REFLECTION PAPER

SKY HUB

An innovative aviation facility in city centre

I-Tan Chen 5699096

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PROJECT DESCRIPTION

Berlin, as a metropolitan city in Europe, is linked with diverse ground transportation within the city. To promote the concept of UAM (Urban Air Mobility)/AAM (Advanced Air Mobility), the introduction of vertiport design as an innovative and sustainable heliport drives the transport efficiency and processing service for the rising number of regional travellers.

The main research question is

"**How can we establish an innovative aviation infrastructure into a city centre?**"

The three ambitions of the project, SKY HUB, are as follows:

Redefine the future of aviation

Considering how it aims to be a public building, SKY HUB should provide a space to challenge the current airport architectural expression and form and define a benchmark of vertiport with the consideration of sustainability and low carbon emission to satisfy the EU commission's ambition in preserving climate change.

Redefine the future of aviation

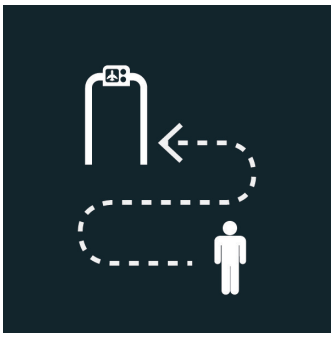
Interlock vertiport with city centre

The idea behind this proposal is to provide a way to promote the inner-city aviation infrastructure which can not only integrate the building appearance into the urbanscape of Berlin city but also underline the relationship between the public and the vertiport and a way of doing so is by having a degree of openness to the building and enhancing the connectivity with the neighbouring context.

Interlock vertiport with City centre

Optimise the flow for future air mobility

By adjusting the program within the vertiport terminal building and introducing software stakeholders to improve the travelling procedure, such as platforms for submitting travelling documents or a ticketing system. It can reduce the demand for space within the terminal and reduce the waiting time in the building; thus, programmes and passenger administration within the building can be well compact to minimise the land demand within the inner city and challenge the vertical form of the aviation infrastructure typology.



Optimise the flow within future air mobility

ASPECT 1

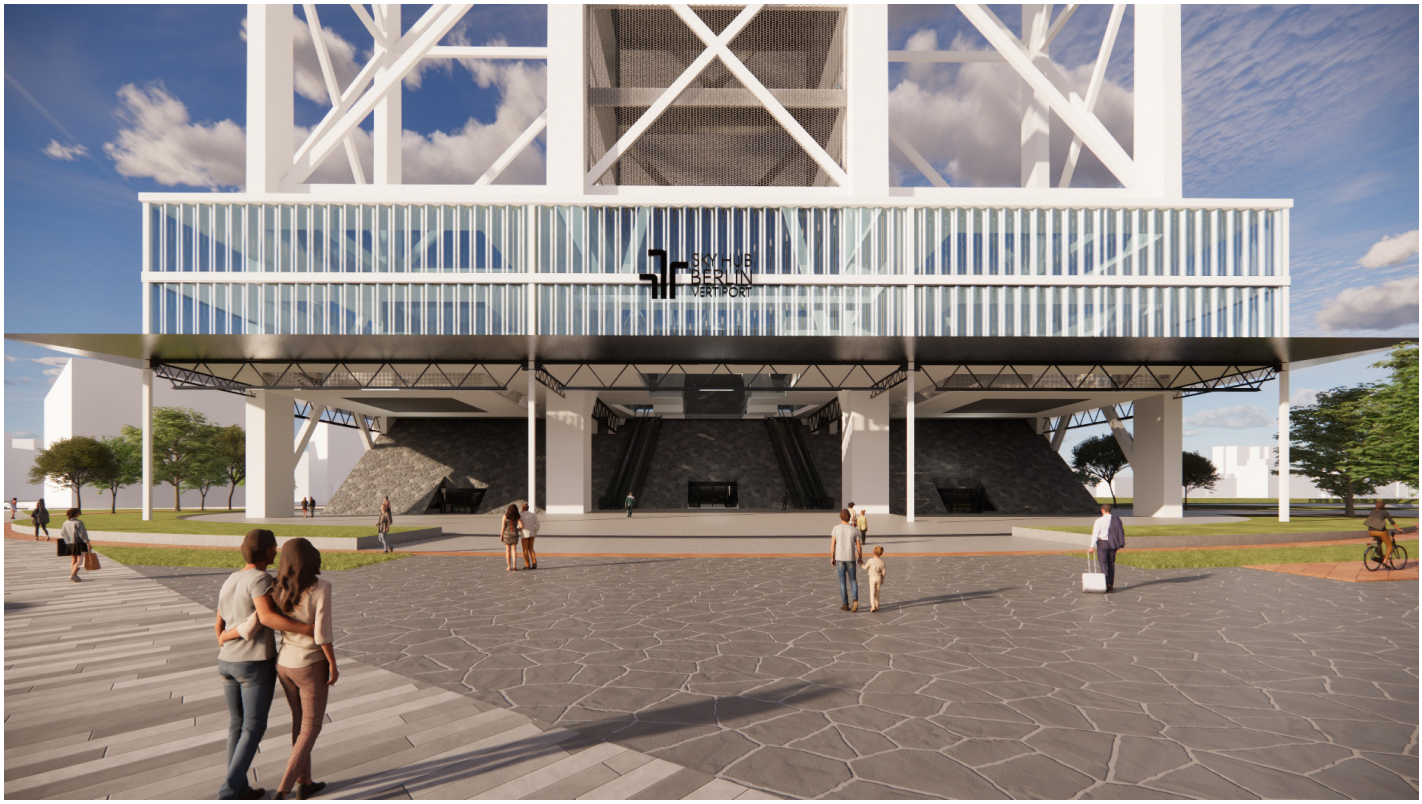
The relation between your graduation project topic, Architecture track, and MSc AUBS programme.

