

**18 SEPTEMBERPLEIN**Eindhoven, Netherlands, 2014 - 2020.
Photo © Evabloem

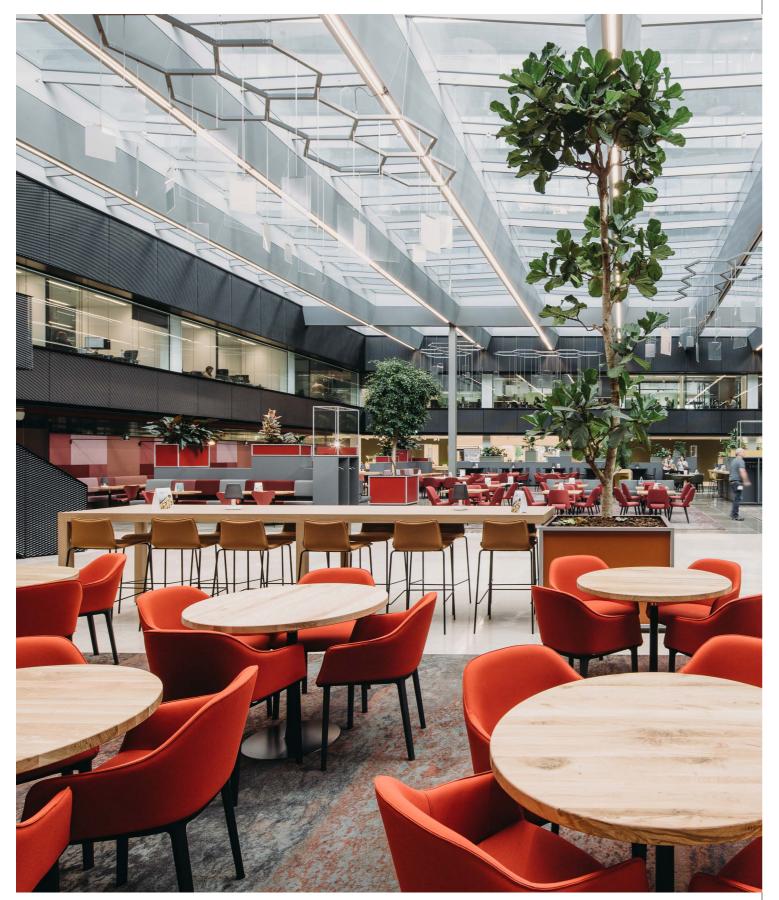
# (ABSTRACT)

The built environment is not working to its full potential. Our offices, homes, malls, theatres, and public spaces are all aging; our new builds are accelerating global carbon emissions; and our cities are losing their local heritage. Architects and designers are in a position to help lead the charge on addressing the environmental, social, and economic challenges posed by the existing built environment through thoughtful extension, renovation, redevelopment, and transformation.

Yet transformation also extends beyond the existing building stock, opening up opportunities to explore how architects and designers can influence larger societal challenges. By encouraging developers to adopt more sustainable practices, prioritising the needs of users, and shaping how people engage with public spaces, design has the potential to impact not only the success of individual developments but also to drive cultural and behavioural change. Through a balance of learning from the past and envisioning the future, there is a chance to create spaces that are not only functional but also sustainable, resilient, and rich in cultural significance. It is equally important to focus on post-occupancy performance and long-term economic viability. Doing so, ensures the delivery of projects that provide lasting value for clients and communities.

CONTENTS		uns	CASE STUDIES	
7	Introduction		41	Fellenoord 15
11	Europe		43	Hanwha H.Q.
21	North America		45	P.C. Hooftstraat
25	Asia		47	FOUR Frankfurt
33	Middle East		49	18T Mansion
39	Conclusions		51	The Bridge
41	Case Studies		53	Chamartín-Clara Campoamor Station
63	Footnotes and References		55	Expo City Dubai
			57	SeoulONE
			59	Schwanthalerstrasse
			61	Bloor Street

7 WHAT IF THE PAST TRANSFORMS THE FUTURE?



FELLENOORD 15 Eindhoven, Netherlands, 2017 - 2022. Photo © Evabloem

# → INTRODUCTION

# The adage "the most sustainable building is the one that already exists" lays bare a unique tension within the architecture and design sectors.

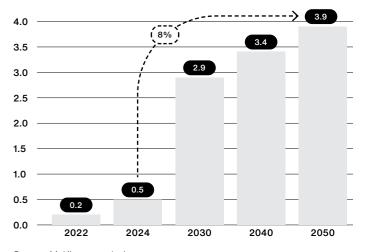
Those in the business of envisioning the built environment need to ask themselves how they can design new projects with the health of the planet in mind. However, they must equally ensure that our buildings and cities are healthy for people too. But what do we do with the urban fabric that we already have? And how do we prepare it for the future?

It is well known that the building and construction industries are responsible for around 40% of global raw material consumption and nearly 40% of energy-related CO2 emissions. Retrofitting existing buildings, rather than constructing new ones, has the potential to cut total carbon emissions by 50% to 75%, according to McKinsey. To align with the IEA's net-zero targets for 2050, regions such as Asia-Pacific, Europe, and North America will need to retrofit approximately 3% of their building stock annually by 2030. Similarly, Latin America, the Middle East, and Africa are projected to require retrofitting rates of 2.3% each by 2030, equating to roughly 4 million and 7 million buildings, respectively.<sup>2</sup>

On the whole, today's architecture and design firms recognise their responsibility to create spaces that align with global sustainability goals. By embracing such practices, they should aim to inspire and lead by example, fostering a mindset shift towards high-performance, holistic and environmentally conscious extensions, renovations, redevelopments, and transformations. It is also crucial for architects and designers to acknowledge the pressing challenges of our time, including the growing housing shortage. Globally, and particularly in Europe, this issue presents a significant challenge, yet the solution often lies within our existing building stock. Through thoughtful extensions, vertical additions, and adaptive reuse, we can meet demand while minimising environmental impact.

# Project global retrofit market size (2022-2050) to meet EIA net-zero targets, in \$ trillion

--- COMPOUND ANNUAL GROWTH RATE (CAGR)



Source: McKinsey analysis

# Top 5 themes which will drive real estate investment decisions and strategic planning

Changing customer demands / preferences

2 Corporate financial health / profitability

3 ESG

Demographic shifts

Housing affordability

Source: Emerging Trends Europe survey 2025

9 WHAT IF THE PAST TRANSFORMS THE FUTURE? UNS

Aesthetics also play a critical role in the transformation of the built environment, requiring a careful approach that reserves the historical value of existing structures while incorporating forward-looking design solutions.

While sustainability sits at the fore, it is essential to recognise that our current building stock also holds an historical - and, often, emotional - significance within our cities and countries. Governments are looking to maintain the essence of iconic places, while updating buildings to stay on track with sustainability qualifications, with many aiming to reach carbon neutrality by 2050. These are parameters within which architecture and design studios need to explore new realms of possibilities.

Aesthetics also play a critical role in the transformation of the built environment, requiring a careful approach that preserves the historical value of existing structures while incorporating forward-looking design solutions. Balancing heritage with contemporary needs ensures the creation of spaces that are visually cohesive, culturally significant, and capable of adapting to changing requirements and future demands.

In addition, in this paper, when looking at locations where the age and condition of existing building stock is not the challenge, we will include examples of the transformative measures we have developed to design equally sustainable and resilient urban environments. Here, transformation takes on another, equally important and necessary definition. Research, innovation and technology should be harnessed to explore how to transform the public's experience of a place. We need to explore different ways to investigate how users interact with public space, not only so that we can design the best environments possible, but also to nudge behaviours and encourage our clients and end users to make more healthy and sustainable choices.

Throughout this paper, we will be distinguishing between extensions, renovations, redevelopments,

and transformations. While most of the below case studies revisit spaces that already exist, they each require a different approach during the design process. These all differ in scope, purpose, structural changes, sustainability, cultural and historical value. **Extensions** thoughtfully expand spaces, balancing preservation with innovation to meet modern demands. Renovations encompass a wide range of interventions, from restoring a building's aesthetics to upgrading its functional properties, ensuring spaces remain relevant and efficient. Redevelopment revitalises outdated spaces, executing changes efficiently without compromising quality, and adapting them to meet today's needs while remaining flexible for the future. **Transformation** goes beyond these processes, embracing regenerative design and changes in building function to actively restore the environment and enhance urban quality and community wellbeing, creating sustainable and resilient spaces that positively impact both people and the planet.

The paper will also examine how our multidisciplinary teams at UNS are implementing design ideas within the realms of extension, renovation, redevelopment, and transformation across continents, and the challenges and issues architects and designers face while doing it. We will illustrate these ideas with case studies of projects that we believe inspire a collective shift toward holistic, environmentally responsible built and urban environments.

While time and economics are critical to the success of any transformation project, the vision must extend beyond project completion. Only by focusing on the business case and post-occupancy performance, can we ensure that every transformation delivers long-term value.



HANWHA H.Q. Seoul, South Korea, 2013 - 2019. Photo: © Rohspace



Aging building stock, functions changing

The European building stock is aging.<sup>3</sup> Around 35% of buildings are over 50 years old, and nearly 75% of the total building stock, exceeding 220 million structures, is energy inefficient.<sup>4</sup> Across the region, much attention is being paid to how to extend buildings' lifespans for, at least, another 50 years. As such, governments are pushing through sustainable legislation with the goal of reaching carbon neutrality. Capitalising on these sentiments, while investigating ways to upgrade, or even change, the current built environment is of the utmost importance.

