



MASTER-/DIPLOMARBEIT

SofAir - Terminal 3 für den Flughafen Sofia

Aufbruch in eine neue Ära des Fliegens

SofAir - Terminal 3 for Sofia Airport

The dawn of a new era of flying

ausgeführt zum Zwecke der Erlangung
des akademischen Grades eines
Diplom-Ingenieurs / Diplom-Ingenieurin
unter der Leitung von

Manfred Berthold
Prof Arch DI Dr

E253 - Institut für Architektur und Entwerfen

eingereicht an der Technischen Universität Wien
Fakultät für Architektur und Raumplanung

Iliyan Kukutsov
Matr. Nr. 12044233

Wien, am _____
Datum

Unterschrift





Flughäfen spielen eine zentrale Rolle bei der Entwicklung von Ländern, und eine noch größere Rolle haben effiziente Flughafenterminals.

Der Flughafen Sofia verfügt derzeit über zwei funktionierende Terminals, die jedoch nicht in der Lage sind, das steigende Passagieraufkommen zu bewältigen, das sich in 13 Jahren seit der Eröffnung von "Terminal 2" auf mehr als 7 Millionen Fluggäste fast verdreifacht hat. Ein neues und effizienteres Terminal wird benötigt, um das erwartete Passagierwachstum in den kommenden Jahren aufgrund der möglichen Aufnahme in den Schengen-Raum im nächsten Jahr zu bewältigen.

Mit diesem Projekt sollen diese Probleme praktisch und effizient angegangen werden, indem eine schnelle und effiziente Möglichkeit geschaffen wird, von und nach Sofia zu reisen. Das Entwicklungskonzept konzentriert sich auf den Übergang der Passagiere vom und zum Terminal und die Effizienz der Funktionen.

Airports have a central role in the development of countries, and an even greater role have efficient airport terminals.

Sofia Airport has currently two working terminals, but they cannot cope efficiently enough with the increased passenger traffic, which has almost tripled in 13 years since the opening of "Terminal 2" to more than 7 million. A new and more efficient terminal is needed to accommodate the expected passenger growth in the upcoming years due to the possible acceptance into the Schengen Area next year.

This project aims to address those concerns practically and efficiently, providing a fast and efficient way to travel from and to Sofia. The development concept focuses on the passenger transition from and into the terminal and the efficacy of functions.

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



CONTENTS

01 Introduction	8
02 Site Analysis	10
02.01 Sofia Airport	12
02.02 Location	15
02.03 Current Situation	18
02.04 Previous Development Plans	24
02.05 Passenger Terminal Planning	32
03 Objectives	38
04 Methodology and Process	40
04.01 Concept	42
04.02 Phases	48
04.03 Program	50
04.04 Structure	54
04.05 Light Concept	58
05 Outcome	60
05.01 Site Plan	62
05.02 Floor Plans	64
05.03 Sections & Elevations	86
05.04 Details	90
05.05 Visualisations	92
06 Area Calculation	118
07 Conclusion	124
08 Bibliography	128
09 Film Strips	134
10 Curriculum Vitae	138

01

INTRODUCTION

The development of a new airport terminal at an operational airport is a very difficult and complex task, which must integrate the existing infrastructure and the surrounding environment. One must be very conscious of how they make the interventions without disturbing the ongoing air and passenger traffic.

This work aims to find an aesthetic and practical solution to the problems of modern flying. The focus of the design is to provide a convenient and stress-free experience combined with the demands of the modern flyer such as fast access and exit, a variety of shops and restaurants, and a relaxing overall trip.

The approach to the task included an analysis of the most practical and immersive experience, different volume designs, styles and arrangements, and calculations of the needed area.

02

ANALYSIS

02.01 Sofia Airport

The official history of Sofia Airport begins in 1937 when Tsar Boris III allocates land for the construction of a passenger airport, where it still stands. The first building of the airport opened two years later and by the end of the 1940s, a 1-kilometer-long concrete runway replaced the existing grass and gravel one.

The first international flight routes began at the end of the 40s with routes to Budapest, Belgrade, and Prague. Modernizations and extensions of the airport were made over the next two decades by the end of which a bigger terminal building was constructed and the runway extended to 2,7 kilometers long to accommodate newer and bigger planes.

The current building of "Terminal 1" was constructed in 1975 and modernized to its current state in 2001. It was able to handle around 3 million passengers per year in the 70s and 80s.

The first major redevelopment of the airport began in 2000 with a project of an ICAO Category 3 runway (3,6 km long) and a new "Terminal 2". The second terminal is around 2 kilometers from the old one, opened in 2006 with an area of 99 340 m², with an extension in 2013. During the extension, a connection to the Metro system was constructed.

Later a park with a size of 365 thousand m² was developed around the building of Terminal 2 to allow for a place for relaxation and cultural gatherings for the public.



Fig. 1 Old Sofia Airport Terminal

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

ANALYSIS

Currently, Sofia Airport is the biggest passenger airport in Bulgaria and is the only one in a radius of almost 150 km serving more than 7 million passengers in 2019.

It has 65 regular and 35 seasonal domestic and international routes. Since the acceptance of Bulgaria to the European Union there has been a steady passenger growth and in 13 years the passenger numbers almost tripled. Additional growth is expected after the acceptance of Bulgaria and Romania to the Schengen Area in 2024.



Fig. 2 Map of current Destinations

02.02 Location

Bulgaria is located on the southeast Balkan peninsula, bordering the Black Sea at the east, the Danube River and Romania to the north, Serbia and North Macedonia to the west, and Greece and Turkey to the south.

Sofia is located in the western part of the country, and it is the capital city. It has a population of over 1,5 million people. Together with the neighboring regions of Pernik, Kyustendil, Montana, and Vratsa, the airport will serve a combined more than 2,5 million people.



Fig. 3 Map of Bulgaria

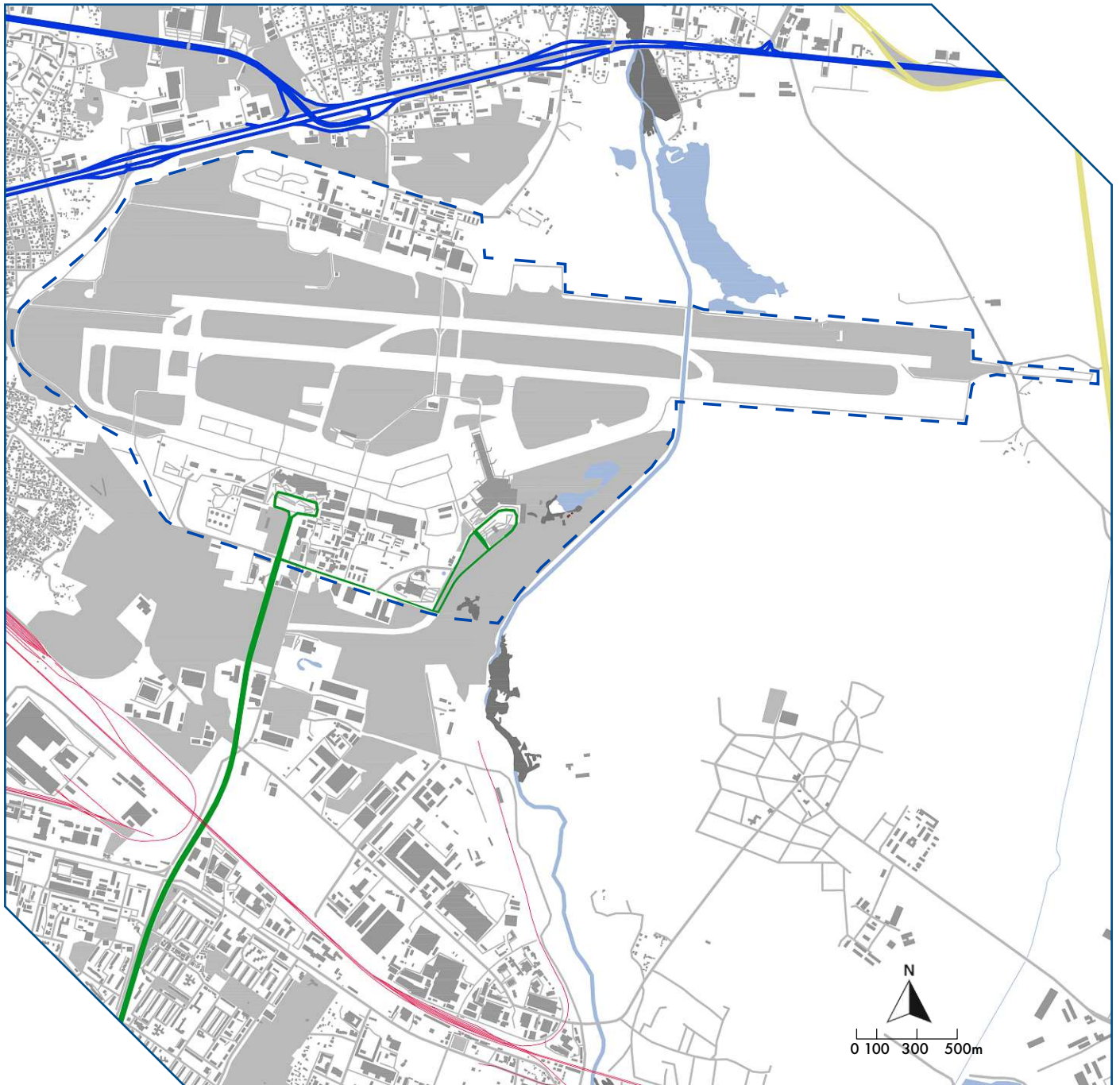
ANALYSIS

Sofia Airport is located around 10 kilometers northeast of the center of the capital city – Sofia. It is located close to A1 Trakiya Highway, A2 Hemus Highway, and the Sofia Ring Road, and has a direct uninterrupted boulevard leading directly to the two terminals, which makes it easily accessible from nearby cities and villages. There is a train track close used by the industrial zone around the airport and a train station 2,5 kilometers away.

The airport is currently well connected by public transportation with two bus lines and a metro station leading directly to it.

There are free open areas around the airport, allowing for a seamless expansion without needing relocation.

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
 The approved original version of this thesis is available in print at TU Wien Bibliothek.



Legend:

- Train Lines
- A2 Hemus Highway
- Bul. Christopher Columbus (direct access boulevard)
- Sofia Ring Road

Fig. 4 Sofia Airport Location

02.03 Current Situation

Since it was first built in the 1930s the airport has taken only two major reconstructions and developments, one in the 1970s, when "Terminal 1" was built, and one between 2001-2006 - "Terminal 2". It has only one runway, which was added in 2006 (ICAO Category 3 - 3,6 km long). All the additional facilities and hangars belonging to the airport are from the first major reconstruction in the 70s and were also renovated during the second.

In 2021 Sofia Airport was given to Sof Connect for a 35-year concession.

Currently, only "Terminal 2" is fully operational with "Terminal 1" operating only Wizz Air flights, which started during the Covid-19 pandemic in 2020.

The current capacity of Sofia airport is around 7,1 million passengers (2019), with 2000 passengers during peak hours. The basic parameters set for the construction of "Terminal 2" were 2,6 Million passengers per year, and an extension for 200 thousand more in 2013, which was surpassed twice. This constant passenger growth suggests a significant extension and expansion of the passenger capacity and facilities is highly needed. (Fig. 6)

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
 The approved original version of this thesis is available in print at TU Wien Bibliothek.

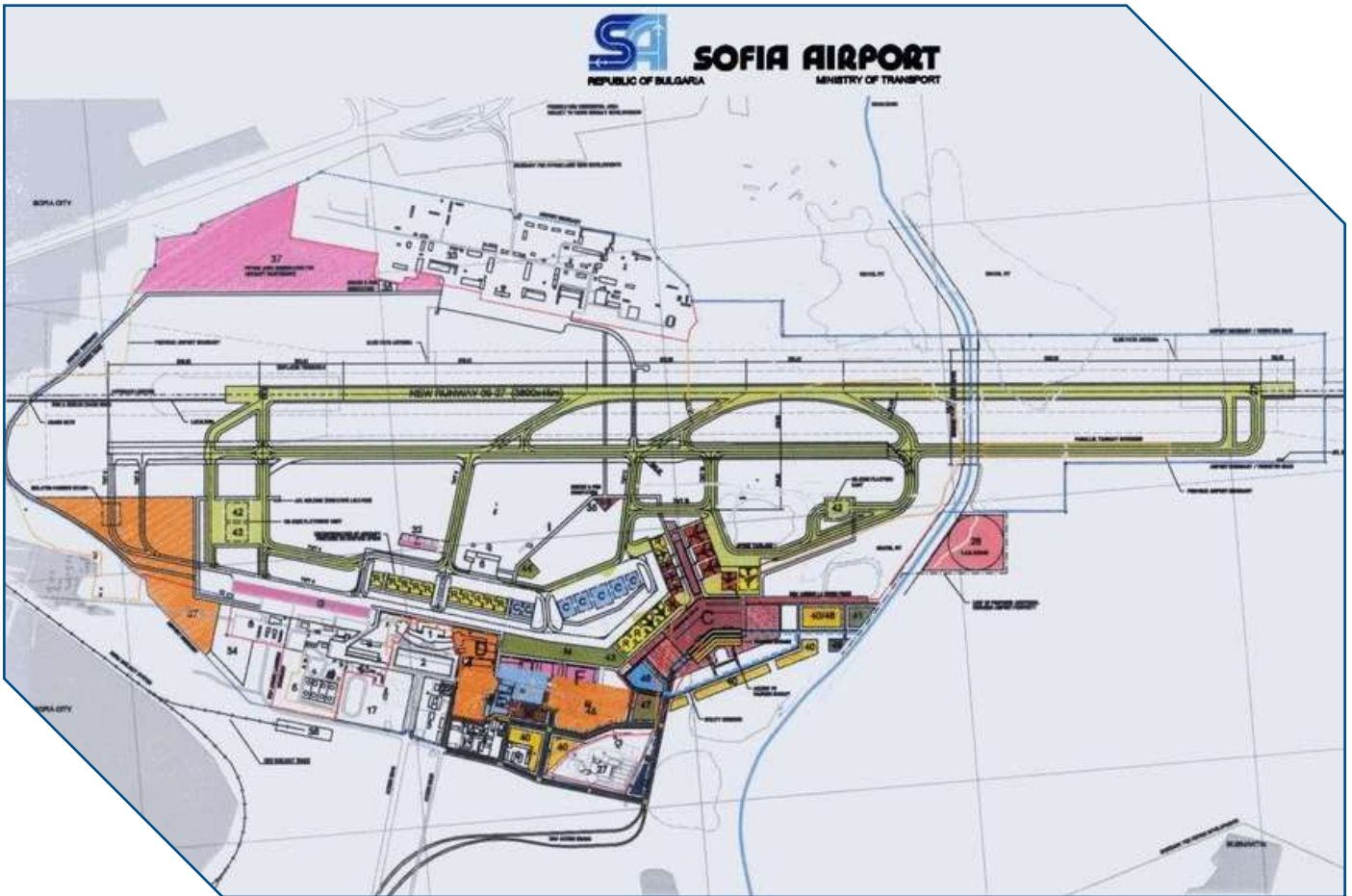


Fig. 5 - Map of the current situation

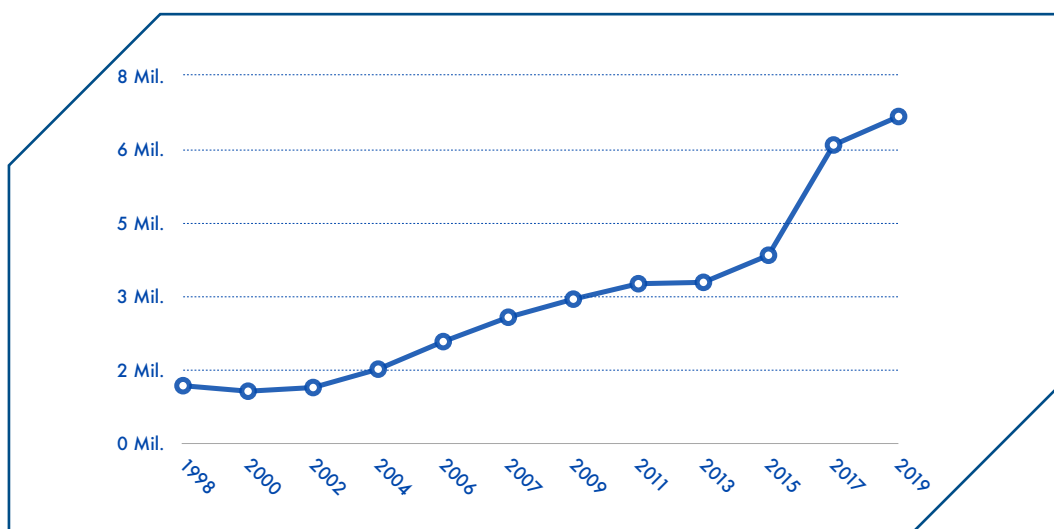

























































Fig. 6 Passenger Graph 1998-2019

ANALYSIS

Currently, "Terminal 2" has a size of almost 100 thousand m2 and is split into two passenger levels with 36 check-in desks and more than 4 thousand m2 of shopping and dining area.

The main passenger level (Level 1) features a 242-meter-long passenger gallery with 7 passenger boarding bridges and additional gates for Bus transfer.

Legend:

- | | | | | | |
|---|------------------|---|--------------------|---|--------------------|
|  | Information |  | Cafe |  | Pharmacy |
|  | Departures |  | Restaurant |  | Newsstand |
|  | Parking |  | Arrivals |  | Cigar Shop |
|  | Lift |  | Taxi |  | Alcohol & Tobacco |
|  | Escalator |  | ATM |  | Duty-Free Shop |
|  | Exit |  | Stairs |  | Bulgarian Products |
|  | Handycap Toilets |  | Emergency Exit |  | Shops FAB |
|  | Special Assist |  | Toilets |  | VAT Refund |
|  | Medical Center |  | Prayer Room |  | Groceries |
|  | Nursery Room |  | Transfer |  | Rent-A-Car |
|  | Baggage Check-in |  | Gates |  | Airline Offices |
|  | Waiting Area |  | Outbound Control |  | Bank |
|  | Baggage Trolleys |  | Arrivals Control |  | Covid Lab |
|  | Smoking Area |  | Transfer Control |  | Travel Insurance |
|  | Bus |  | Customs |  | Taxi Office |
|  | Terminal Shuttle |  | Health Control |  | Currency Exchange |
|  | Lounge Preslav |  | Sanitary Control |  | Ticket Desk |
|  | Lounge Vitosha |  | Veterinary Control |  | Baggage Wrapping |
|  | Lounge Pliska | | | | |

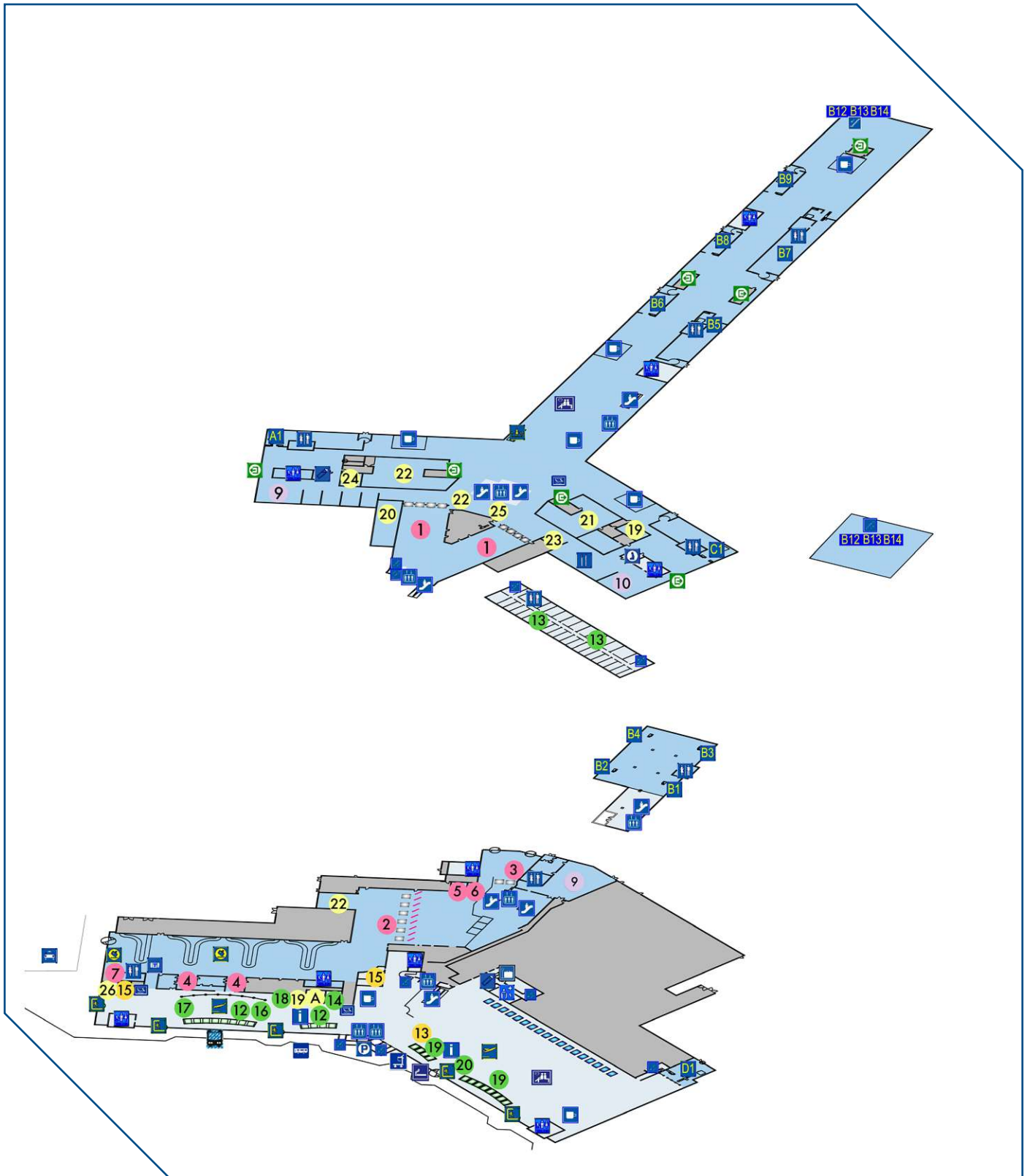


Fig. 7 Terminal 2 Floor Maps



Fig. 8 Sofia Airport Exterior Terminal 2



Fig. 9 Exterior Terminal 2



Fig. 10 Terminal 2 Check-in



Fig. 11 Terminal 2 Cafe

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

02.04 Previous Development Plans

After the rapid passenger growth due to the low-cost flight companies, talks of a new expansion of the airport started to surface. The initial ideas were to split the two terminals one for domestic, and the other for international routes, another idea was a further expansion of the second terminal east to accommodate additional plane gates but none of those variations were not a sufficient long-term solution to the current and future problems the airport will face.

After record-breaking passenger numbers for 2016 and 2017, talks of a new terminal building began to be the go-to idea for the future of the airport.

Finally, in 2020 SofConnect was given the concession of the airport, and the first official development plans were publicly shown.

The idea of SofConnect was to “to make Sofia Airport an enabler of social, economic, environmental and inclusive growth that contributes to Sofia and Bulgaria.”(1)

The official project shown is a new “Terminal 3”, located west of “Terminal 2” and connected to it both airport and the public side, and redevelopment of the current terminals to accommodate bigger planes, newer parking structures, and a long gallery between the terminals.

(1) Official SofConnect Statement (see “List of Literature”)

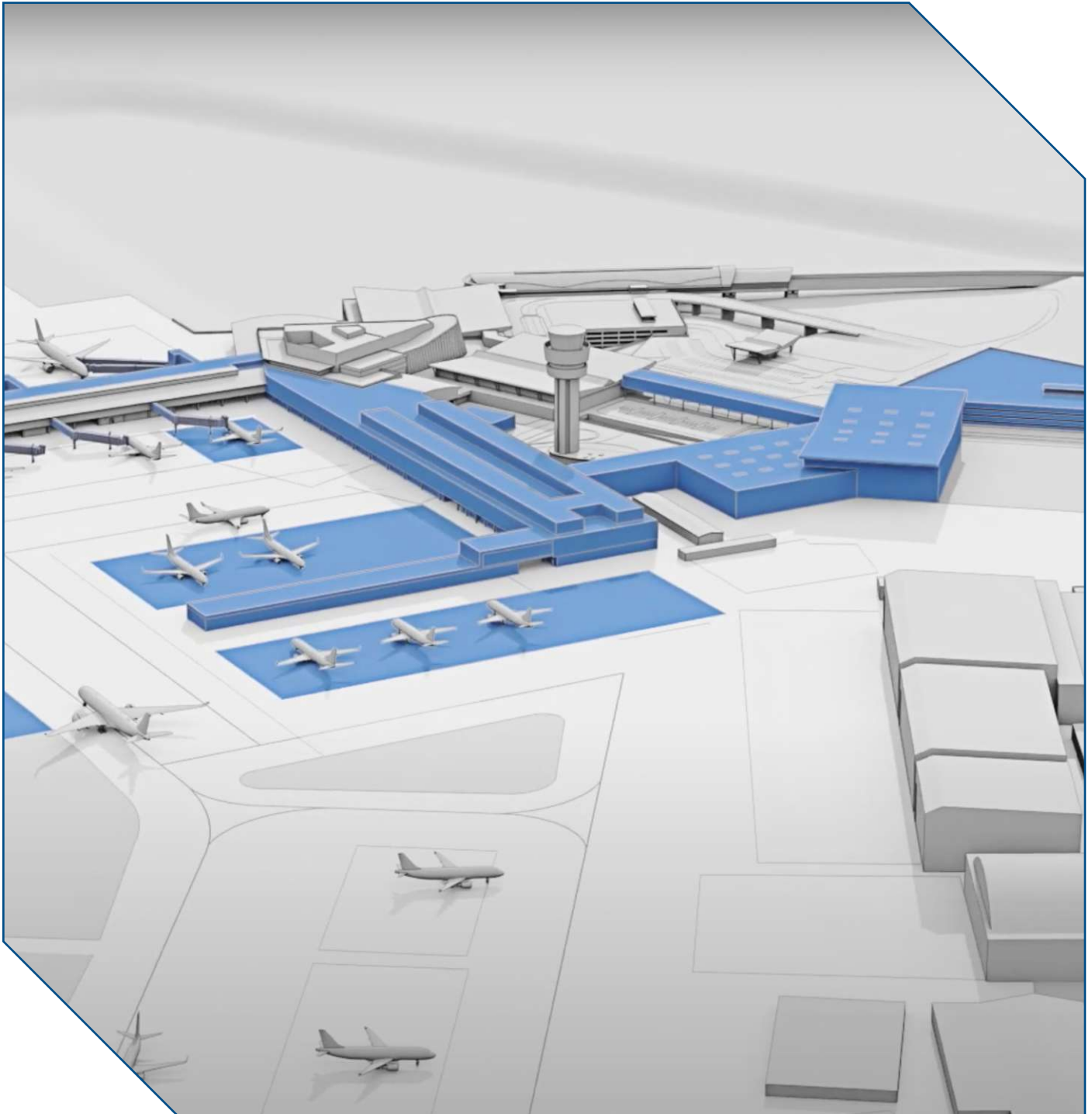


Fig. 12 SofConnect Vision Project

ANALYSIS

The main focus is on the new terminal, which will include a space for 6 new passenger boarding gates and new aprons for bus boarding. Interior redevelopment and enhancement were also included to make the terminal feel modern and accommodate better the passenger, who chose Sofia Airport.

The Project is thought to be done in four stages, beginning with a modification of the current "Terminal 2" – new passenger boarding bridges to accommodate bigger planes.

