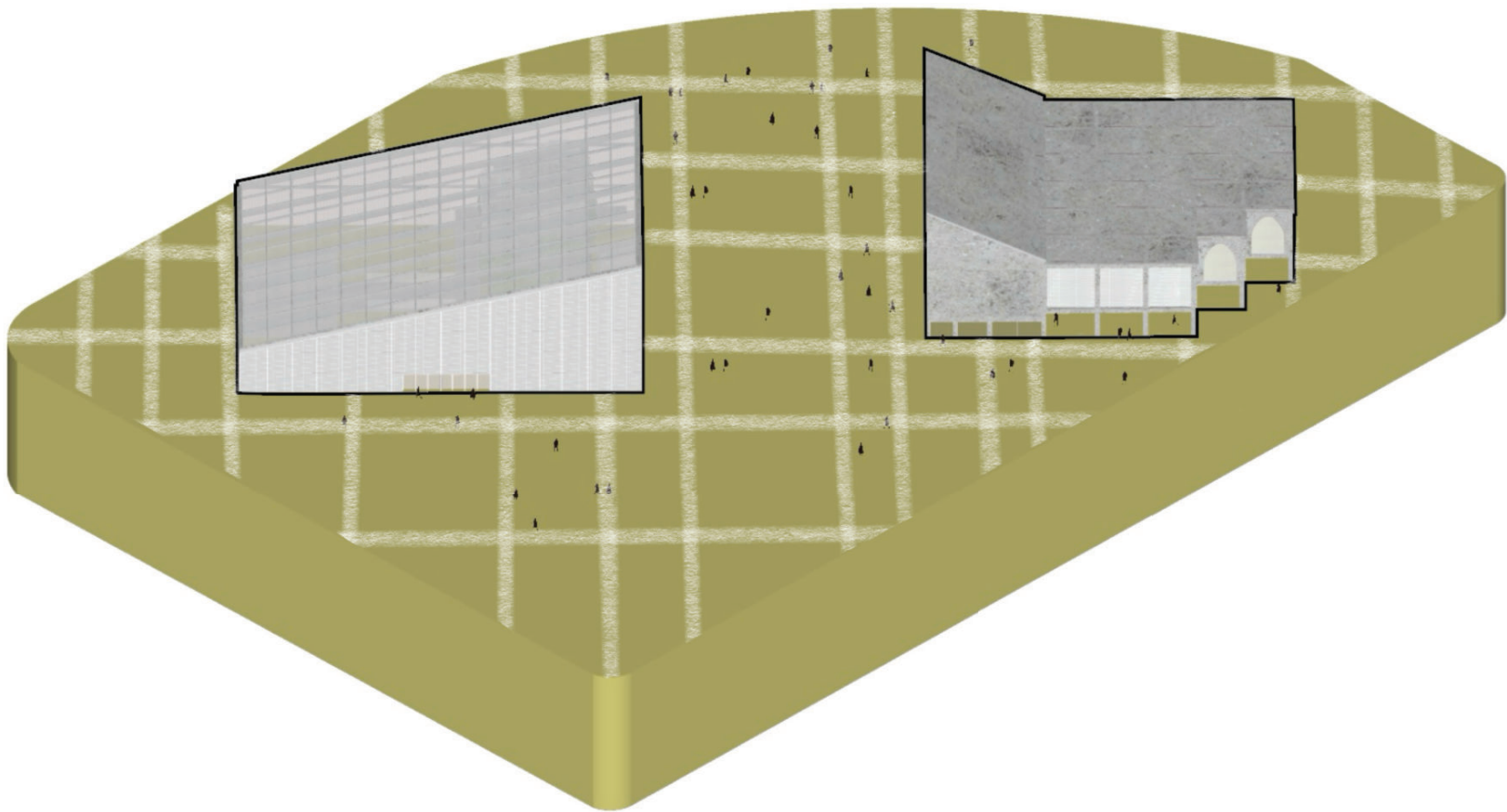
Given the site's critical connection to the main intersection of the Siam Square area, the integration of a skywalk connection is an essential design consideration. Accessibility must accommodate all types of users through the principles of universal design. This requires the provision of multiple vertical circulation options, including stairs, ramps, and elevators, to ensure inclusive and barrier free access throughout the site.





Green/Screen house builing shape

The Green/Screen House building design draws from a classic triangular form that maximizes solar gain through its west-oriented roof. Air openings are oriented toward the southwest and northeast, enhancing cross ventilation and optimizing natural airflow. This strategy helps reduce internal heat and humidity, improving thermal comfort within the space while minimizing reliance on mechanical systems. Together in order to achieve the same architectural language, the extended part of the hub soft power hub side also mimicked the slope roof, making the building become unique.

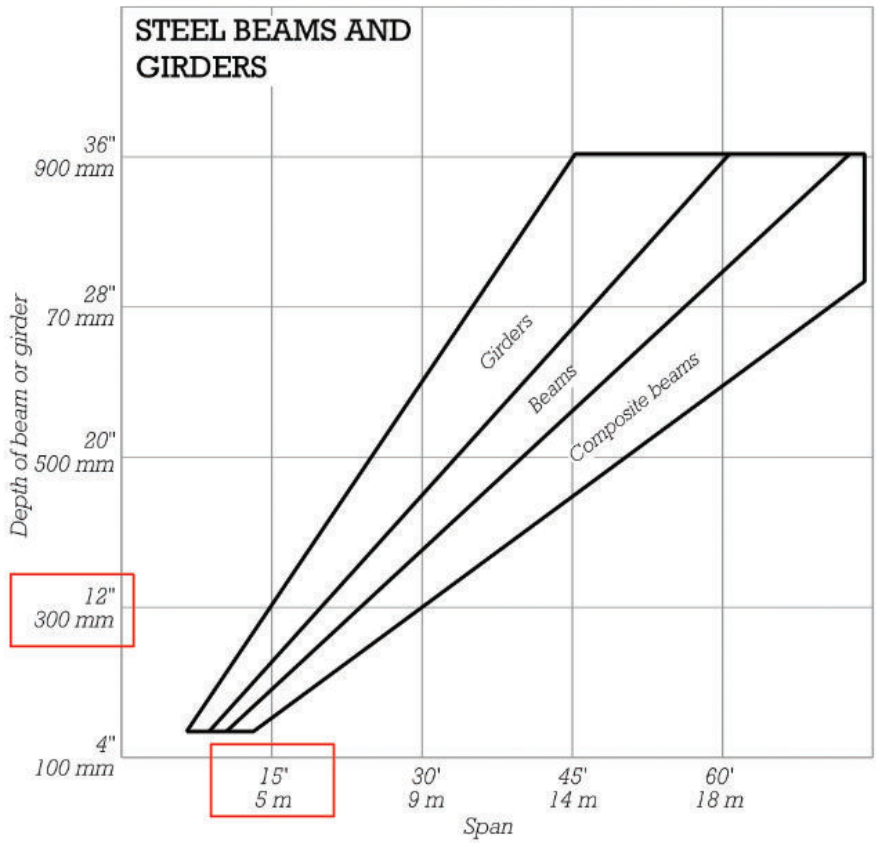


Landscape and path

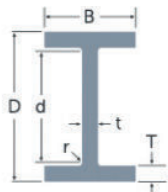
By extending the original grid of Scala Cinema as a guiding framework, the landscape and outdoor spaces are integrated seamlessly with the overall building layout. The site is organized into three distinct yet interconnected spatial zones distributed across the area: a main gathering space with theater-like seating, a cultivation space, and an open grass area. The grid system not only establishes spatial order but also naturally generates circulation paths, providing clear and intuitive access to all areas of the site.

Structure and Sizing

Referring to the structural design guidelines presented in “The Architect’s Studio Companion” book, the sizing of steel beams and columns is determined by the building area, overall height, and column span. Accordingly, after consulting the relevant structural graphs, the proposed member sizes were verified using the universal section tables provided by the steel supplier to confirm the appropriateness of the structural system.⁴²



British Steel, the only UK manufacturer of structural sections, is BES 6001 certified, guaranteeing commitment to responsibly sourced materials. Our structural sections are CE and UKCA marked and tested to the highest standards, providing quality and assurance for the UK construction market.

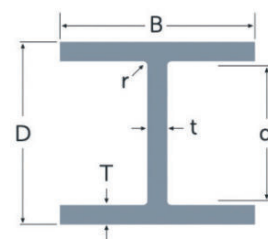
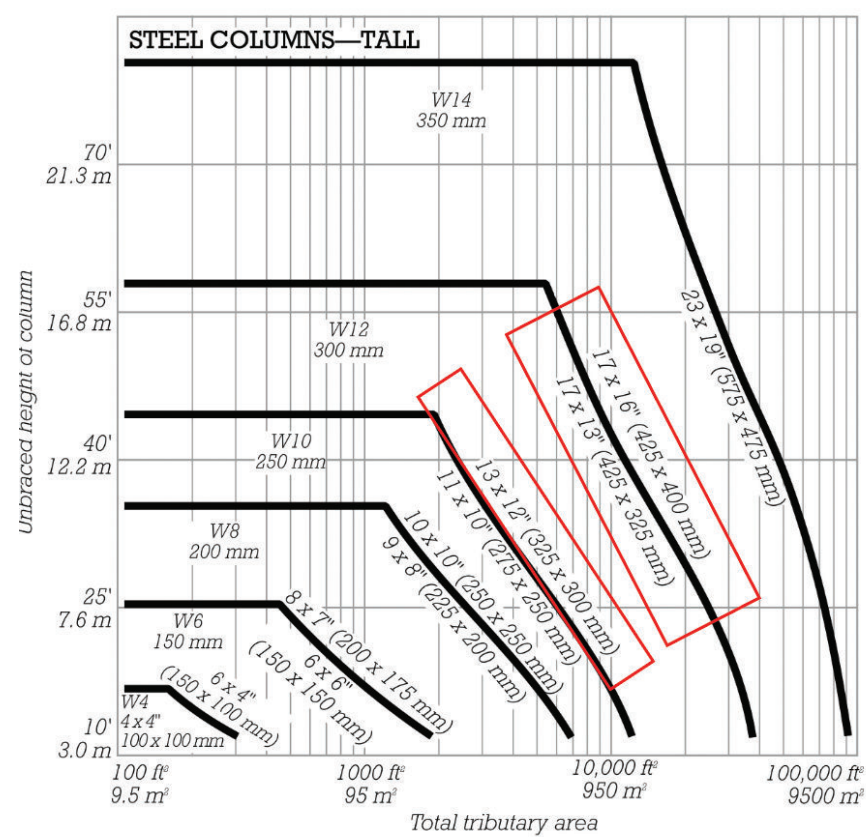
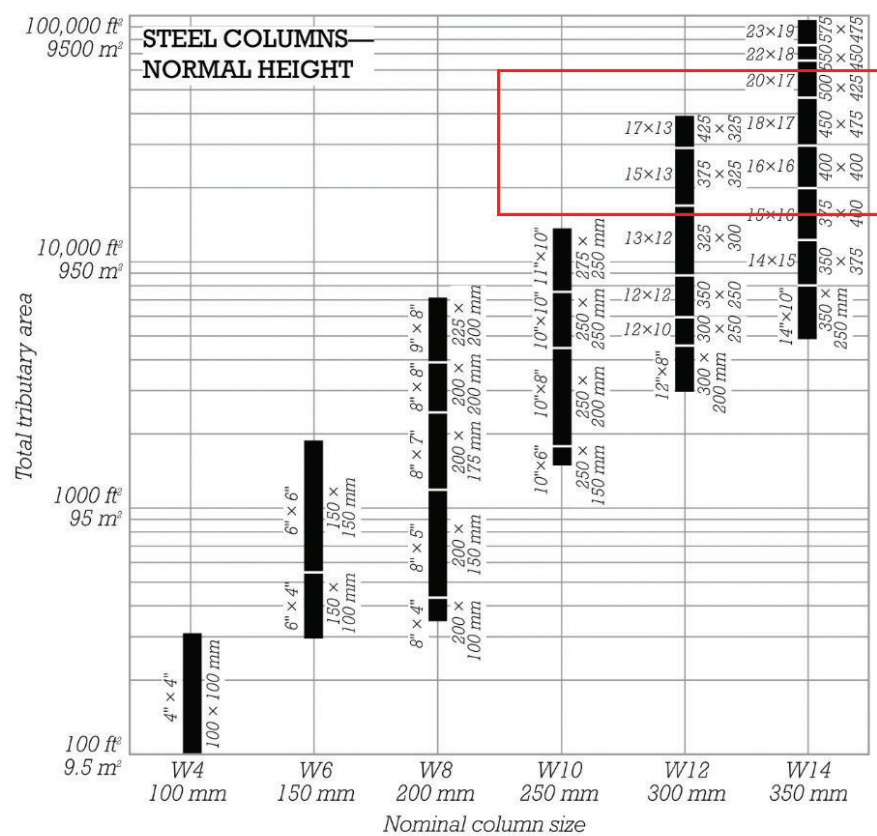