Since January 2023, office buildings in the Netherlands, with few exceptions, need to meet at least an energy label C. This means that the building cannot consume more than 225 kWh per m² per year of fossil fuels. However, in the past decade, approximately 7 million square meters, or 15%, of office space in the country has remained unoccupied. Similar trends can be observed in other European office markets, such as Frankfurt and Paris, where significant investments have surpassed actual demand. With these challenges, developers and decision makers are faced with four options: consolidation, renovation or upgrading, demolition and new-build, or conversion to new functions.

It is at this juncture that today's architects and designers can advise their clients to opt to upgrade their building stock and illuminate a new business model where value is created from what is already there. In fact, retrofits could save up to 77% of costs compared to fully new buildings. While in many transformation projects, the existing buildings often fall short in terms of energy efficiency, there is another aspect that often goes unnoticed: health. Health should be a fundamental starting point for almost all projects. When undertaking transformation or renovation projects, it is important to create teams that continuously develop solutions that enhance the health of end-users and sustainability of the built environment.

35%

Around 35% of buildings in Europe are over 50 years old, and nearly 75% of the total building stock, exceeding 220 million structures, is energy inefficient.<sup>4</sup>

15%

In the past decade, approximately 7 million square meters, or 15%, of office space in The Netherlands has remained <u>unoccupied</u>.

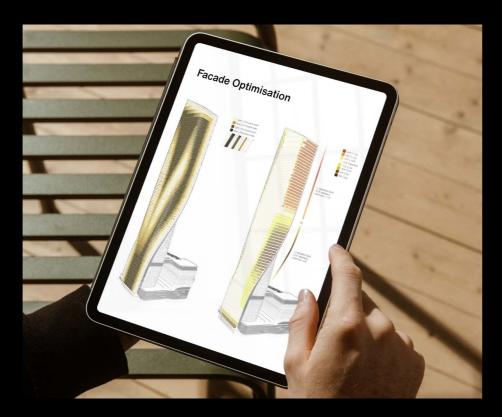
77%

Retrofits could save up to 77% of costs compared to fully new buildings.8



While renovation is one approach developers can take to improve their building stock, in Germany, much attention is being paid to transforming offices into residential projects, as the country has been grappling with a severe housing shortage for some time. With a focus on metropolitan areas, current estimates show that 320,000 new units will be needed annually until 2030, or a new house every 80 seconds.9 Meanwhile, office vacancy rates have also increased, reaching nearly 11 million square meters across 127 cities. 10 With more buildings standing empty in German cities and demands for housing skyrocketing, transformation projects present a much-needed solution to the country's growing challenges.

Architecture and design also need to turn their attention to designing for function-to-function flexibility, especially in densely populated urban areas where space is limited, and many buildings have cultural and historical value. Renovating an existing house rather than constructing a new one can reduce embodied carbon by more than 68%.11 Turning their attention to these transformation projects allow architecture and design studios to make sustainable choices that are in line with governments' environmental policies, while also adding value to their clients' existing building stock.



At UNS, transformation projects are approached by integrating climate mitigation and adaptation strategies that ensure buildings meet the most stringent-and ever-evolvingstandards. To help our designers achieve this, we develop a variety of in-house digital tools that help us understand how an existing building is currently performing and the design choices that can be made to ensure it is, at the very least, compliant with the latest regulations. By designing for long-term resilience, clients and investors are provided with confidence that their transformed buildings will remain sustainable and compliant for decades to come.

# Don't forget about heritage

→ EUROPE

Although there is an important urgency to design the utmost environmentally sustainable buildings, architects and designers cannot lose sight of the cultural and historical value of the local context. Both the Dutch and German, as well as many other European countries', governments have laws in place to preserve the cultural-historical character of places and ensure no damage is done to monumental



In 2019, UNS renovated the facade of P.C. Hooftstraat 138 in Amsterdam, demonstrating how innovative and sustainable materials can be employed to enhance aesthetic appeal, durability and energy efficiency, and also adhering to strict regulations regarding traditional Dutch streetscapes. At FOUR Frankfurt, a mixed-use urban development in the heart of Frankfurt, our designers integrated the monument-status facade of the original Deutsche Bank building. This assimilation aimed to preserve the historical significance of the original building, while the rest of the podium is re-opened to the public, creating a walkable urban space that reconnects different parts of the city.

17 WHAT IF THE PAST TRANSFORMS THE FUTURE?

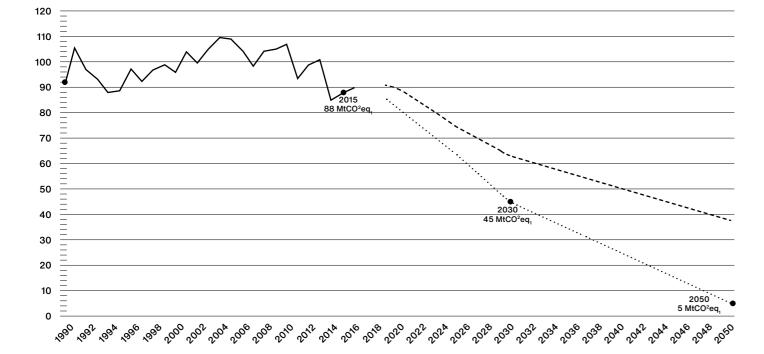
Striking a balance between designing for sustainability and maintaining the local aesthetic is a driving force in France. For the country to reach its decarbonisation goals for 2050, developers can only invest in extending, renovating, redeveloping, and transforming their building stock. Many of these projects are taking place in suburbs, where outdated public buildings such as hospitals are being transformed into new, mixed-used community centres. Architecture and design studios can also help bring about behavioural change by including urban design into these regeneration projects.

In addition, in Greece, developers are looking at interventions that bring added value to their building stock, notably in the hospitality sector. With a focus on maintaining local aesthetics and historical significance, especially in coastal cities and islands, designers are reimagining the hospitality offering and interior experiences to bring new value to the projects and their locations.

In Luxembourg, on the other hand, the government and large private companies have been redeveloping brownfield sites within the country for the past 25 years. With a strong history in the steel industry, these sites are now being cleaned and redeveloped to bring about a new sense of community.

#### Historical and projected emissions from the buildings sector between 1990 and 2050 (in MtCO<sup>2</sup>eq)

Historic Emissions (secten 2018)
 Business-as-usual (with existing measures)
 Revised SNBC scenario (carbon neutrality)



→ EUROPE



The Kyklos building in Luxemburg, designed by UNS for the Belval site, is a testament to the reinvestment in this area and to how we can explore new sustainable design choices while respecting local heritage. Here, our designers used the 'Carbon Builder' to intricately study numerous options to reduce the carbon footprint of their projects. For the Kyklos building proposal, using the early prototype of our Carbon Builder enabled the team to make the correct decisions early in the concept design process. By choosing to use recycled steel, the project not only reduces its environmental footprint but also demonstrates how circular economy principles can be applied to contemporary architecture. This approach ensures that the building's structural integrity and aesthetic appeal are maintained while minimising the consumption of new resources.

In Spain and Portugal, larger infrastructure projects are taking centre stage when it comes to transformation and regeneration. As travel to and from the countries increases, so does the strain on older stations that need upgrading. With a need for housing, public buildings and large infrastructure projects, architecture firms working within Europe should take this opportunity to revisit and upgrade the built environment without putting a strain on the planet.



Projects like UNS, b720 Arquitectura and Esteyco's' proposal for the transformation of Madrid Chamartin-Clara Campoamor Station highlight the importance of modernising transport hubs while preserving their historical and architectural significance. In the case of Chamartin Station, the design retained the iconic shape of the arches, blending the station's heritage with a sustainable design that accommodates multi-modal transport, increased capacity, enhanced user experience and expanded programming, including a large public park.



UNS

## Retrofitting is at an alltime high, but is it?

A significant portion of the country's infrastructure faces major risks from natural disasters vulnerable to flooding, high winds, or wildfires:

19%

of power infrastructure,

17%

of telecommunications systems, and

12%

of airports.

American cities are revisiting their current building stock at an unprecedented rate. According to the American Institute of Architects (AIA), since 2022, the majority of revenue for architecture firms is now generated from renovation projects rather than new construction (Bloomberg). While this figure may signal a more environmentally focused shift in the market, just 3.8% of these renovation projects focus on enhancing a building's energy performance, while only 1.6% aim to improve its resiliency (Bloomberg). While developers and clients outside of the North American market are mainly choosing retrofitting, renovation, extension, and transformation to upgrade their building stock to align with governments' environmental goals, in the United States, the choice to renovate versus building new illustrates the ever-changing economic climate developers and investors face.

But there is room for a more-expansive view on this topic.

Climate change and its effect are being felt more consistently every year. We are facing more extreme weather events, more severe storms, and more frequent wildfires, all which impact air quality and daily life across the world. The U.S. building industry, in the meantime, produced 169 million tons of construction and demolition waste in 2015, according to the U.S. Environmental Protection Agency, which is the most recent year with available data.<sup>13</sup> Extension. renovation, redevelopment, and transformation should not be made to just deal with what we are already experiencing, but what we will face in the future ahead.