The graduation project of a vertiport within Berlin city for an architecture master programme integrated innovative future mobility solutions with expressive architectural design principles for airport typology.

By challenging the concept of verticality for both electric vertical take-off and landing (eVTOL) aircraft and humans, the project emphasises the dynamic flow of vertical movement, seamlessly integrating the vertical parking lift for eVTOLs and the passenger's lift system—the Vertiport, SKY HUB, which is envisioned as a towering structure approximately 220 meters tall. The building not only serves as a hub for future air transportation but also as an architectural and social landmark within the Berlin skyline and nearby vicinity. To achieve the project's ambitions, the mega-frame structure is selected as the backbone of the design. It provides robust support and allows for extensive vertical stacking of eVTOLs, optimising space efficiency in an urban environment where ground space is at a premium.

Because of the assigned theme, Material study, selecting material properties influences the project expression functionally, architecturally, and visually by balancing visibility, aesthetic appeal, and structural integrity. Translucent and reflective materials are strategically employed to create a sense of openness and connectivity with the surrounding urban fabric while ensuring the building's visibility and Prominence as a modern icon in Berlin. Moreover, to respond to the idea of expressing the journey from Ground to Air, careful material choice also enhances the user experience from the ground level to the upper level for city viewing or departure, which offers panoramic cityscape views from the Vertiport, especially from the crown level.

The design meets the practical requirements of accommodating eVTOL traffic for future air mobility. It should not only provide public spaces where people can enjoy unique perspectives of Berlin, thereby fostering a new relationship between the city's inhabitants and its aviation infrastructure. By integrating advanced technology with thoughtful architectural design, the project positions Berlin as a leader in sustainable urban mobility and futuristic architectural innovation. It serves as a blueprint for how cities can adapt to the evolving demands of urban transportation while enhancing the urban experience through high-rise, multifunctional infrastructure.



ASPECT 2

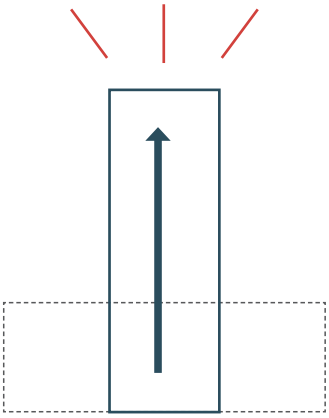
The Relationship between research and design.

In this graduation studio, Bodies & Building Berlin, the research findings influenced the design based on the study of architectural typology, client, site, and programme. According to the conclusion of the findings as well as the assigned theme, MATERIAL, from the studio, the site location must follow three specific rules designed by the assigned Group, Material group. As a result, three main rules need to be obeyed.

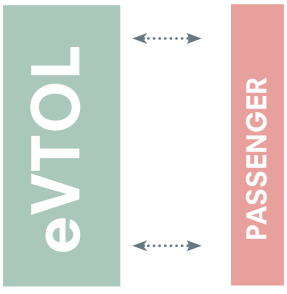
For the site location, Because the common ground of the Group is sourcing, there are three rules: accessibility, Reuse and Prominence. For accessibility, the main requirement is that the site location be selected within a one-kilometre distance of existing waterways or railways for construction transportation. Regarding Reuse, 33% of local materials are required, and they should be sourced within a one-km radius of the site. The last point, Prominence, is that the site location should be in a represented area of Berlin following the map made by the Material group to showcase the material collection of nine typologies. Based on the Group's required rules for site location, to further develop rules for the proper site location of Vertiport, precedent studies of Heliports and qualitative research of Vertiports' landside indicate several points for the inner-city location.