Universal beams (UB) sizes

Designation	Mass per metre	Depth of section	Width of section	Thickness		Root radius	Depth between fillets	Ratios for local buckling		Second moment of area I		Radius of gyration i	
				of web	of flange			Flange	Web	Axis	Axis	Axis	Axis
				t	T			B/2T	d/t	x-x	y-y	x-x	y-y
Serial size	kg/m	mm	mm	mm	mm	mm	mm			cm ⁴	cm ⁴	cm	cm
127 x 76 x 13	13.0	127.0	76.0	4.0	7.6	7.6	96.6	5.00	24.2	473	56	5.35	1.84
152 x 89 x 16	16.0	152.4	88.7	4.5	7.7	7.6	121.8	5.76	27.1	834	90	6.41	2.10
178 x 102 x 19	19.0	177.8	101.2	4.8	7.9	7.6	146.8	6.41	30.6	1356	137	7.48	2.37
203 x 102 x 23	23.1	203.2	101.8	5.4	9.3	7.6	169.4	5.47	31.4	2105	164	8.46	2.36
203 x 133 x 25	25.1	203.2	133.2	5.7	7.8	7.6	172.4	8.54	30.2	2340	308	8.56	3.10
203 x 133 x 30	30.0	206.8	133.9	6.4	9.6	7.6	172.4	6.97	26.9	2896	385	8.71	3.17
254 x 102 x 22	22.0	254.0	101.6	5.7	6.8	7.6	225.2	7.47	39.5	2841	119	10.10	2.06
254 x 102 x 25	25.2	257.2	101.9	6.0	8.4	7.6	225.2	6.07	37.5	3415	149	10.30	2.15
254 x 102 x 28	28.3	260.4	102.2	6.3	10.0	7.6	225.2	5.11	35.7	4005	179	10.50	2.22
254 x 146 x 31	31.1	251.4	146.1	6.0	8.6	7.6	219.0	8.49	36.5	4413	448	10.50	3.36
254 x 146 x 37	37.0	256.0	146.4	6.3	10.9	7.6	219.0	6.72	34.8	5537	571	10.80	3.48
254 x 146 x 43	43.0	259.6	147.3	7.2	12.7	7.6	219.0	5.80	30.4	6544	677	10.90	3.52
305 x 102 x 25	24.8	305.1	101.6	5.8	7.0	7.6	275.9	7.26	47.6	4455	123	11.90	1.97
305 x 102 x 28	28.2	308.7	101.8	6.0	8.8	7.6	275.9	5.78	46.0	5366	155	12.20	2.08
305 x 102 x 33	32.8	312.7	102.4	6.6	10.8	7.6	275.9	4.74	41.8	6501	194	12.50	2.15
305 x 127 x 37	37.0	304.4	123.4	7.1	10.7	8.9	265.2	5.77	37.4	7171	336	12.30	2.67
305 x 127 x 42	41.9	307.2	124.3	8.0	12.1	8.9	265.2	5.14	33.2	8196	389	12.40	2.70
305 x 127 x 48	48.1	311.0	125.3	9.0	14.0	8.9	265.2	4.48	29.5	9575	461	12.50	2.74
305 x 165 x 40	40.3	303.4	165.0	6.0	10.2	8.9	265.2	8.09	44.2	8503	764	12.90	3.86
305 x 165 x 46	46.1	306.6	165.7	6.7	11.8	8.9	265.2	7.02	39.6	9899	896	13.00	3.90
305 x 165 x 54	54.0	310.4	166.9	7.9	13.7	8.9	265.2	6.09	33.6	11696	1063	13.00	3.93

Steel Beam sizing chart from British Steel company

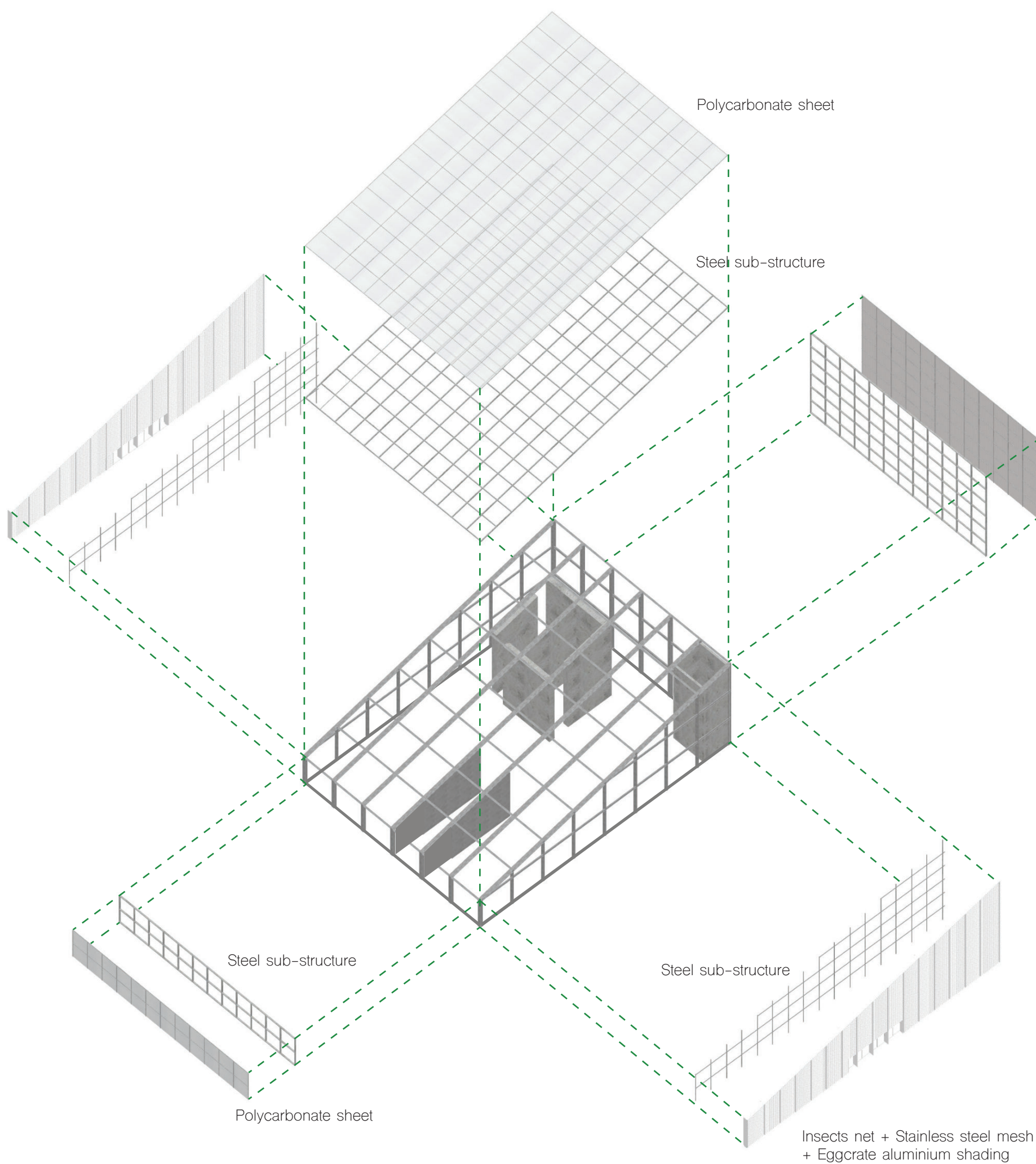
42 Edward Allen & Joseph Lano, The Architect’s studio companion. John Wiley & Sons, Inc., 2012.