Not only do buildings need to be ready for such conditions, but the American infrastructure is also at risk from climate change. A significant portion of the country's infrastructure faces major risks from natural disasters, with 19% of power infrastructure, 17% of telecommunications systems, and 12% of airports vulnerable to flooding, high winds, or wildfires.<sup>14</sup> Architects and designers can encourage the government and private investors to not only invest in upgrading America's infrastructure, but also in simultaneously making it environmentally, socially and physically resilient.

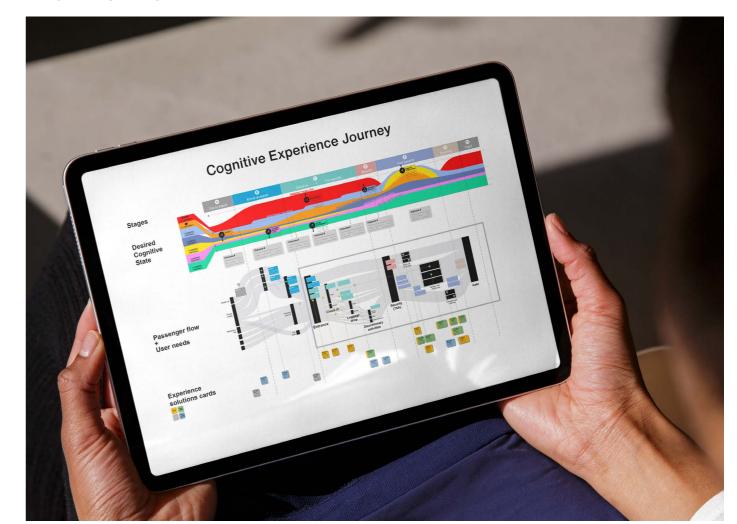
To do this, architecture and design practices should leveraging technological and sustainable innovations, which combine research, strategic guidance, and advanced tools to deliver solutions that are both environmentally responsible and human centered.

#### The social must also be sustainable

While retrofitting, renovation, extension, and transformation are imperative to designing a more environmentally sustainable built environment, making these choices can also improve social sustainability within communities. According to a Bloomberg CityLab, "in places where the mid-century building boom was tempered by the endemic racism and classism that remade cities, much older historic buildings are what's left, surrounded by people that never lost sight of them". Architects and designers need to participate in civic outreach to understand the ways in which overlooked buildings within American communities play a role in their everyday lives. By renovating or implementing adaptive reuse principles, designers can address local challenges while building more resilient communities.

UNS works with key stakeholders, including city officials and community members, to understand how individuals interact with the urban environment. Using different technological approaches, including cognitive analysis through eye movement and stress response tracking, Virtual Reality (VR) and Digital Twin models, we can ensure that mobility solutions prioritise walkability, accessibility, and user experience, while also anticipating the evolving needs of a rapidly growing urban core.

For the system-wide architecture and urban design of the Austin Light Rail project, our designers, in collaboration with HKS and Gehl, designed a system that connects communities, enhances public spaces, and integrates with Austin's evolving urban fabric. It also encourages local Austinites and visitors alike to take public transport and experience the city in entirely new ways.



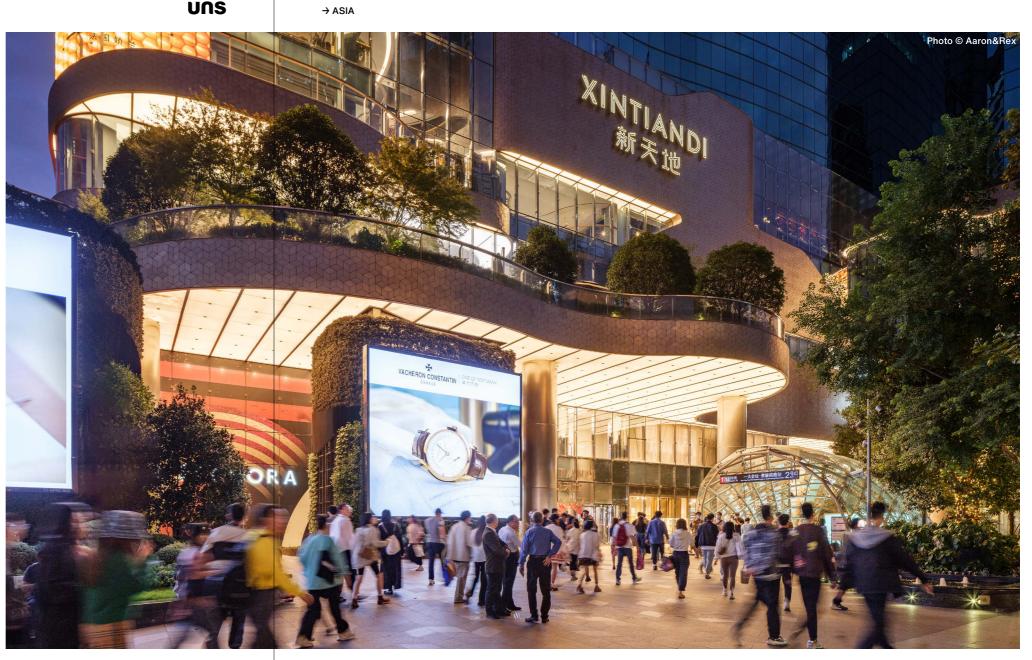


For some time now, countries across Asia have been rapidly urbanising. Asia is home to 54% of the world's urban population, equating to over 2.2 billion people. By 2050, this urban population is projected to increase by 50%, adding approximately 1.2 billion more residents.<sup>16</sup> With such rapid growth also comes higher CO<sup>2</sup> emission rates; the entire continent accounts for around 50% of global emissions.<sup>17</sup>

To combat these emission rates, the Chinese government has put forward a national strategy to achieve carbon neutrality by 2060, while the Korean New Deal, published in 2022, aims to accelerate the transition towards a low-carbon green economy by investing close to 143 billion USD and creating 1.9 million jobs by 2025.18 With public attention set on carbon neutrality and reducing emission rates, Asian governments and the private sector are reevaluating the current building stock, and are looking at ways to extend, renovate, redevelop, and transform what is already there.

In 2021, buildings in China accounted for 36.3% of the country's total energy consumption over their entire lifecycle.<sup>19</sup> The aging building stock, constructed to support the country's rapid urbanisation, is now prompting architects, urban designers, governments, and developers to focus on upgrades that enhance value, either through increased property and land worth, improved societal wellbeing, stronger return on investment, long-term benefits, brand identity, or heritage preservation. These efforts not only align with strategic goals but also play a critical role in advancing a more sustainable built environment. While residential and office buildings are two typologies at the centre of conversation, retail is another typology that needs a sustainable transformation.

In 2024, the Chinese government outlined its aims for upgrading the retail sector to establish a modern retail system characterised by smart technology, convenience, sustainability, a well-balanced supply, diversified channels, and high-quality services by 2029.20 In addition, more retailers are adopting sustainability strategies, such as using renewable energy, LED lighting, and eco-friendly materials, and prioritise properties that meet green standards.<sup>21</sup> This demand for environmentally conscious retail is set to grow making it essential for architecture and design practices to focus on transforming this typology.



Xintiandi Plaza highlights the importance of renovation within the retail typology. Once a traditional department store, it has been transformed, in a collaboration with Shui On Land, into a modern lifestyle destination that caters to contemporary needs by offering shopping, leisure, and social spaces. The project successfully repositioned the space, addressing its outdated functionality and transforming it into a hub of activity. The renovation also embraced cultural preservation through heritage-inspired designs that celebrate the local identity. The adaptable nature of the space demonstrates how thoughtful design can ensure long-term relevance and flexibility in a rapidly changing retail landscape.

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National strategy by the Chinese government to achieve carbon neutrality by 2060.

1.9M

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In anticipation of this trend, the South Korean government allocated the equivalent of 6.9 billion euros a year between 2017 and 2021 to reach their goal of initiating a hundred new regeneration projects a year.<sup>25</sup> However, while the government seeks to mitigate climate change, the private sector is also working to bring about change.

end of their lifespan and will need to be renovated.



The remodelling of the <u>Hanwha Headquarters</u> in Seoul focused on enhancing energy efficiency and incorporating green technologies, transforming the Hanwha Headquarters into a model of environmental responsibility. The design of the building's facade and systems significantly reduced energy consumption while improving overall functionality. This project not only demonstrates the potential of sustainable design but also sets a new standard for urban regeneration in South Korea.

→ ASIA

At an urban scale, South Korea is witnessing a shift toward wellbeing-focused urban transformation, that is spreading out from city centres. This movement is driven by changing societal needs, habitat quality, and growing environmental concerns. Cities like Seoul are embracing participatory urban regeneration projects that prioritise green spaces, sustainable infrastructure, and community engagement. In combination, architects and designers need to address the challenges of aging infrastructure while also creating vibrant, livable spaces that align with the evolving expectations of urban residents.<sup>26</sup>

While there is a much-needed focus on sustainability, governments and developers are also looking to maintain and uphold regional heritage. Urban regeneration projects in South Korea often integrate cultural preservation into their designs ensuring that modernisation does not come at the expense of historical identity.<sup>27</sup> Likewise in China, where architecture studios have to focus on integrating historic elements into their designs. This ensures that the rich cultural identity of neighborhoods is preserved, even as they are transformed to meet the demands of modern urban living.