In stage 2, a new terminal with 6 walk-in-walk-out gates will be built, together with a new parking structure, and a new loading center.

Stage 3 is a "Terminal 3" extension to the west, 5-7 new aprons for planes, another parking structure, and an extended loading center.

The last stage is an apron extension and a parking structure bringing the total apron plane spots to 13, the boarding bridges to 14, and 3 additional parking structures – two leveled and one ground.

SofConnect plans to use only "Terminal 2" and "Terminal 3" for commercial flights and "Terminal 1" as a VIP only due to the difficult connection to the two other terminals and the limited expansion possibilities.

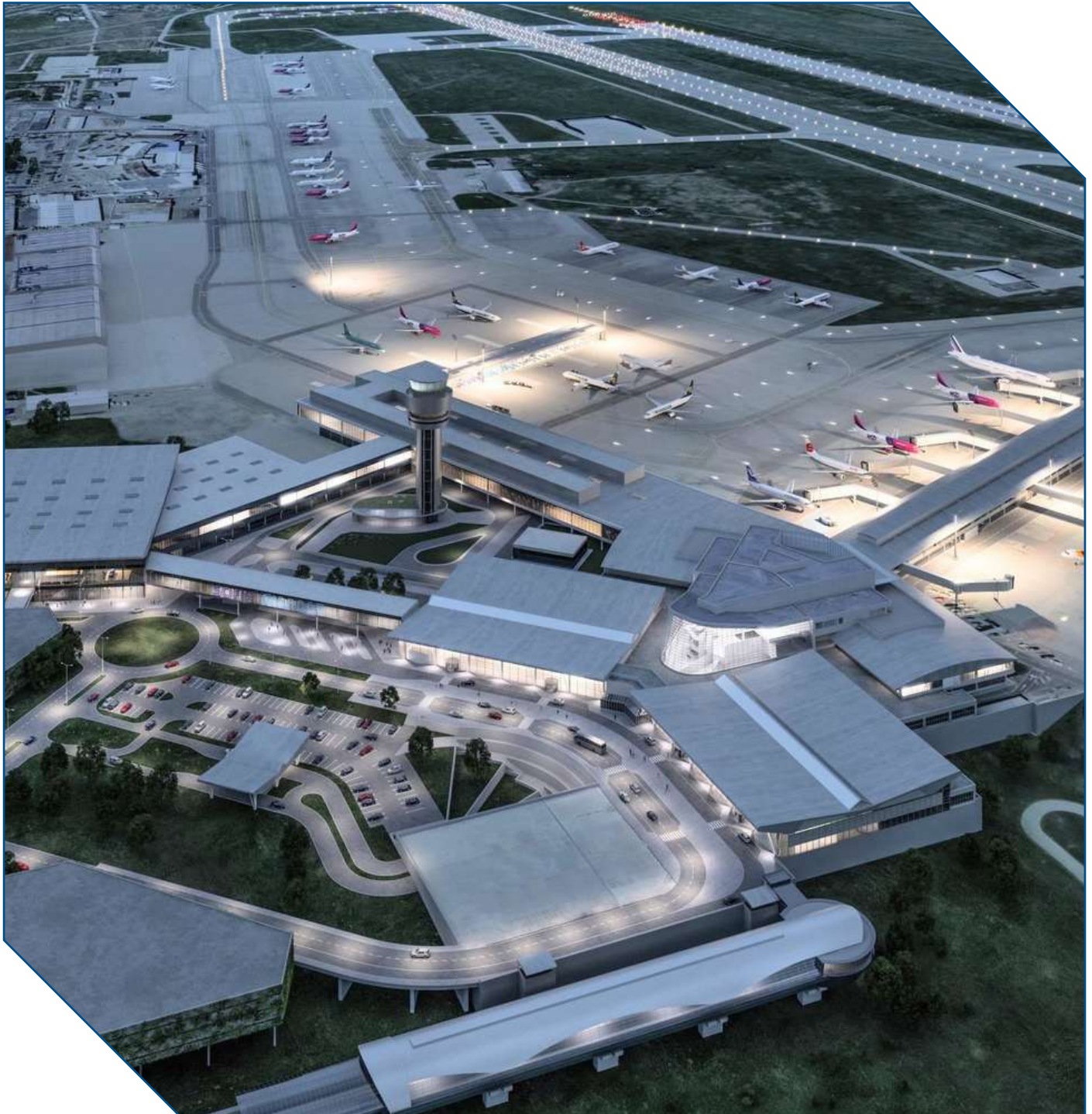


Fig. 13 Airport Visualisation

ANALYSIS

According to the Managing Director of SofConnect, Jesus Caballero, the new terminal will service nearly 100 new routes to and from Sofia Airport, complete reconstruction of the commercial areas, and new retail opportunities. Furthermore, the new experience is expected to be better and easier with new digital implementations.

There are no plans for a new runway because the airport will be focused on using advanced methods to improve air traffic resulting in a new and better operational capacity.



Fig. 14 SofConnect's Terminal 3 Interior



Fig. 15 SofConnect's Terminal 3

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



Fig. 16 SofConnect's Terminal 3 Interior



Fig. 17 SofConnect's Terminal 3 Interior

02.05 Passenger Terminal Planning

When designing a Terminal building, one should first define the attributes of a Terminal Complex. Planning such a structure is influenced by two major parts:

- Landside part
- Airside part

For a well-designed and efficient new terminal, one should focus on the airside component. That requires identifying how and where the aircraft will park, maneuver, and taxi so the overall efficiency of the airport is optimized. This will also optimize the passenger flow to and from the terminal.

The elements that must be considered when dealing with the airside part of an airport terminal are:

- Aircraft sizes
- Aircraft parking
- Aircraft maneuvering
- Ground services
- Security and emergency response

The elements of the landside are directly connected to the Terminal building facilities and should be planned in tandem because they influence the efficiency of the other. Starting from the inside out, the Terminal facilities that must be addressed are:

- Terminal facility requirements (they are influenced by the level of service and the projected passenger capacity)
- Functional relationships
- Flow sequences
- Passenger Movements
- Terminal Concept Development (domestic or international, configurations and levels)

Those elements influence the specifications of the landside facilities, so to optimize the efficiency of the terminal, the landside components that should be carefully thought out are:

- Pedestrian curb front facilities
- Vehicle entry and exit ways
- Parking
- Vehicle curb front facilities
- Transport and commercial vehicles areas
- Rail transit connections

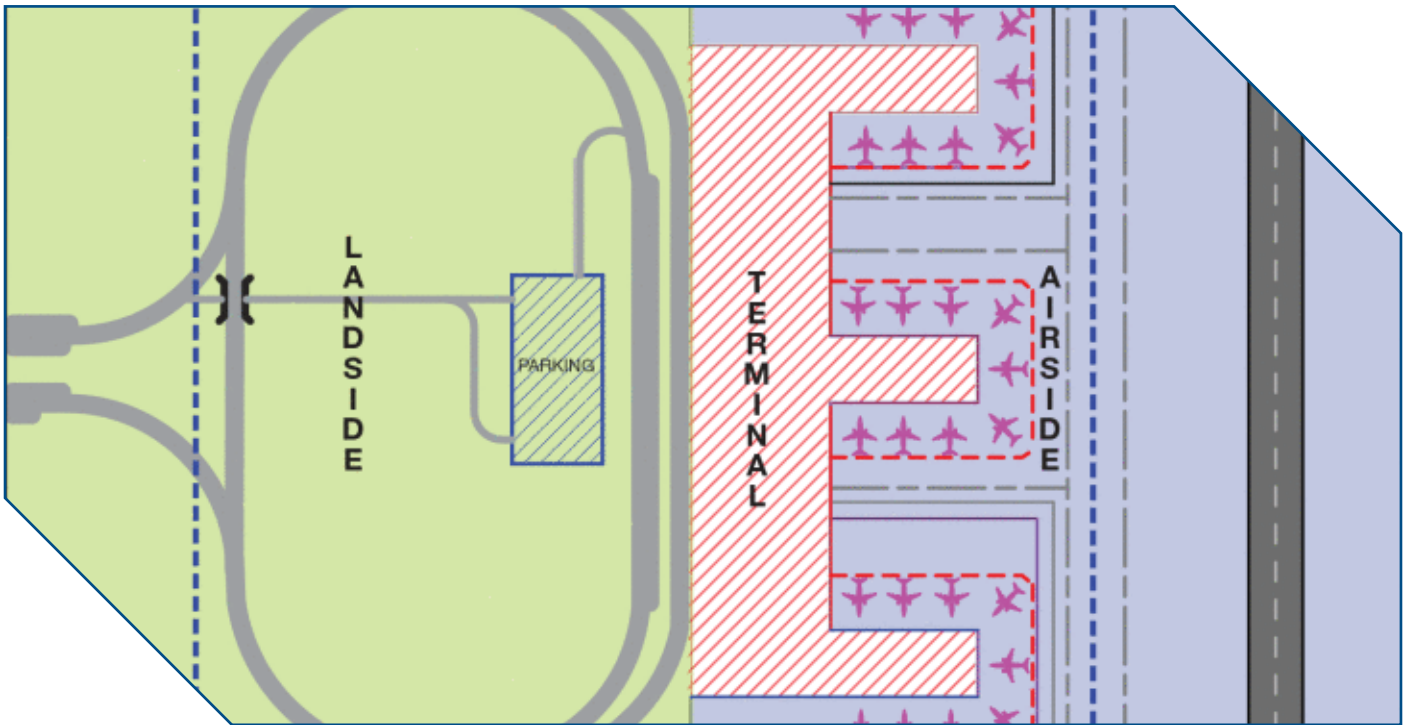


Fig. 18 Landside and Airside Diagram

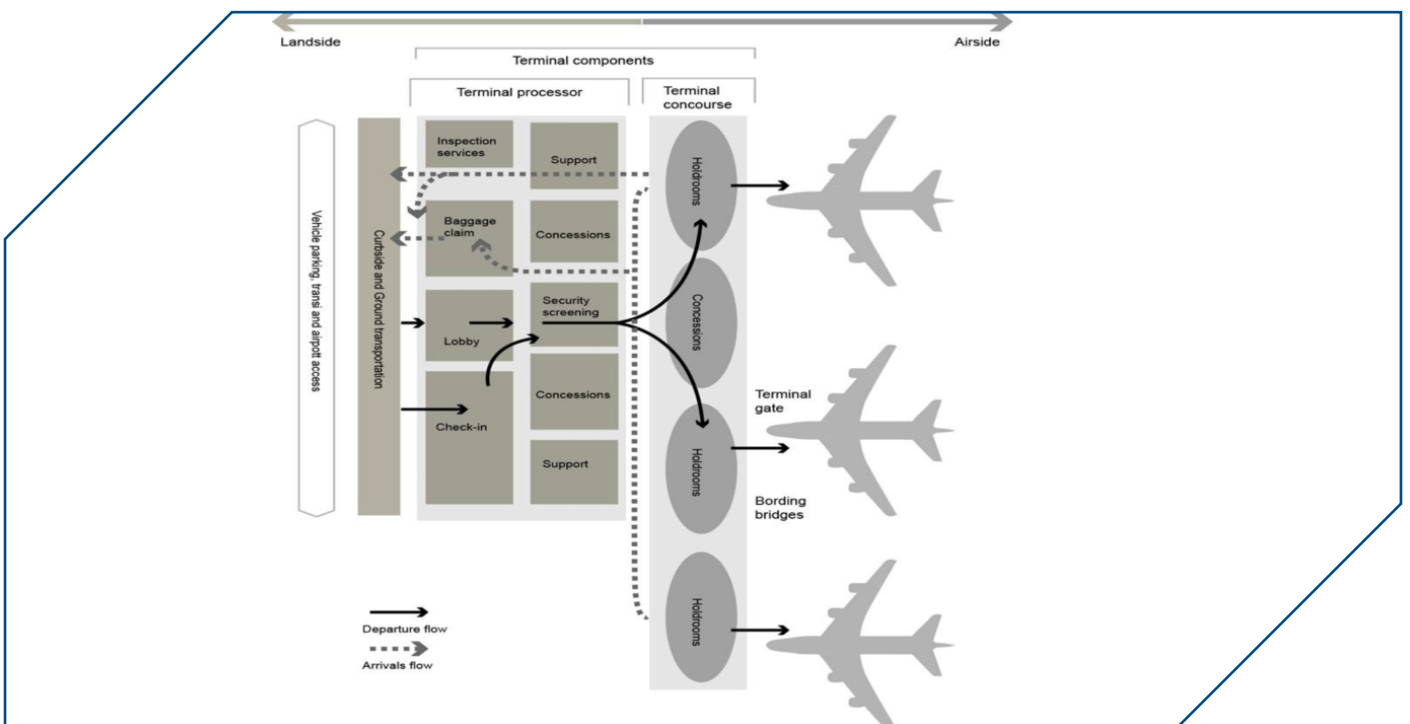


Fig. 19 Components of a Terminal

ANALYSIS

After the main components of the Terminal Complex have been identified, the Terminal Planning begins with the elements of the terminal system:

- Access interface
- Processing interface
- Flight interface

In the development criteria, those elements are determined by the different terminal building types. They are defined by two factors – profile and function.

By Profile:

- Single Level with one-level road access (1) – those are usually old terminals or small airports with a small passenger capacity, mainly for domestic use airports
- Multi-Level with one-level road access (2) – usually medium size airports, usually <10 million passengers per year, offer both bus and passenger bridge boarding
- Multi-Level with multi-level road access (3) – Large airports, mainly >10 million passengers per year, plane boarding mainly with passenger bridges

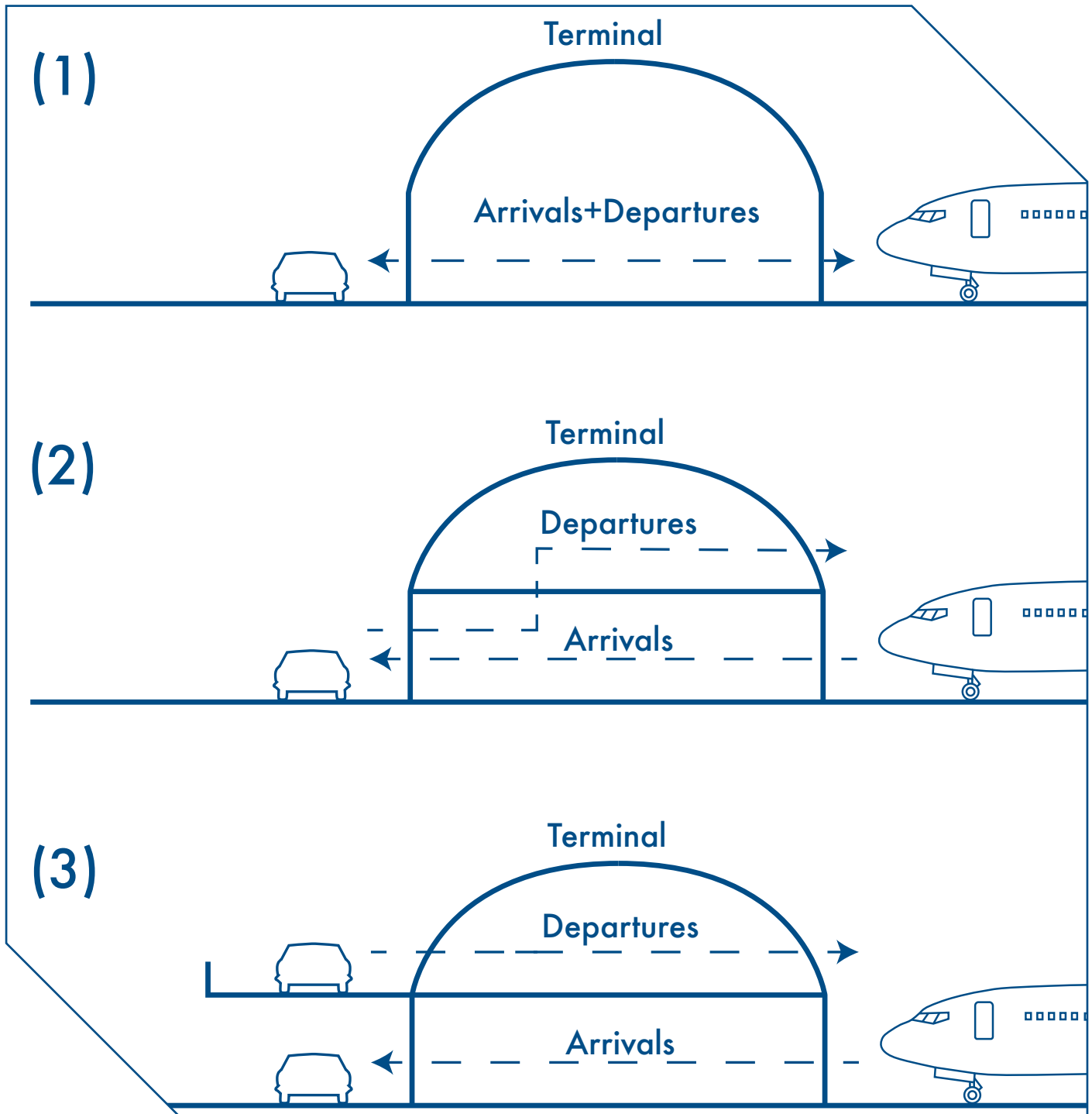


Fig. 20 Terminal Profiles

ANALYSIS

By Function:

- Linear/Curvilinear
- Pier
- Satellite
- Concourses
- Shuttle

The linear/curvilinear terminal is a configuration where the planes park perpendicular to the building. It is simple to navigate for the passengers and all the baggage handle functions run along the middle of the main building. The boarding is usually done with passenger bridges, but the passengers have a greater distance to cover if they are boarding at the furthest gates. This type of configuration can be extended to the sides if additional passenger capacity is needed.

The Pier Terminal is a configuration that has a similar idea to the linear, but the aircraft capacity is more because the planes can park on both sides. These Terminals usually have more than one pier and like the linear the baggage processes are carried in the middle of the main building, and also the distance is long for the passengers. "Terminal 2" of Sofia Airport uses this configuration.

The Satellite Terminal is a configuration where the main terminal building is connected to the building(s) with gates, usually underground, so the satellite buildings can have planes on all sides, which makes the distance for passengers in the satellite terminal short. The additional facilities are centralized in the main building. The benefit of this configuration is the easy construction that does not require a direct road connection from the satellite building to a road system.

The Concourses Terminal uses multiple linear buildings connected usually underground. That is a hybrid build between a linear and a satellite terminal configuration.

The Shuttle Terminal is usually used in small airports. There is no direct connection between the terminal and the planes. The aircraft is parked on an apron and the passengers are transported by airport shuttles to and from the terminal. All the processes take place in the main building. This type of terminal configuration is slower, and the overall passenger capacity is small.

A combination of multiple configurations is also possible and is mostly used when an airport is being expanded. This solution is used in big airports like O'Hare in Chicago, USA. The problem with those combinations is the land needed for them and the rise of low-cost airlines, who prefer the shuttle terminals because of the lower airport terminal costs.

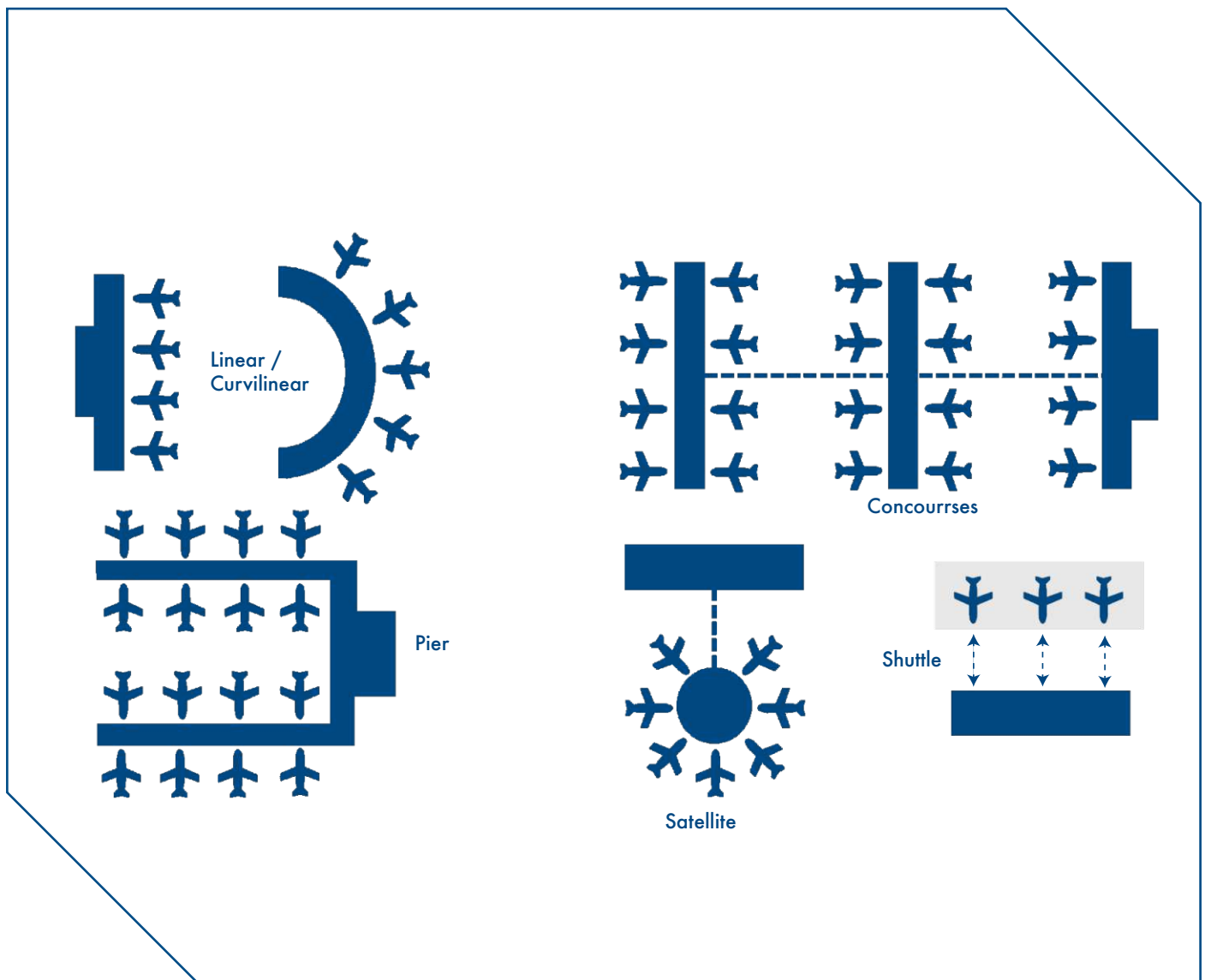


Fig. 21 Terminal Function Configuration

03

OBJECTIVE

Currently, the Terminals of Sofia Airport are barely able to handle the passenger growth seen over the last decade. They were designed and built without a clear view of the technical advances of the future and now they lack the modern simplistic user experience. The layout, capacity, and amenities offered are outdated and a new modern terminal is needed.

The aim of this project is to address all these problems and concerns for the future of the airport in a modern and practical way, and combine them with a pleasant, easy, and simply laid-out passenger experience, creating a comfortable atmosphere that steers you away from the stress of modern flying and brings you into an environment where you feel relaxed and ready for the journey ahead.

04

METHODOLOGY

METHODOLOGY

Designing the most suitable terminal starts with identifying the current problems of the existing two terminals:

- One-level access for arrival and departure
- No railway connection
- Lack of commercial spaces
- Long walking distances
- The complexity of the terminal navigation
- Slow process speeds
- Low flyer satisfaction

After listing the current problems, an evaluation of them is needed. This process will allow you to choose the most suitable design by profile and function. To solve the one-level access, a two-level new terminal is needed (best design by profile). As we have determined in 02.05 Passenger Terminal Planning, a satellite terminal is the most efficient and suitable solution to other problems such as long distances and complexity.

04.01 Concept

The overall shape of the building depends on the location of the terminal the available infrastructure and the free space available. Because the space around the current airport is limited due to its location and the satellite terminal requires a lot of space around it for the maneuvers of the planes. The most suitable location for the new terminal is approximately 1 kilometer east of "Terminal 2", on a free plot of land with enough offset from the nearest buildings. The site is approx. 3,55 km². There the shape can be more freely chosen.

Additional space for a runway is also needed because that will be the next stage of the expansion of the airport. This new runway will feature an intersecting design with the existing runway. This next stage will ensure that the airport can support passenger growth for, at least, the next two decades.

The new terminal will be placed in a way that supports the current infrastructure and will work perfectly with the future proposed runway, without interrupting the current and future air traffic flow.

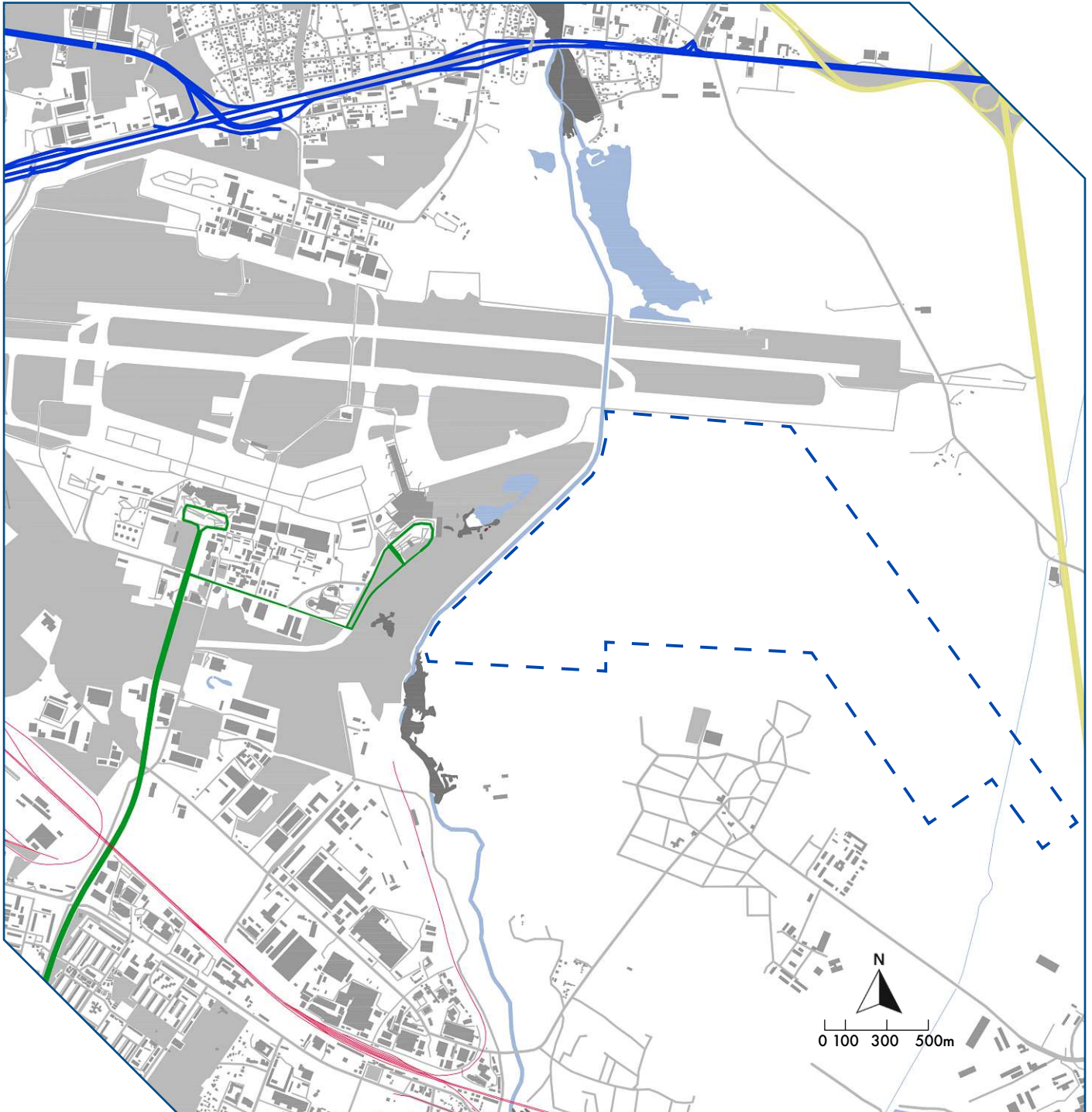


Fig. 22 New Terminal Location Map

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

METHODOLOGY

As this is an Airport Terminal Building, I wanted to use as inspiration something related to the aeronautic field - Blended Wing Aircraft. As this is thought to be the new efficient design for the future of the aircraft because of its better fuel efficiency and noise reduction (1). It perfectly complements the idea of an efficient airport terminal.