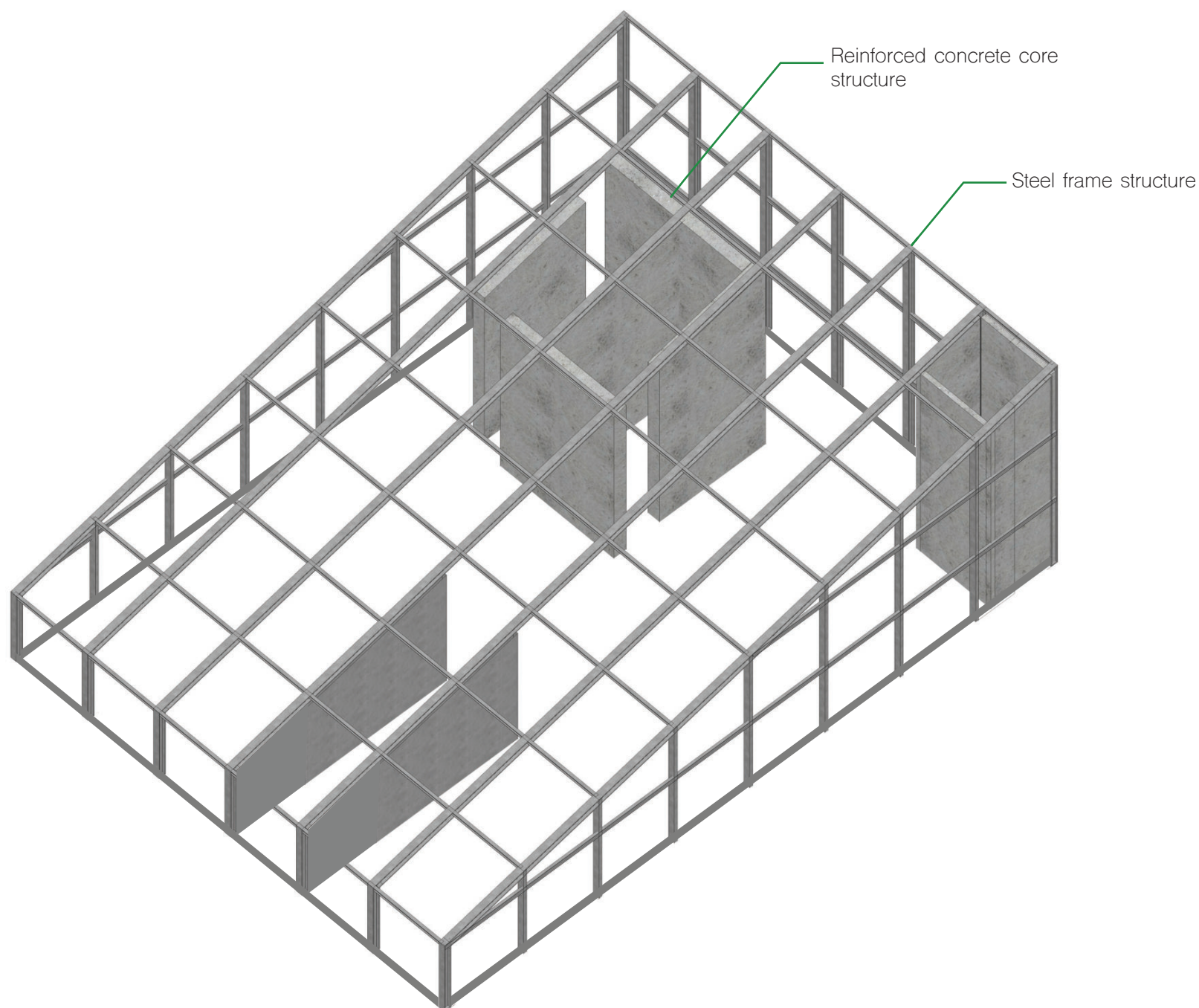


Universal columns (UC) sizes

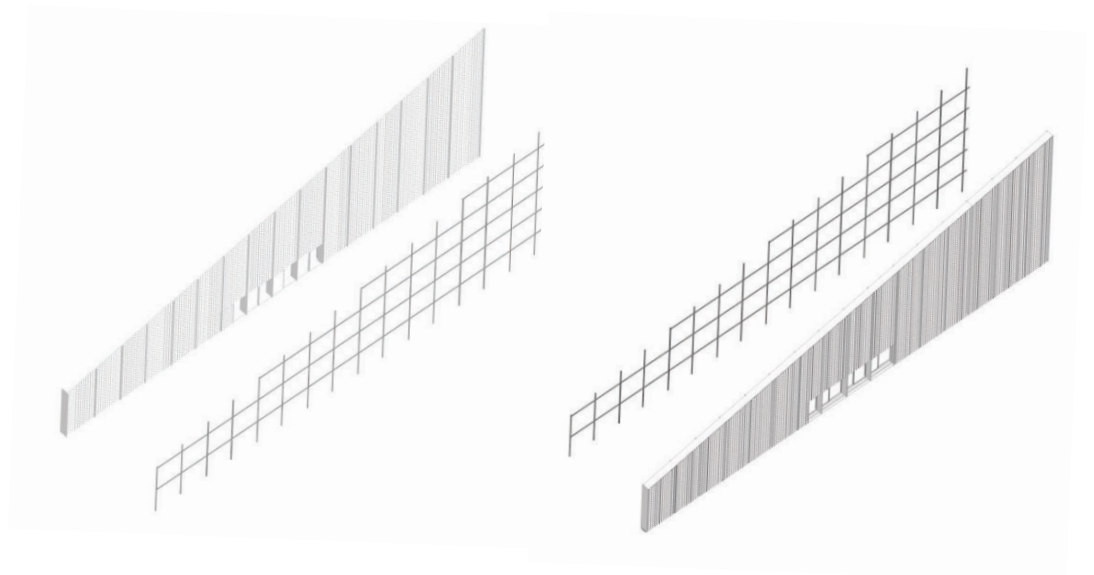
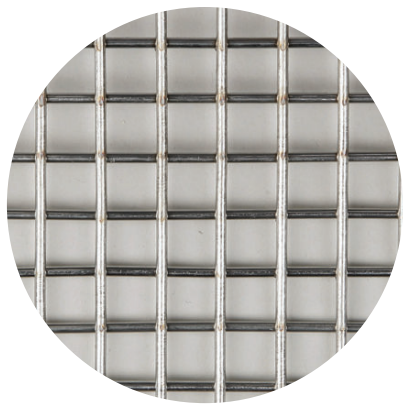
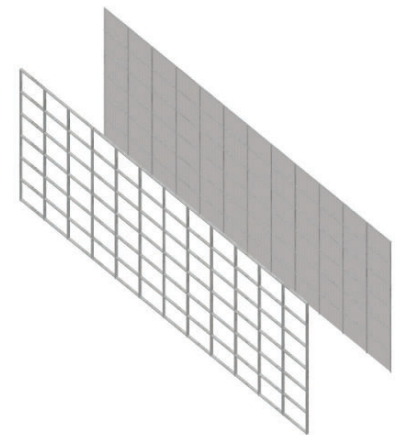
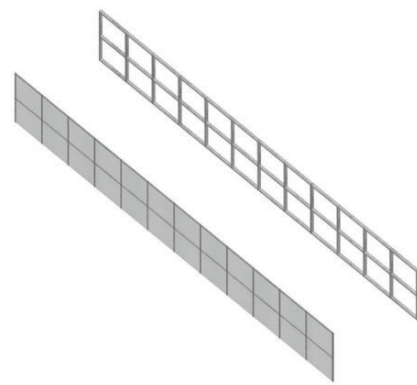
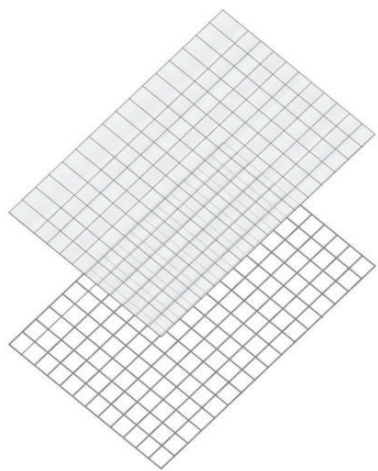
Designation	Mass per metre	Depth of section	Width of section	Thickness		Root radius	Depth between fillets	Ratios for local buckling		Second moment of area I		Radius of gyration i	
				of web	of flange			Flange	Web	Axis	Axis	Axis	Axis
				t	T								
Serial size	kg/m	D mm	B mm	t mm	T mm	r mm	d mm	B/2T	d/t	x-x cm ⁴	y-y cm ⁴	x-x cm	y-y cm
356 x 368 x 179	179.0	368.0	374.0	15.0	23.9	20.0	280.2	7.82	18.7	57940	20853	15.9	9.52
356 x 368 x 196	196.0	372.0	374.0	16.4	26.2	20.0	279.6	7.14	17.0	63988	22861	15.9	9.53
356 x 368 x 202	201.9	374.6	374.7	16.5	27.0	20.0	280.6	6.94	17.00	66607	23692	16.00	9.57
356 x 406 x 216	216.0	375.0	394.0	17.3	27.7	20.0	279.6	7.11	16.2	71495	28257	16.1	10.1
356 x 406 x 235	235.1	381.0	394.8	18.4	30.2	20.0	280.6	6.54	15.30	79431	30997	16.20	10.10
356 x 406 x 237	237.0	380.0	395.0	18.9	30.2	20.0	279.6	6.54	14.80	79134	31045	16.2	10.10
356 x 406 x 262	262.0	387.0	398.0	21.1	33.3	20.0	280.4	5.98	13.3	89764	35023	16.3	10.2
356 x 406 x 287	287.1	393.6	399.0	22.6	36.5	20.0	280.6	5.47	12.40	100221	38682	16.50	10.30
356 x 406 x 314	314.0	399.0	401.0	24.9	39.6	20.0	279.8	5.06	11.2	110589	42609	16.6	10.3
356 x 406 x 340	339.9	406.4	403.0	26.6	42.9	20.0	280.6	4.70	10.50	122889	46859	16.80	10.40
356 x 406 x 347	347.0	407.0	404.0	27.2	43.7	20.0	279.6	4.62	10.3	125301	48091	16.8	10.4
356 x 406 x 382	382.0	416.0	406.0	29.8	48.0	20.0	280.0	4.23	9.40	141674	53623	17.0	10.5
356 x 406 x 393	393.0	419.0	407.0	30.6	49.2	20.0	280.6	4.14	9.17	146964	55374	17.10	10.50
356 x 406 x 421	421.0	425.0	409.0	32.8	52.6	20.0	279.8	3.89	8.53	159938	60089	17.2	10.6
356 x 406 x 463	463.0	435.0	412.0	35.8	57.4	20.0	280.2	3.59	7.83	180519	67044	17.5	10.70
356 x 406 x 467	467.0	436.6	412.2	35.8	58.0	20.0	280.6	3.55	7.84	183349	67842	17.50	10.70
356 x 406 x 509	509.0	446.0	416.0	39.1	62.7	20.0	280.6	3.32	7.18	204886	75411	17.7	10.8
356 x 406 x 551	551.0	455.6	418.5	42.1	67.5	20.0	280.6	3.10	6.67	227284	82681	18.00	10.80
356 x 406 x 592	592.0	465.0	421.0	45.0	72.3	20.0	280.4	2.91	6.23	250519	90184	18.2	10.9
356 x 406 x 634	633.9	474.6	424.0	47.6	77.0	20.0	280.6	2.75	5.89	275191	98138	18.40	11.00

Steel Column sizing chart from
British Steel company



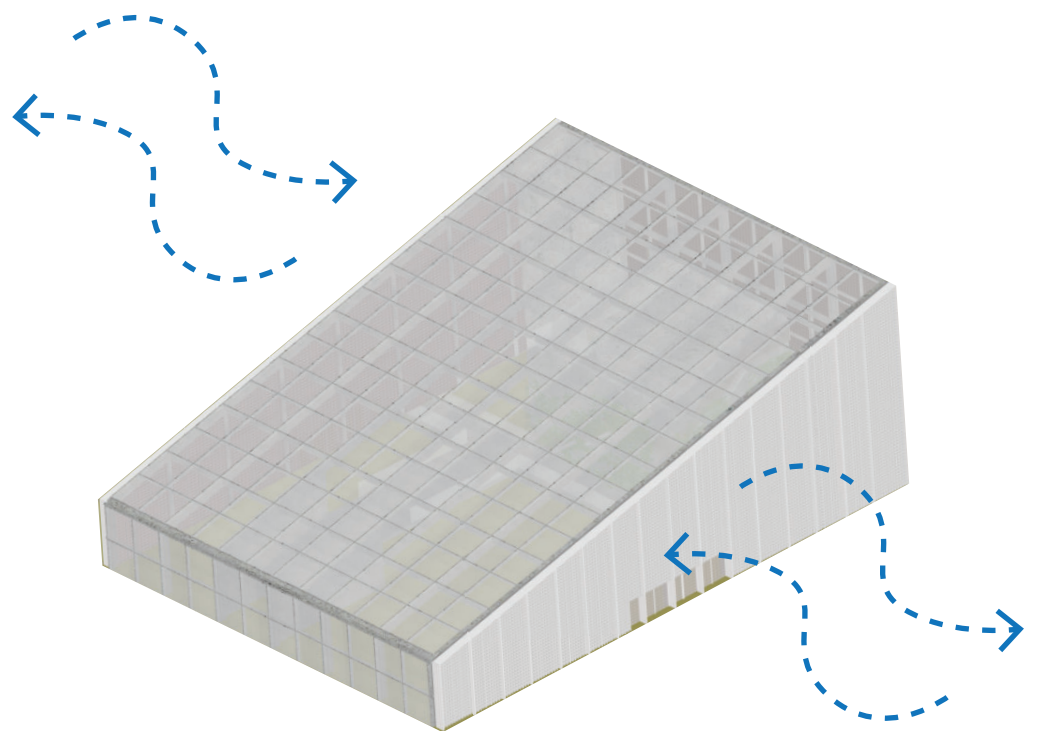


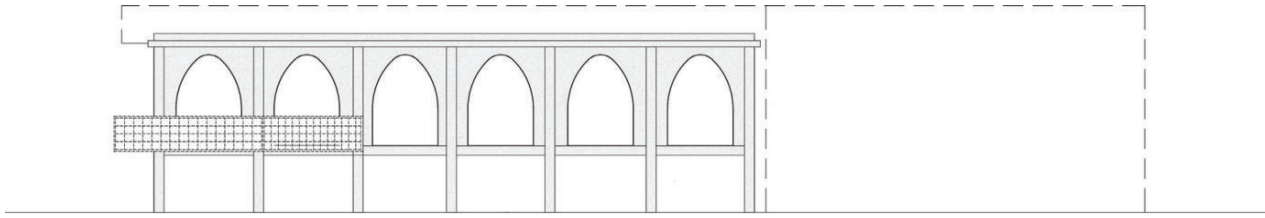
In order to support the huge span of steel structure. Enhancing the division of space and function by creating the core of function with a strong structural support as a reinforced concrete shear wall is a way to utilize the space and solid wall as much as possible. This reinforced concrete shear wall have been arranged through the corners of the building to support all the spaces, the smallest core are using as the services core for the system, office and storage with some attachable plant nursery on the wall itself.