The design approach to maintaining regional heritage is illustrated in the UNS designed 18T Mansion in Chongqing. Located in the historic Shibati area on the Yuzhong peninsula, the project, designed in collaboration with the developer GuocoLand, transforms the site into a WELL-platinum certified residential project. 18T introduces contemporary residential towers and public spaces while integrating key heritage elements, such as the iconic 18-step reachable well, into its design. This approach not only enhances livability but also ensures that the cultural identity of the neighbourhood remains intact. As a cornerstone of the Shibati area's transformation, 18T is also designed to create a sense of community and connection, offering flexible, green, and socially engaging spaces that cater to both current and future residents.

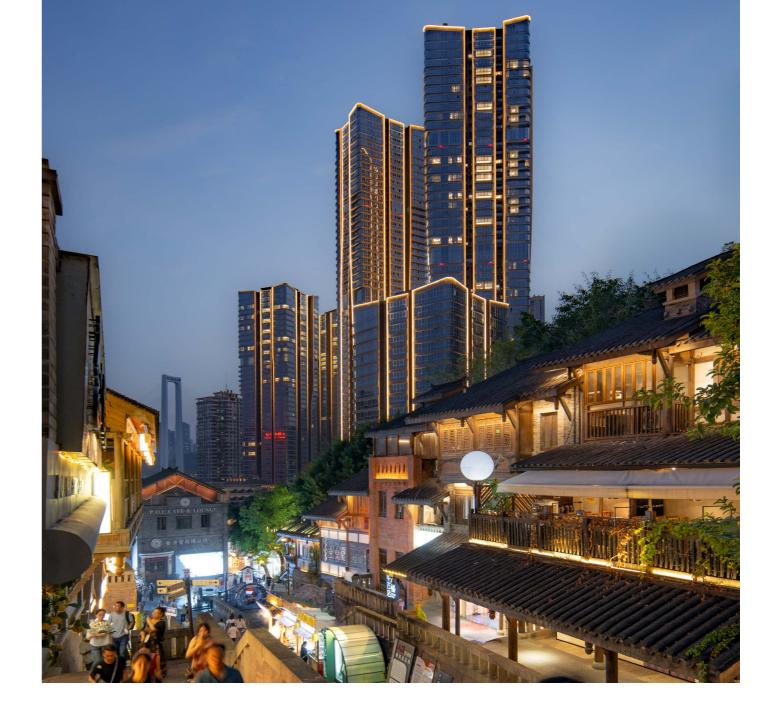


31 WHAT IF THE PAST TRANSFORMS THE FUTURE?

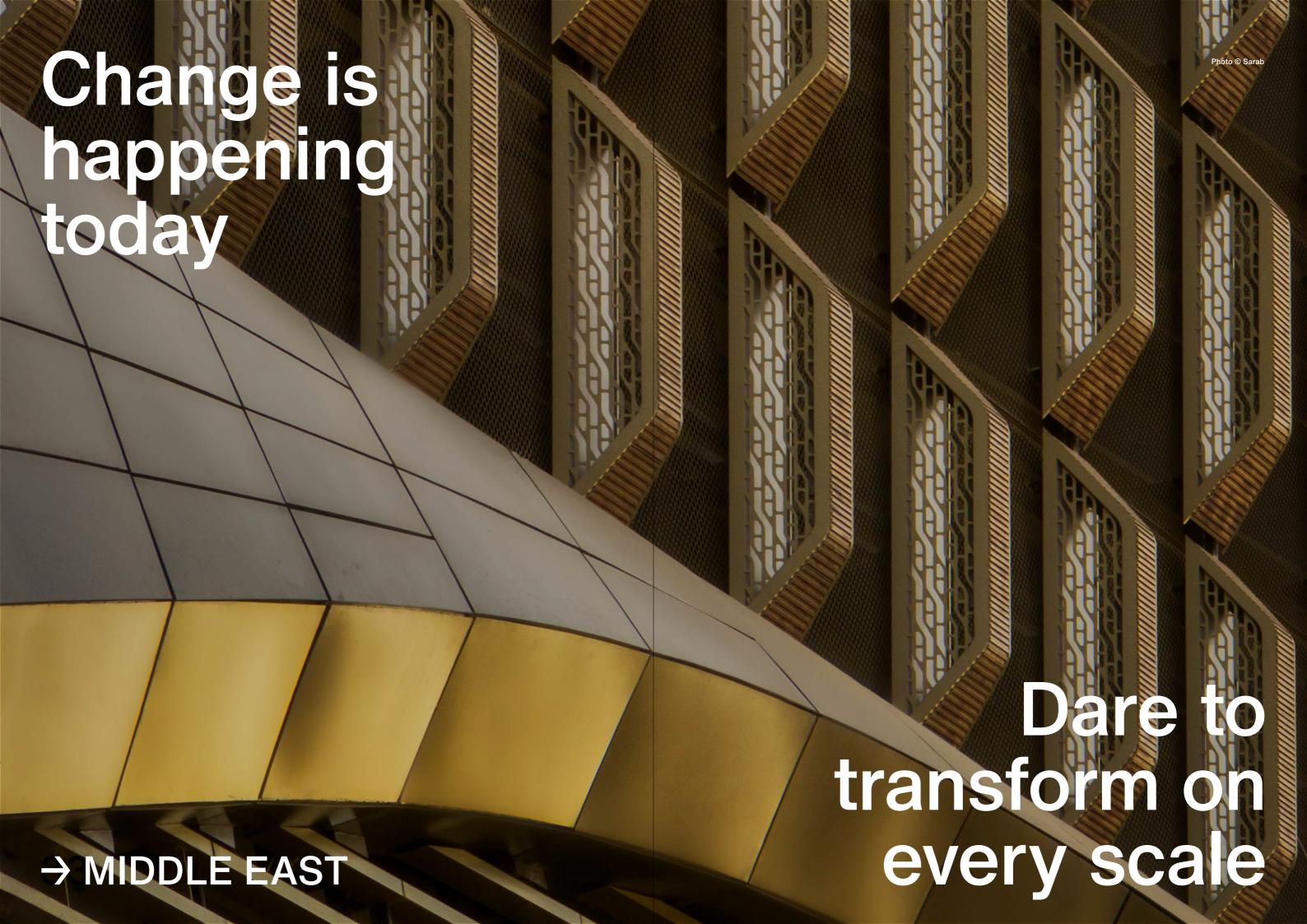
India, on the other hand, is still experiencing a boom in urbanisation and cities such as Mumbai and New Delhi need to build housing and communities at unprecedented rates. While these are often new builds, designer practices are looking into SMART technologies and sustainable strategies and materials to keep embodied and operational carbon low in these projects. Alongside this rush, it is also imperative to understand and preserve local traditions and heritage. Striking a balance between designing for sustainability as well as designing for context will be an important focus for architecture studios in this part of the world.



At UNS, we are contributing to urban transformation in India through projects like <u>Karle Town Centre</u> (KTC) in Bangalore. KTC is a masterplan for a new innovation tech campus located in the heart of Bangalore's thriving tech hub. As part of the city's rapid growth, KTC aims to set an example for future urban destinations in India by focusing on three key pillars: Health, Culture, and Garden. The development is designed to integrate nature and architecture seamlessly, creating a "Garden City of the 21st Century" that reflects Bangalore's identity while promoting sustainability.



**18T MANSION** Chongqing, China, 2017 - 2024. Photo © Kris Provoost Meanwhile, in Vietnam international tourism and focus is increasing and developers are looking to design practices to bring added value to their properties. From theatres to hotels and even masterplans, they are asking the question: what can our public spaces be? It is the role of architects and designers to imagine what this future can hold. This may not yet be the reevaluation of the current building stock, but it provides a space for design innovations that support urban transformation in terms of social and environmental sustainability, alongside economics and local heritage.



→ MIDDLE EAST

#### Change is coming quickly

The Middle East is currently in a state of transformation, and countries like Saudi Arabia and the United Arab Emirates (UAE) are leading the way with ambitious infrastructure projects and economic diversification programmes. The region's architectural services market is expected to grow at a CAGR of 7.61% between 2025 and 2030.28 Such growth has been supported through foreign investments and public-private partnerships that are pushing innovation, especially within the architecture and design sector.

As a result, the construction industry in the Middle East is experiencing unprecedented growth, with Saudi Arabia at the forefront. In 2022, the country reported a 51.3 billion USD in awarded contracts, marking a 35% increase from the previous year.29 Saudi Arabia also reported that it had issued over 3,300 new foreign investment licenses, many of which opened opportunities for architecture and design practices across the globe.<sup>30</sup> This investment, especially that in the urban and built environments, reflects a deliberate effort to lay the groundwork for dynamic public spaces that are future-ready, grounded in heritage and able to support new communities.

Guiding much of the growth within Saudi Arabia is the Vision 2030. Published in 2016, it is a government programme aimed at 'steering the nation towards a more diversified and innovative economy'. Within the goals laid out in Vision 2030, the large role that gas and oil played in the country's rapid development is recognised. As a result, Vision 2030 has sustainability embedded "at its heart, with a focus on diversifying the energy mix, expanding renewables, and addressing climate challenges". 31 Striking a balance between urbanisation, building sustainable, longlasting and future-ready communities, and maintaining the local culture and heritage is the challenge facing architects and designers working in the Kingdom.

This is also reflected in the UAE, where the government and investors are seeking to enhance tourism, culture, hospitality, and the economy. It is here where transforming the built and urban environments can provide an opportunity to achieve these goals.