The design process started with the base form - a Boeing X-48, which is an experimental model aircraft made for NASA in the mid-2000s. It is a Blended Wing Aircraft with an almost triangular shape. Then lines were drawn to outline the outer shape of a triangle.

From this base shape of a triangle, the lengths of the sides were determined by using the wingspan of the biggest operational passenger aircrafts and the space for maneuvering around them.

Aircraft Model	Wing Span (in m)
Airbus A380	79,8
Boeing 747-8I	68,4
Airbus A350-1000 (dif. variations)	64,8
Boeing 777F (dif. variations)	64,8
Boeing 747-400 (dif. variations)	64,4
Airbus A340-600	63,5
Airbus A330 (dif. variations)	60,3

Fig. 23 Aircraft Wingspan Table

If we take the wingspan of an Airbus A380 and the space needed between 2 aircrafts parked is around 100m diameter per aircraft. That means 5 aircrafts are equal to 500 meters per side of an equilateral triangle, so when all communications are in the middle, all passengers have the same distance from the center, allowing for equal distances from all gates.

(1) Nasa Blended Wing Aircraft Factsheet (see "List of Literature")

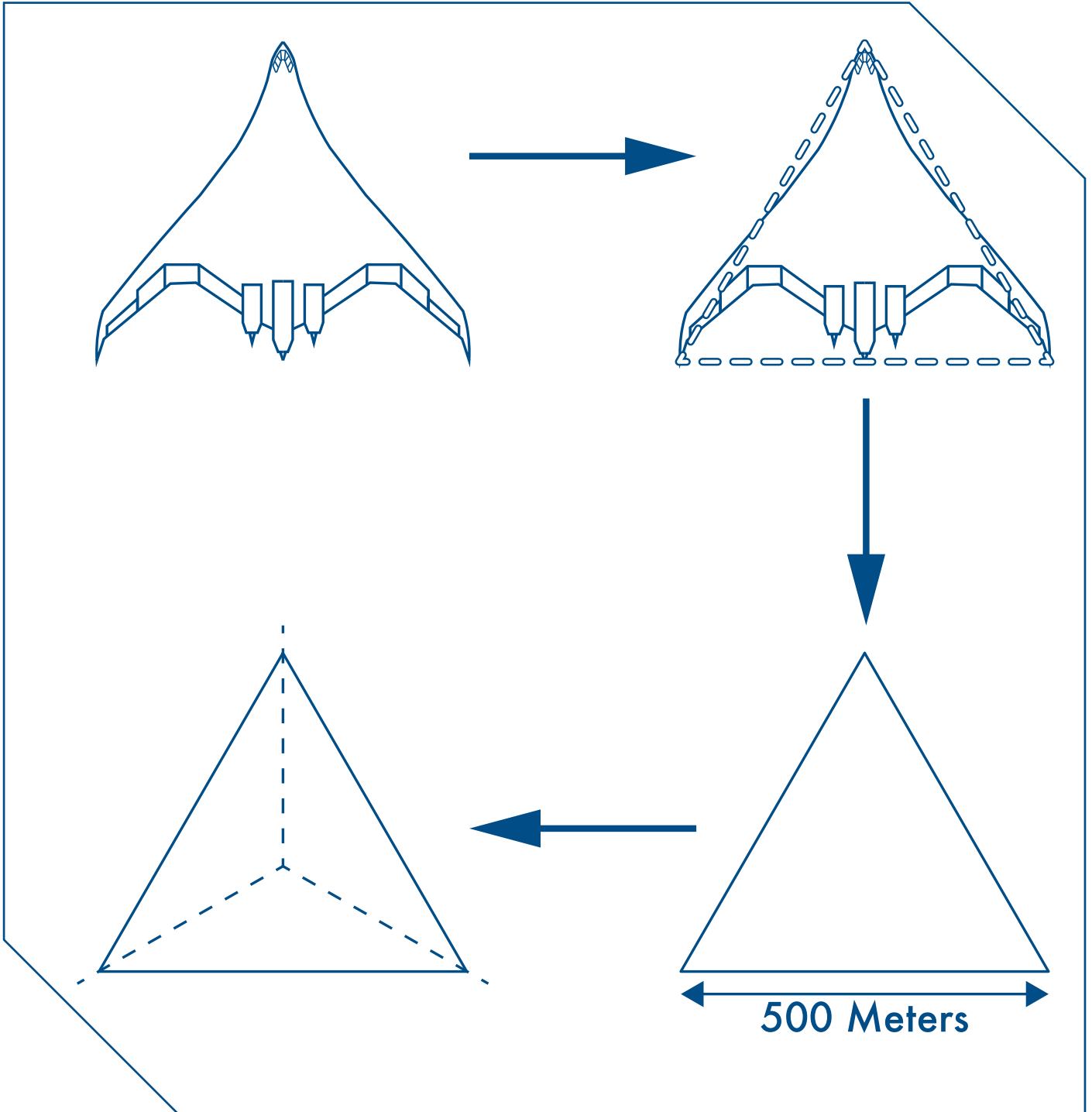


Fig. 24 Initial Form Diagram

METHODOLOGY

The next step is a further rework of the shape. Starting with an opening in the middle. A circle has been circumscribed around a triangle. This opening will span down to the traffic connections to add natural light and ventilation to the space.

Additionally, on all three sides, a semi-circle has been inscribed and all three have also been pushed inwards to create a curved shape for a more panoramic view and a better flow of the façade.

After those shape changes, the length of the side has been shortened, and as a solution to this problem, the edges on all three sides will be extended, with about 90 meters as a continuation of the curve to create an overall length suitable for 6 aircraft per side.

To make the shape a bit more interesting, the extensions will not be fully covered on the last floor, and the roof will sharpen the semi-circles up to the edges of the initial triangle. This shape will complement the initial base form of the Boing X-48.

The final shape of the Terminal can accommodate 6 aircraft per side and 2 additional at the front of the extensions, for a combined 24 aircraft.

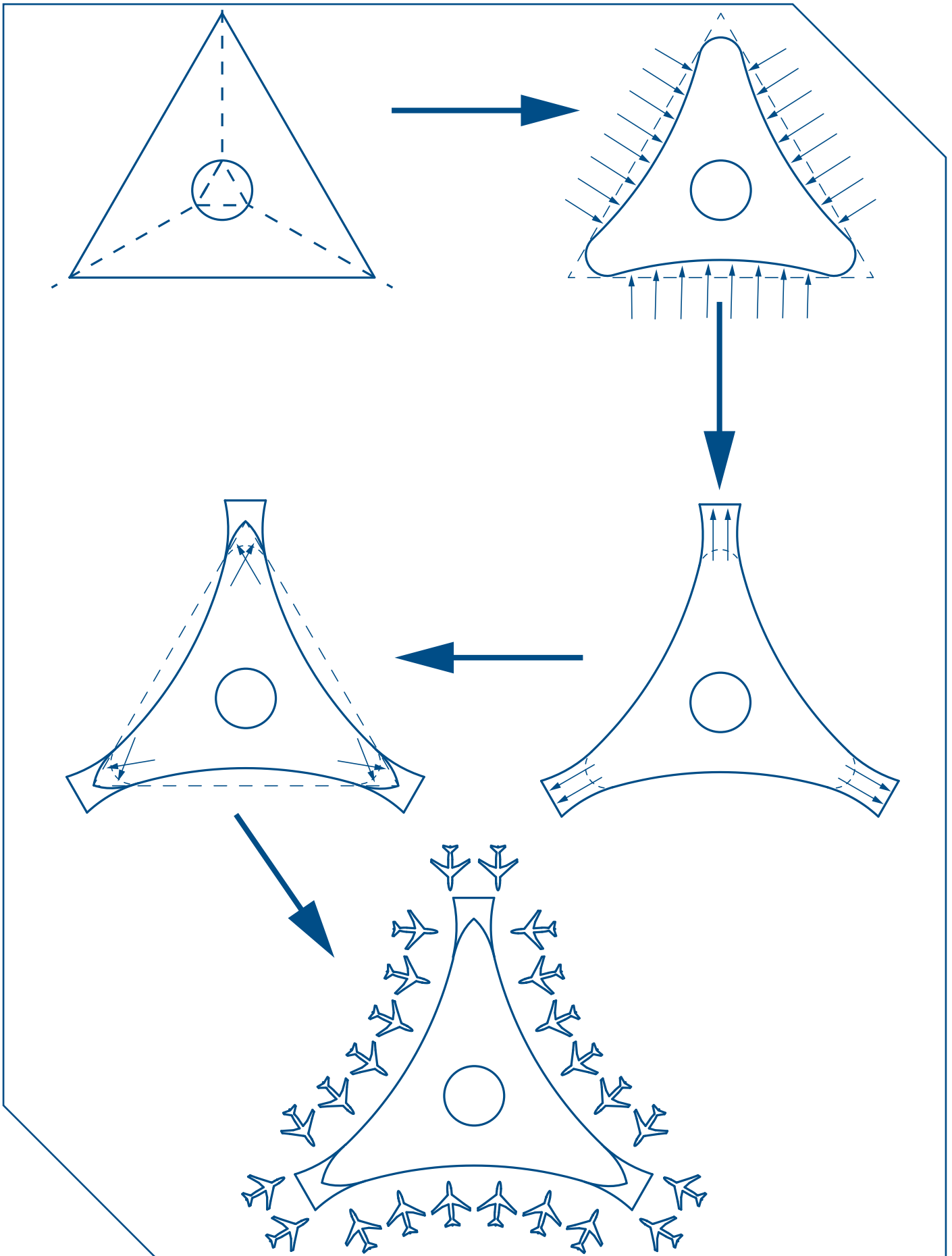


Fig. 25 Final Form Diagram

METHODOLOGY

04.02 Phases

A new terminal must be able to accommodate future passenger growth over the next few decades without the need for major redevelopments. In this case, a two-phase plan is proposed as the most practical solution.

In Phase 1, the new terminal will be built east of the existing airport structures, on a free plot of land. The connection to the building will be entirely underground – vehicle traffic, railway connections, and metro connections. The new Terminal building will be built with the existing infrastructure in mind and during the redevelopment it will not impact the normal operations of the airport. The Terminal will have 24 passenger bridge connections and an apron with 3 spots for shuttle connection.

In Phase 2, a new runway will be constructed to support future growth and new demands. It will be suitable for bigger planes for the future use of the airport. The construction process will not impact the operations of the original 2 terminals, or the newly constructed one. This is the proposed extension of the airport if a need arises.



Fig. 26 Current Situation

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
 The approved original version of this thesis is available in print at TU Wien Bibliothek.

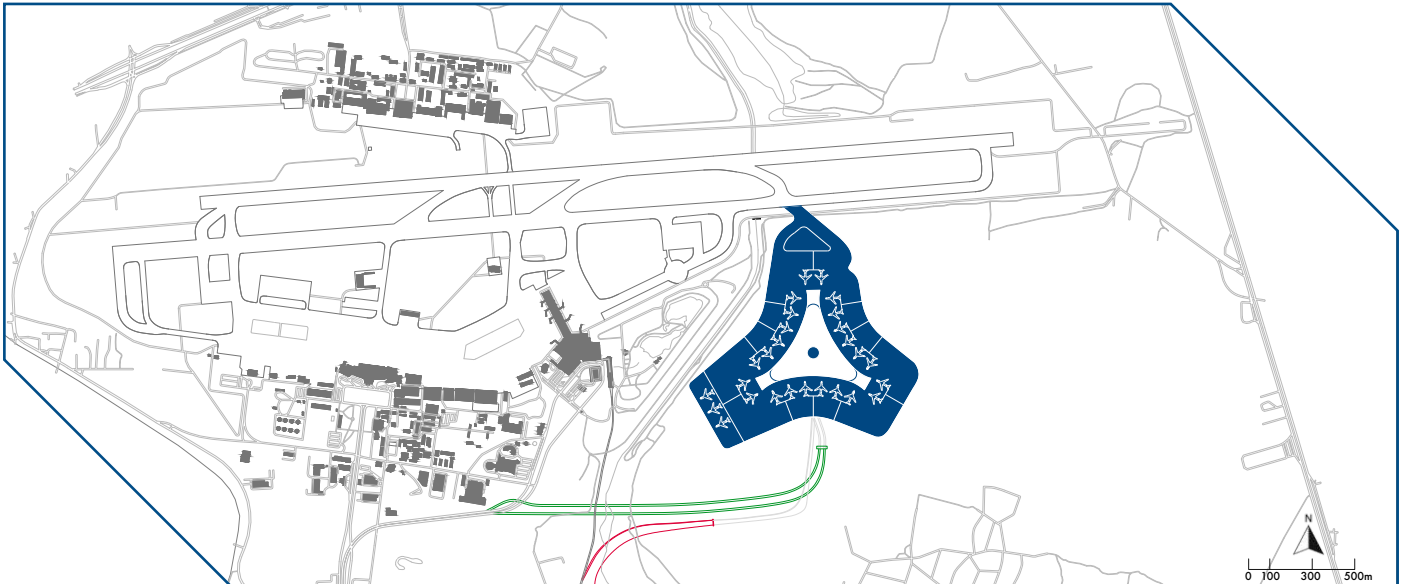


Fig. 27 Phase 1

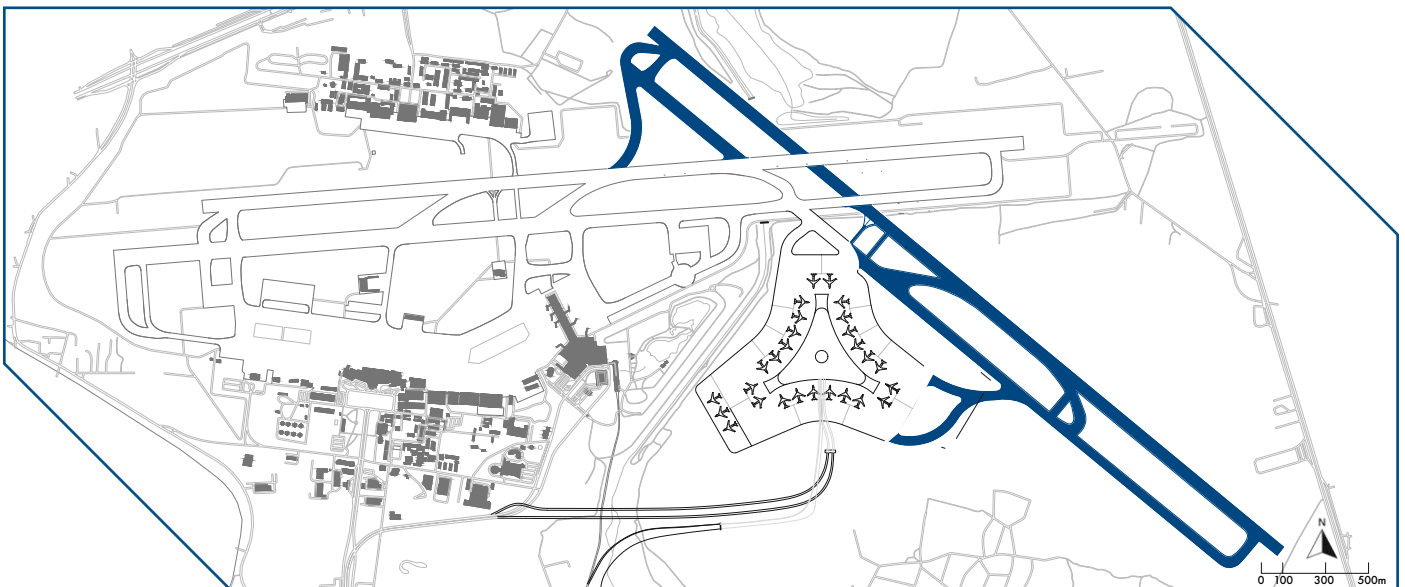


Fig. 28 Phase 2

Legend:

- Proposed Intervention
- New Vehicle Roads
- New Metro and Railway Tracks

04.03 Program

Designing a functional, usable, and passenger-friendly airport terminal starts with creating a well-laid-out functional arrangement or a room program. This program is a blend of the required necessary functions and areas, and the creature comforts that modern passengers want to have access to at an airport. A special emphasis has been paid to the mutual connection and the vertical layout of the different functions.

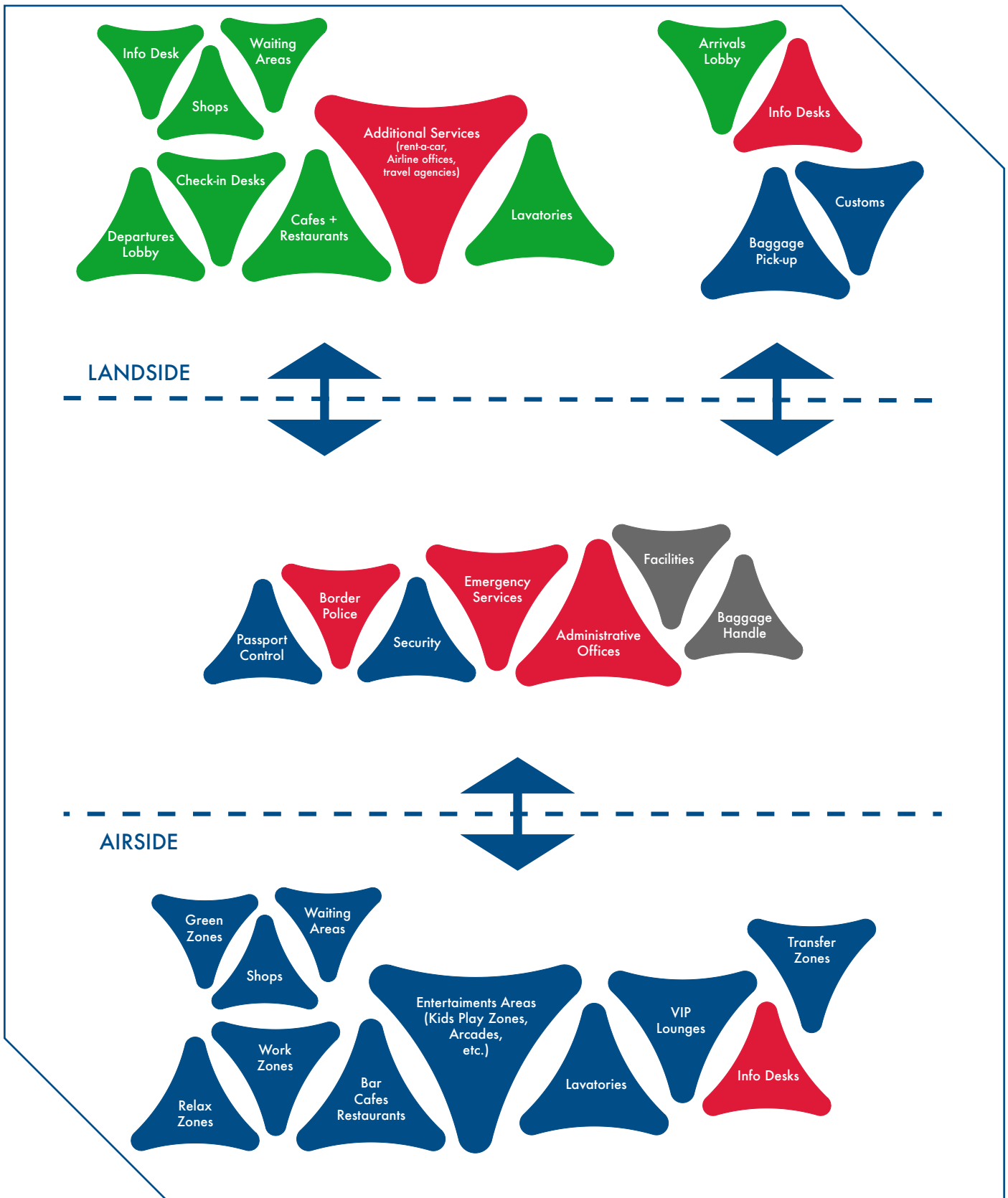
The functional arrangement has been divided into two main zones – Landside and Airside. The program guides the passenger from the time they arrive at the terminal until they are in the air and vice versa.

To optimize the passenger, flow the vertical placement of the functions and areas has been arranged so the departing and arriving passengers are on different floors.

The arrivals make their way to the ground floor where they go through passport control and security, take their checked luggage, and go on directly to the second underground floor where they exit through the arrivals lobby.

The departures arrive at the first underground floor, then they make their way up to the ground floor for the check-in desks and departures lobby and then to the first floor where they go through passport control and to their designated gates. If they have access, they can also make their way up to the second floor, used only by the VIP lounges.

That functional division ensures the unobstructed passenger flow and the easy operation of the airport. The movement patterns proposed are created in a way that gives both arriving and departing passengers to reach their desired destination fast and direct without the typical terminal labyrinth pattern. The program also allows for a more comfortable and stress-free stay at the terminal both on the landside and the airside.



Legend:

- Airside
- Landside
- Offices/Services
- Facilities

Fig. 29 Program Diagram

METHODOLOGY

The functional arrangement stretches out on 7 floors, 4 underground, and 3 above ground.

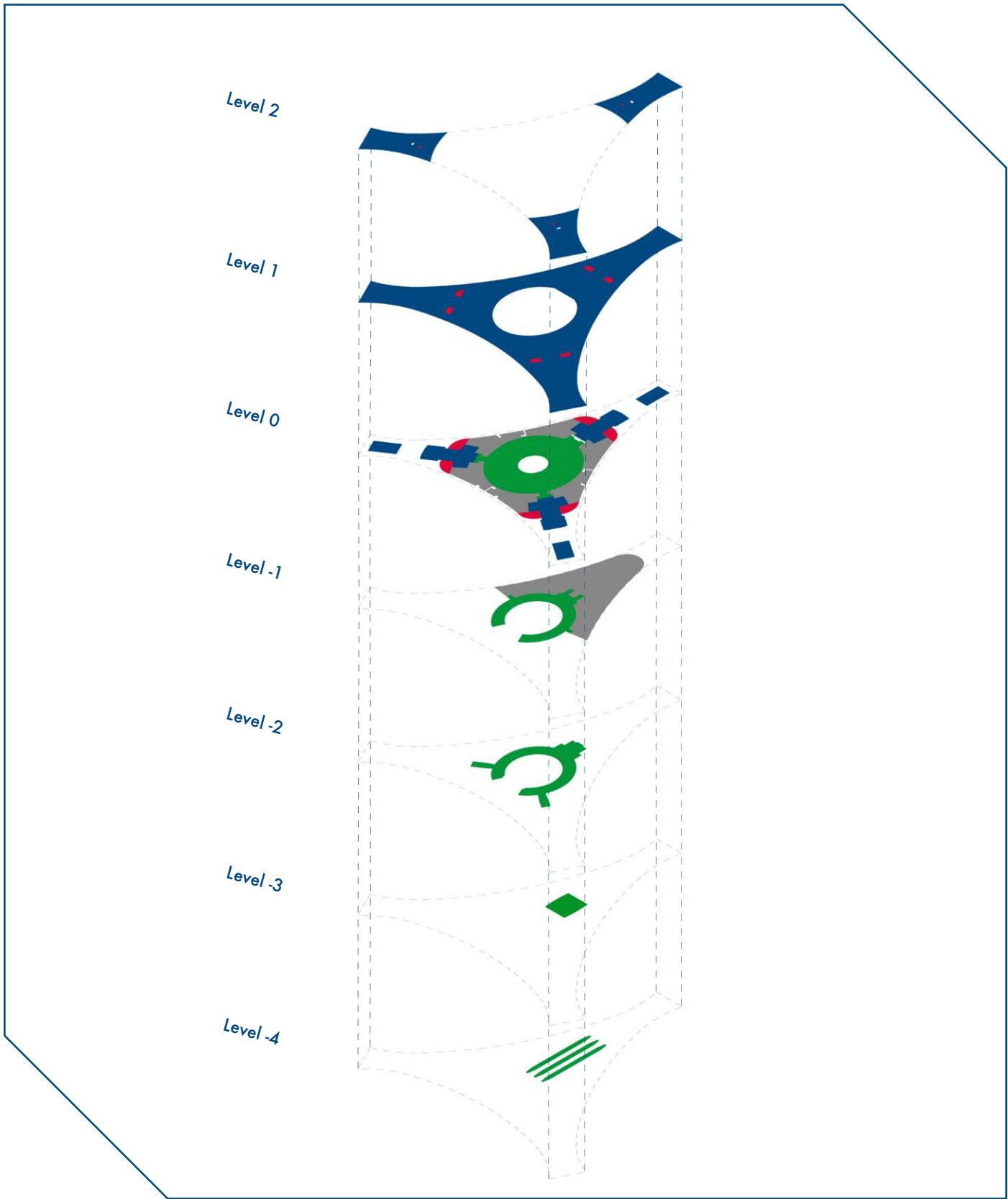
The program, as mentioned above, divides the flow of passengers into different levels for better circulation. The passenger can access the building through the train and metro platforms or vehicle connections on the first two underground levels.

The division of the arrivals and departures is an important concept of this project and doing so eases the traffic both within and outside the terminal.

Another benefit of this solution is the faster access and exit times. As seen in the diagram (Fig.30) the passengers go through the exit axis on the three sides of Level 0 and make their way on the same axis on Level -2.

If you are a departing passenger, you arrive at Level -1 and make your way to the Check-in Desks in the middle of Level 0 and off to Passport control one level above, Level 1.

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
 The approved original version of this thesis is available in print at TU Wien Bibliothek.



Legend:

- Airside
- Landside
- Offices/Services
- Facilities

Fig. 30 Axxo Program Diagram

04.04 Structure

The structural concept of a project of this magnitude is never an easy task, especially when you must deal with long beam spans and tall columns. The structure grid was strongly influenced by the circular opening in the middle of the building. To complement the circular opening the structure grid is radial, split into 3 sections, where a ray of columns is added to counteract the spread between the original grid due to the distancing between the ends and the middle of the grid.

The grid has 16 concentric circles, the first with a radius of 30 meters. In the first section of the grid, the first 4 circles, the radii are increasing by 20 meters, in the second and third sections the increment is 17,5 meters. The lines starting from the center are put every 15 degrees of the circle, 24 in total in the first section. 24 new line segments are added in between the first ones for a total of 48 in the second section and 48 more line segments are added in the final section, where the total segments rise to 96. Altogether the columns per floor are 450, circular with a diameter of 0.6 meters made of steel.

In the middle part of the building, the structure concepts feature flower-like columns where instead of 1 there are 4 columns at an angle of 85 degrees to counteract the buckling of the structure because the columns reach up to 25 meters tall. On those critical points, the weight of the construction of the roof is spread onto 4 columns instead of 1. This solution has been used in the airport terminals in Zurich, Switzerland, and Indianapolis, USA, where the massive glass roof is only supported on 4 corners.