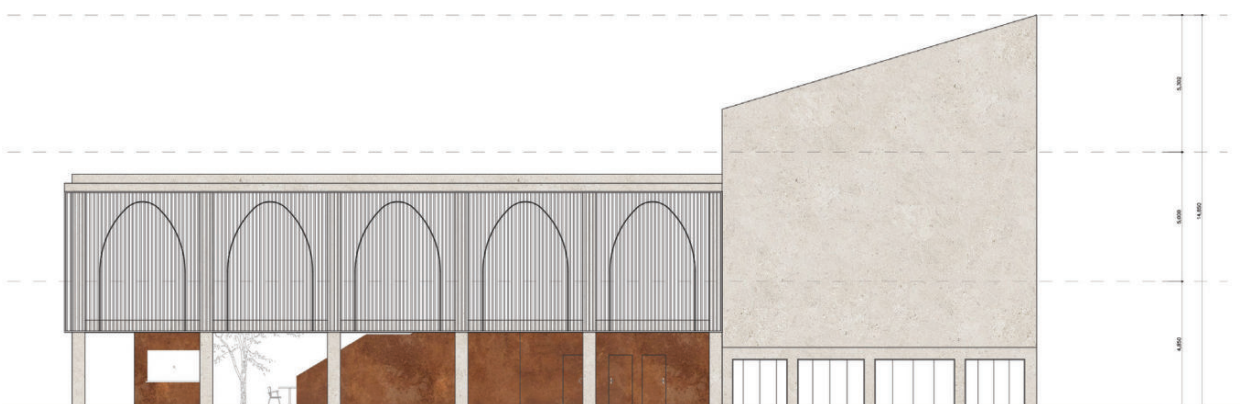
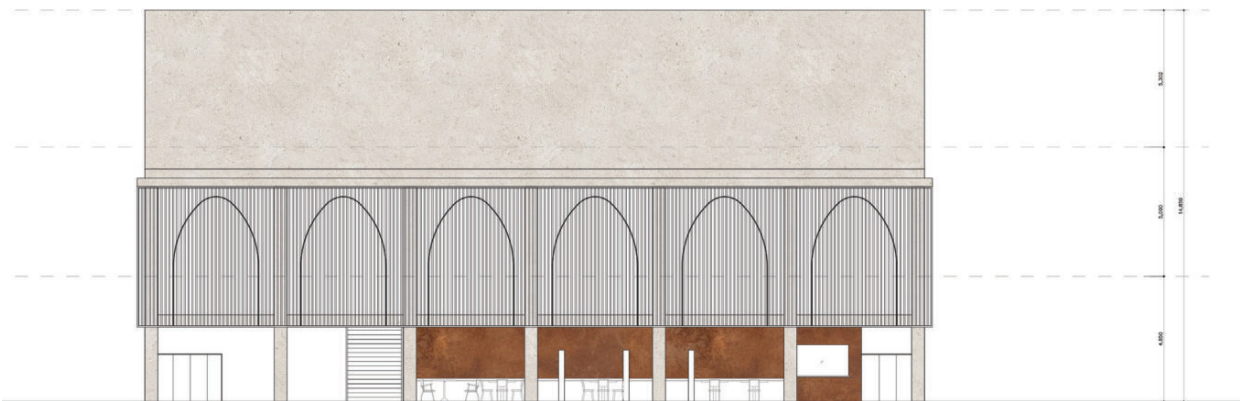
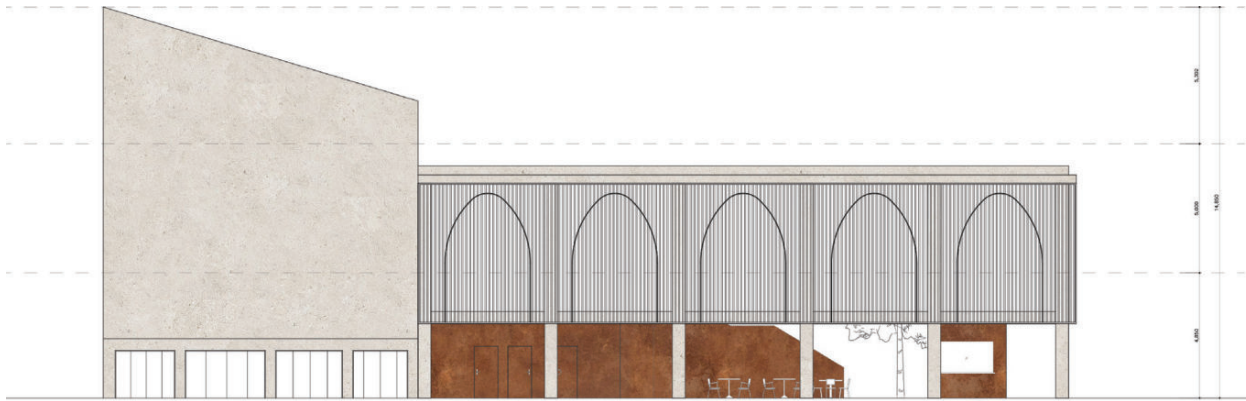
Facade

The west-east sides which exposed to the weather the most using the polycarbonate as the main protection from the rain and screening the direct sunlight into the building while still gain the weaker sunlight for the plants inside. While the north-south sides using more porous material s layers like stainless steel mesh, insect net and egg-crate aluminium shading. This is to allow the full ventilation from this side of building making the building interior cool down naturally and decrease the humidity. The egg-crate aluminium shading here act as a rain shading facade as in the monsoon season the rain is a main problem here. The proportion of this facade need to be 2:1 (depth:height) in order to use the angle to screen the rain.





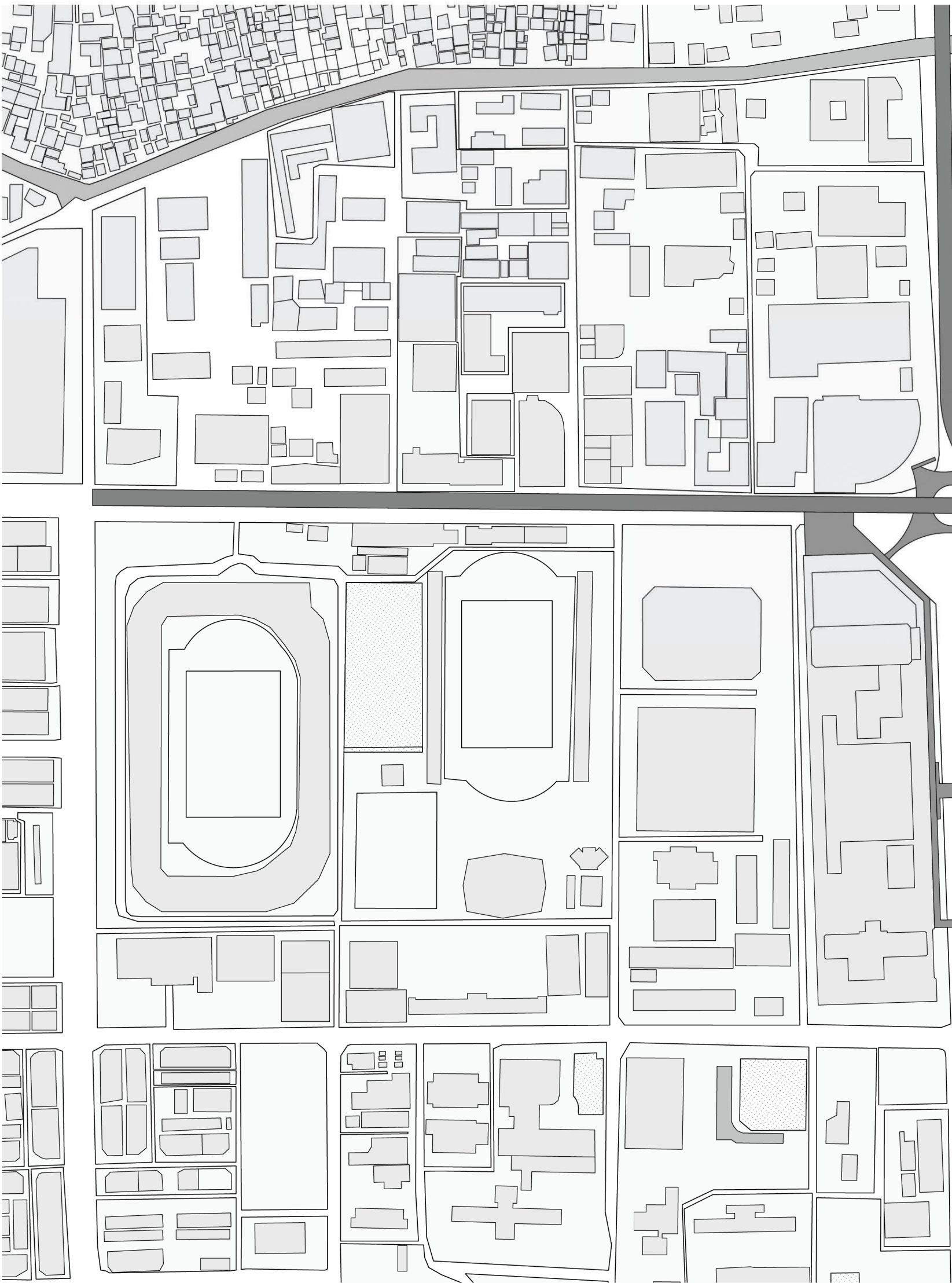
Old Scala Cinema Facade



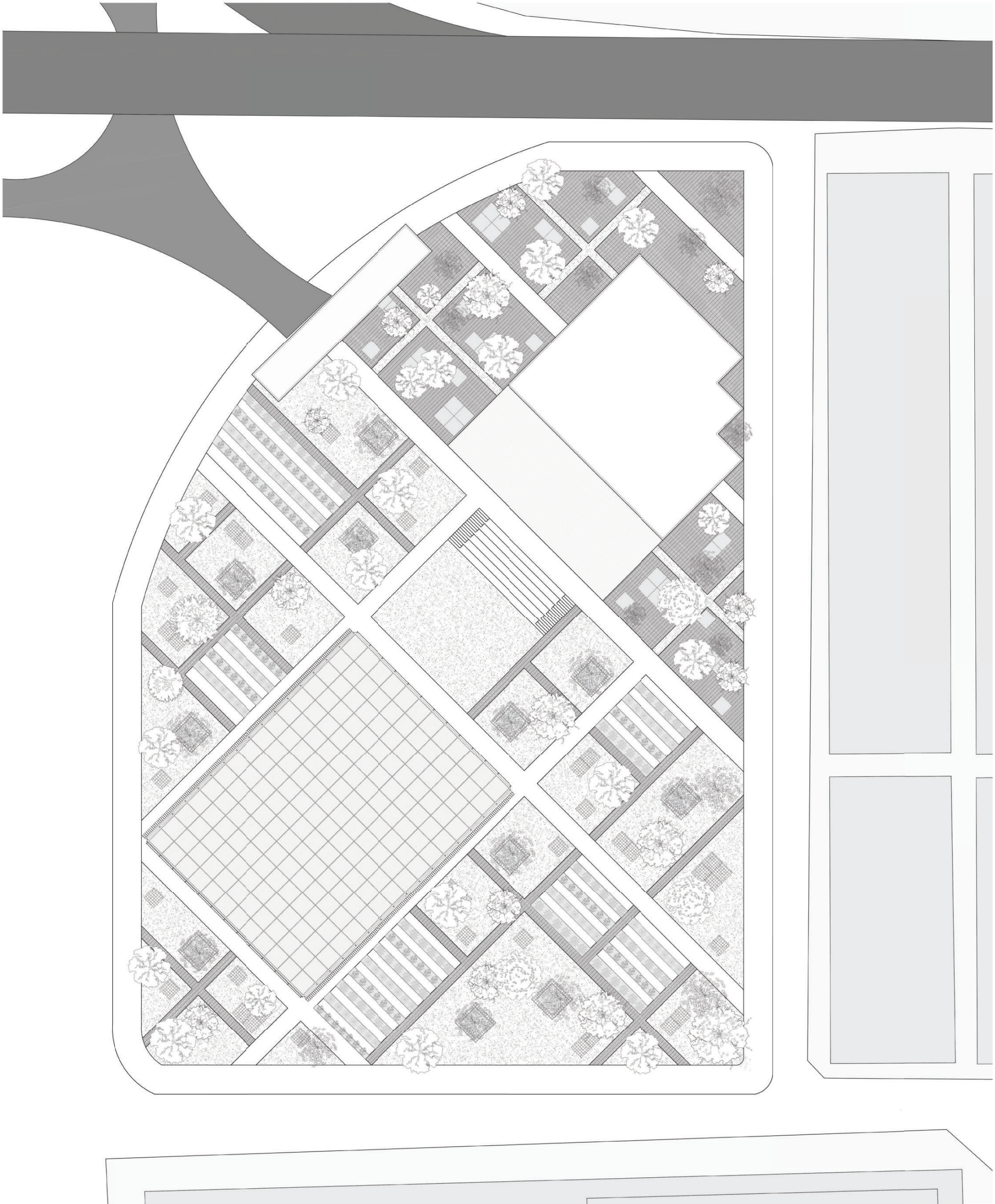
New designed Scala Cinema Facade

Scala Cinema Facade

The main challenge of the new designed building is to rebuild the same facade to keep resemble the memory of the Scala cinema while make it blend with the new design of the whole site. Keeping the important feature as the Arch and the architectural grid as these two things are the key iconic feature of the cinema while adding the other material for the extended facade. Using the similar material as the greenhouse building as the polycarbonate.