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150m

Between 2008 and 2010, Dubai was completing more skyscrapers over 150 meters tall each year than the entire United States.



As Saudi Arabia continues its push to urbanise and reimagine its future, the UAE is starting to reevaluate its current building stock. During the peak of the construction boom between 2008 and 2010, Dubai was completing more skyscrapers over 150 meters tall each year than the entire United States, a remarkable achievement considering its significantly smaller population.<sup>32</sup> However, outdated materials, construction with limited durability, and the extreme desert climate of the city have already begun to challenge the performance of building facade systems, which are generally designed to last around 30 years before signs of wear and tear become evident. In the near future, a significant number of buildings are expected to encounter these issues simultaneously.

To combat these issues and ensure the longevity of the built environment, architects and designers can strategically upgrade and re-programme existing assets to be climate-smart, culturally authentic, socially inclusive, and commercially resilient. In the UAE, they should also tap into the local heritage where traditional forms, materials and passive cooling strategies can be harnessed to design healthier, more sustainable places.

Architecture practices are tasked with keeping such climate and environmental differences in mind when designing facades for new buildings, or in renovation projects. Architecture firms need to develop tools that enable their designers to make informed decisions at the very beginning of the design process, in addition to Al models capable of aggregating data from simulations and tools to establish proprietary benchmarks for building stock. This approach, which has already been adopted at UNS, allows for early-stage interventions, ensuring that design strategies are both precise and impactful from the outset.



UNS' work on the Wasl Tower in Dubai exemplifies how innovative design can address the challenges of a harsh climate while ensuring longevity. The tower's facade is a key feature, designed not only to enhance its aesthetic appeal but also to withstand the extreme heat of Dubai. By incorporating advanced materials and technologies, the facade minimises solar heat gain, reduces energy consumption, and ensures durability against the region's demanding environmental conditions.

→ MIDDLE EAST

The accelerated aging of Dubai's building stock presents a pivotal opportunity and a clear responsibility for architects and designers. The task is no longer simply to build, but to innovate solutions that ensure structures are 'future-ready'; they are designed for longevity, resilience, and peak performance with minimal intervention for decades to come.

Transforming the existing underperforming building stock offers significant potential to enhance asset value, diversify revenue streams, boost tourism and hospitality, and lower lifecycle costs through energy and water efficiency. While the process involves higher upfront capital investments and longer ROI timelines, these risks are balanced by the long-term benefits of resilience and strengthened brand positioning. However, one of the key challenges remains the current market conditions and occupancy rates.

In the Middle East, architecture and design studios have the chance to transform legacy and underutilised assets into sustainable, culturally meaningful, and economically vibrant spaces that foster thriving communities. This is accomplished through thoughtful preservation, robust environmental strategies, inclusive programming, and phased, commercially viable implementation.

This forward-thinking approach of transforming and future-proofing urban environments is highlighted in UNS' design for the redevelopment of Expo City Dubai. Building on the legacy of the 2020 World Expo, UNS has embraced the challenge of reimagining the site as a sustainable, mixed-use urban hub designed for long-term resilience. By integrating advanced climate-responsive strategies, such as improved massing for shading, energy-efficient facades, and natural cooling systems, the master plan ensures that the development is not only environmentally conscious but also adaptable to the region's extreme climate. The redevelopment of Expo City Dubai prioritises creating year-round public spaces that support community building while minimising environmental impact.



39 WHAT IF THE PAST TRANSFORMS THE FUTURE?

# "The greenest building is the one that already exists."

Carl Elefante, FAIA

Architect and Former President of the American Institute of Architects (AIA)

#### Transformation cannot wait.

→ CONCLUSIONS

As we continue to face the effects of climate change, housing shortages, empty office buildings, rapid urbanisation, and the loss of cities' local identity, extensions, renovations, redevelopments, and transformations present much-needed solutions.

Throughout this paper, we explored the many reasons why "the most sustainable building is the one that already exists". The design decision to revisit our current building stock can reduce carbon emissions by up to 75%, significantly contributing to global sustainability goals. By extending the lifespan of buildings through thoughtful renovations, vertical additions, and functional upgrades, architects and designers can meet governments' demands while minimising environmental impact.

This sustainable thinking should not end at transformation; we must all integrate sustainability into every stage of the design process, from material selection to energy efficiency. The Research and Innovation team and Sustainability and Technology consulting services at UNS are bringing this thinking into all of the studio's designs. By focusing on measurable impact, we provide clear, actionable solutions to complex challenges, ensuring developments are not only future-ready but also contribute to a healthier planet.

In addition to environmental sustainability, transformation must prioritise the needs of the people who use and interact with the built environment. From France and Germany to Dubai, Shanghai and the United States, architects need to create inclusive and accessible urban environments that foster community building and place making. While architecture and design firms research and address current user needs, it is also important to focus on post-occupancy performance and long-term economic viability. Doing so, ensures the delivery of projects that provide lasting value for clients and communities.

At UNS, we directly respond to these needs. Our Economic consulting connects design innovation with economic expertise to realise the full potential of every project. We provide strategic guidance on making sustainable decisions to maximise site potential. By aligning a creative approach with business goals, user needs, and future trends, we deliver clear, actionable insights that empower impactful decision-making.

In the end, transformation is not just limited to the existing building stock. By nudging developers to make more sustainable decisions, to prioritise users needs, and to influence how people interact with public spaces, architects and designers can contribute, not only to the appeal of the development, but to broader cultural and behavioural shifts. In looking to the past and designing for the future, we can create spaces that are sustainable, resilient, and culturally meaningful.

The following are **case studies** selected to illustrate a variety of approaches to the adaptation of buildings and the urban environment.

# Fellenoord 15

UNS' refurbishment of the former Rabobank headquarters in Eindhoven, commissioned by Edge, demonstrates how transformation can unlock the potential of aging building stock. The 32,000 m2 Fellenoord 15 project reimagines the structure as a sustainable, tech-enabled government office, setting a benchmark for future-ready design.

At the heart of this transformation was a bold decision: to retain and repurpose the robust shell of the existing building rather than opting for demolition. This approach not only preserved 80% of the building's framework but also delivered measurable environmental and economic benefits.

Client
Edge (At time of commission known

as OVG real estate)

Location Eindhoven, The Netherlands

Status Completed

Programme Offices

Transformation Redevelopment

40%

FELLENOORD 15

40% reduction in CO2 emissions compared to constructing a new building, aligning with global sustainability goals.

1 year

A one-year acceleration in project delivery, bypassing lengthy licensing and permitting processes.

67%

67% decrease in operational energy consumption, ensuring long-term efficiency and reduced environmental impact.





Another element of the design is the conversion of a former parking garage into an atrium, topped off with a transparent roof. This intervention improved the use of the space, enhanced natural light, and created a central hub that supports collaboration and community.

By integrating contemporary design elements with the existing structure, the project demonstrated how transformation can balance sustainability, functionality, and aesthetics. The design not only reduced embodied carbon but also delivered a healthier, more efficient environment for its users.

Fellenoord 15 underscores the potential of transformation as a critical tool in addressing the challenges of climate change, urbanisation, and resource scarcity.

#### UNS

# Hanwha H.Q.

Aligning with Hanwha's identity as a global leader in renewable energy, a key feature of the project is the integration of photovoltaic (PV) panels into the building's facade. This design choice not only enhances the building's energy efficiency but also aligns with global sustainability goals by leveraging renewable energy sources. The results are a 35% reduction in CO2 emissions and a 40% decrease in annual energy consumption.

A phased construction approach, which was conducted three floors at a time, ensured that the building remained fully occupied throughout the construction. This strategy mitigated potential revenue loss and minimised disruptions to daily operations. Additionally, the modular facade design reduced both labour and equipment costs.

The design of the interior office spaces focused on creating an environment that enhances employee performance and wellbeing. Client Hanwha Group

Location Seoul, South Korea

Status Completed

Programme
Renovation of
facade, interior
of common
spaces and
lobbies, meeting
levels including
auditorium and
executive areas,
redesigning of the
landscape

Transformation Renovation

Key design features include

Intuitive wayfinding and increased natural daylight

Meeting rooms with glass enclosures that balance privacy and transparency

Central lobbies with warm wood tones, planting, and coffee corners to foster social interaction

A multi-purpose auditorium with adaptable configurations and optimised acoustics

HANWHA H.Q. Photo © Rohspace

By enhancing space utilisation and prioritising user experience, a workplace has been created that not only supports productivity but also contributes to the client's long-term profitability.

# P.C. Hooftstraat

The renovations of P.C. Hooftstraat 138 and 140-142 illustrate how contemporary design can integrate with historical context, creating a space that not only meets modern demands but also preserves the essence of Amsterdam's architectural heritage. By uniting two separate buildings into one cohesive project, this project has established one of the largest retail spaces along the iconic P.C. Hooftstraat while staying true to the spirit of the city.