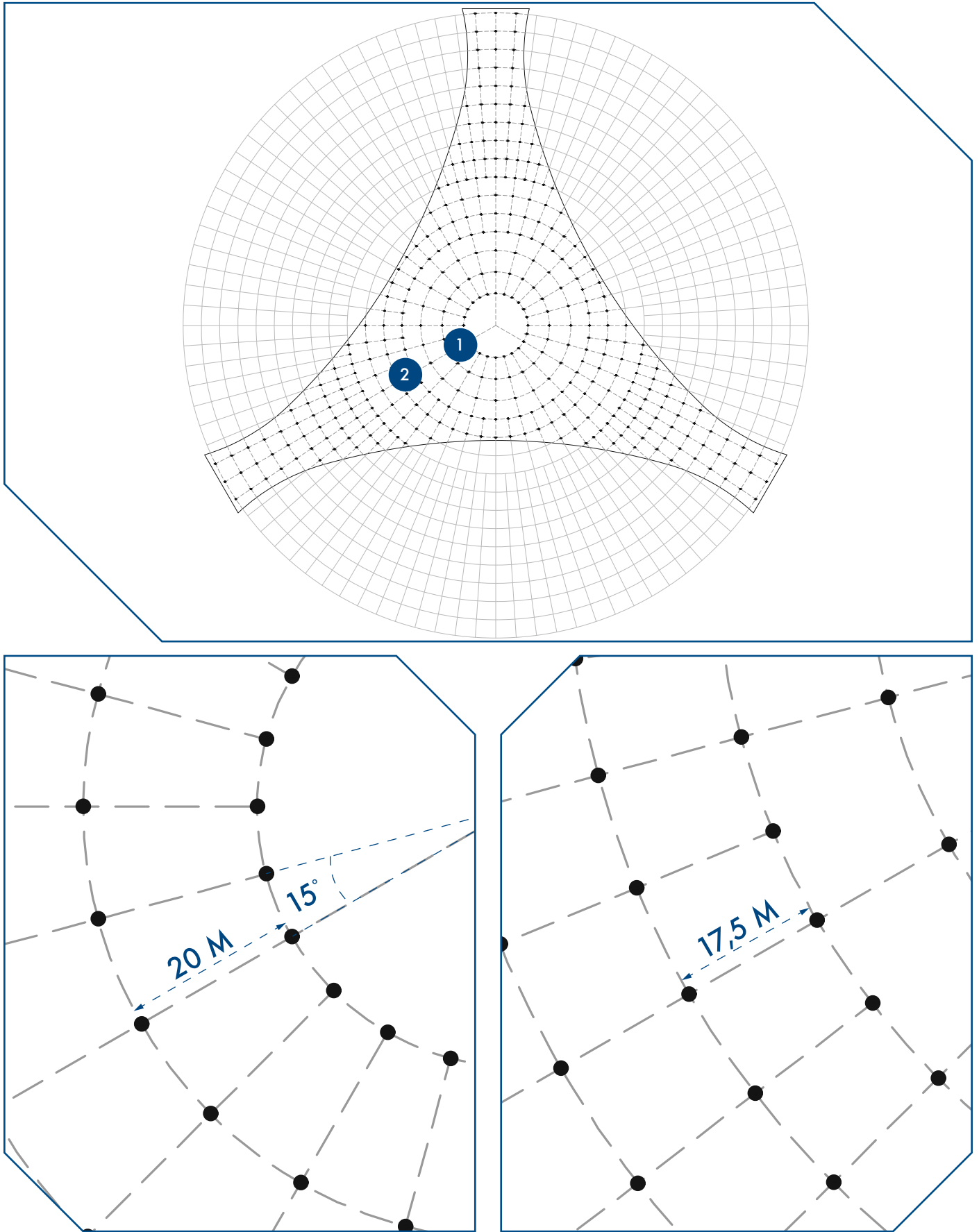


Fig. 31 Structure Raster + Grid Zoom

METHODOLOGY

The construction of the roof follows the same grid as the main anchor points but also adds additional reinforcements to the construction raster. For this structural part of the terminal, a sustainable and durable solution was the focus. The material used for the roof structure is Glued Laminated Timber or Glulam. That is a type of structural engineered wood consisting of pieces of timber bonded together with strong moisture-resistant adhesive. Glulam has also very good sustainable characteristics and will contribute to the overall CO2 reduction of the project.

Glulam is very suitable because of its structural capabilities, as well as its esthetic looks. In this case, the longest span unsupported width is around 15 meters (because the angled columns cut the distance between the support points). According to leading manufacturers of Glulam timber in Europe, like Binder Holz, KLH, and Siero Lam, the optimal dimensions of each beam are 300x900mm, they were also given a small curvature of 5 degrees from edge to the middle of the roof to counteract the possible bending. To add additional structural rigidity, a 100mm Cross Laminated Timber (CLT) slab layer was added. On top of it will lie the insulation and the roof construction will be finished with prefabricated aluminum sheets, which are light, durable, easy to shape, and corrosion-resistant.

Mass-Timber structures have become popular in the aeronautics sector with a few airports announcing they will use such construction for their new terminals. Real-life examples are Zurich Airport, which expects its Dock-A to be made entirely of wood by 2032. Additionally, more airports choose timber as a roof construction solution like Portland International Airport in the USA, which expects the new wooden roof to be finished by 2024.

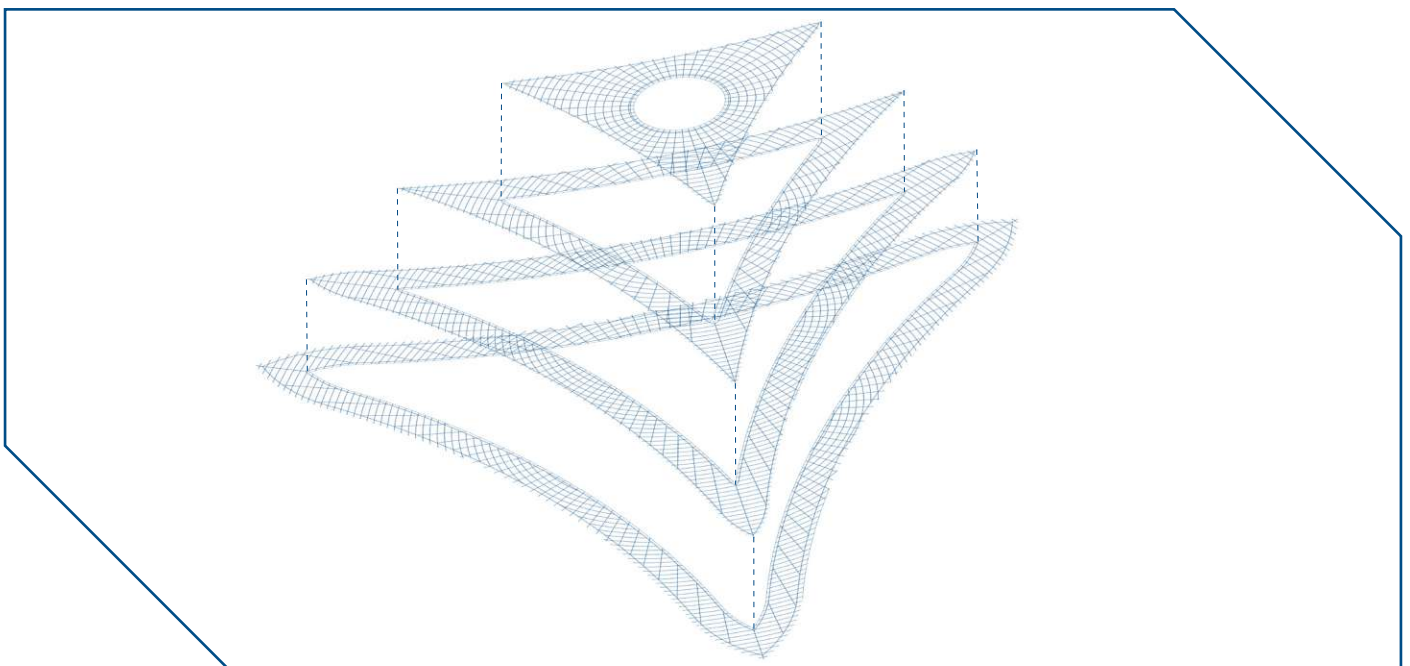


Fig. 32 Roof Raster Axso

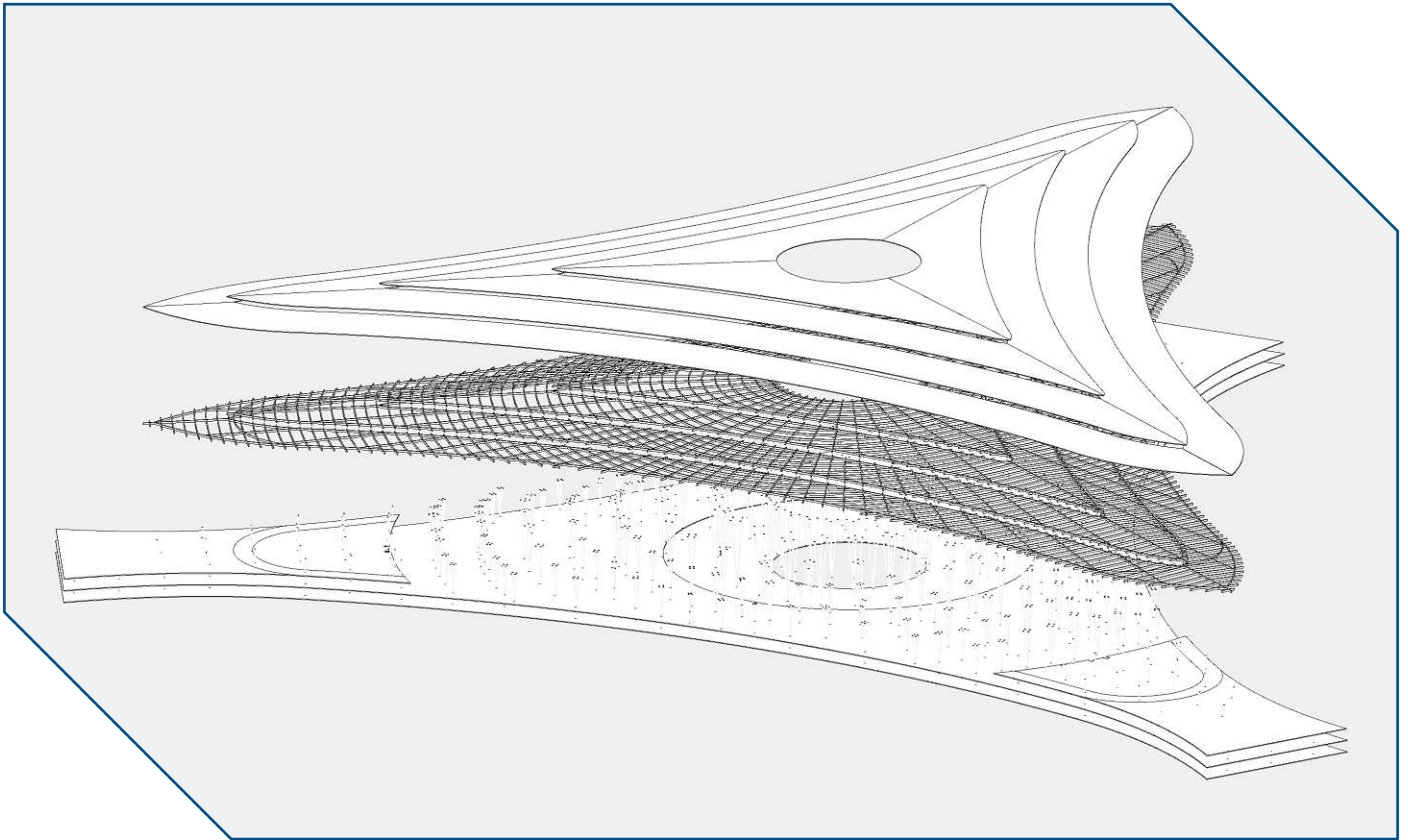


Fig. 33 Blown-up Axso overground Structure



Fig. 34 Visualisation Frame and Columns



Fig. 35 Visualisation Roof

04.05 Light Concept

Natural light is an important factor in the concept of the terminal, the opening in the middle was added for ventilation and additional natural light inside the main part of the terminal. The large, glazed facades added tons of natural light around the gates. But they and the oculus were not sufficient. The solution to this problem was a stepped roof.

The main roof is divided into 4 concentric parts, each offset 20 meters from the edge. Each part will be elevated from the other, creating an unobstructed 360-degree small façade. With the four parts, 3 additional small facades will be added, each 2 meters in height. With their help natural light will penetrate all corners of the building, providing sunlight even to the northern parts of the building and will create a feeling of lightness inside the massive terminal.

As the building is oriented, the terminal receives uninterrupted sunlight throughout the day. Those small facades will create an ambiance in the terminal and together with the green spaces inside the main space.

The interior of the building is organized according to this concept, so the passengers can take advantage of every ray of sun. Also, the main part of the building, the first-floor gates, and the shop area will receive the most sunlight, providing a pleasant outdoor feeling environment.