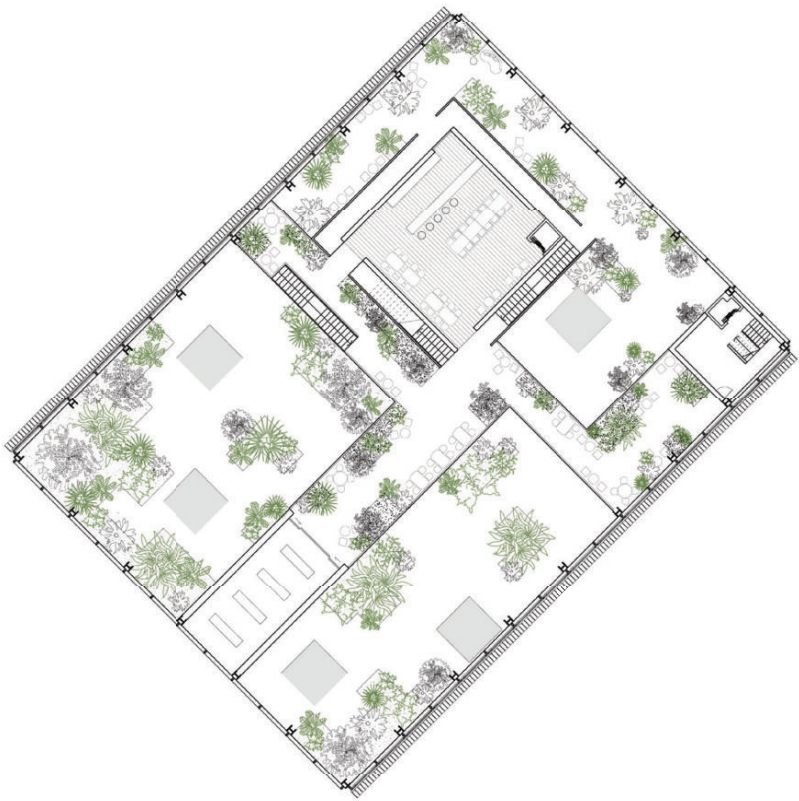
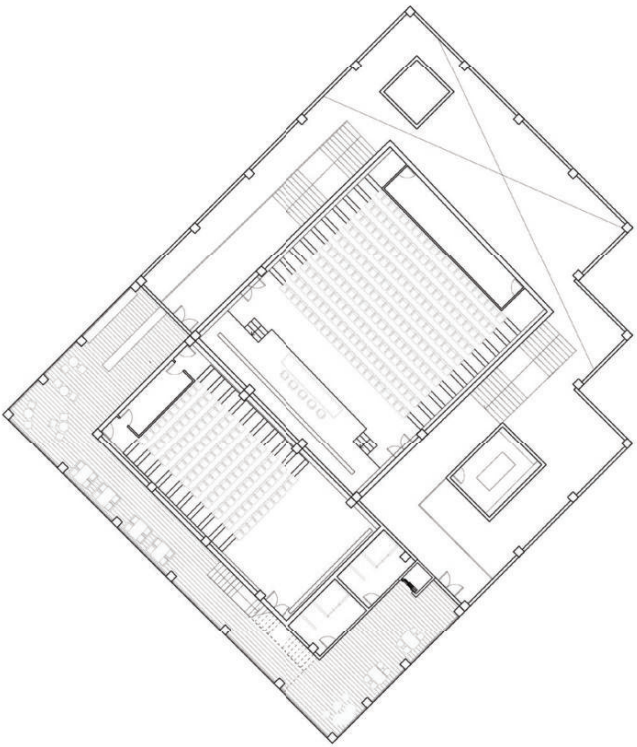
ROOF PLAN