Client Warenar Real Estate - Warenar

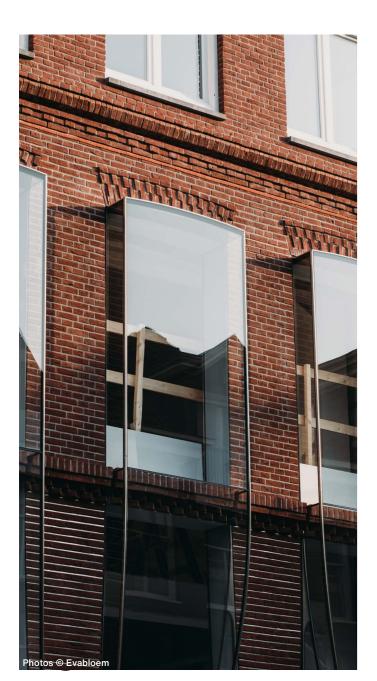
UNS

Location
Amsterdam, The
Netherlands

Programme
Retail facade,
Residential facade

Status Completed

Transformation Renovation





### The Looking Glass

P.C. HOOFTSTRAAT

At **P.C. Hooftstraat 138**, fashion and architecture converge in a fluid expression of craftsmanship and geometry, celebrating the artistry of high-end, tailored clothing. The design respects the original three-windowed vertical division of a traditional Amsterdam townhouse, while blending aesthetics and function.

The facade is a unitised structural glass rainscreen, a reinterpretation of Amsterdam's architectural language. To address the risk of thermal breakage, stainless steel plates were structurally glued to the glass elements, acting as cooling ribs and enhancing durability. This innovative "picture frame" concept allowed for the pre-assembly of a glass box, ensuring precision and efficiency during installation.

# Key features of the facade include

1.5

A fully pre-assembled glass box, connected to the "picture frame" was manufactured in a controlled factory environment and installed on-site in just 1.5 days.

Stainless steel trims enhance the resilience of the system, protecting vulnerable glass edges while maintaining a refined appearance.

# 8mm

8mm-wide silicone seams between the glass panels and steel profiles accommodate manufacturing tolerances and ensure durability.

A multi-purpose auditorium with adaptable configurations and optimised acoustics

#### The Brick Pixelation

At **P.C.** Hooftstraat 140-142, the facade embodies the intricate craftsmanship of couture clothing through a textured and transparent design. The "Brick Pixelation" facade features cast stainless steel bricks with glass inlays, creating a partially transparent, illuminated shopfront that enhances the character of one of the city's most renowned streets.

The design process involved extensive experimentation to achieve a balance of brick size, transparency, and lighting. While the stainless-steel bricks maintain the dimensions of traditional bricks, their tapered edges and refined details elevate the facade's aesthetic. The glass inlays, manually glued into the bricks, add a layer of intricacy and lightness.

# Key features of the facade include

The bricks are mounted onto larger steel frames, ensuring precision and efficiency during on-site installation.

Behind the steel brick facade, operable glass windows provide access for maintenance and cleaning, ensuring long-term functionality. The renovations of P.C.
Hooftstraat 138 and 140-142
integrate advanced materials and
construction techniques with a
deep respect for Amsterdam's
architectural traditions to create a
retail space that is both innovative
and timeless.

# **FOUR Frankfurt**

FOUR Frankfurt highlights UNS' approach to urban transformation, where extensions breathe new life into existing structures while safeguarding their architectural and historical value. Located in the heart of Frankfurt, this ambitious project reimagines this previously inaccessible area, transforming it into a vibrant mixed-use development that reflects the city's evolving needs and aspirations. FOUR Frankfurt is a bold response to the challenges of urban densification.

Client
G&P Erste
Management GmbH

Location Frankfurt, Germany

Programme
Offices,
Residential, Hotel,
Retail, Commercial,
Services.

Status Completed

Kindergarten

Transformation
Preservation and
Redevelopment

Key to the project's success is its ability to balance the old and the new

An existing buildings' facades and structural elements were carefully retained and integrated into the new design, maintaining a connection to Frankfurt's architectural history.

By retaining portions of the existing structures, the project minimises material waste and reduces the environmental impact of construction.

The design prioritises public spaces, with pedestrian-friendly streets, green areas, and plazas that encourage social interaction and community engagement.

The development combines residential, office, retail, and leisure spaces, fostering a sense of community and enhancing urban vitality.

The addition of high-rise towers introduces modern functionality and density, ensuring the development meets the city's growing demand for housing and office space.

FOUR highlighted several key lessons learned throughout its development. First, conducting early and thorough assessments of the building's condition proved essential, as it could have significantly reduced costs by identifying structural issues and preservation needs at an earlier stage. Additionally, maintaining strong relationships with heritage preservation offices was another critical factor, ensuring smooth collaboration and successful integration of historical elements into the modern design. The importance of well-prepared documentation of existing structures became evident, as it expedited the approval process and facilitated informed decision-making.

FOUR Frankfurt serves as a model for how cities can evolve their existing building stock. By embracing innovative extensions, the project demonstrates how thoughtful design can create sustainable, resilient urban environments that honour the past while looking to the future.



# **18T Mansion**

The 18T Mansion project exemplifies UNS' expertise in revitalising historic neighbourhoods through thoughtful redevelopment. The building was designed to address the growing demand for high-rise living in Chongqing, China, while enhancing the quality of the living environment across every layer - from improving the indoor habitat to fostering a sense of community.

Client **Guocoland** 

Location Chongqing, China

Programme
Residential towers,
amenities,
lobbies, courtyards
and cultural
facilities

Status Completed

Transformation Redevelopment Key aspects of the redevelopment include

18T MANSION

84

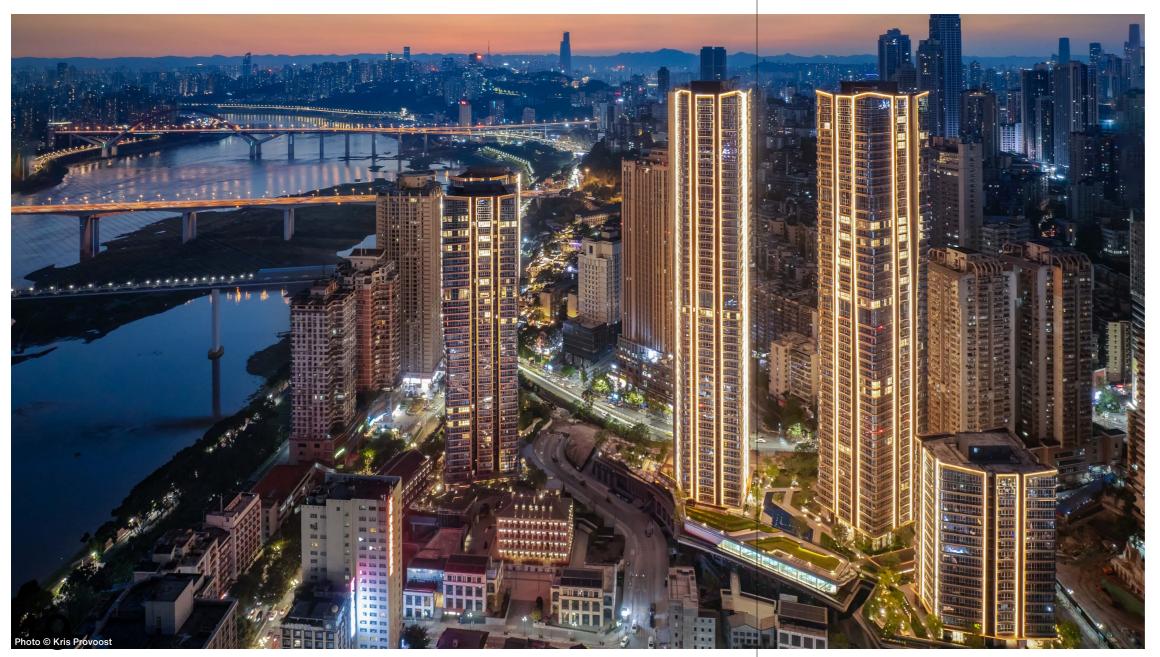
A progressive upward and outward movement in the massing accommodates 84 distinct unit types, ranging from 83 m² to 1,200 m², meeting the needs of diverse demographics and family combinations.

In collaboration with JTL Studio landscape architects, UNS introduced a variety of ecological plants and waterscapes to the outdoor areas.

3.3

Bespoke floor-to-ceiling windows provide stunning vistas, abundant natural daylight, and ceiling heights of 3.3 to 3.6 meters, reducing the need for artificial lighting and creating a sense of spaciousness.

The development offers 10 clubhouses, including 24/7 ultra-fitness centres, sports centres, heated swimming pools, children's playrooms, themed entertainment spaces, art galleries, an infirmary, banqueting halls, and more. These shared amenities are distributed across lobby floors, double-height sky gardens, and the top floors of the podiums in the five towers.



18T Mansion's redevelopment prioritises the needs of the community, creating spaces that encourage social interaction and foster a sense of belonging. Public areas, such as courtyards and shared spaces, provide opportunities for connection and engagement, while the integration of cultural facilities enriches the urban experience.

The project also emphasises resilience, with durable materials and adaptable designs that ensure the building's longevity. By anticipating future challenges, 18T Mansion secures its place as a valuable asset for the community, earning it a **WELL-platinum certification**.

# The Bridge

The Bridge project in Warsaw, Poland, shows UNS' approach to extension. The Bellona building, a former printing house and locally protected monument, is deeply rooted in the history of Warsaw's Jewish Quarter. The project's design respects the area's cultural significance by preserving key historical elements. These were restored under strict conservation guidelines, ensuring their historical integrity while integrating them into a modern context.