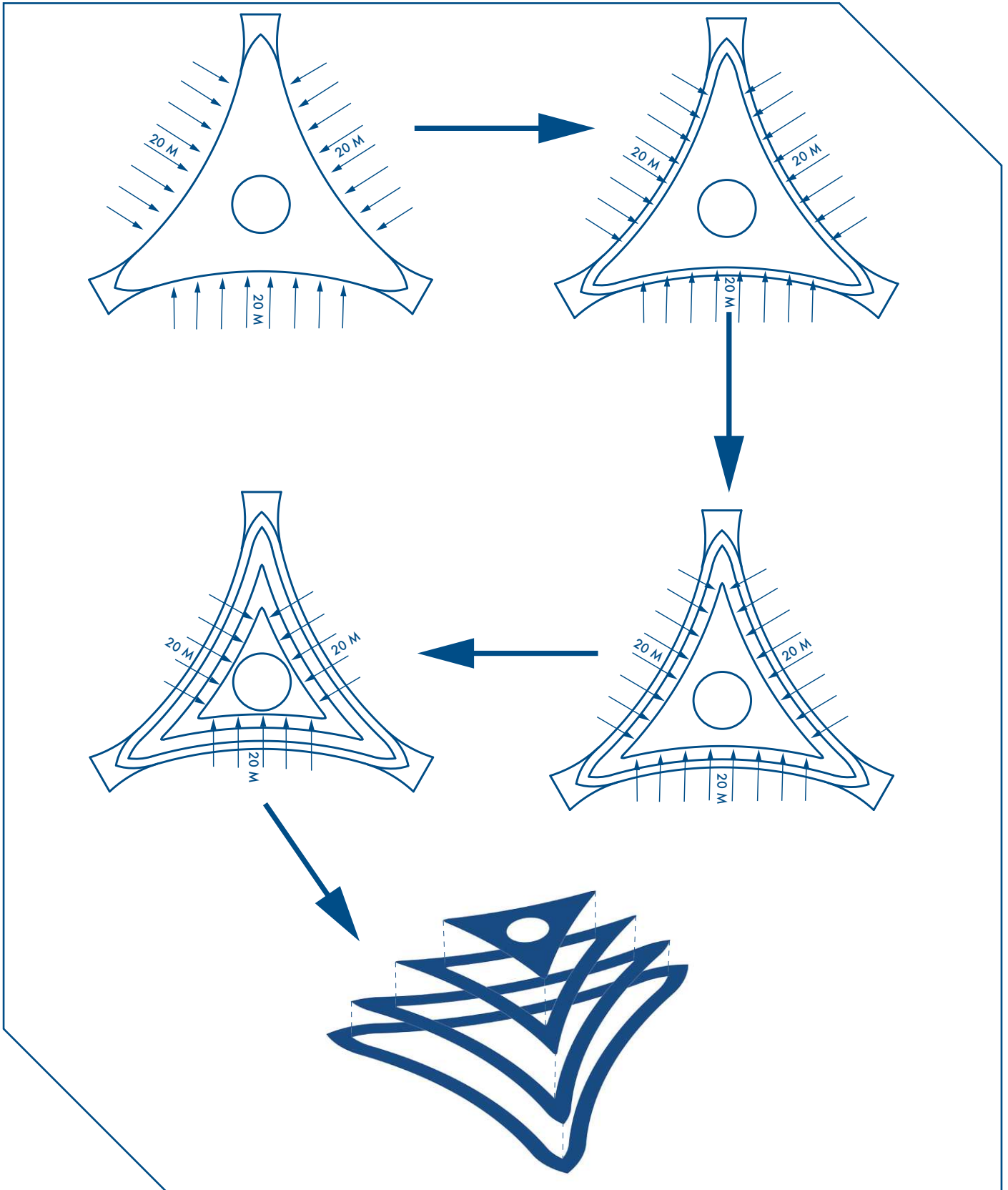


Fig. 36 Roof Light Diagram

05

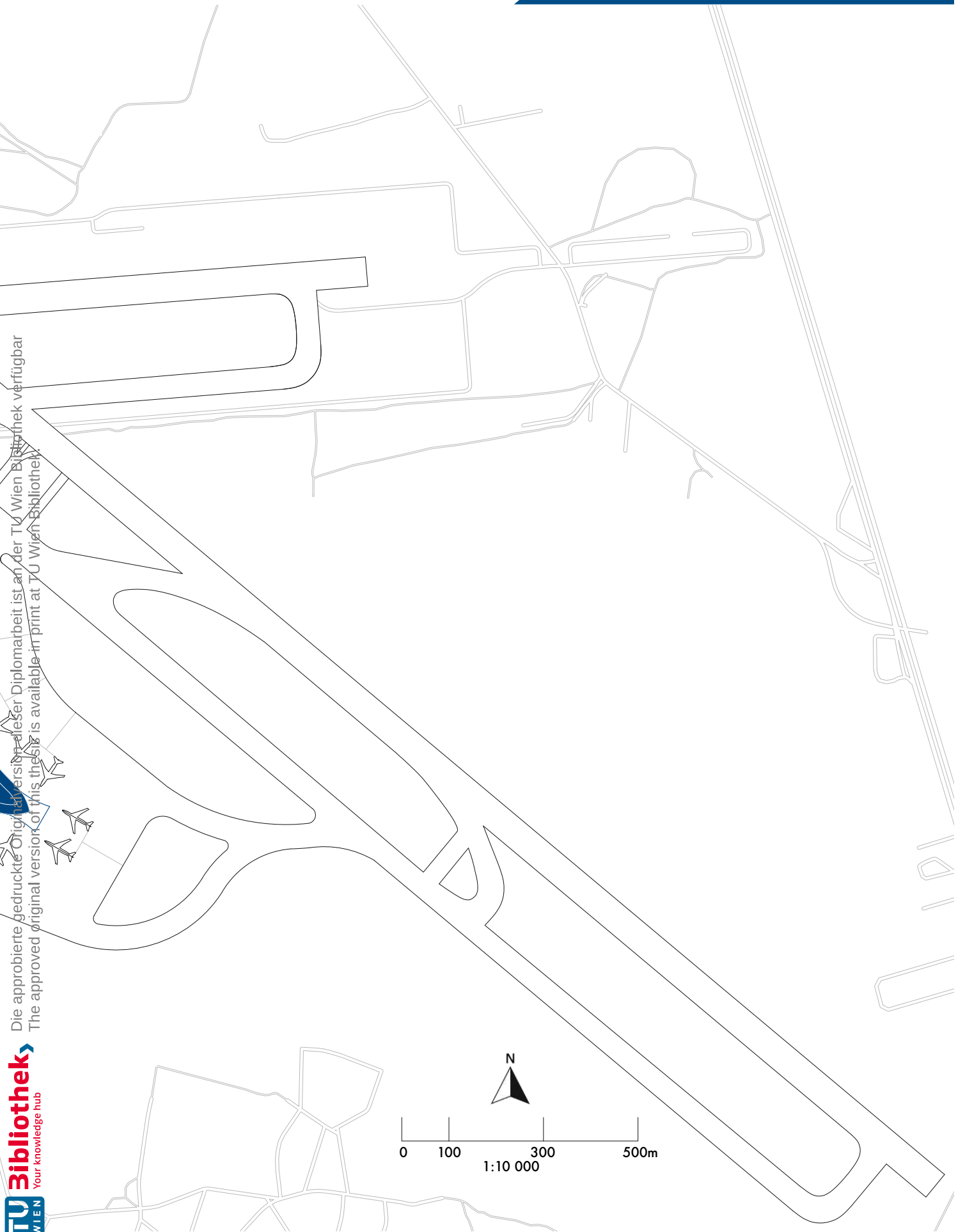
OUTCOME

OUTCOME

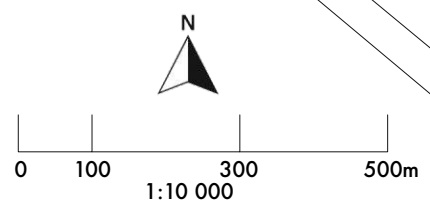
05.01 Site Plan



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

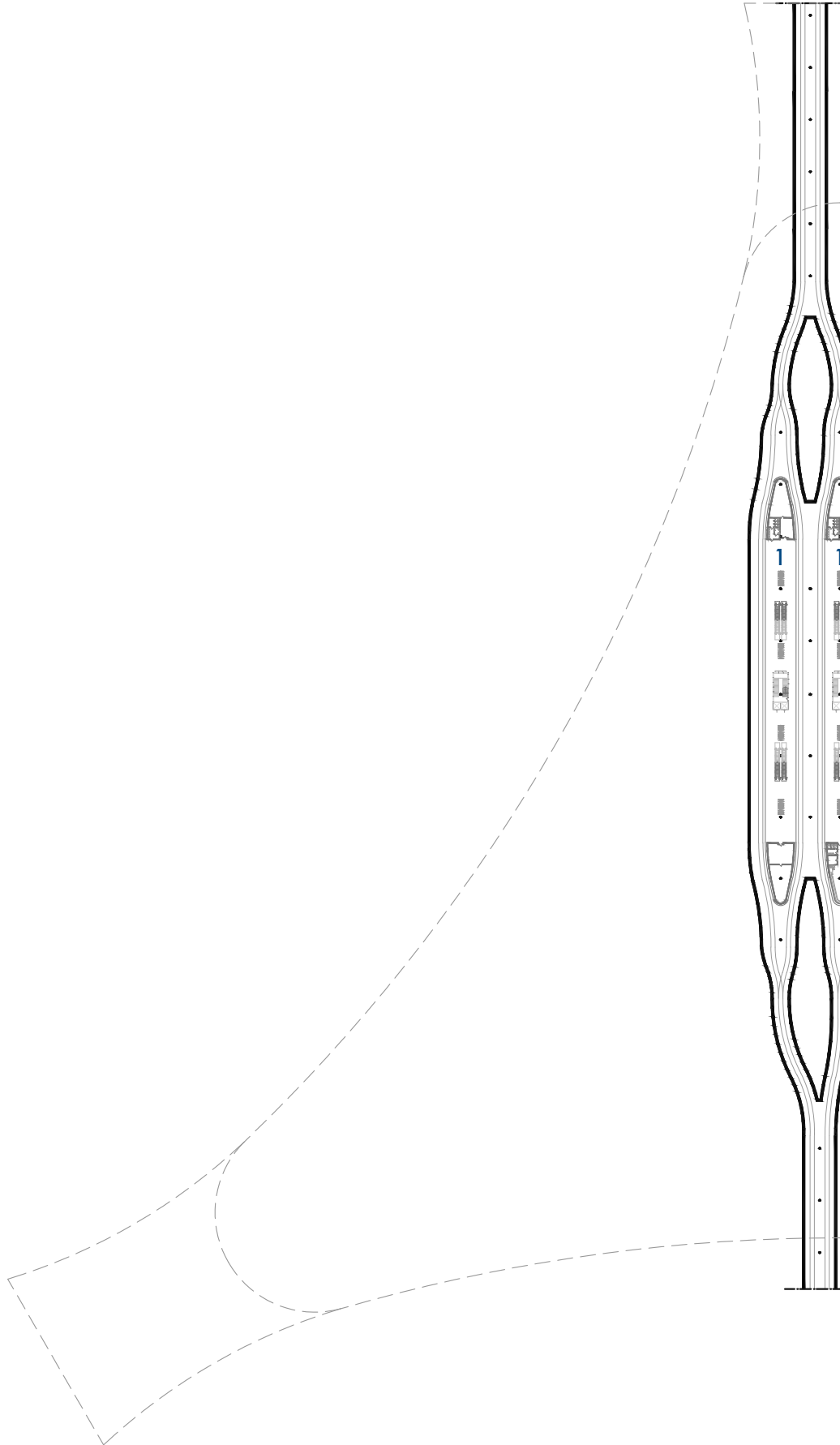


Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek

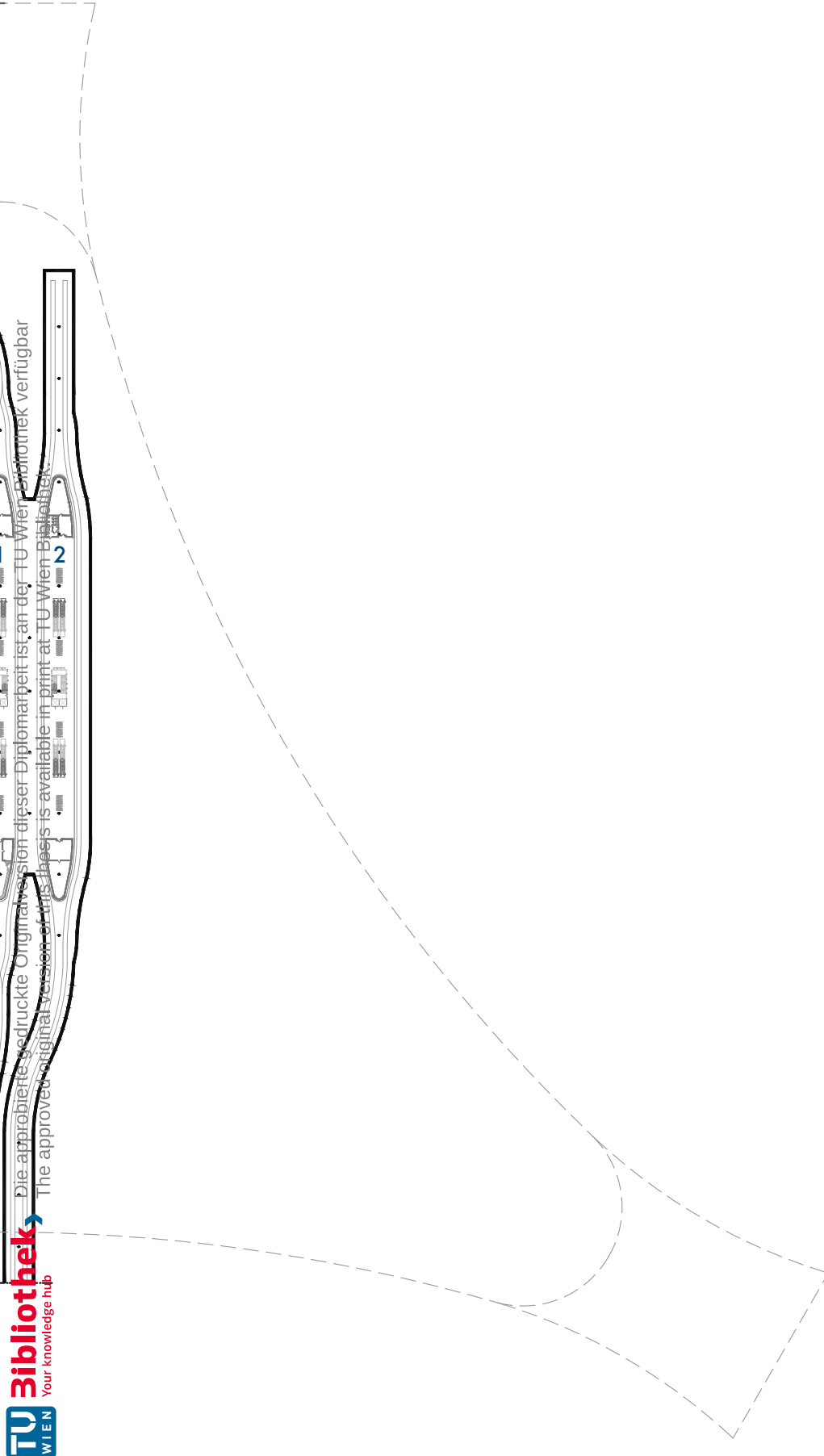


05.02 Plans

1. Train Platform 1 & 2
2. Metro Platform



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



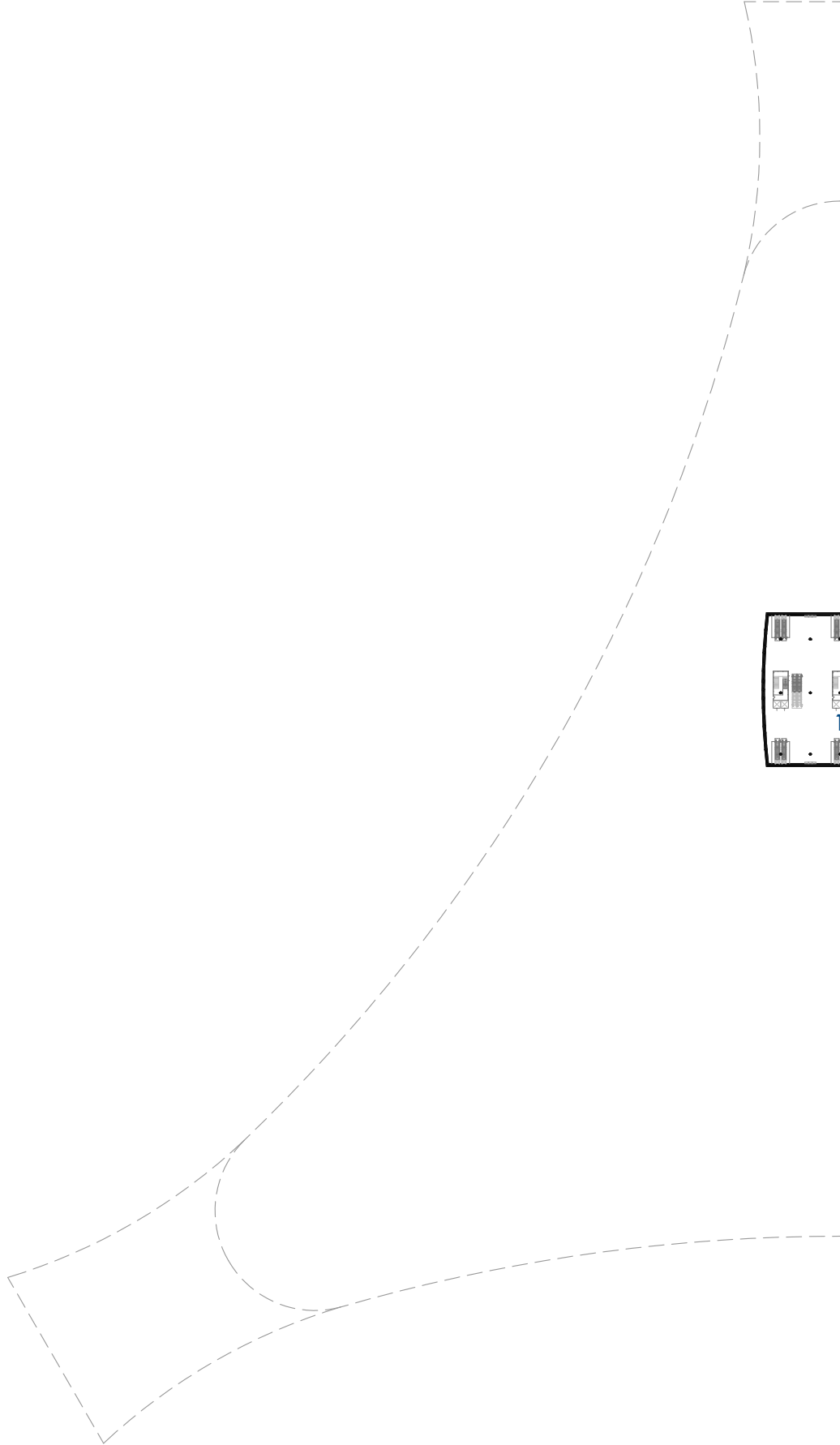
TU WIEN
Your knowledge hub

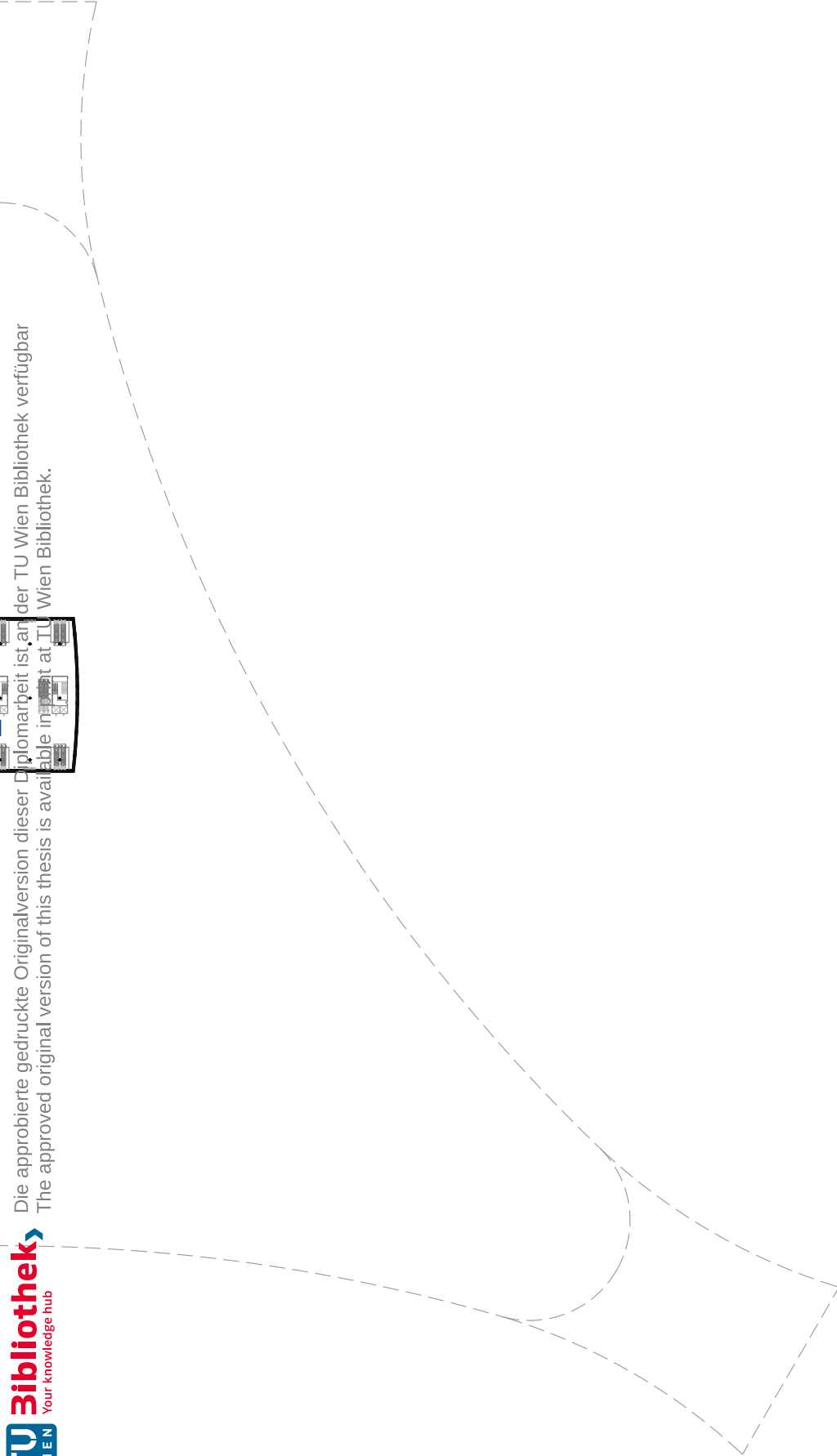
Bibliothek
Your knowledge hub

Die abgebildete gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Photomek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek

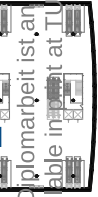
2

1. Transport Lobby

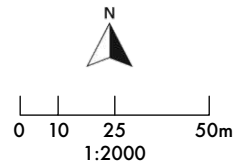




der TU Wien Bibliothek verfügbar
Wien Bibliothek.

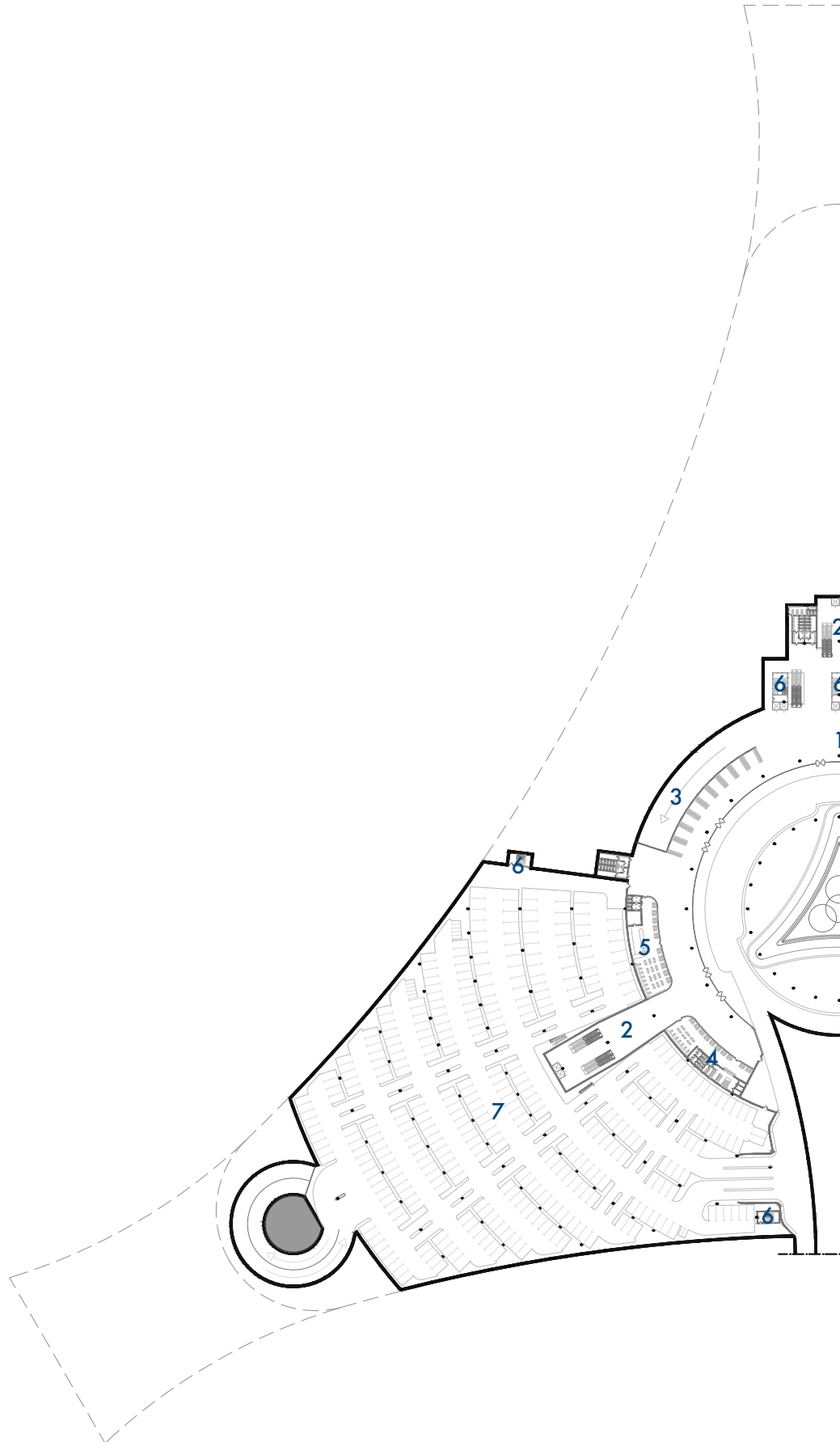


Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an
The approved original version of this thesis is available in

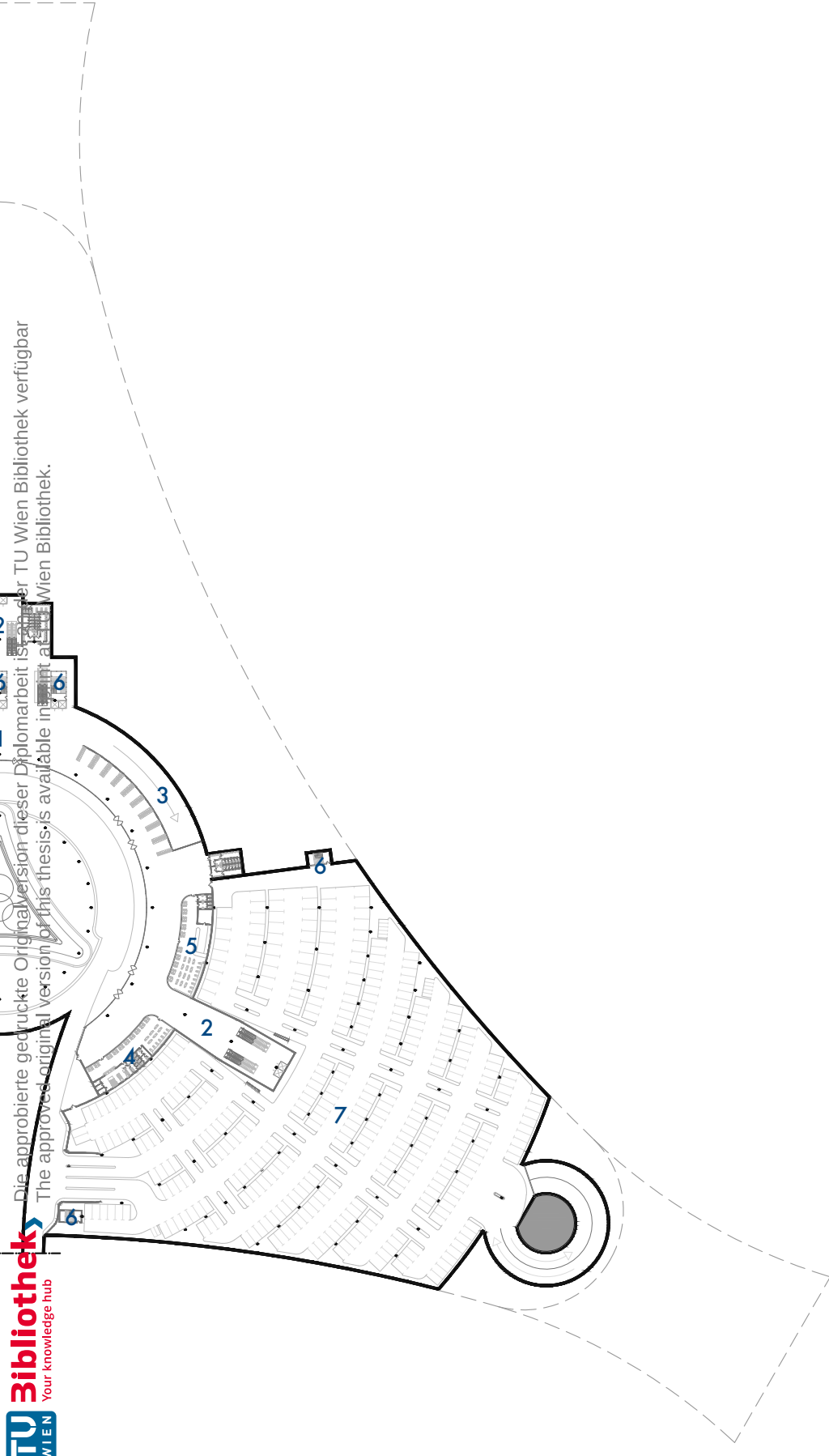


OUTCOME

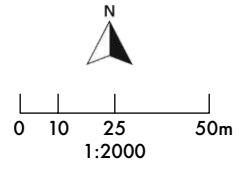
1. Arrivals Lobby with waiting room
2. Arrivals Exit
3. Ramps to upper Level
4. Restaurant
5. Cafe
6. Emergency Stairs
7. Parking Garage



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

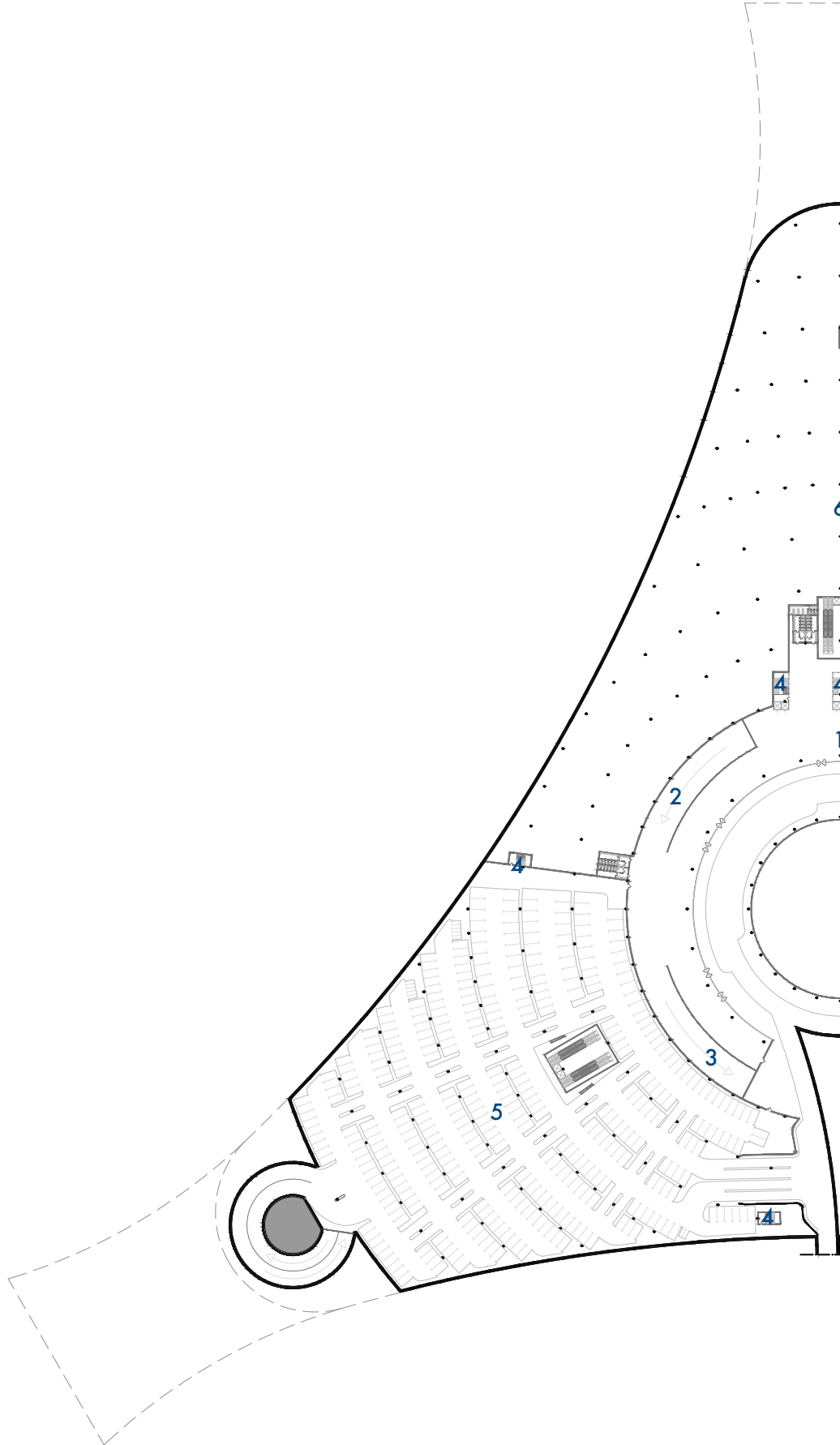


Die approbierte gedruckte Originalversion dieser Diplomarbeit ist nur über TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

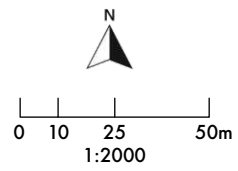
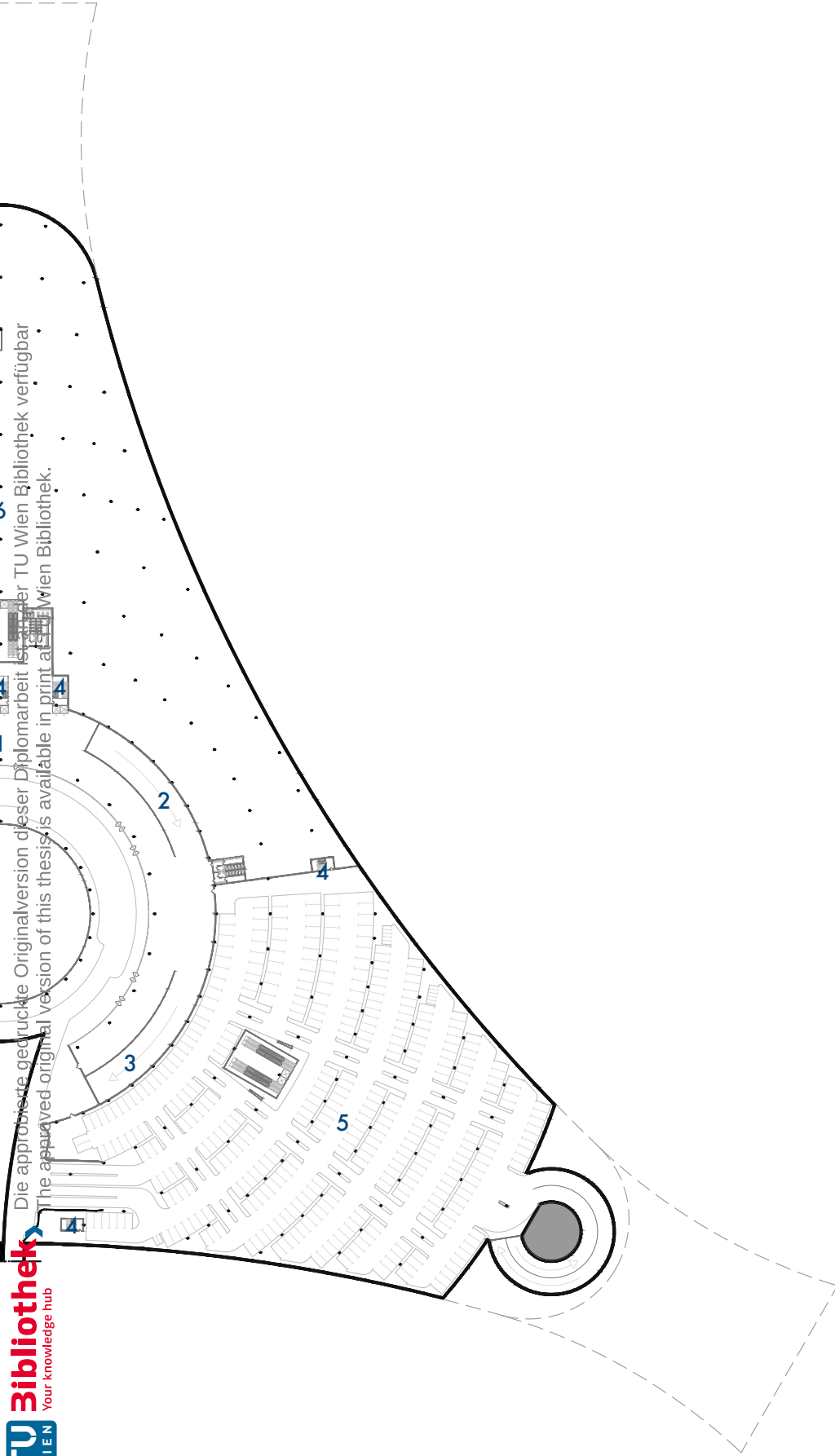


OUTCOME

1. Departures Lobby
2. Ramps to lower Level
3. Ramps to upper Level
4. Emergency Stairs
5. Parking Garage
6. Technical Rooms



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

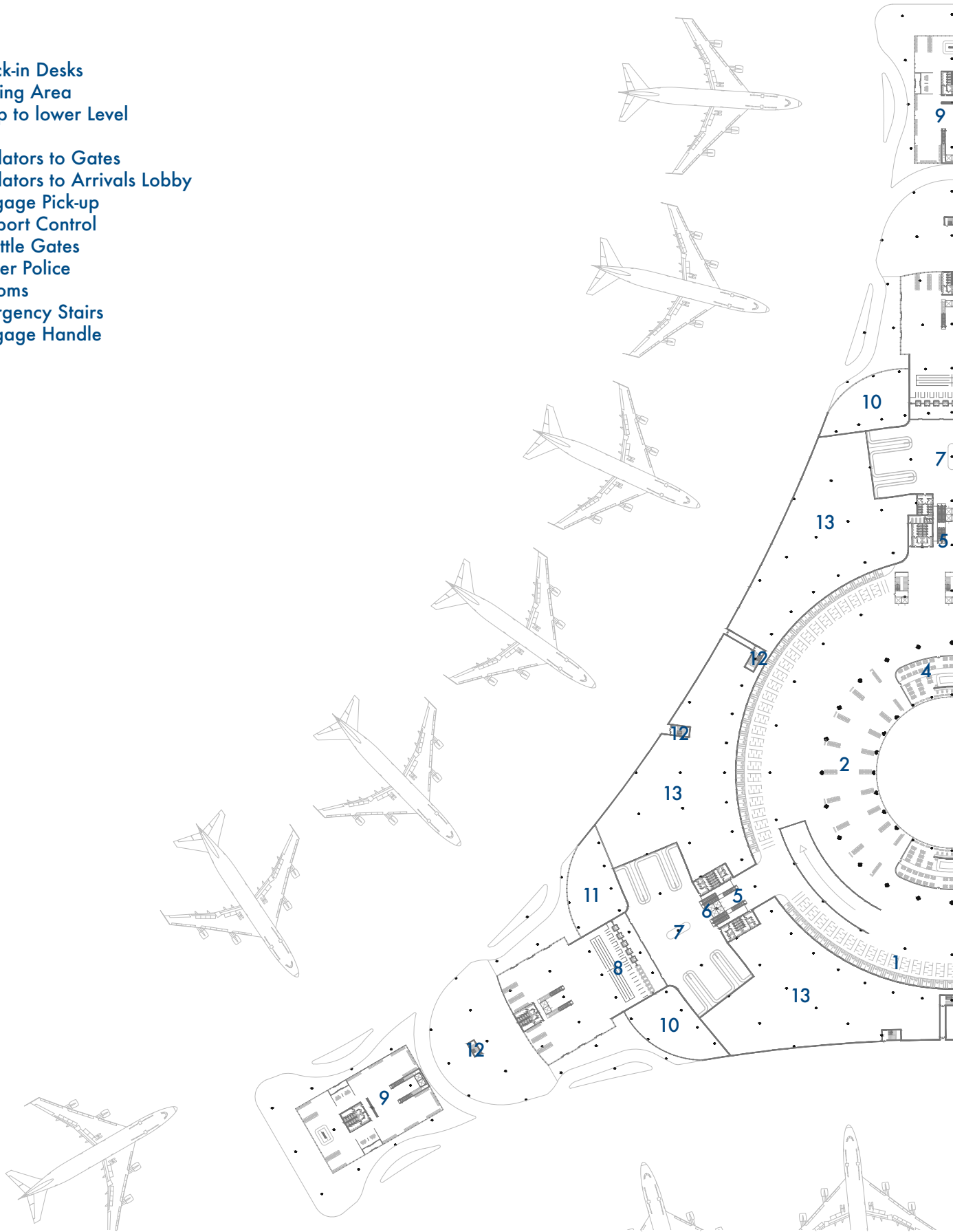


Die approbierte gedruckte Originalversion dieser Diplomarbeit ist über TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