GROUND FLOOR PLAN

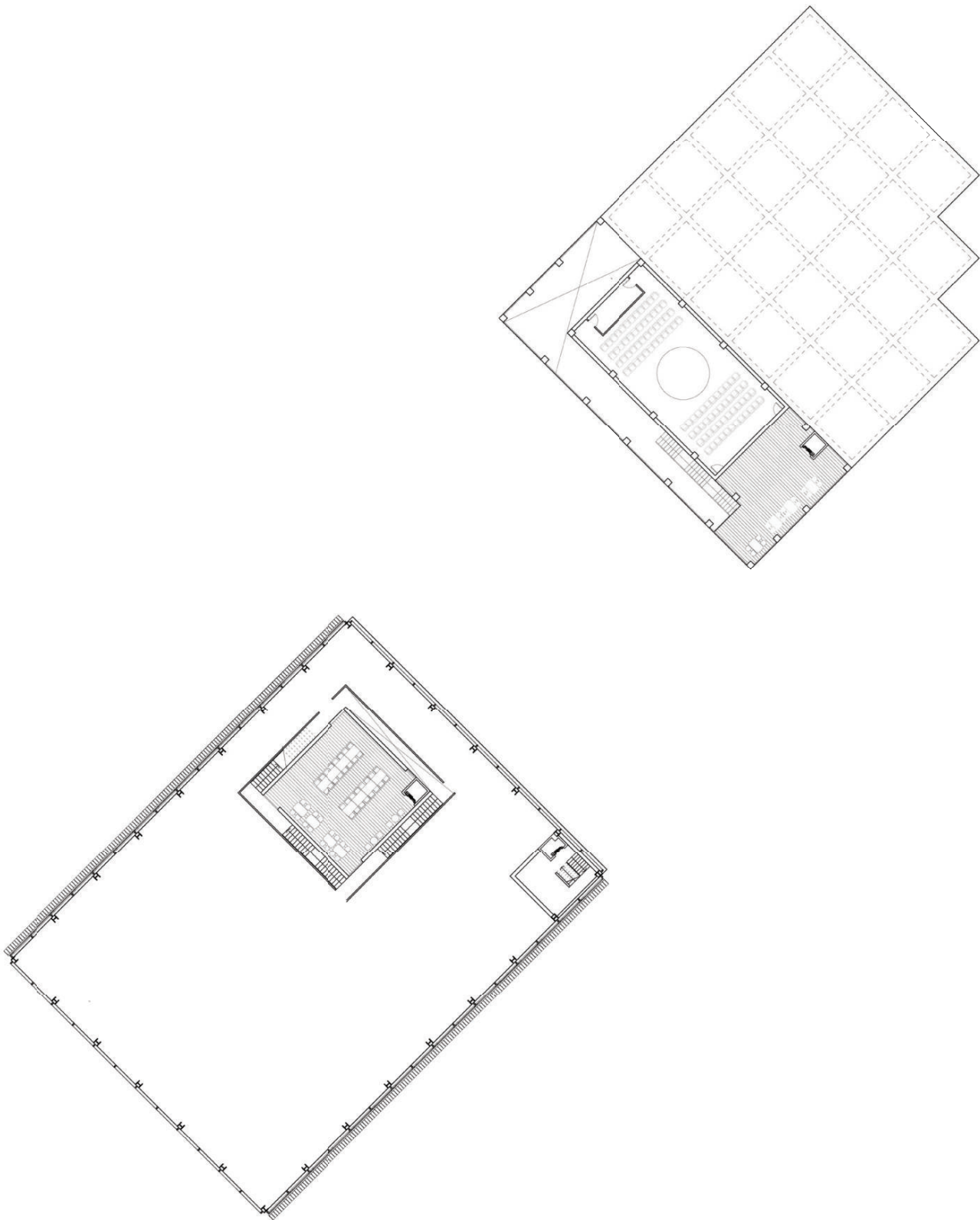




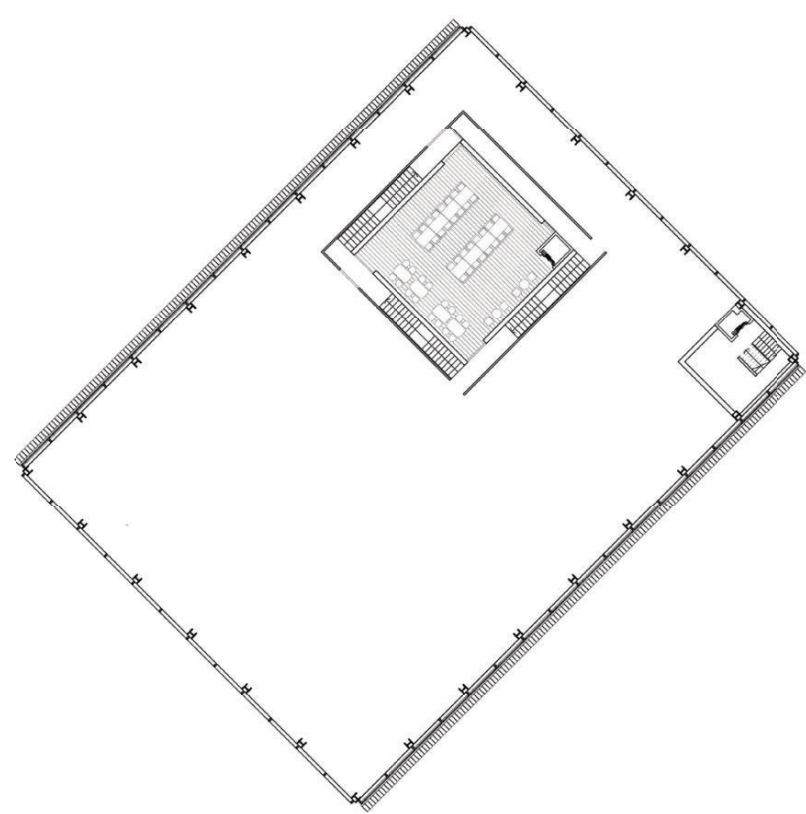
FIRST FLOOR PLAN

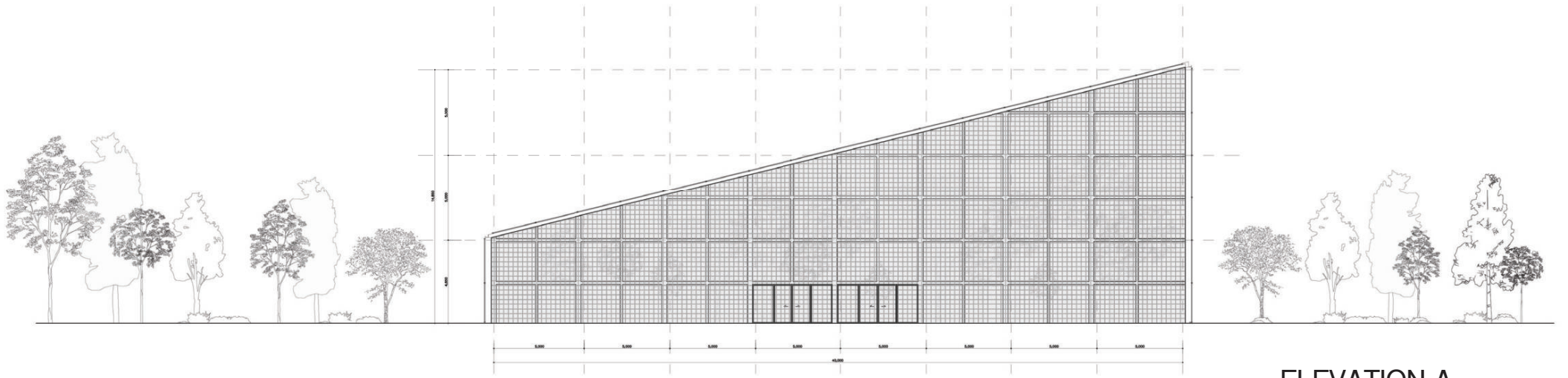


SECOND FLOOR PLAN

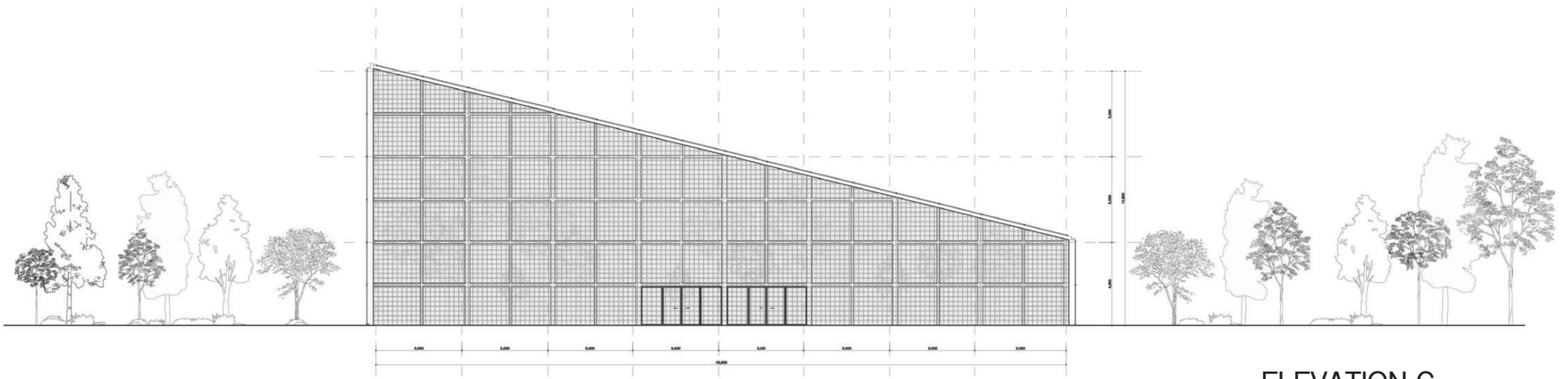


THIRD FLOOR PLAN

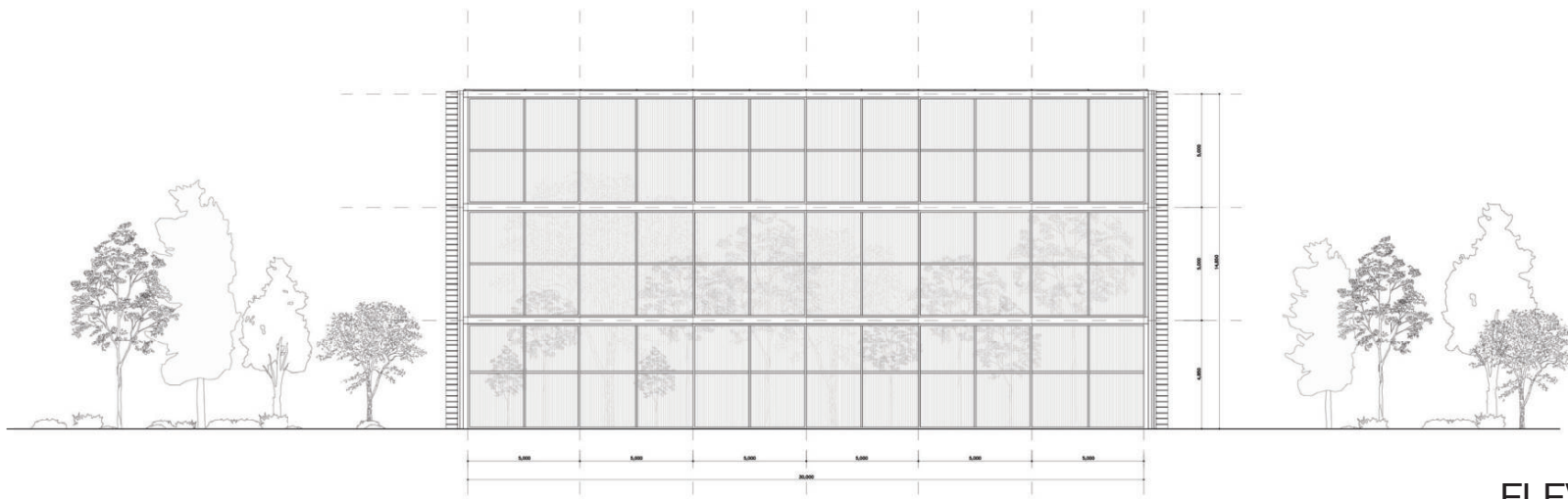




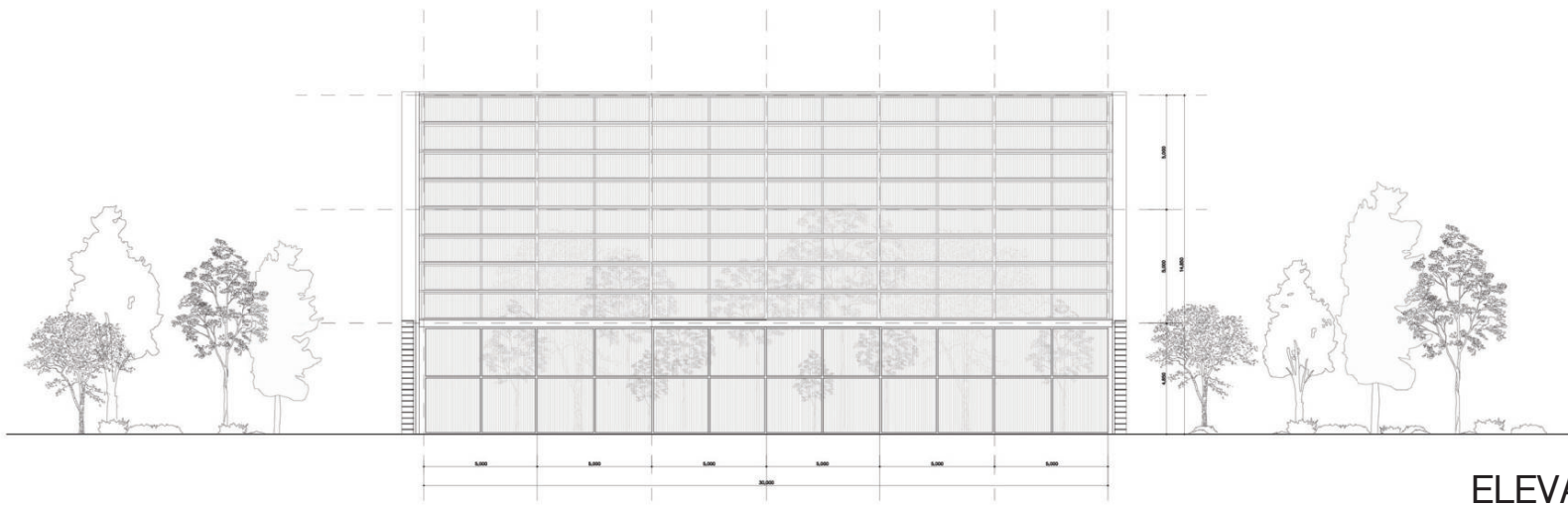
ELEVATION A



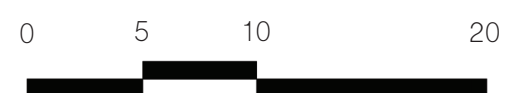
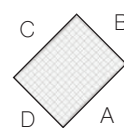
ELEVATION C

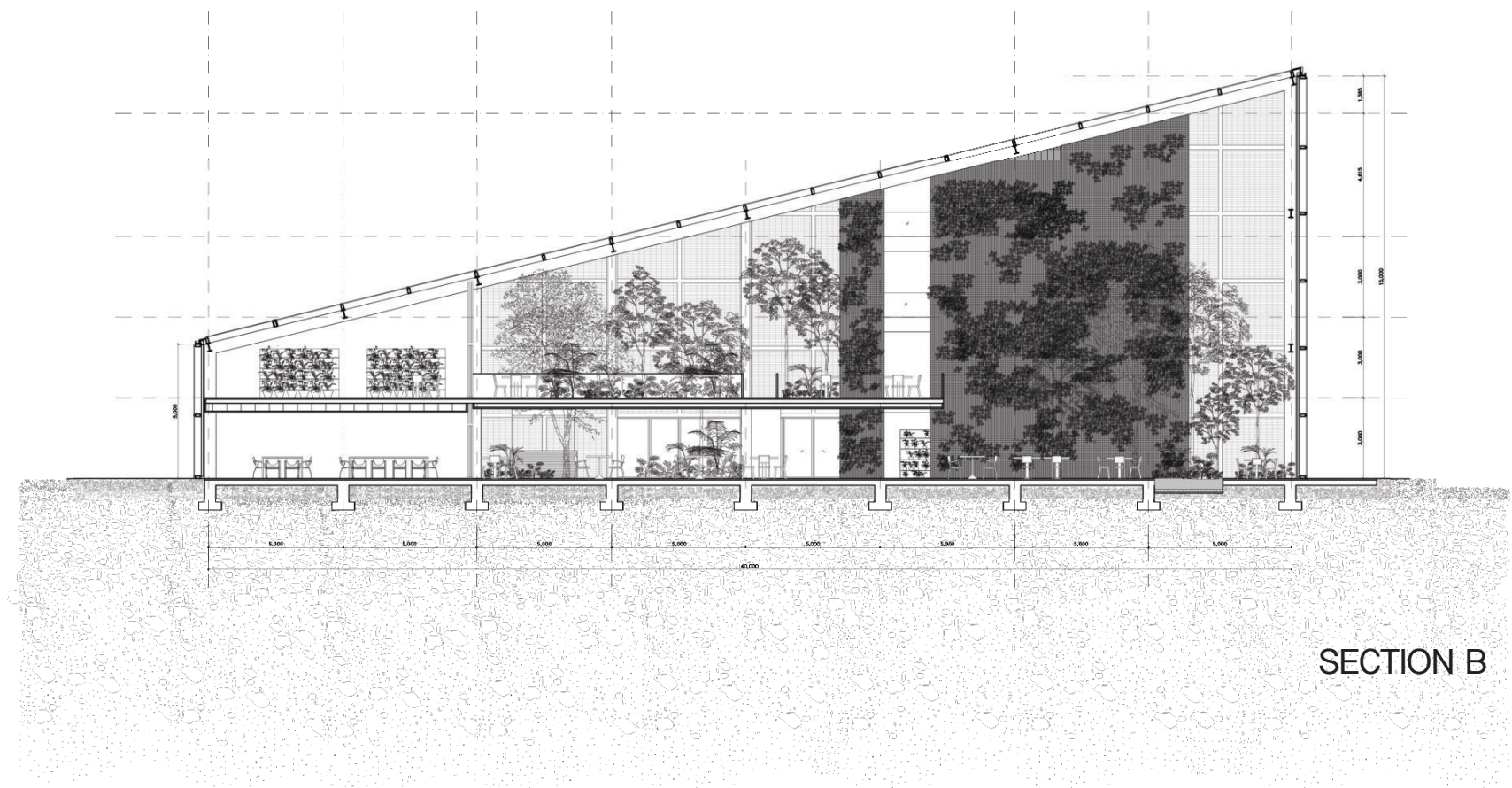
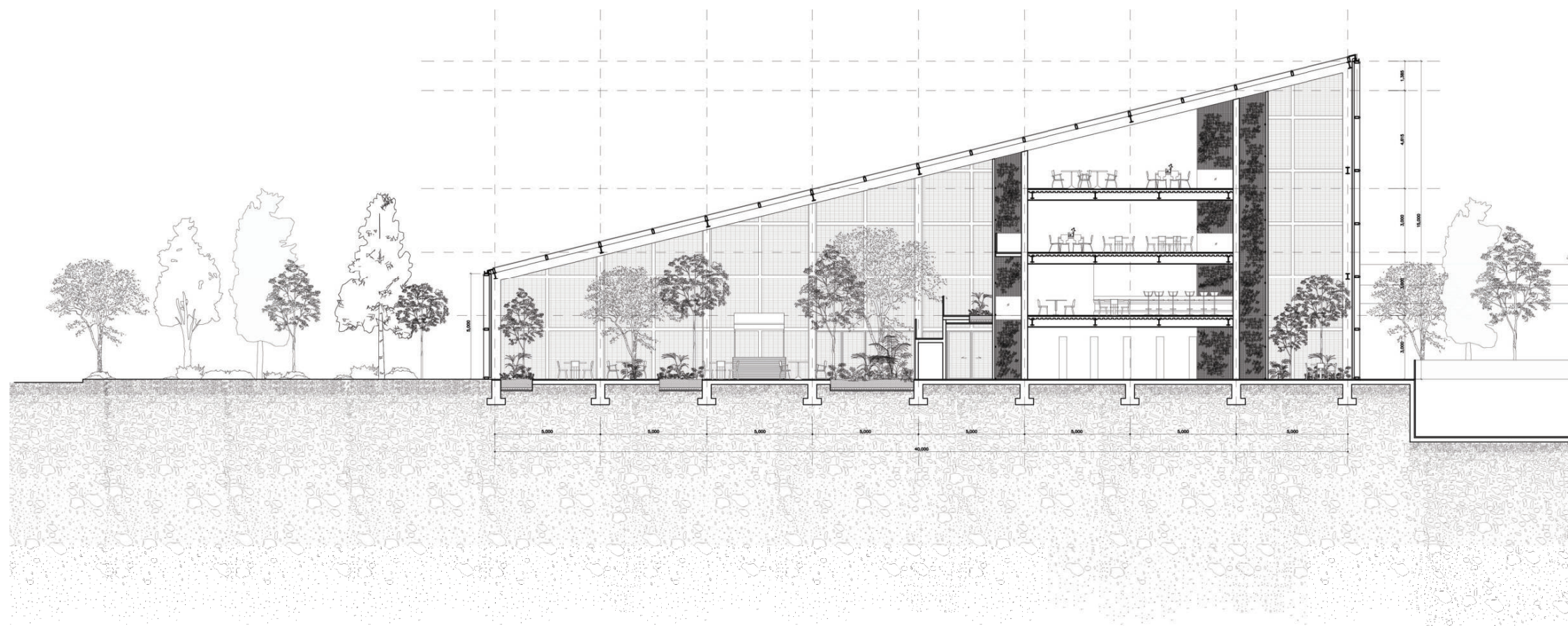