Therefore, the vicinity of the vertiports, such as restaurants, hotels, parks, and other public shared facilities, with the value of tourism also influenced the site location and footprint of the building, as well as the adjustment of programme organisation. Firstly, the site should be close to car parks, bus stops or stations, waterways, railways and other public transport. Secondly, the footprint of the building should be minimised to respond to the main research question," How can we establish an innovative aviation infrastructure in a city centre?". Thirdly, regarding the programme organisation of the Vertiport, because of the ambition of optimising the flow within future air mobility, the airside lounge will be repositioned to the landside, which means that the publicness and accessibility of the landside lounge for the public is higher than airside lounge owing to the no requirement of security check and immigration control. Because of the importance of inner-city location as infrastructure, the connectivity of the building with the surrounding vicinity is essential for the future of Vertiport.

In this project, SKY HUB, the research leads designed, as much as the design becomes a representation of the research, where the compatibility of the air travelling procedure as well as the connectivity with existing communities within the inner-city area.



Verticality



Separate flow

ASPECT 3

The methodology of the studio, approach and the method chosen.

The principal methodology within the graduation studio is structurally organised by splitting the research into three parts: Clients, Programme and Site, as well as further research on the selected typology, Airport. The methodology is quite comprehensive and valuable for a graduation thesis. After concluding the findings from the research, the form study, the concept development, and design implementation, the process is formed with group discussions and individual fascinations, which act as essential roles in encouraging students to produce the final products following a diverse experience.

The project's main methods are literature reviews, quantitative studies, and a series of precedent studies of Vertiports, Heliports, and airports. This project and literature-based research allows the findings for the design phase and the project statement to become more precise and dependable.

ASPECT 4

The Relationship between the project and the academic as well as societal value.

The project is significant in the broader social context and contemporary era for future air mobility as it addresses many of the critical challenges of inner-city aviation infrastructure worldwide, which can currently be viewed as a trend.

In this graduation project, the research included site location, existing vicinity, urban development, clients' competitive identity in a globalised world, and programmes for optimising the flow within aviation infrastructure while maintaining transportation function.

Furthermore, the project aims to explore the future circularity of material in architectural design and environmental sustainability, which can somehow enhance and balance the forces of material waste in urban areas. It seeks to create an open but well-programmed hub, foster dynamic urban interactions through transportation, and prepare for future changes in aviation. Additionally, it examines the feasibility of urban and architectural interventions, including financial considerations of limited empty plots within metropolitan areas, sustainable building practices by circular material selection, and the future role of infrastructural and mobility nodes within the urban fabric, which are central to the project's objectives.

ASPECT 5

The transferability of your project results

Because the methodology of the graduation studio, Complex Projects, includes research from site to client to programme, the comprehensiveness of the research can be viewed as relevant proof of the project's transferability, especially in Europe. The background and issues of the city of Berlin somehow reflect the situation of the regional aviation industry in Europe.

After the pandemic, the growth of tourism and the concern of sustainability alert that future mobility should be more precise while selecting site locations, building plots, and material adaptation, such as the lack of larger empty plots in European metropolitan areas and material waste in the construction industry.

ASPECT 6

Ethical issues and dilemmas you may have encountered during graduation

As a new sub-category under airport typology, designing a vertiport faces a challenge in architecturally envisioning a picture of it. It can be viewed as a chance and a barrier to the graduation project. The typical airport typology has a main horizontal terminal and one vertical control tower occupying land. As a result, the unexpected result of the vertical flow of the graduation project, SKY HUB, can be treated as an essential expression of architectural design by splitting the vertical movement of passengers and aircraft into two parts.

Unlike the airports that have been built, the main focus is more on the inclusive spatial experience than functional flow only. An expected challenge of the project is integrating the building into the existing urban fabric and seamlessly changing the function of the vicinity for the public communities. It envisions how the new sub-typology of the airport can smoothly become a part of people's options for regional daily commutes as well as become a social hub for visitors to Berlin.

Moreover, because of the assigned study of material, the material, an essential phase of architectural design, was integrated into the design phase when the research had just started.

When I started approaching material research before the design phase, it was difficult to break the mindset while brainstorming the project concept because of the Material study.

However, after I treat the material study as an extra layer of understanding Berlin city, the material study not only allows us to take architectural expression, style, and circularity into consideration as the beginning but also forces us to explore more new and local materials from Berlin and Germany. This process of researching material was a catalyst of the project for me to reflect on the architectural aesthetic with existing architectural expression within the city. At the same time, it also provides a different perspective to evoke the building's identity, representing the typology's characteristics through material implementation.