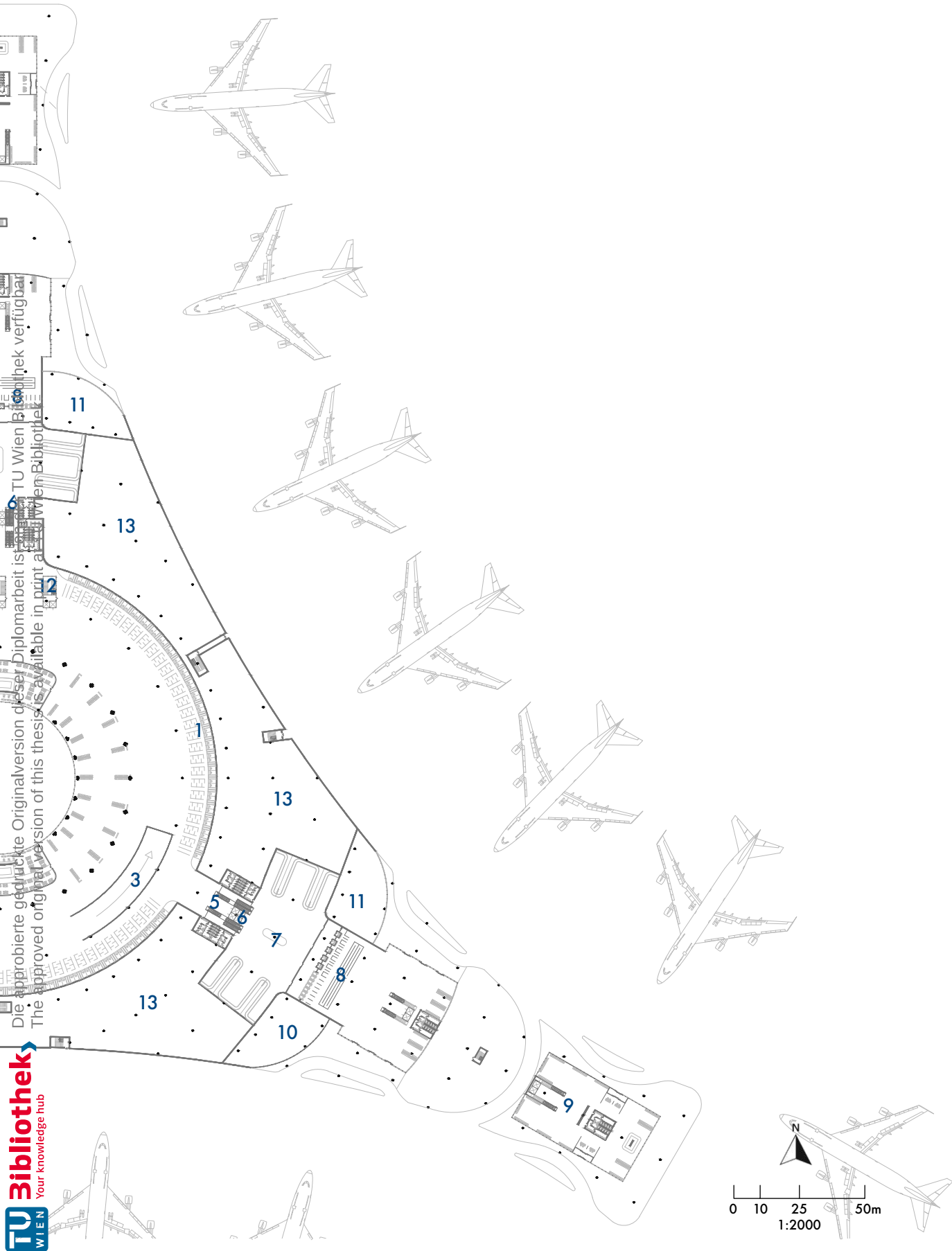
TU **Bibliothek**
WIEN Your knowledge hub

OUTCOME

1. Check-in Desks
2. Waiting Area
3. Ramp to lower Level
4. Cafe
5. Escalators to Gates
6. Escalators to Arrivals Lobby
7. Baggage Pick-up
8. Passport Control
9. Shuttle Gates
10. Border Police
11. Customs
12. Emergency Stairs
13. Baggage Handle



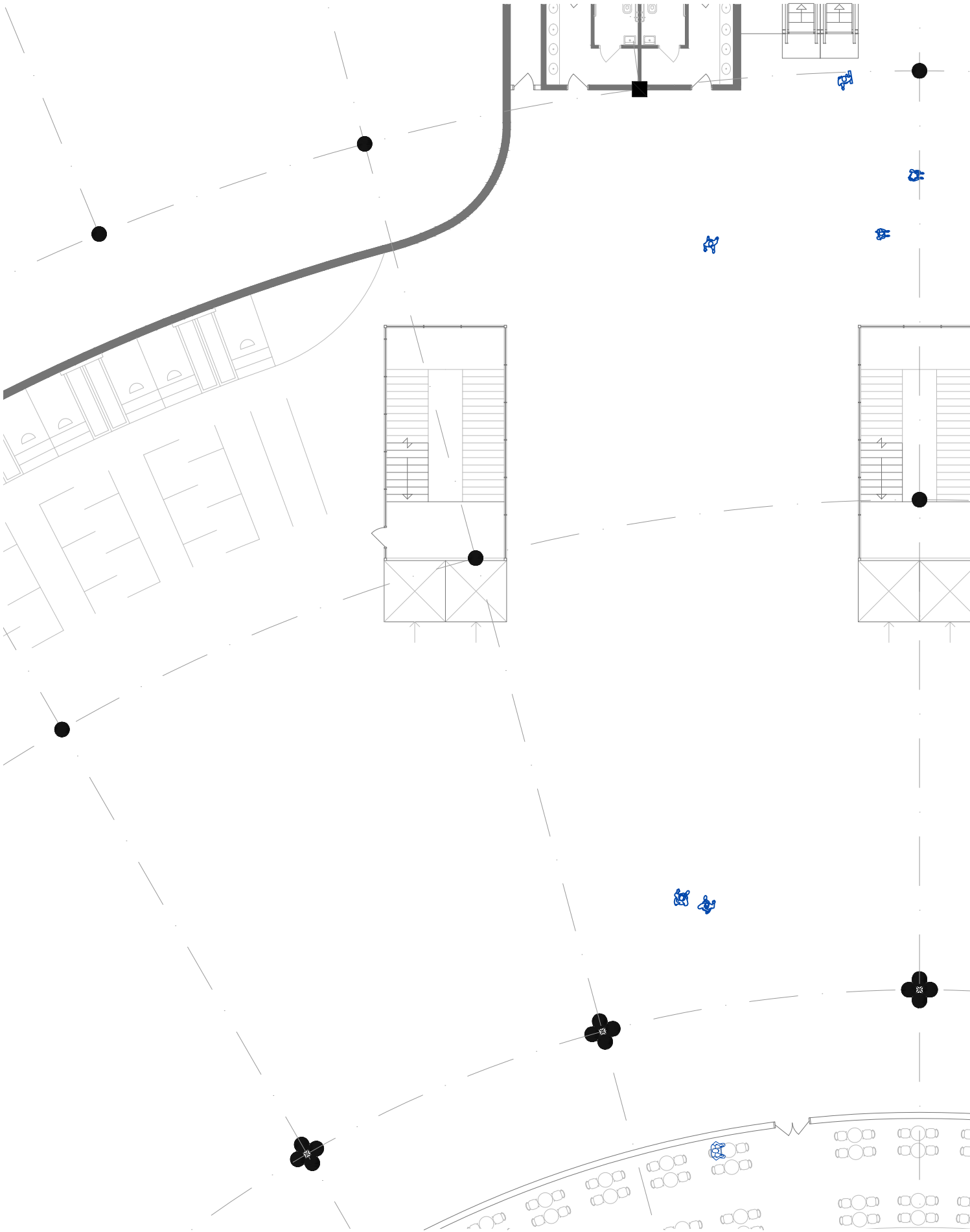
Pl. 6 Level 0 (0.00)



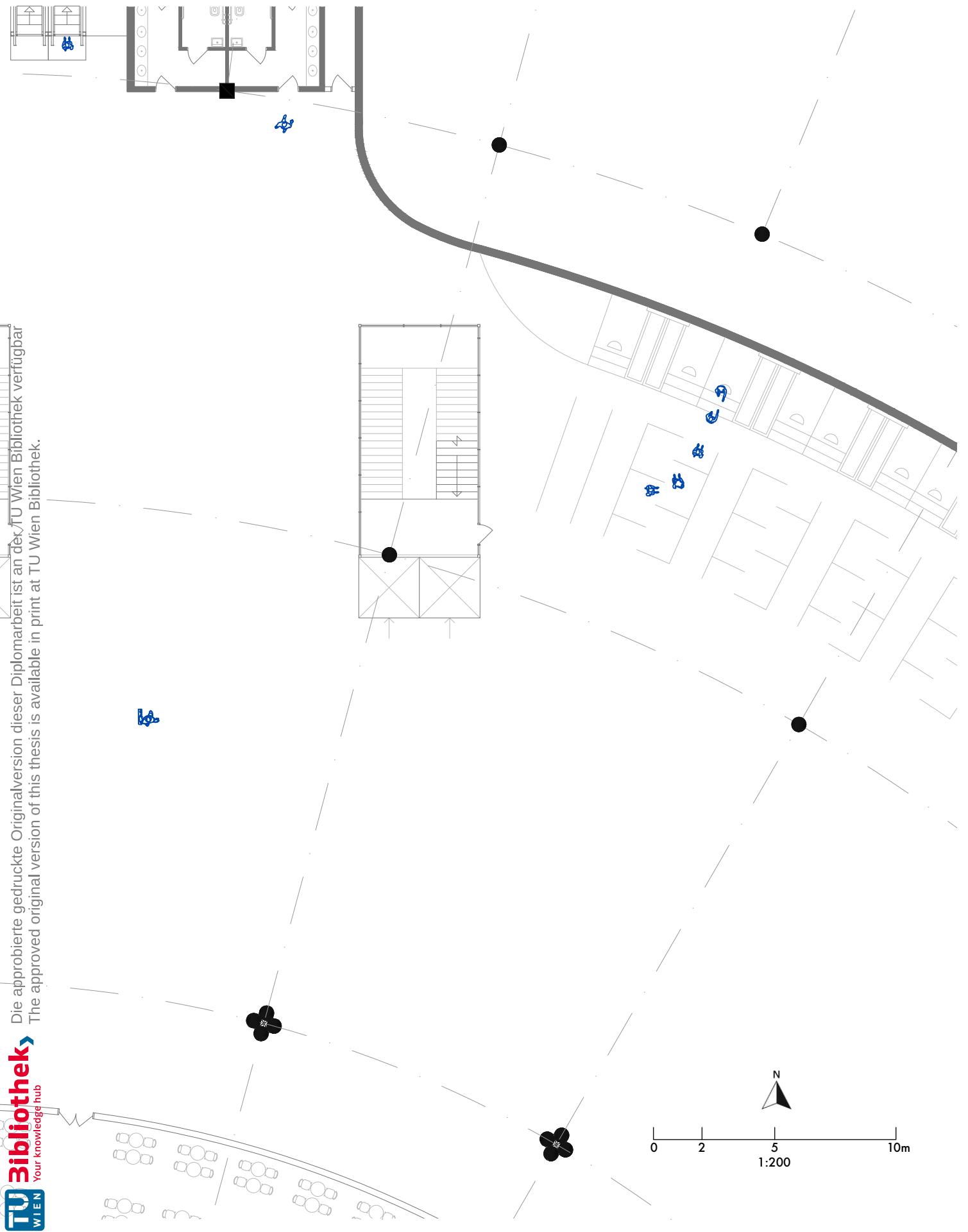
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibiothek verfügbar.
The approved original version of this thesis is available in print at the TU Wien Bibiothek.

OUTCOME

TU BIBLIOTHEK WIEN Your knowledge hub
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



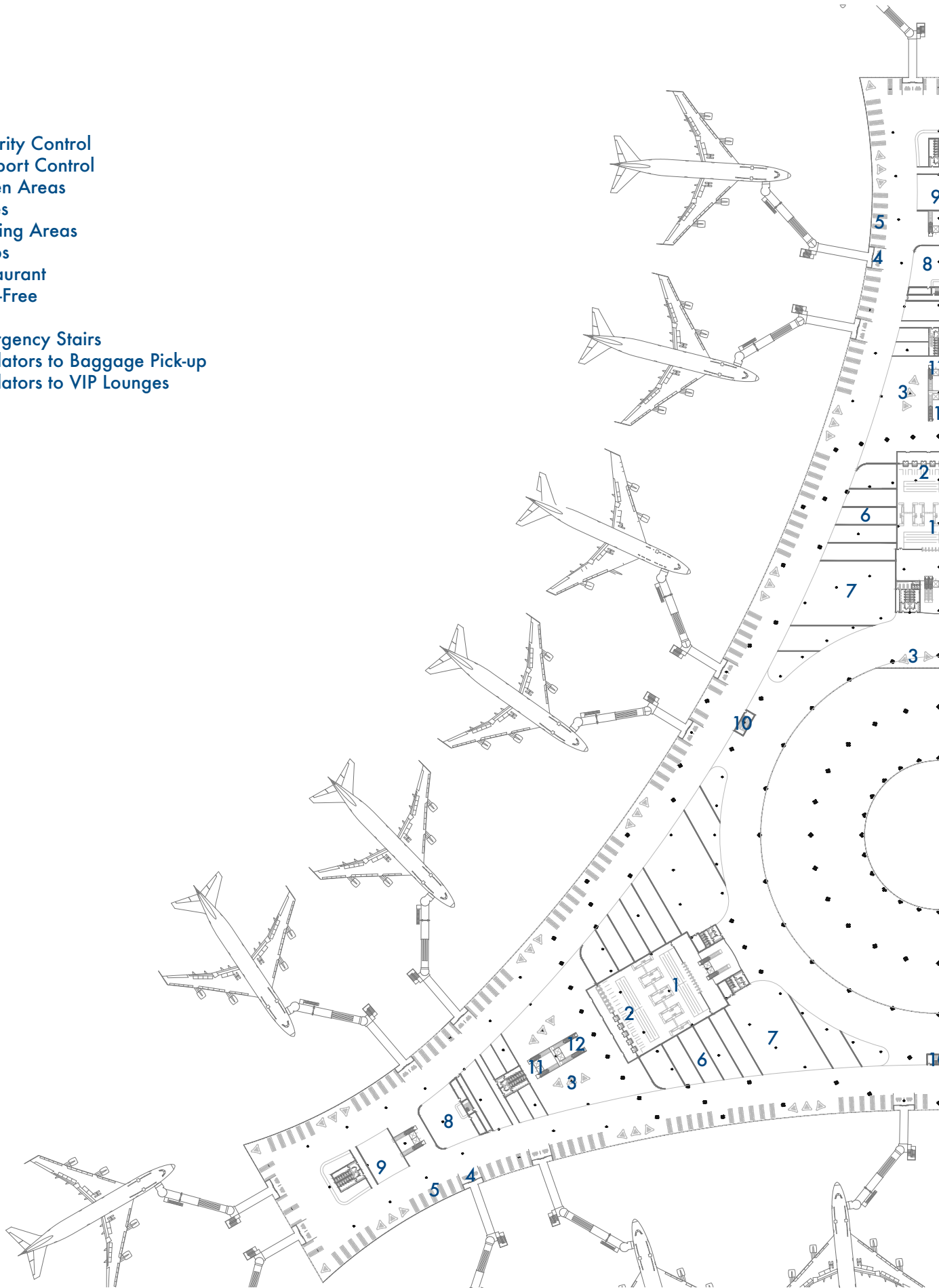
Pl. 7 Level 0 (0.00) (Cut-Out)



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

OUTCOME

1. Security Control
2. Passport Control
3. Green Areas
4. Gates
5. Waiting Areas
6. Shops
7. Restaurant
8. Duty-Free
9. Cafe
10. Emergency Stairs
11. Escalators to Baggage Pick-up
12. Escalators to VIP Lounges



Pl. 8 Level +1 (+5.00)

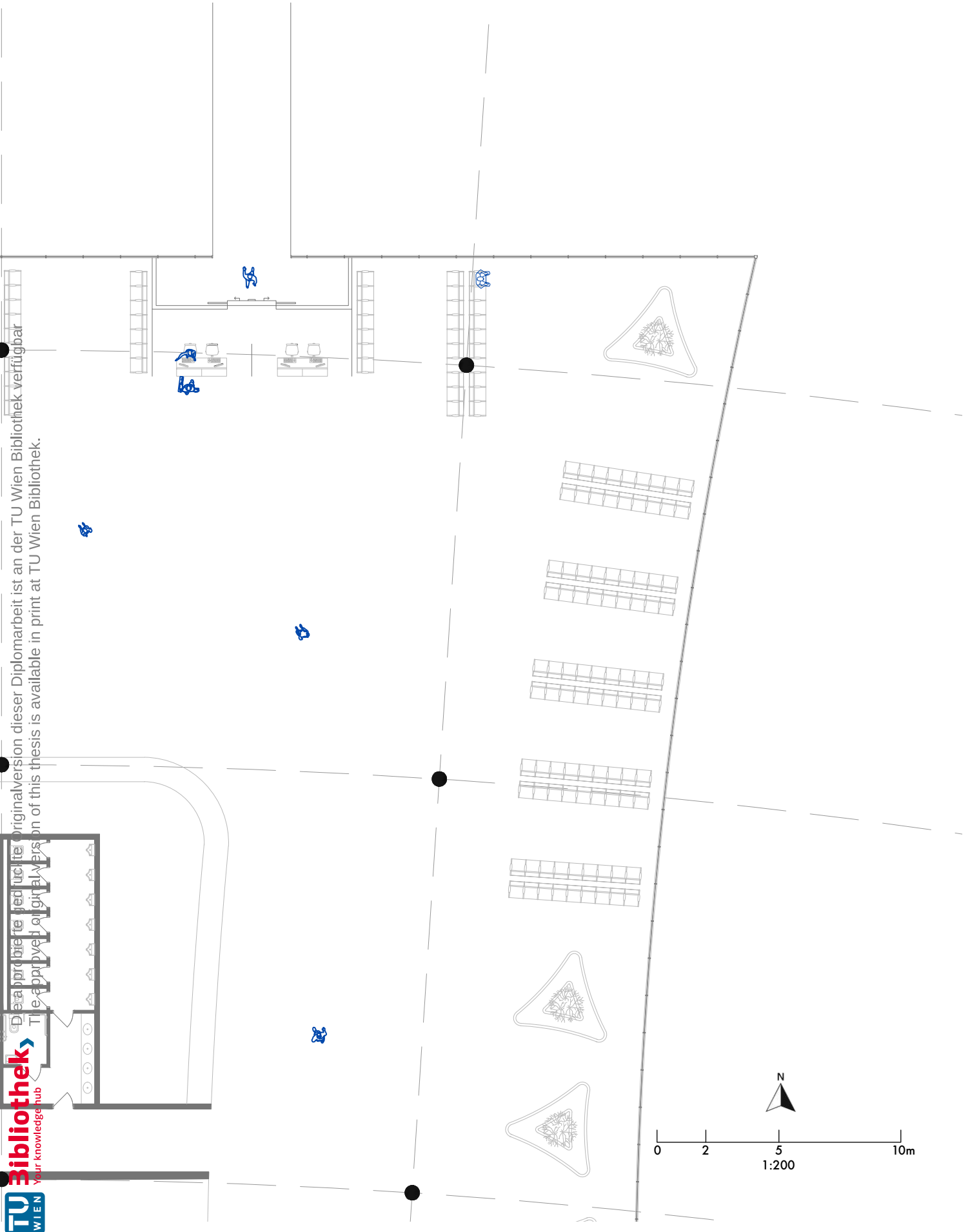


OUTCOME

TU WIEN **Bibliothek** **Your knowledge hub**
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



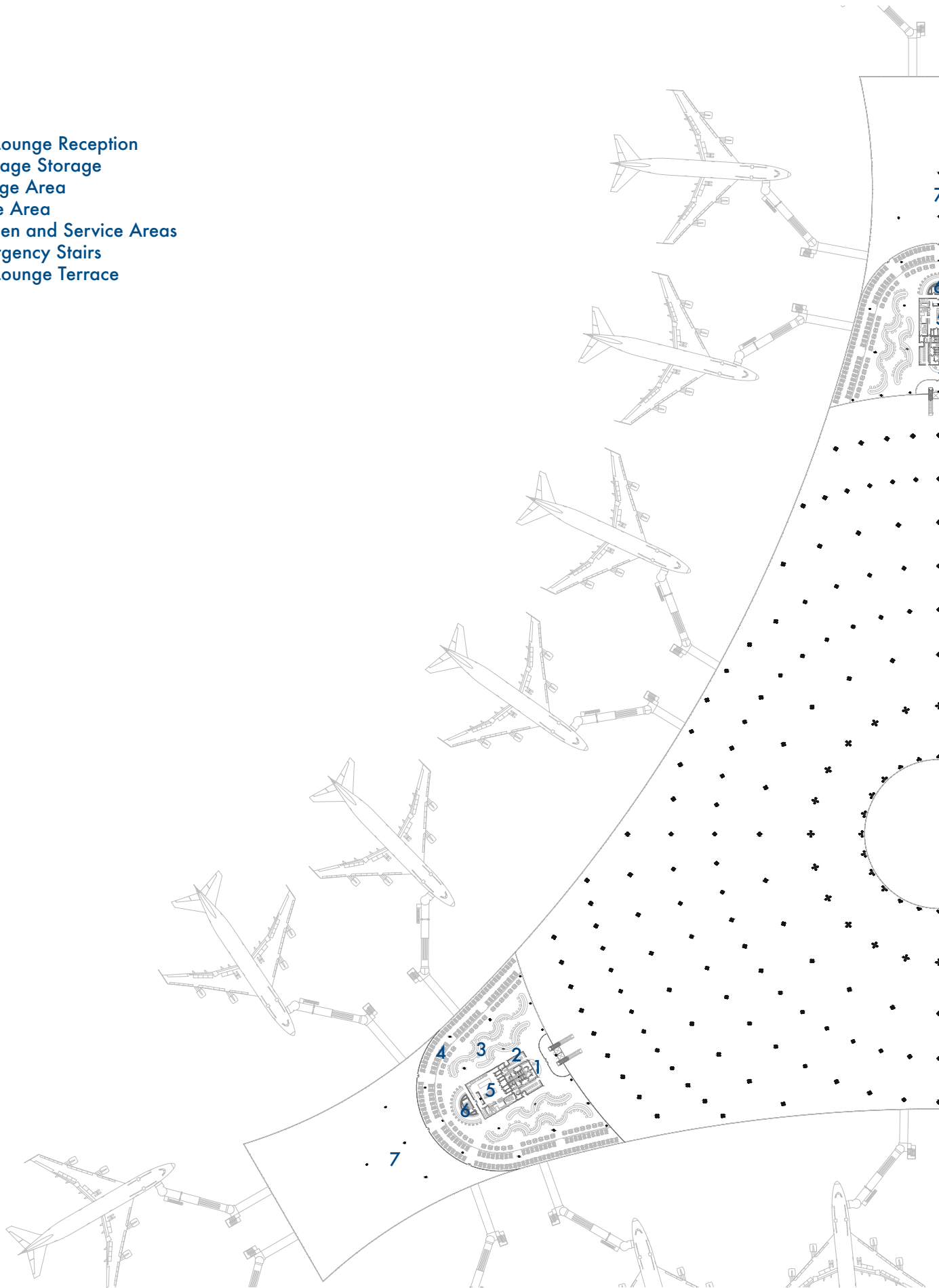
Pl. 9 Level +1 (+5.00) (Cut-Out)



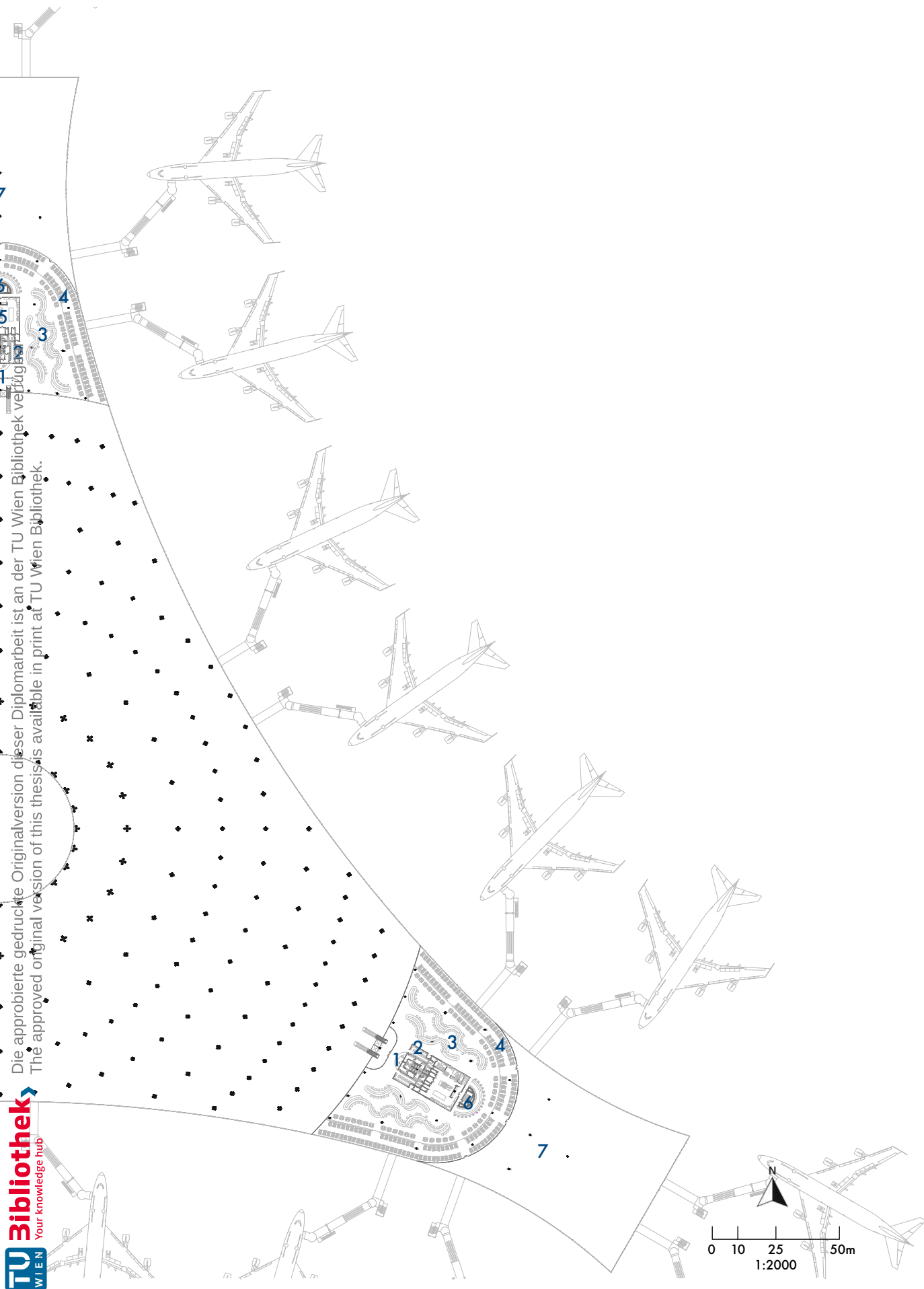
Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