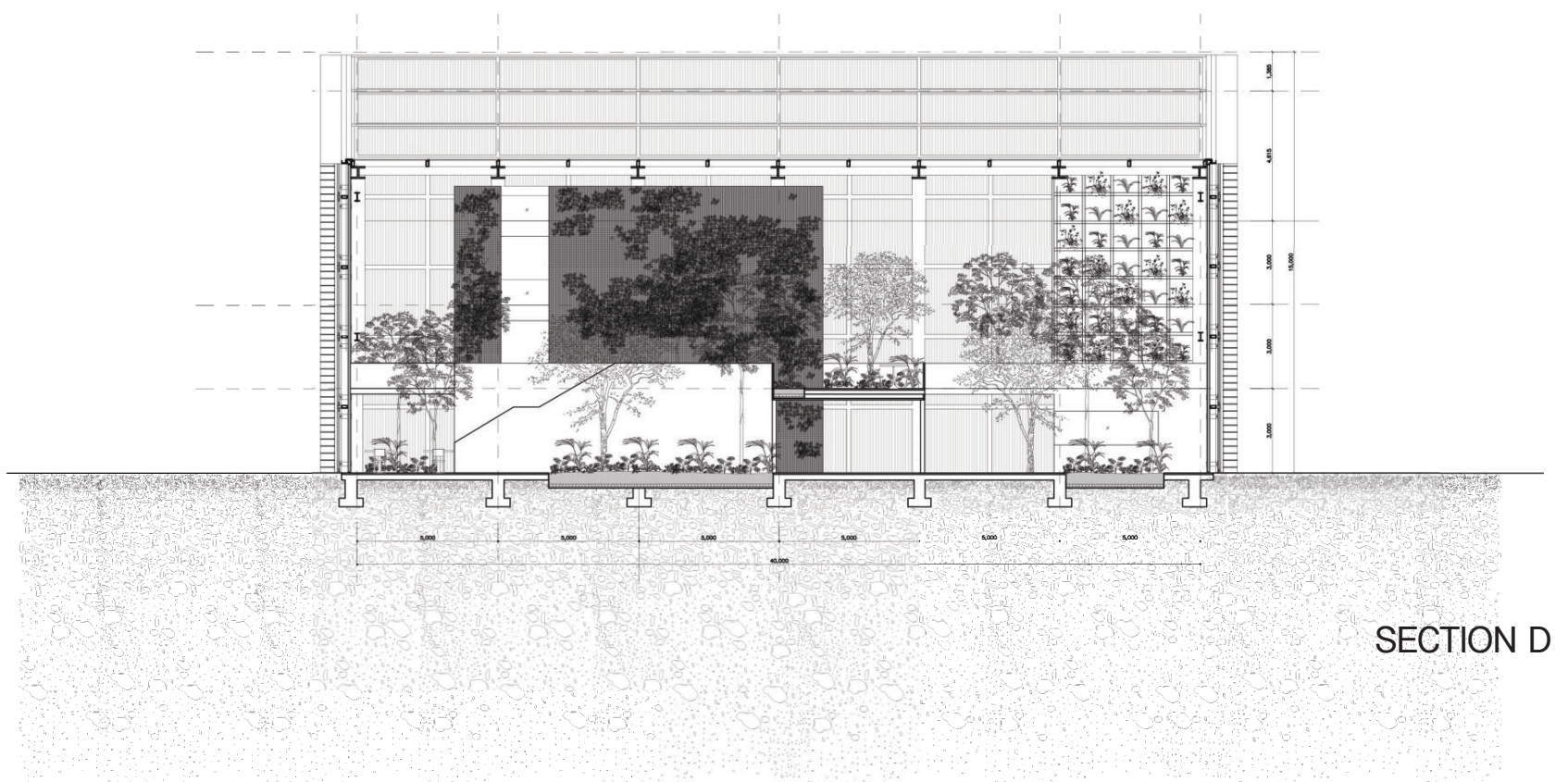
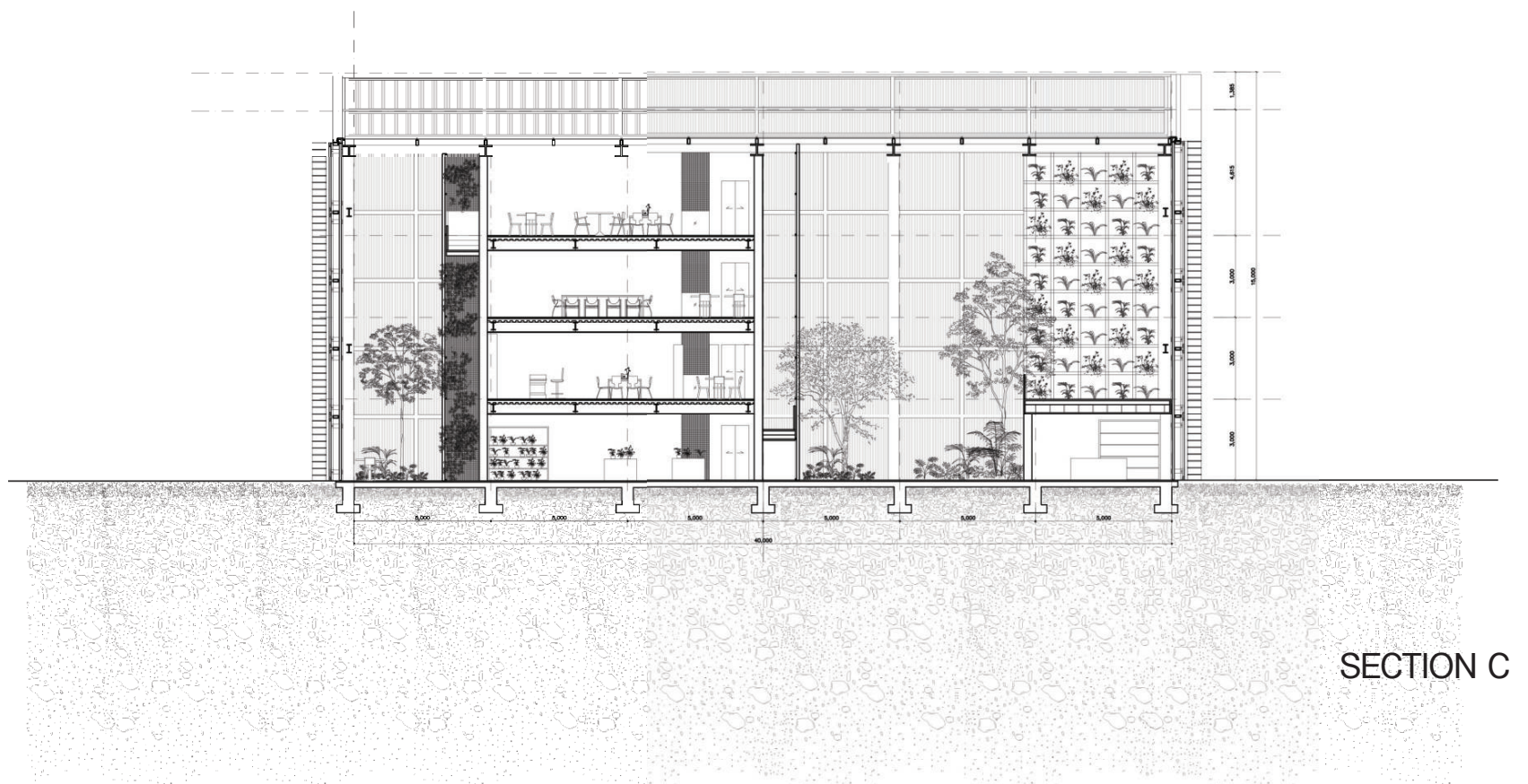
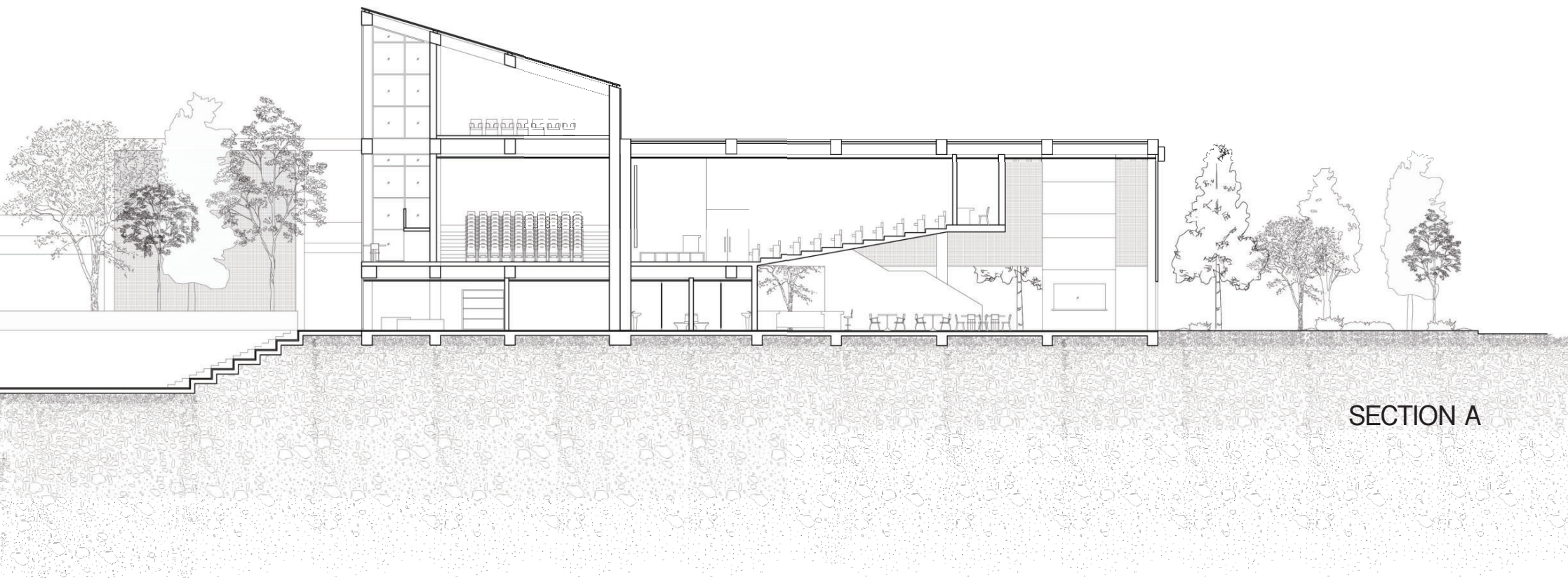
ELEVATION B