The Bridge is also defined by its ability to connect the Bellona with a new tower through a design that respects the grid and geometry of the old building and introducing contemporary elements.

Client **Ghelamco Poland** 

Location Warsaw, Poland

Programme Office Tower

Status Under construction

Extension

THE BRIDGE

Key design features include

The original geometry of the facades was maintained, with light boxes and planting introduced to address fire regulation requirements while preserving the building's visual integrity.

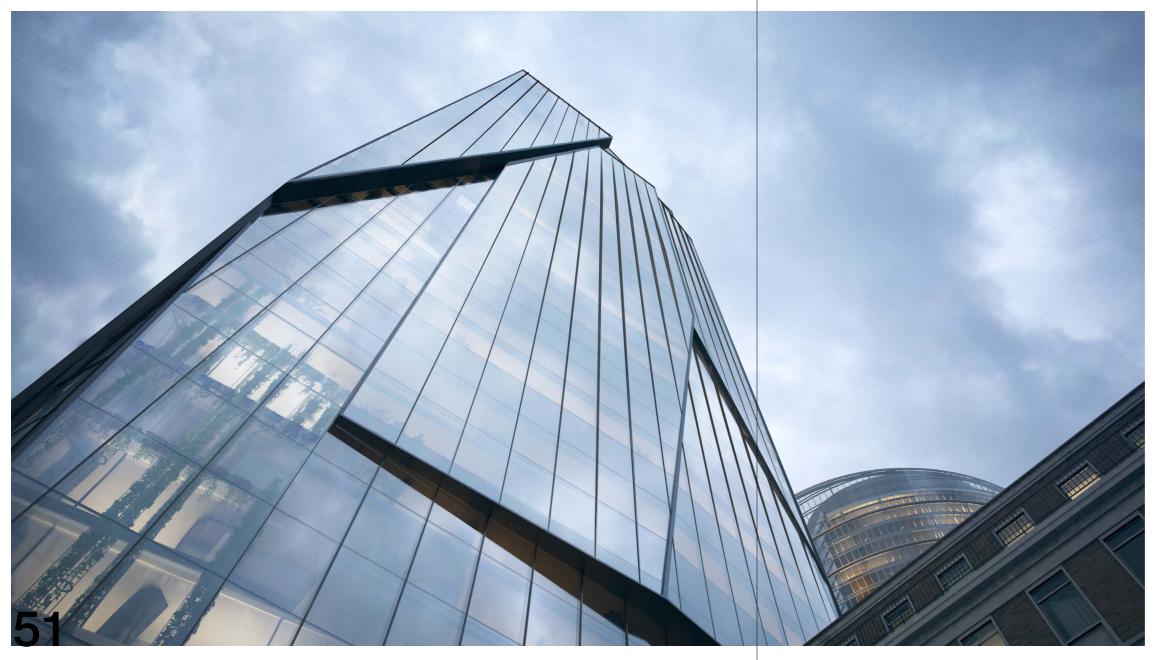
project.

Close collaboration with city conservation officers and local architects ensured compliance with heritage regulations and historical accuracy throughout the

Original Ackermann slabs and columns, as well as ceramic tiles in the lobby were retained, ensuring material circularity and reducing waste.

Windows that had to be closed for fire safety were replaced with light boxes and planting, maintaining the facade's integrity.

A glass structure was introduced to link the old and new buildings, creating a visual and functional transition that respects the historical grid of the Bellona.



The extension of The Bridge also faced several technical and material challenges, including lowquality materials from a previous renovation in the 1950s and the need to integrate modern systems into the older structure. These challenges were addressed through innovative solutions that balanced preservation with functionality.

While the new tower achieved BREEAM Outstanding and Shell and Core Platinum certifications, the project also integrated a solar farm outside Warsaw to compensate for energy use. These measures reflect UNS' commitment to sustainability and resilience, ensuring that The Bridge is not only functional but also environmentally responsible.

# Chamartín-Clara Campoamor Station

'Open Ecosystem' in Madrid exemplifies UNS' approach to redevelopment, where an outdated station is revitalised to meet contemporary needs while remaining adaptable for the future. This large-scale urban transformation, designed in collaboration with b720 Fermín Vázquez Arquitectos and Esteyco, reimagines the Madrid Chamartín-Clara Campoamor Station and its surrounding area. By ensuring efficient execution without compromising quality, the project demonstrates how redevelopment can breathe new life into underutilised spaces, fostering long-term value for cities and their inhabitants.





UNS

Location
Madrid, Spain

Programme
Train Station
Masterplan, Offices

Status In progress

Transformation **Redevelopment** 



# Key aspects of the redevelopment include

The project was designed to minimise disruption to the existing railway operations, ensuring that the station will remain fully functional throughout the redevelopment process.

The redevelopment transforms Chamartín station into a modern transport hub, improving connectivity within Madrid and beyond. The station's design also accommodates future expansions, ensuring it can adapt to changing demands.

The project combines residential, office, retail, and leisure spaces, creating a dynamic urban environment that supports diverse activities and lifestyles.

Green spaces, energy-efficient buildings, and sustainable mobility solutions are integrated throughout the development, reducing its environmental impact and enhancing the quality of life for residents and visitors.

Open Ecosystem's design prioritises the needs of the community, creating spaces that encourage social interaction and foster a sense of belonging. Public plazas, pedestrian-friendly streets, and green areas provide opportunities for recreation and relaxation, while the integration of cultural and leisure facilities enriches the urban experience.

# **Expo City Dubai**

Expo City Dubai highlights UNS' expertise in urban redevelopment, where existing infrastructure is reimagined to create a sustainable, peoplecentric environment. As a legacy site from Expo 2020 Dubai, the masterplan integrates residential, commercial, cultural, and recreational spaces, creating a people-centric environment designed to thrive in a competitive real estate market.

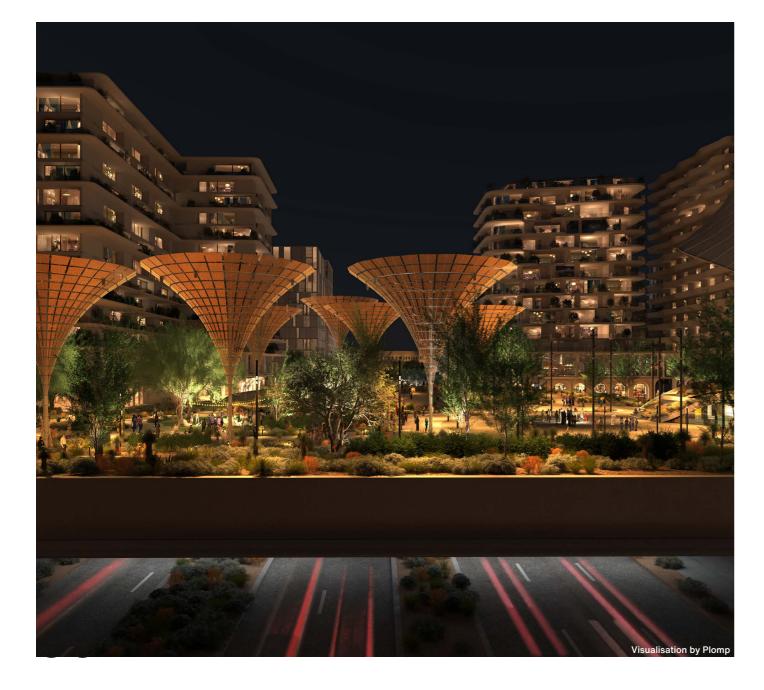
Client Expo City Dubai

Location **Dubai, UAE** 

Programme
Mixed-use Master

Status In progress

Transformation
Redevelopment &
Transformation



# Key <u>preservation</u> efforts include

80%

Over 80% of the original buildings and infrastructure were retained, ensuring the legacy of Expo 2020 remains intact.

Existing materials, such as paving and gravel, were repurposed to minimise waste and reduce costs.

The public realm design immerses residents and visitors in the UAE's unique natural and cultural heritage, incorporating native trees, wadi-like open spaces, and local wildlife.

#### Key features include

35K

The site provides housing for 35,000 residents and workspace for 37,000 people.

The integration of smart city technologies enhances efficiency and accessibility across the site.

Green and blue networks, along with native landscaping, support local ecosystems and improve thermal comfort.

The masterplan incorporates walkable streets, cycling paths, and micro-mobility options, ensuring accessibility and reducing reliance on cars.

The use of clean energy and alternative water sources reduces the environmental footprint of the development.

The masterplan for Expo City Dubai prioritises the creation of a healthy, human-centric environment that fosters community engagement and wellbeing. By integrating amenities such as parks, schools, and cultural spaces, the development supports an inclusive urban lifestyle. The project also sets a new standard for sustainability by integrating smart city technologies, clean energy, and alternative water sources. Achieving **LEED Gold and WELL Community Gold certifications**, Expo City Dubai reflects UNS' commitment to environmental responsibility and human health.

By prioritising redevelopment, sustainability, and community wellbeing, Expo City Dubai serves as a blueprint for future urban design.

# **SeoulONE**

SeoulOne illustrates UNS' approach to urban regeneration, where a disused industrial rail yard is transformed into a 10-minute neighbourhood for all. Located in the northeast of Seoul, this 405,000m<sup>2</sup> car-free development redefines urban living in South Korea by integrating multigenerational housing, green spaces, and mixed-use programmes.