OUTCOME

1. VIP Lounge Reception
2. Luggage Storage
3. Lounge Area
4. Table Area
5. Kitchen and Service Areas
6. Emergency Stairs
7. VIP Lounge Terrace



Pl. 10 Level +2 (+10.00)

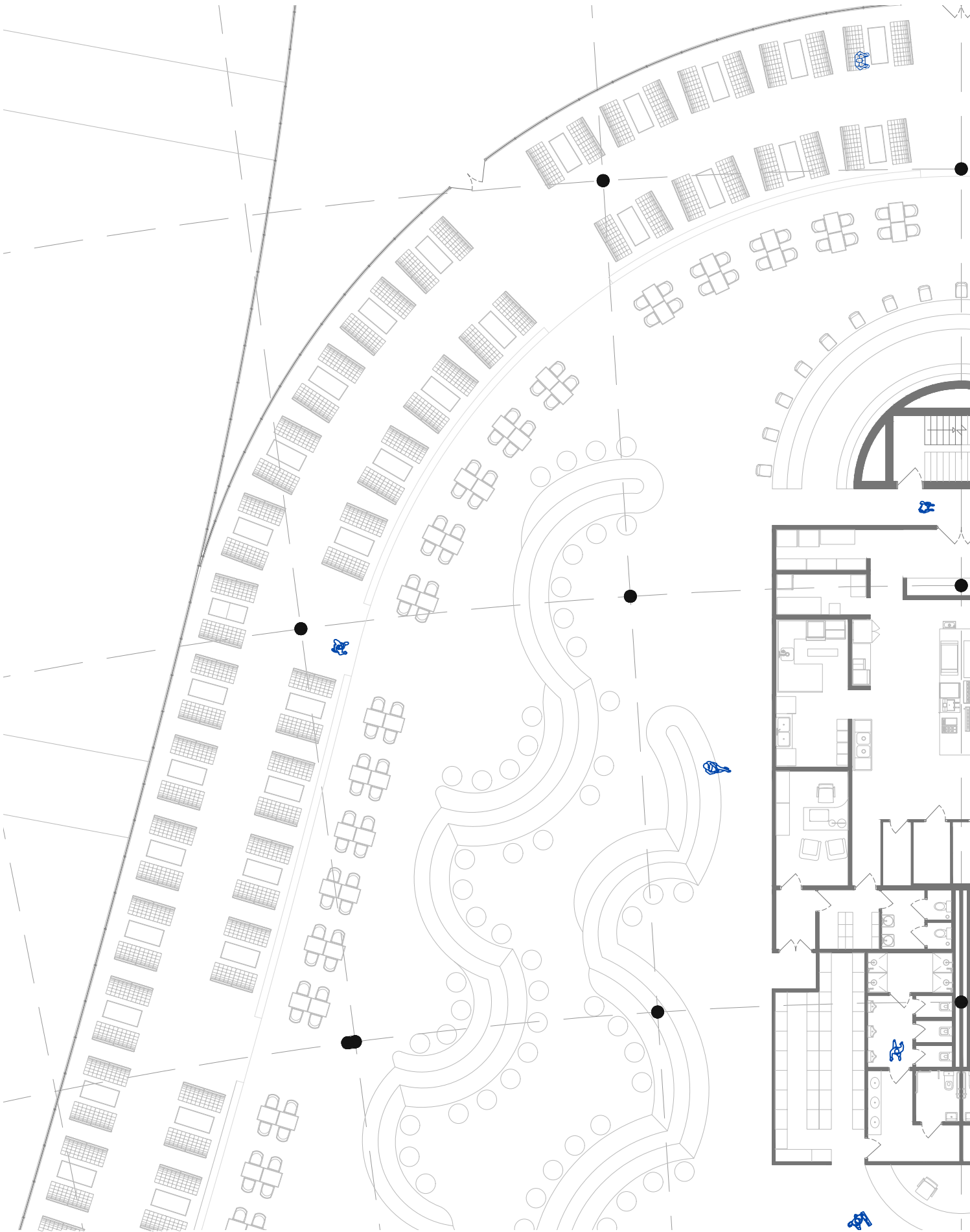


Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

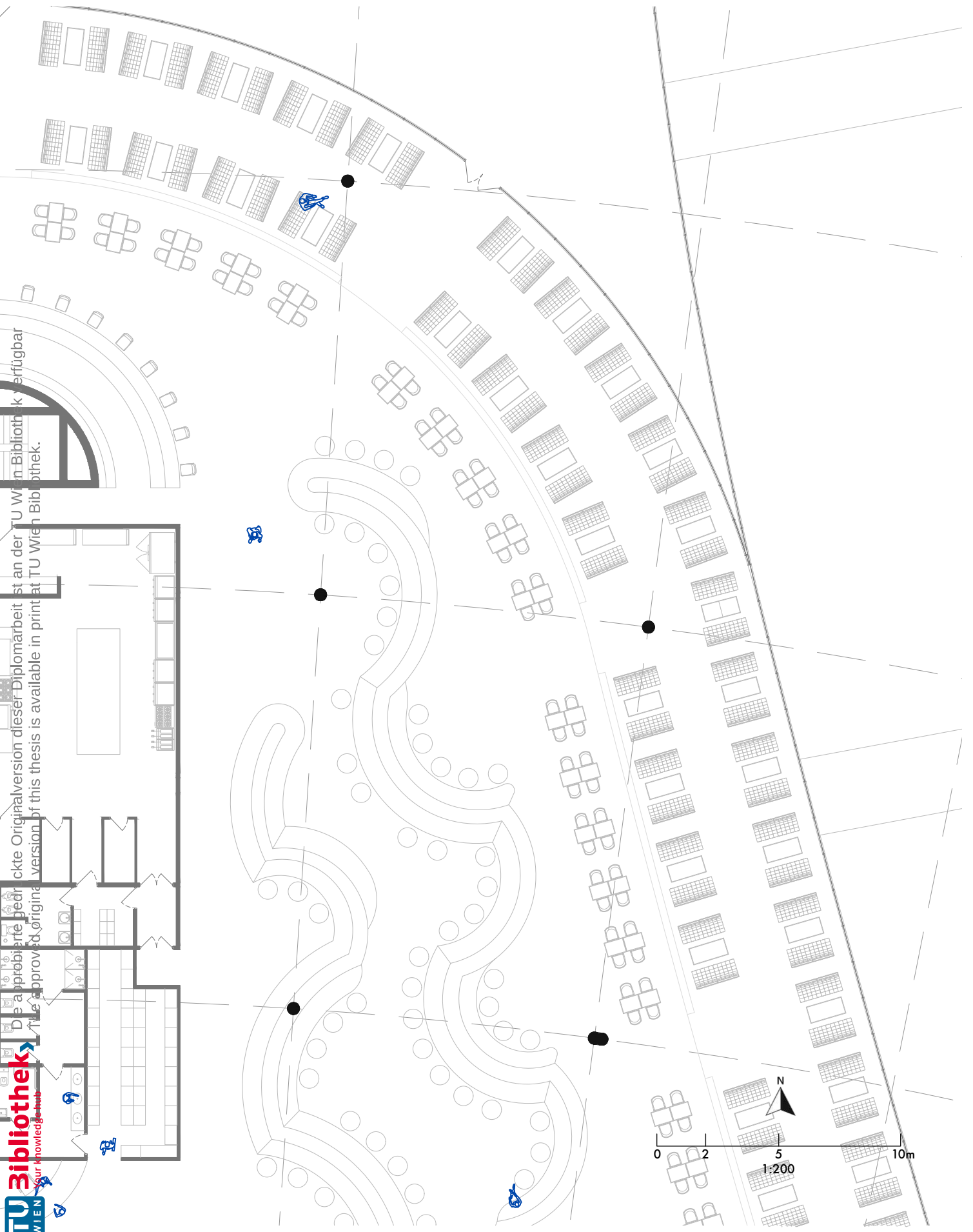
OUTCOME

TU Bibliothek
WIEN Your knowledge hub

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



Pl. 11 Level +2 (+10.00) (Cut-Out)



Die Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The original version of this thesis is available in print at TU Wien Bibliothek.

Die approbierte Peer-Review-Version dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

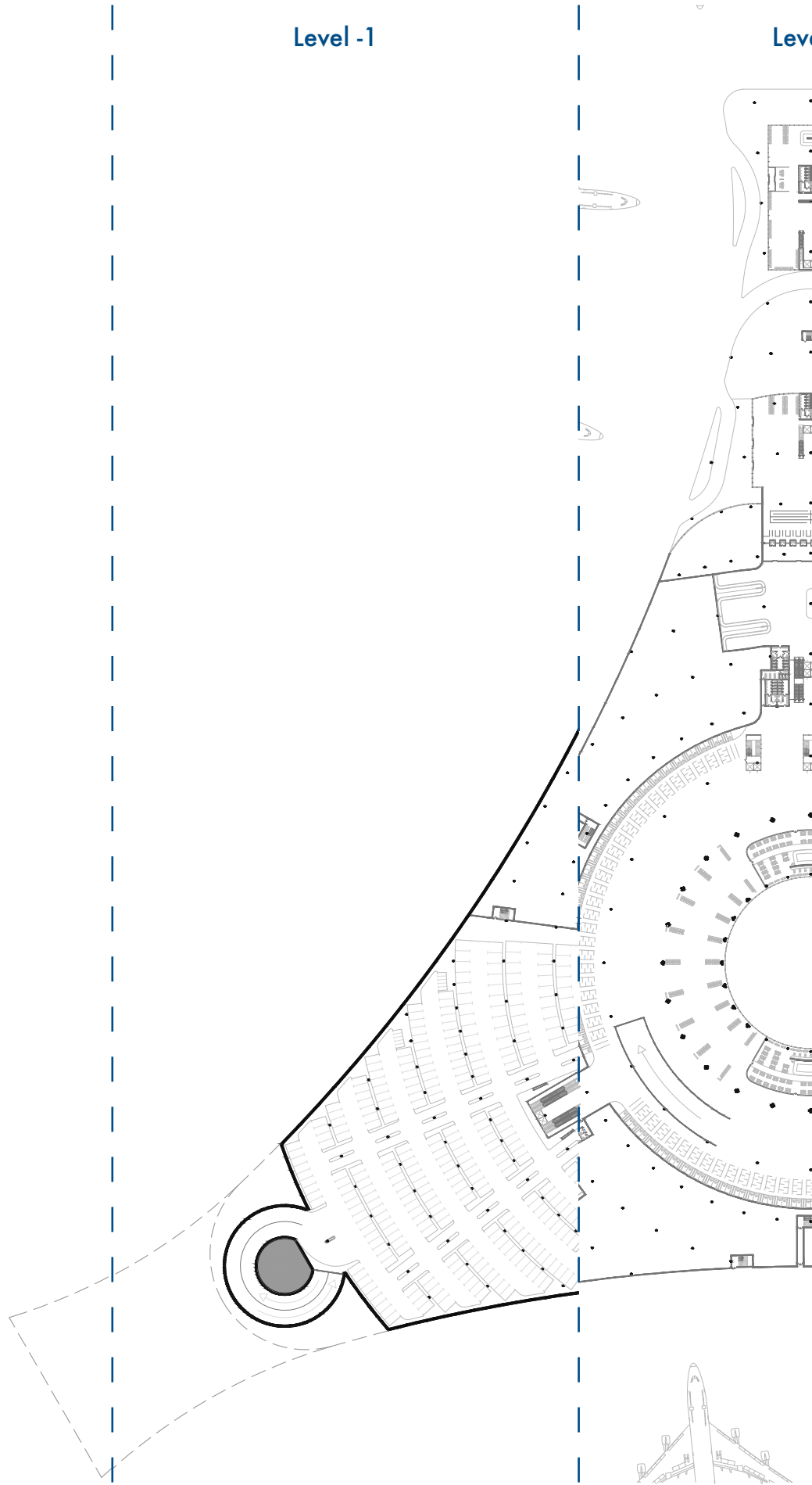


OUTCOME

Level -2

Level -1

Level 0



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

Level 0

Level 1

Level 2

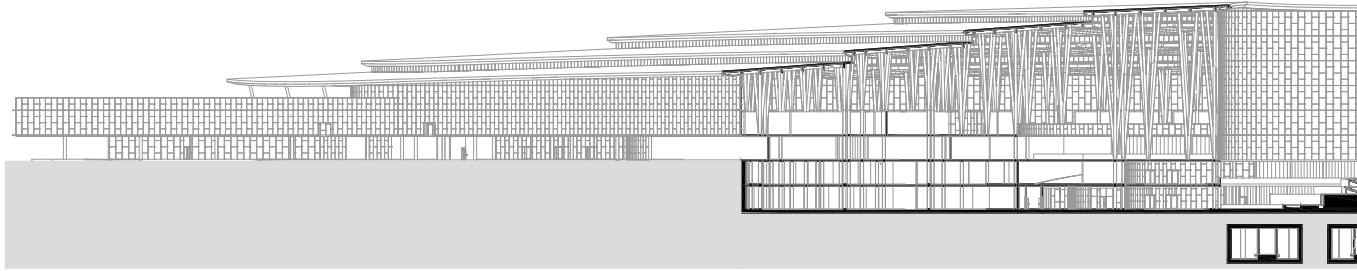


Die approbierte gedruckte Originalversion dieser Diplomarbeit ist ausschließlich über die Bibliothek verfügbar.
The approved original version of this thesis is available in print at the TU Wien Bibliothek.



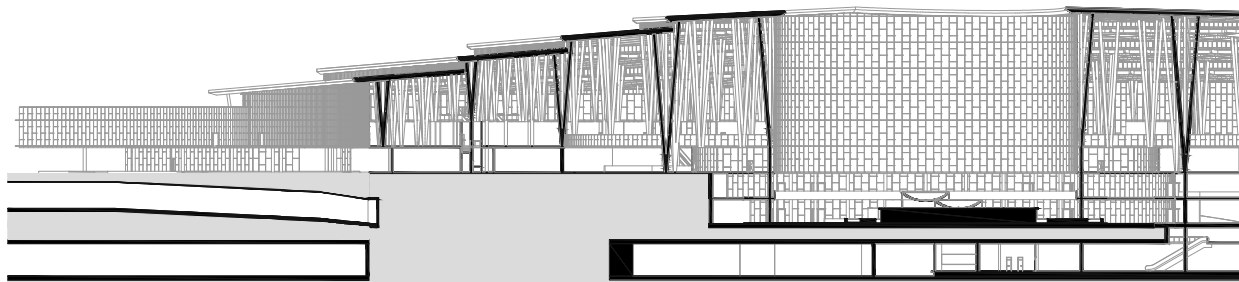
05.03 Sections & Elevations

Level +2 —
Level +1 —
Level 0 —
Level -1 —
Level -2 —
Level -3 —
Level -4 —

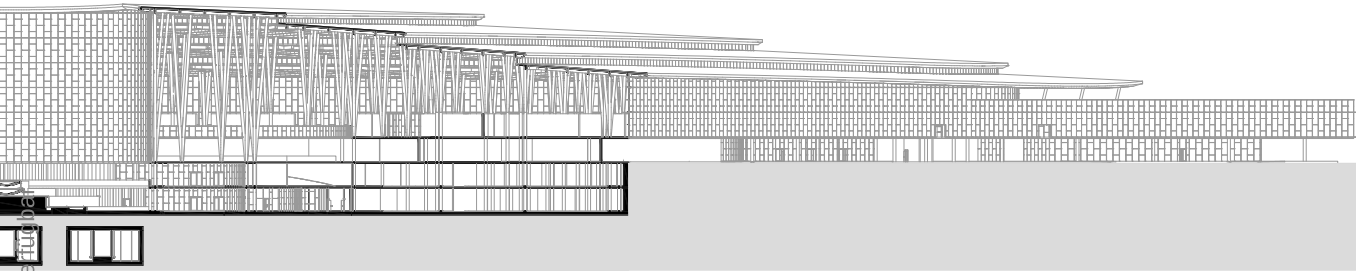


Pl. 13 Section AA'

Level +2 —
Level +1 —
Level 0 —
Level -1 —
Level -2 —
Level -3 —
Level -4 —

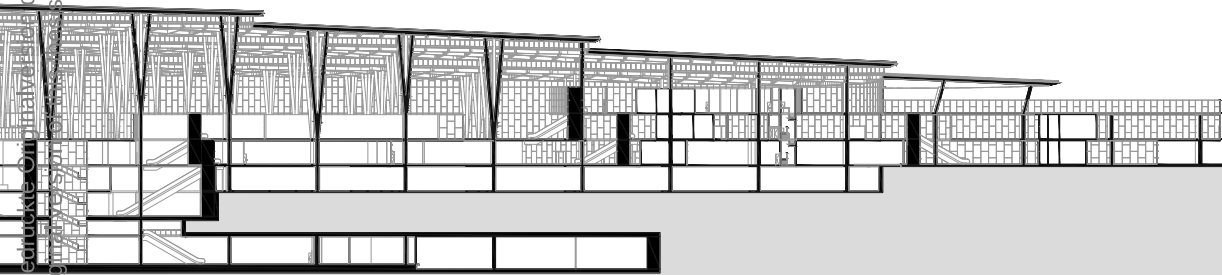


Pl. 14 Section BB'



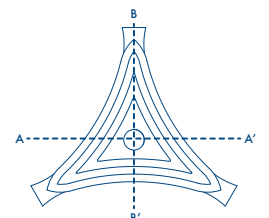
— +10.00
 — +5.00
 — +0.00
 — -5.00
 — -10.00
 — -13.50
 — -20.00

0 10 25 50m
 1:1500



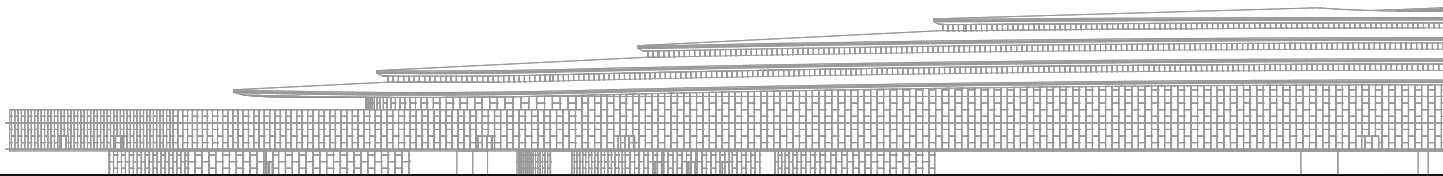
— +10.00
 — +5.00
 — +0.00
 — -5.00
 — -10.00
 — -13.50
 — -20.00

0 10 25 50m
 1:1500

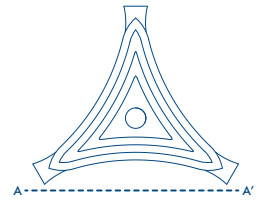
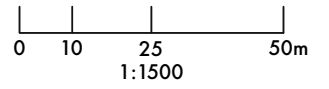
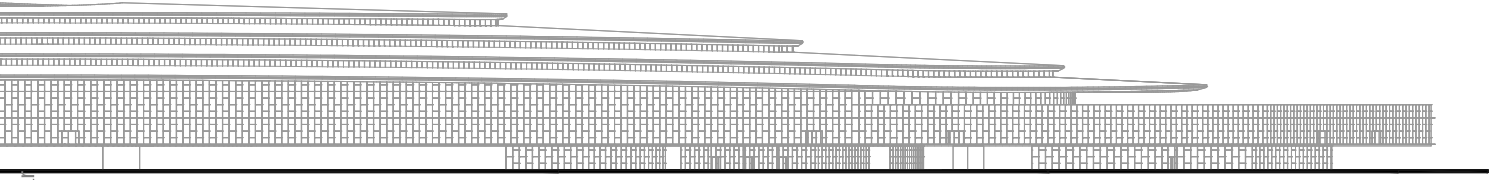


Dieser Diplomarbeitsentwurf ist an der TU Wien Bibliothek verfügbar.
 This work is available in print at TU Wien Bibliothek.