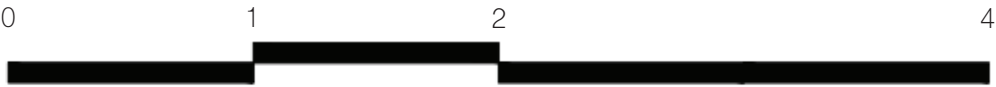
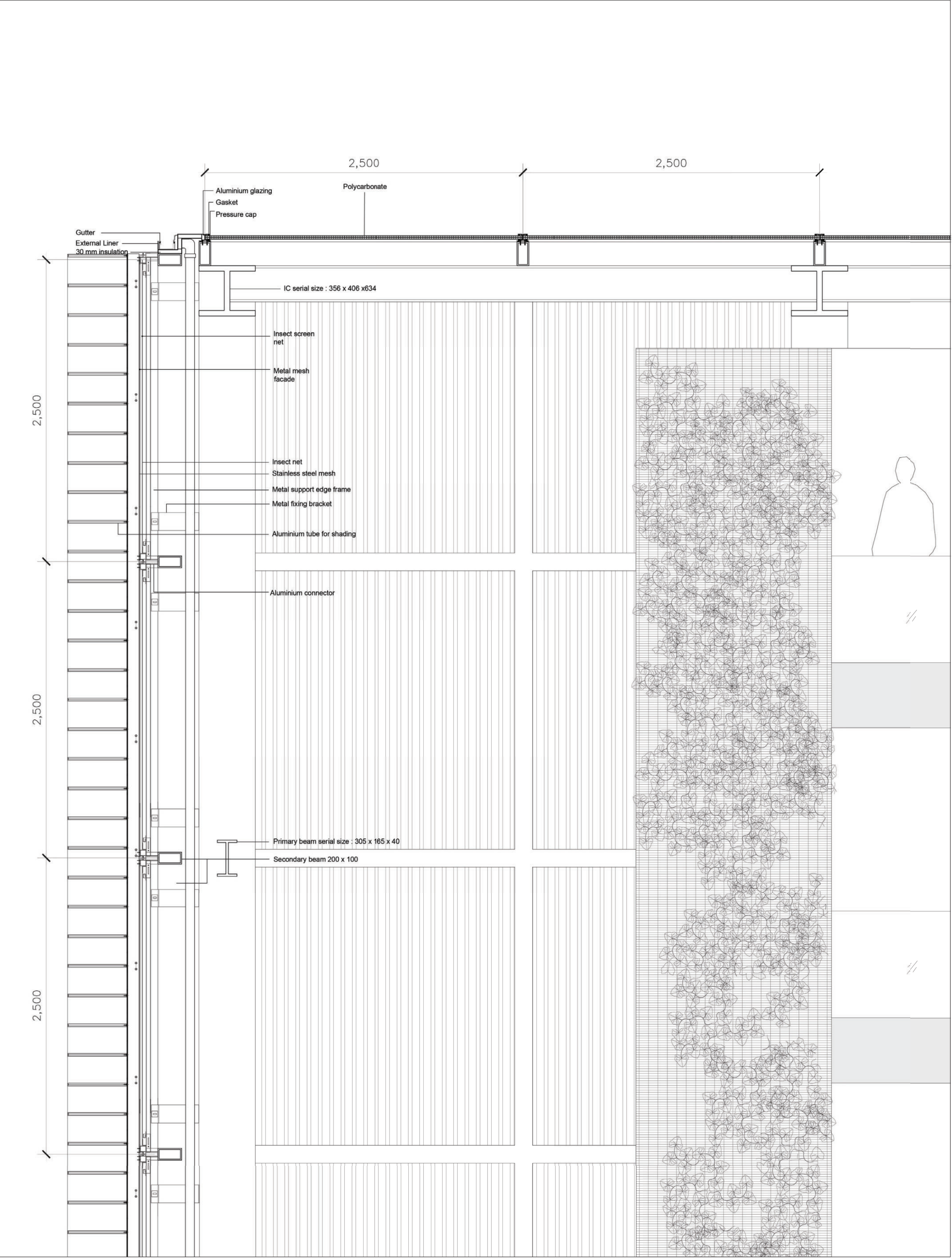


ELEVATION D

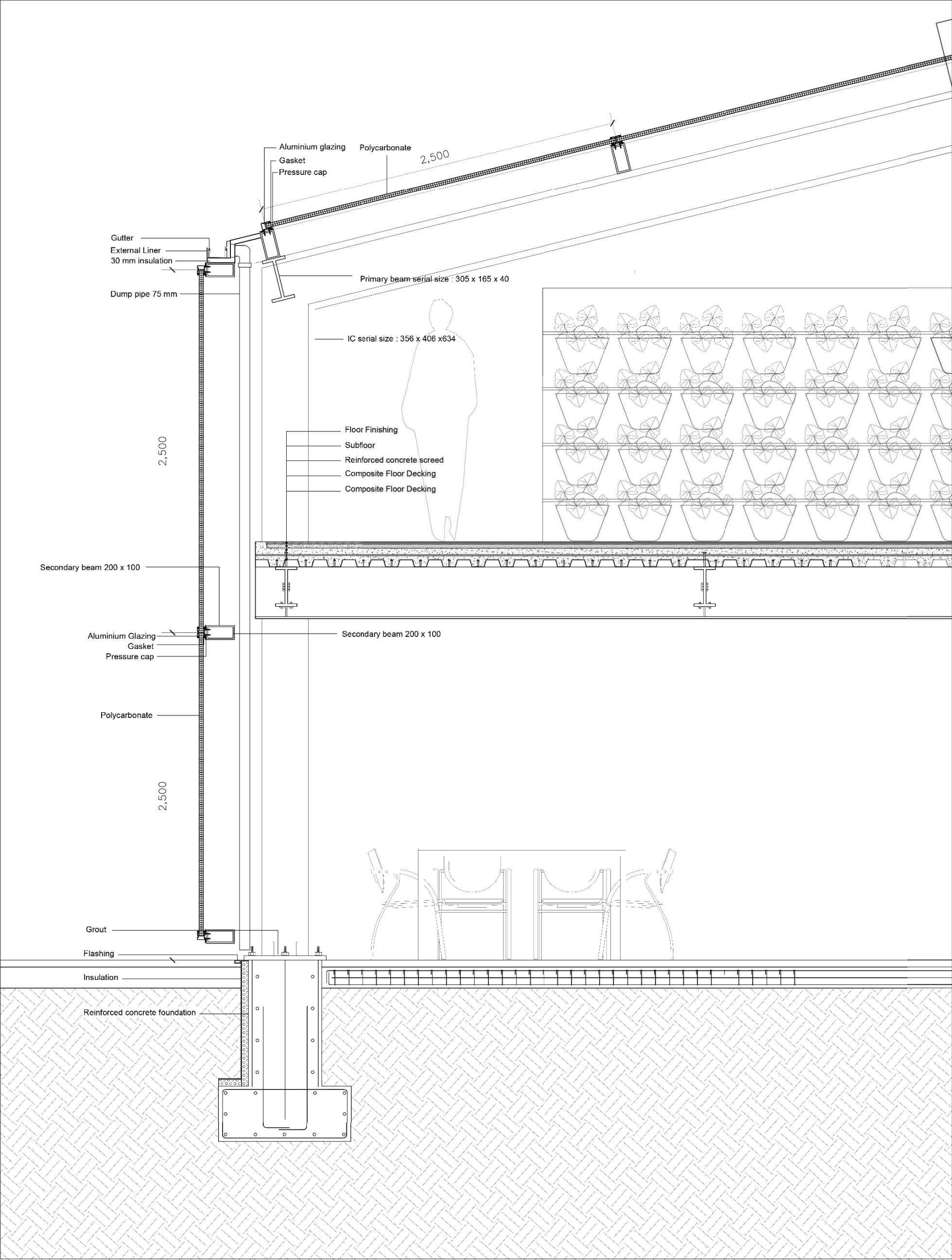








FACADE DETAIL A



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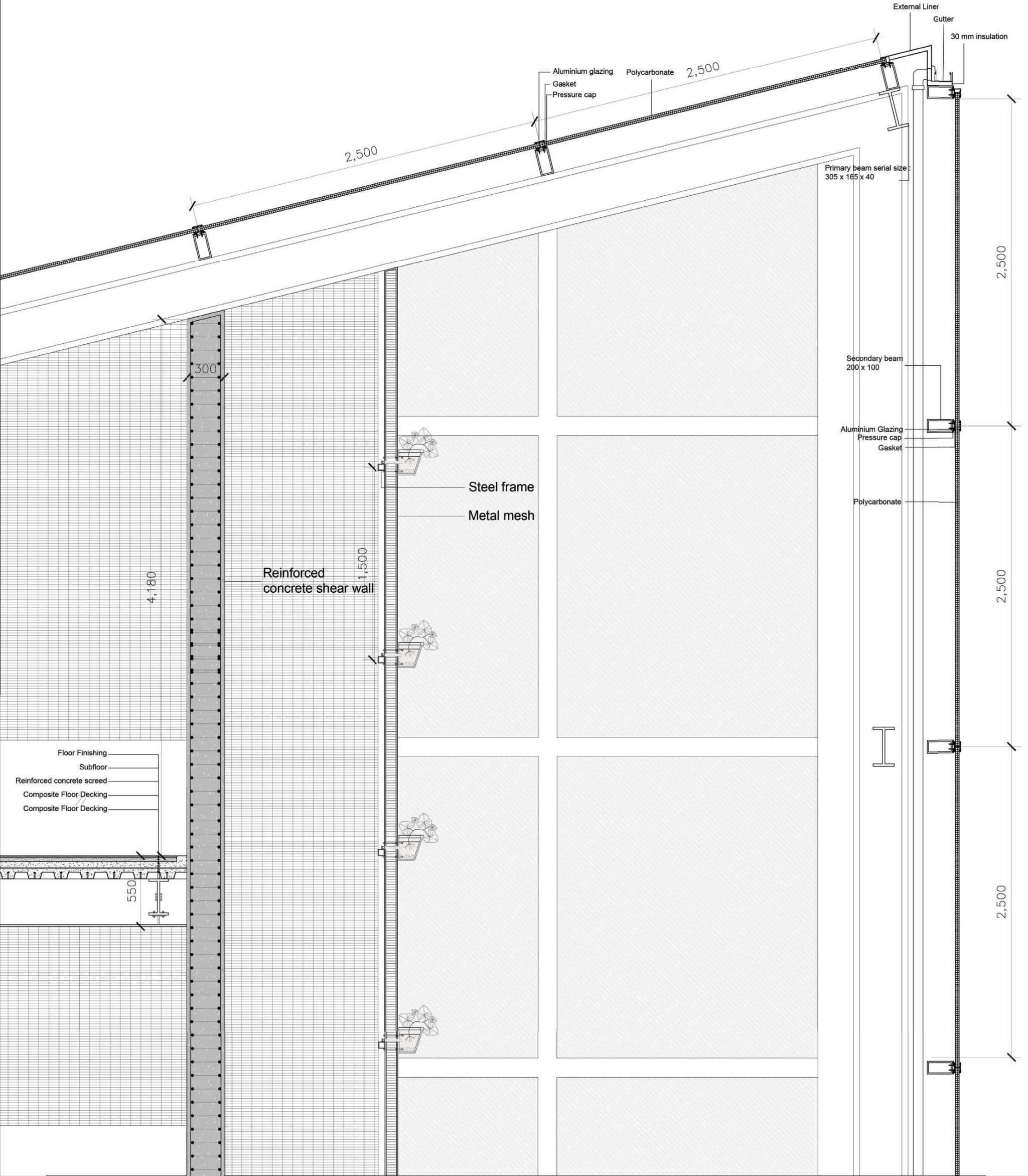
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FACADE DETAIL A

FACADE DETAIL B



FACADE DETAIL C











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