Key aspects of the project include

8 - 60' 30%

The site is integrated into its surroundings through pedestrian bridges and a metro station, reducing travel time to Gangnam from one hour to just eight minutes.

24/7

The site combines residential towers, retail spaces, offices, a hotel, sports facilities, daycare centres, senior living facilities, and a medical centre, ensuring a lively 24/7 activation.

Client Hyundai Development Company (HDC)

Location Seoul, South Korea

Programme Mixed-use Master plan: Commercial, Residential. Community

Status In progress

Transformation Redevelopment

Over 30% of the site is dedicated to vegetation, including pocket parks, roof gardens, water gardens, and a forest walk. creating a year-round green village.

Every two residential towers are connected by podiums that house exclusive community spaces for residents, mitigating loneliness and fostering a sense of belonging.

From large-scale shopping malls to small-scale street pavilions, SeoulOne's retail offerings cater to diverse user groups.

While the site is not a traditional monument, it holds historical significance as a former rail yard. The design respects this legacy by incorporating elements of Korean culture and history, ensuring the development resonates with the local community.



#### Key cultural considerations include

The architecture reflects the shapes of old Korean houses and ceramics, blending modernity with tradition.

Collaboration with local architects and community members ensured the project aligns with cultural nuances and community aspirations.

SeoulOne also sets a benchmark for sustainable urban development in South Korea, integrating green and blue networks, clean energy, and smart city technologies. The project complies with strict local sustainability standards, reflecting UNS' commitment to environmental responsibility.

#### Key sustainability measures include

Locally sourced materials, including those reflecting traditional Korean ceramics, were used to minimise waste and reduce the environmental footprint.

The project incorporates extensive green spaces and biodiversityenhancing features.

SeoulOne demonstrates how a brownfield site can be transformed into an active development that prioritise connectivity, community, and cultural relevance. The project serves as a catalyst for future urban development in Seoul, adding value to the area and improving the quality of life for its residents.

The Schwanthalerstrasse project in Munich demonstrates UNS' innovative approach to extension, restoration, and urban revitalisation. Commissioned by LEGO for both office use and future investment purposes, this project transforms two heritageprotected buildings, constructed in 1912 and 1913, into a lively, sustainable, and community-focused development. The design for the Schwanthalerstrasse preserves over 70% of the existing structure and integrates Cradle-to-Cradle (C2C) principles.

The project transforms the previously private courtyards into an open public space, fostering community interaction and engagement.

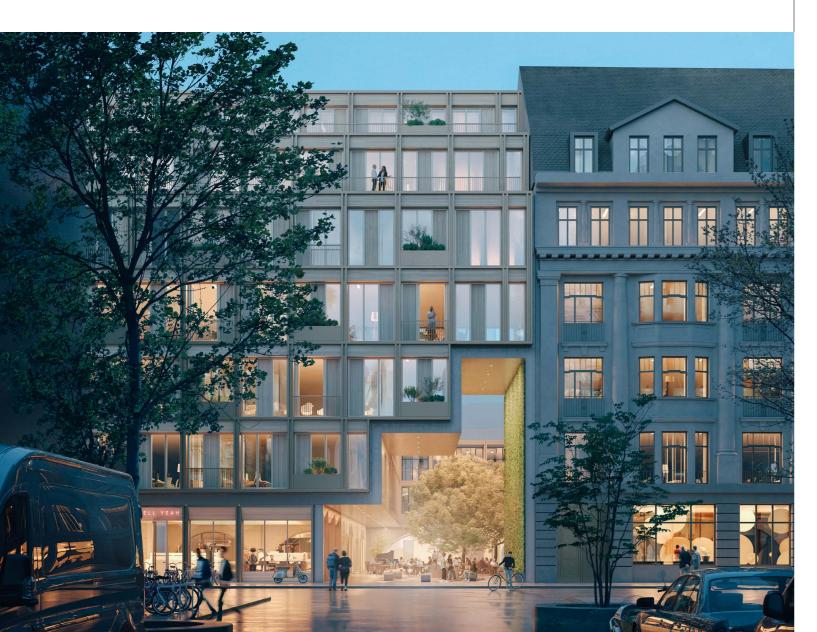
Client LEGO

Location Munich, Germany

Programme Offices, public space

Status In progress

Transformation Extension & Renovation



#### Key preservation and sustainability efforts include

SCHWANTHALERSTRASSE

Coordination with Munich's heritage department ensures the restoration of facades and the preservation of key elements, such as the original staircase.

Incorporates public green spaces and sustainable building practices, enhancing the quality of life for the community.

Historical research informed the reuse of existing materials, such as rebuilding window frames to resemble the original thin windows while meeting modern requirements.

Before construction began, an artist collective used the upper floors as studios and canvases, leaving behind a legacy of creative interpretation.

The project is pre-certified for **DGNB Platinum.** 

> The Schwanthalerstrasse project navigates the complexities of integrating modern requirements, such as sound insulation and sustainability, with heritage protection regulations. These challenges are addressed through ongoing negotiations and innovative design solutions.

#### Key design strategies include

Most of the existing building structure remains visible, both inside and outside, celebrating the building's history and character.

The project incorporates a top-up and a new building on adjacent land, ensuring the site meets modern density and functionality requirements.

Neighbours were invited to site tours and presentations, fostering transparency and community support for the project.

WHAT IF THE PAST TRANSFORMS THE FUTURE?

# **Bloor Street**

UNS' renovation of the Bloor Street facade demonstrates how a 52-year-old building can be revitalised to meet current demands while maintaining its legacy through the integration of materials, cohesive design guidelines, and sustainable practices. The decision to renovate rather than rebuild significantly reduces the project's carbon footprint. By leveraging global networks to address supply chain challenges, the project also ensures the use of high-quality materials while maintaining cost-effectiveness.

Client **ProWinko** 

Location

Toronto, Canada

Programme **Facade** 

Status Completed

Transformation **Renovation** 

Key preservation efforts include

**BLOOR STREET** 

High-quality, classic materials were selected to align with the building's original character while meeting modern sustainability standards.

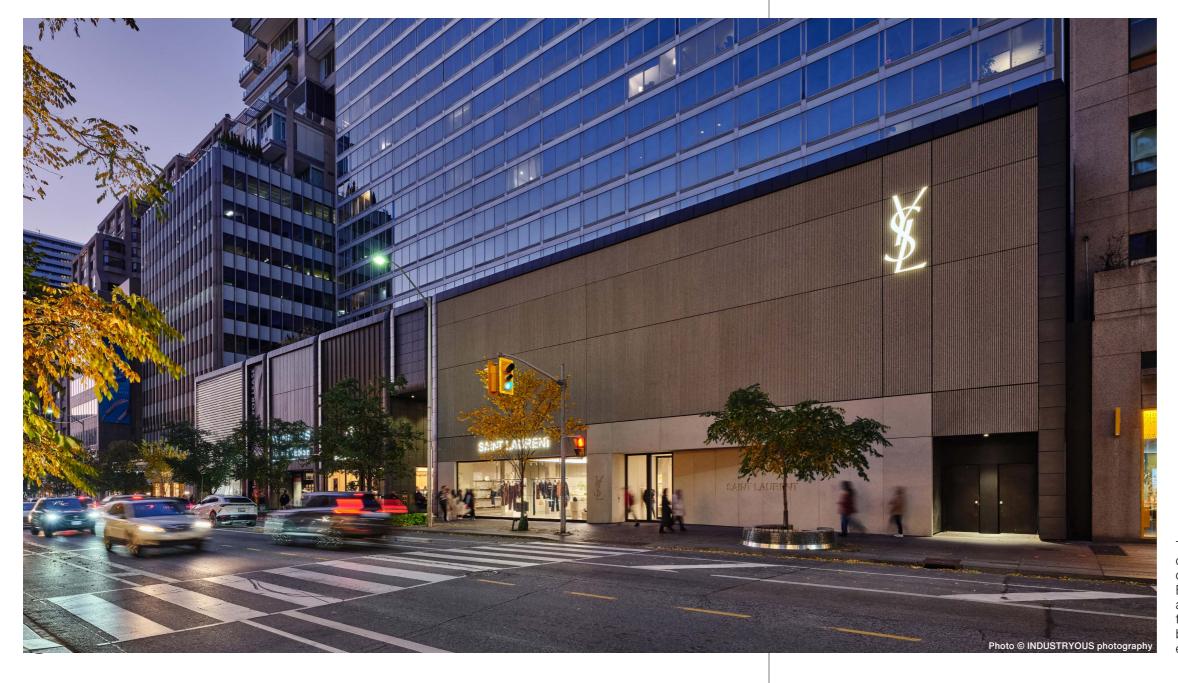
The original brick line and architectural character of the building are preserved, ensuring continuity with its local context.

Enhanced pedestrian access, including direct links to the TTC Subway station and Yorkville Park, improves connectivity and convenience for the community.

Historical research informed the integration of past modifications, ensuring the current transformation aligns with the building's legacy and avoids challenges for future architects.

Guidelines for wayfinding, logo lights, and branding allow for individual expression while ensuring a unified aesthetic.

A global network of suppliers was utilised to address supply chain issues and maintain quality standards.



The Bloor Street project contributes to the discourse on transformation by demonstrating how renovation can balance history, sustainability, and modern needs. By preserving the building's character, enhancing accessibility, and creating a cohesive environment, the project revitalises a historic structure while boosting local commerce and community engagement.

63

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