OUTCOME

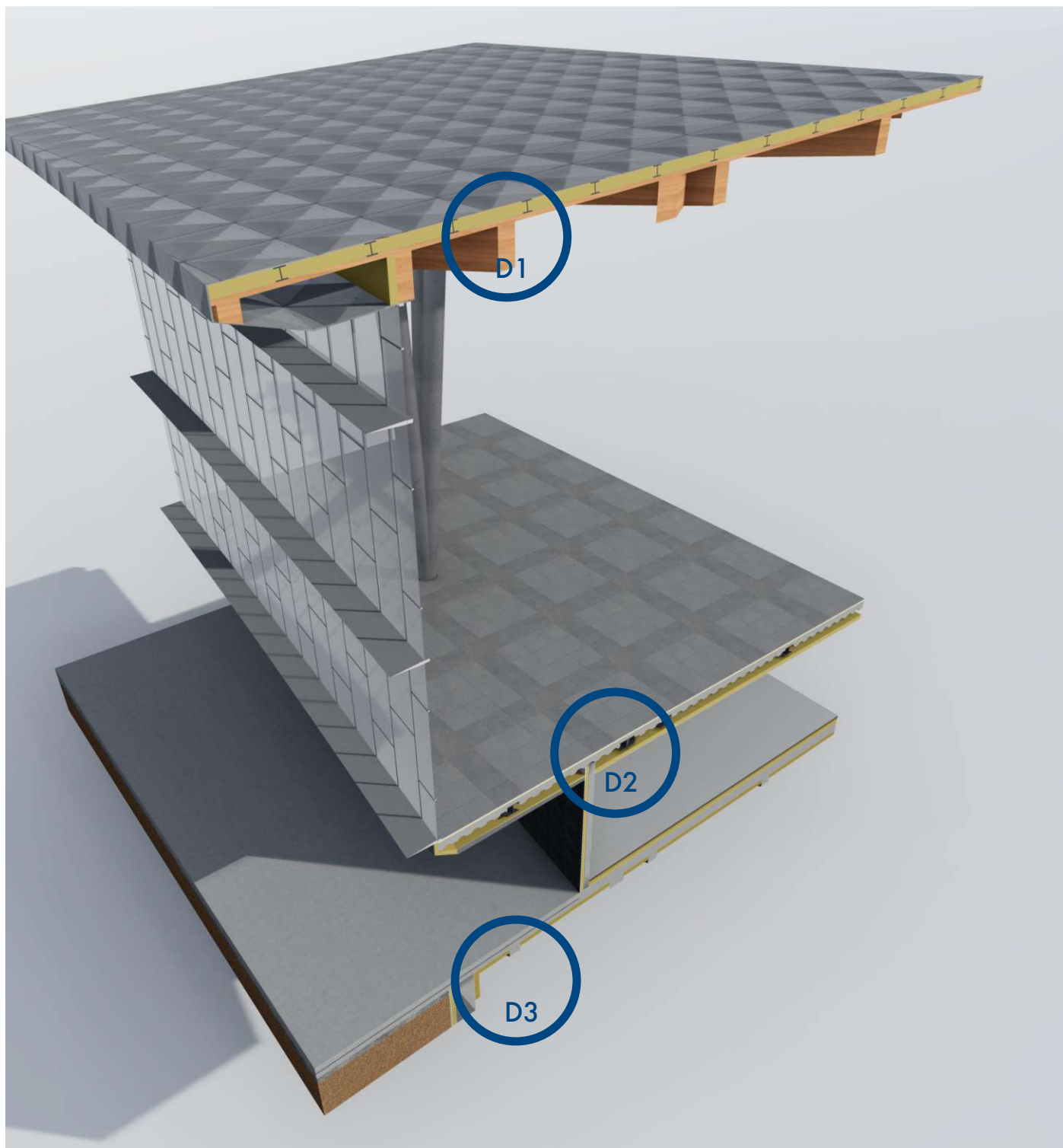


Pl. 15 Elevation

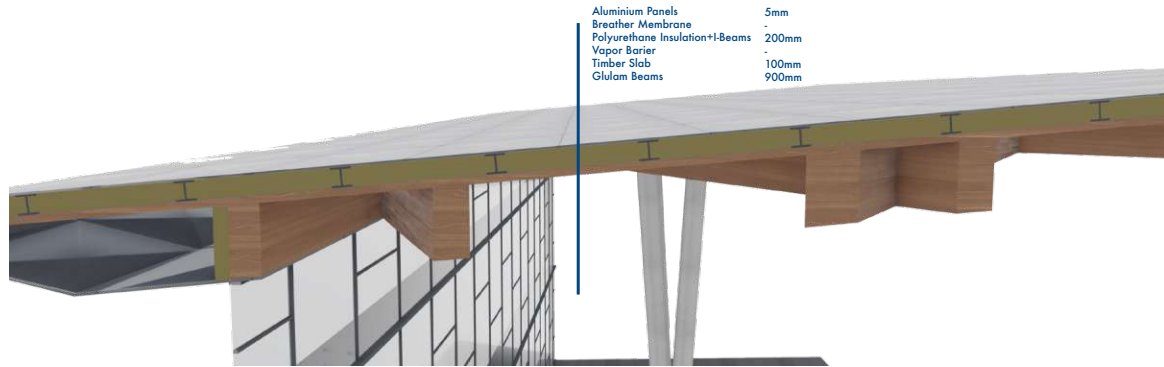


Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

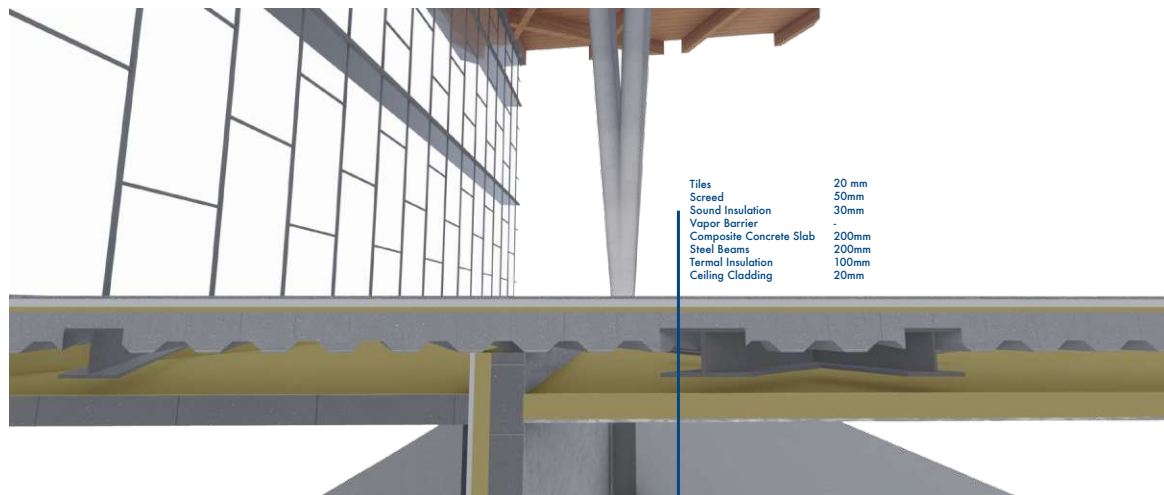
05.04 Details



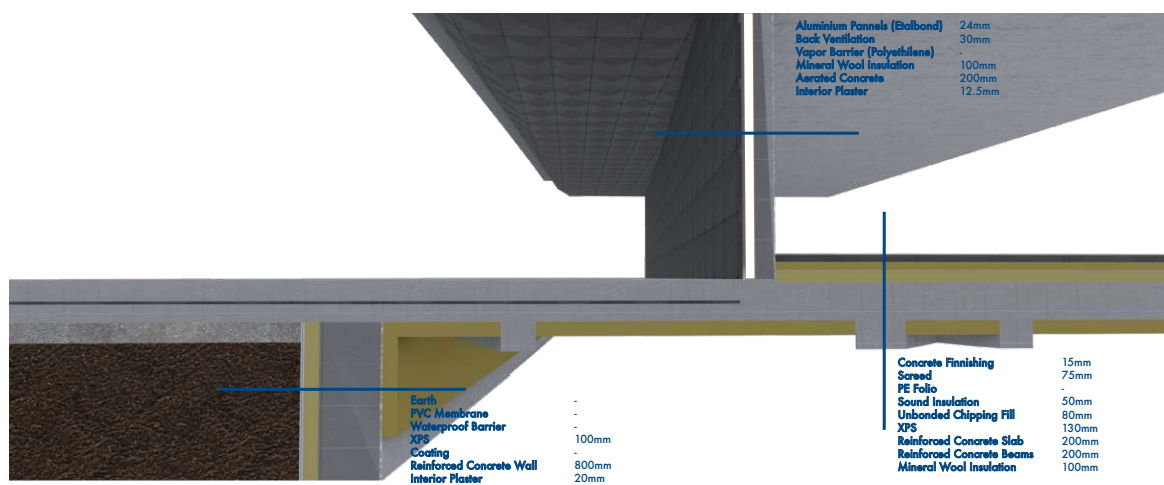
Vis. 1 3D Details



Vis. 2 D1



Vis. 3 D2

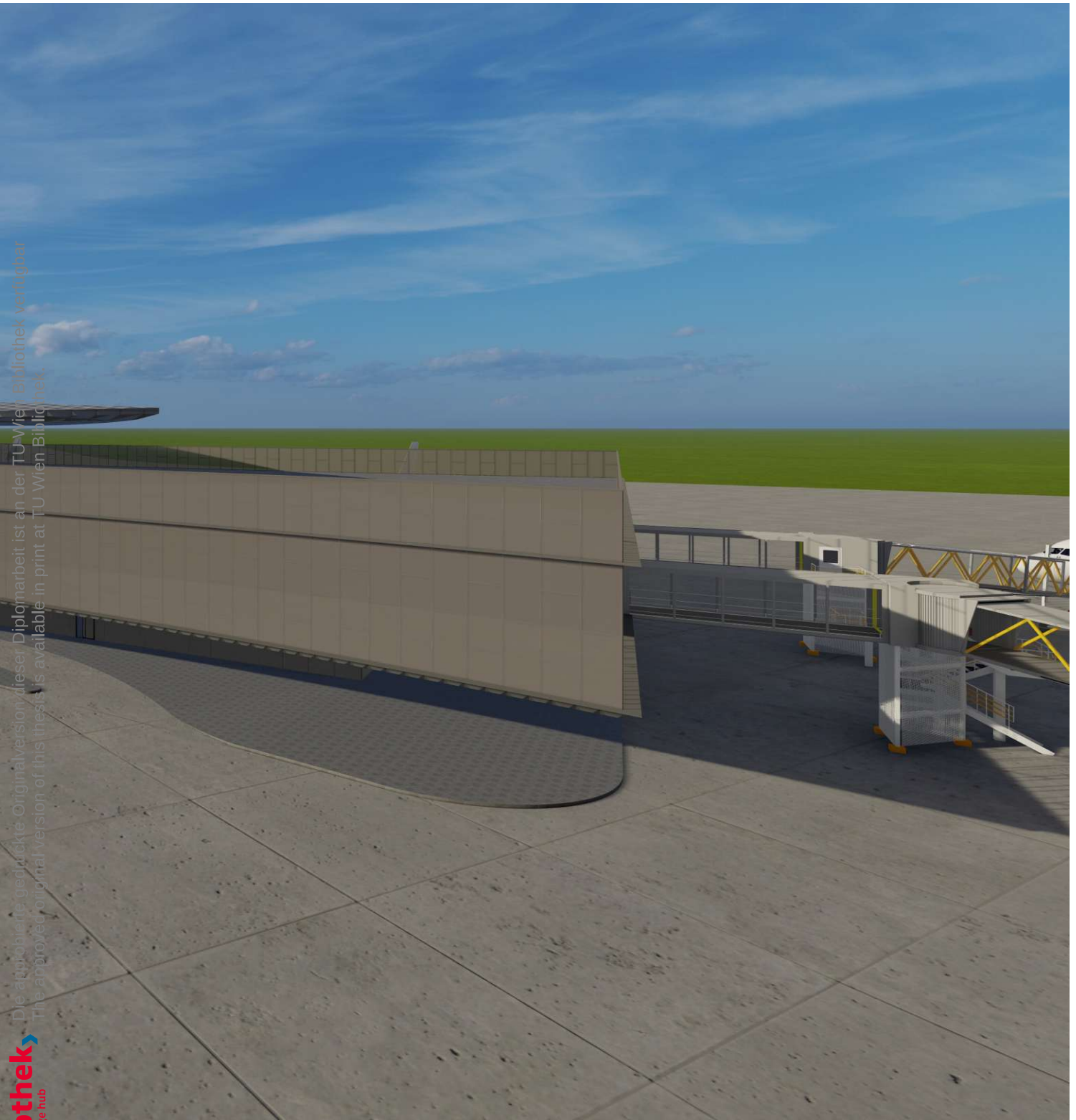


Vis. 4 D3

05.05 Visualisations

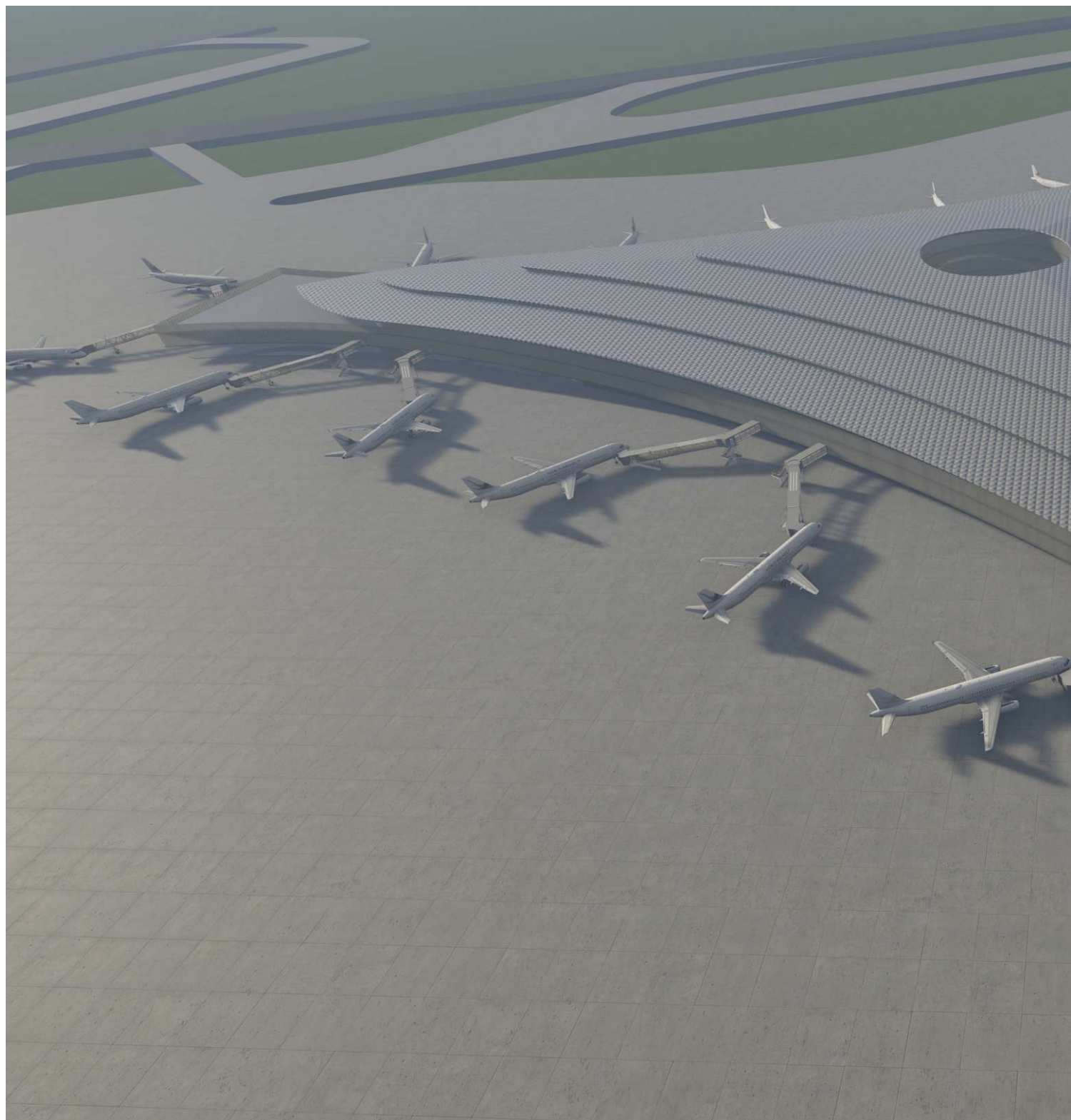


Vis. 5 Exterior North Edge



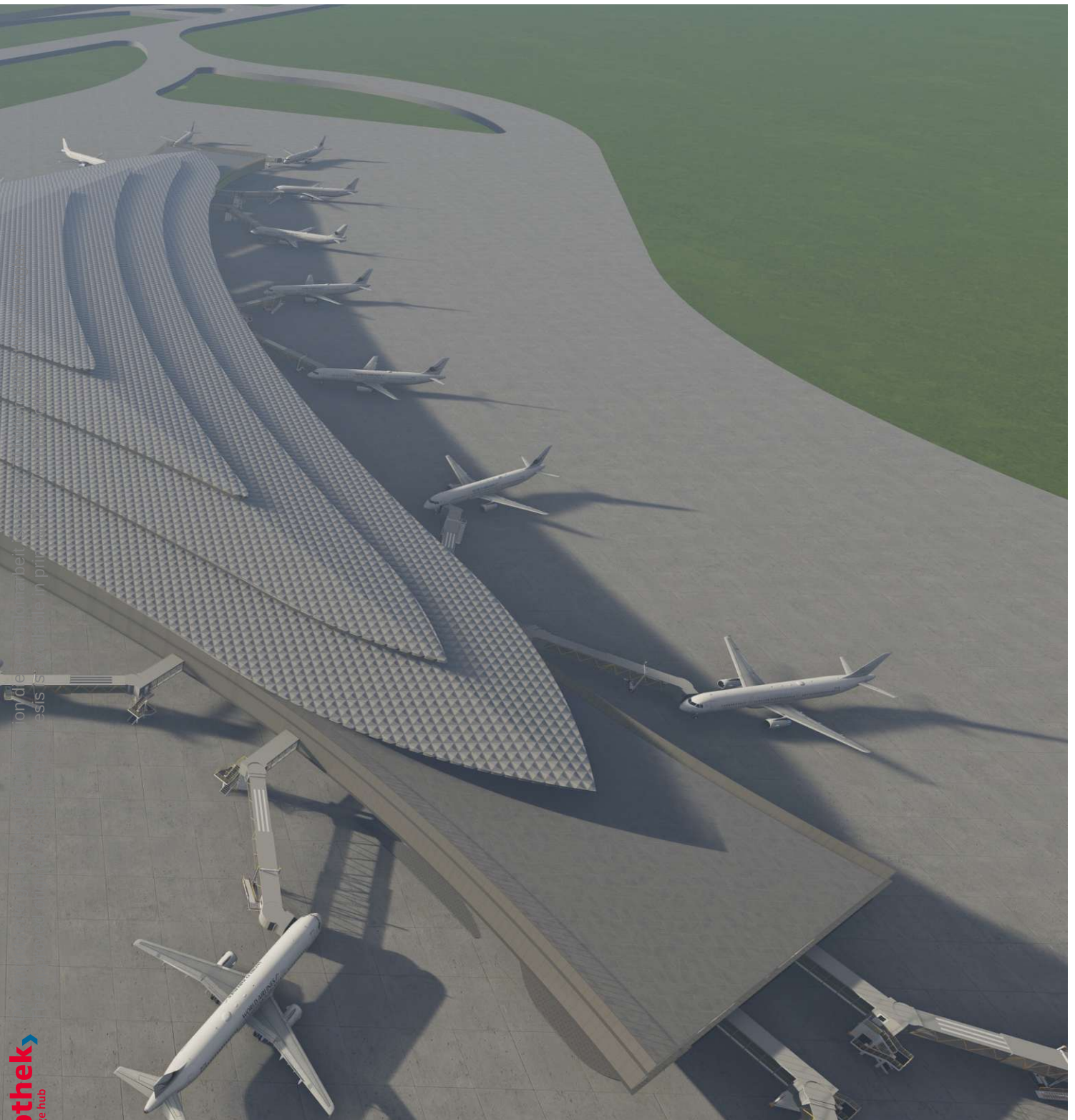
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

OUTCOME



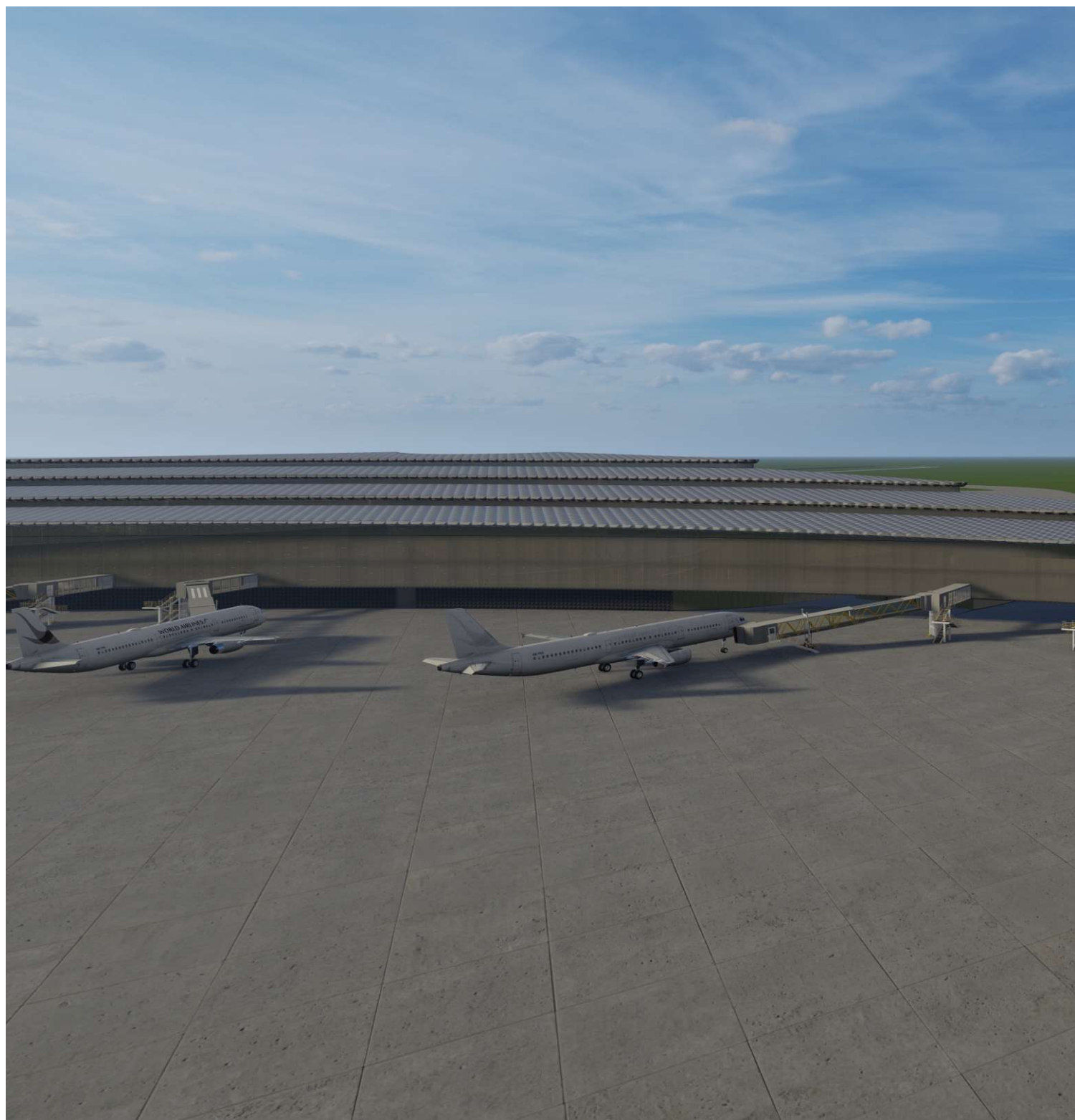
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

Vis. 6 Exterior Areal View



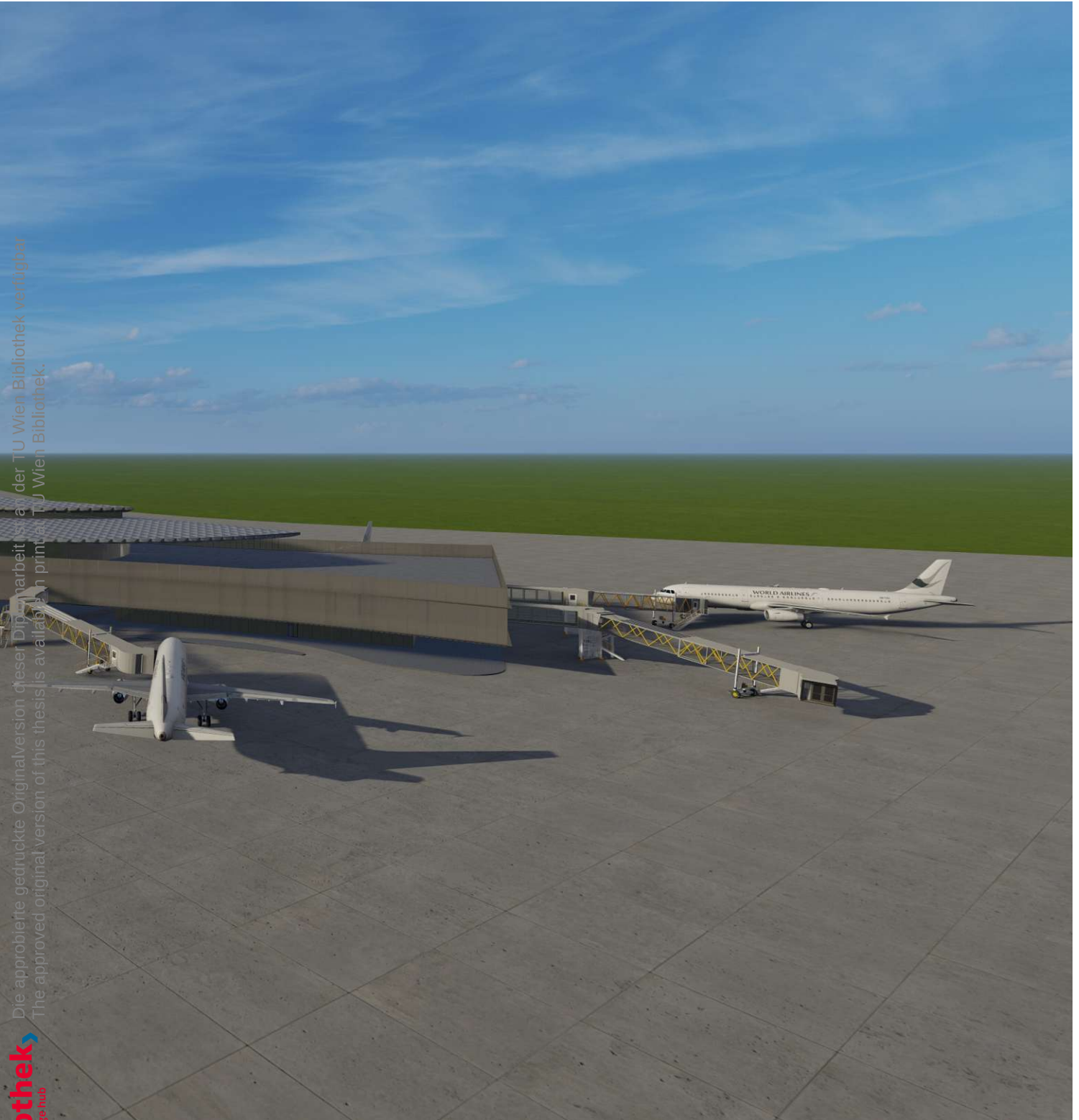
tonde
esis S

OUTCOME

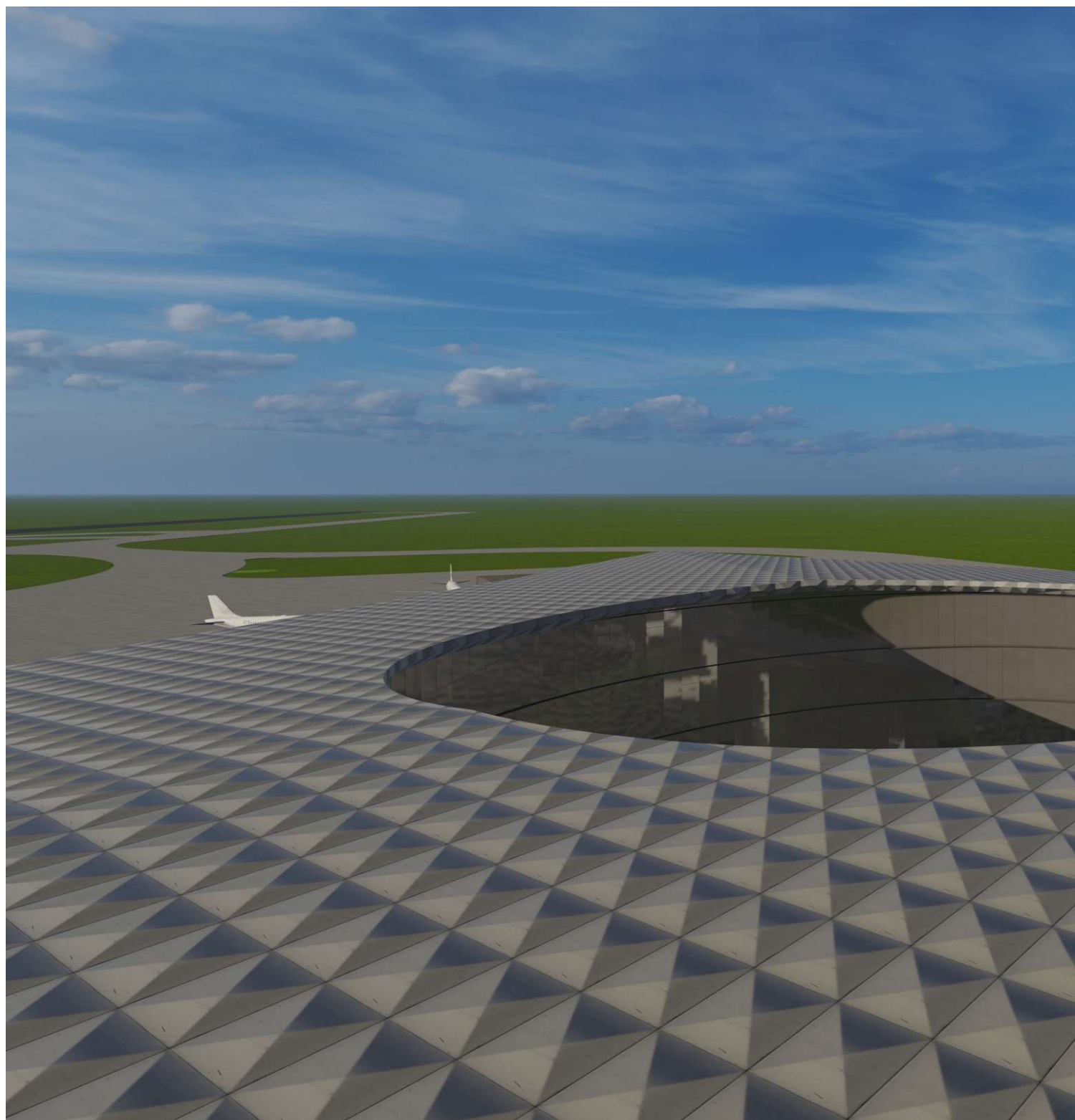


Vis. 7 Exterior Zoom-Out

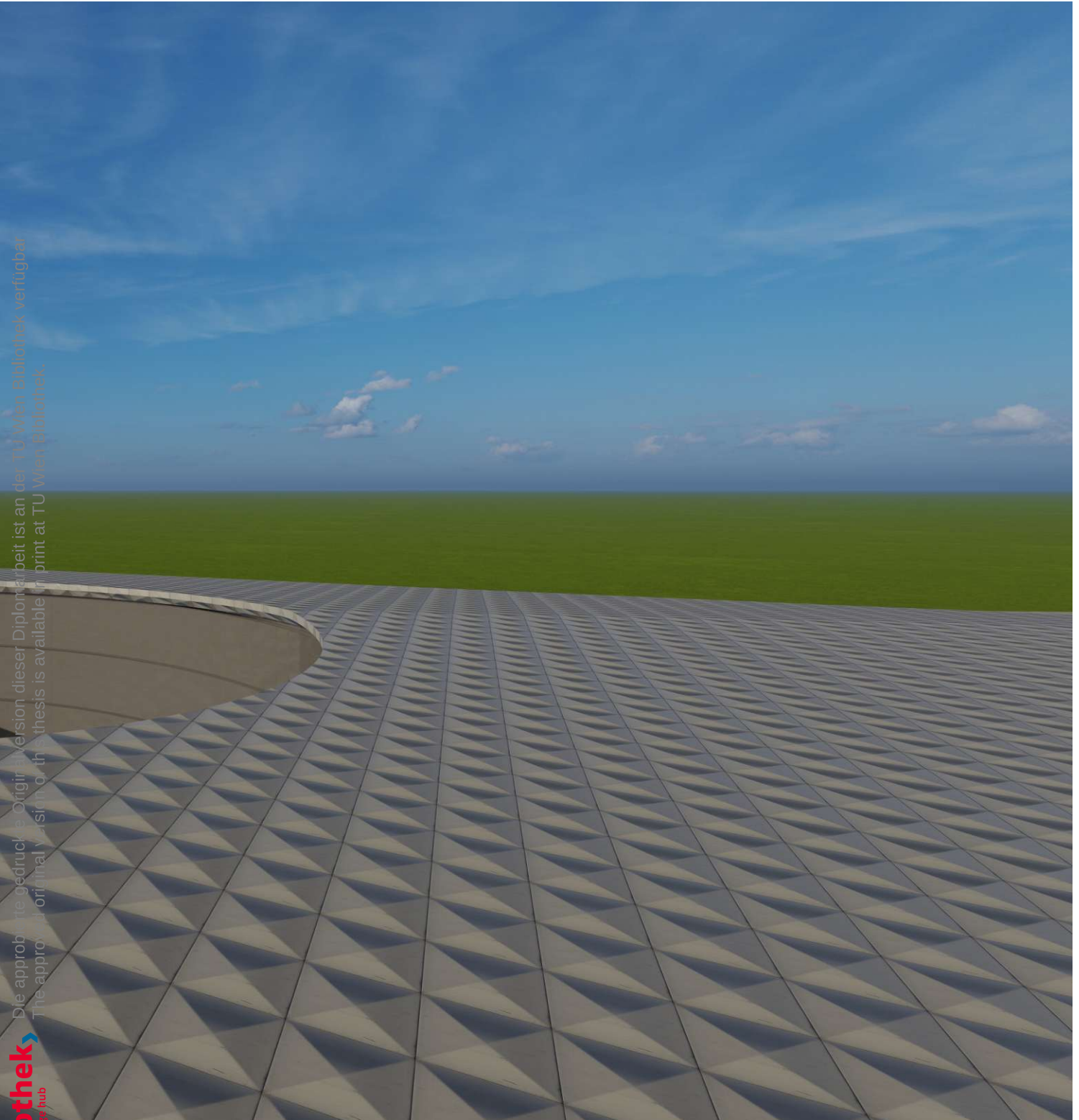
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

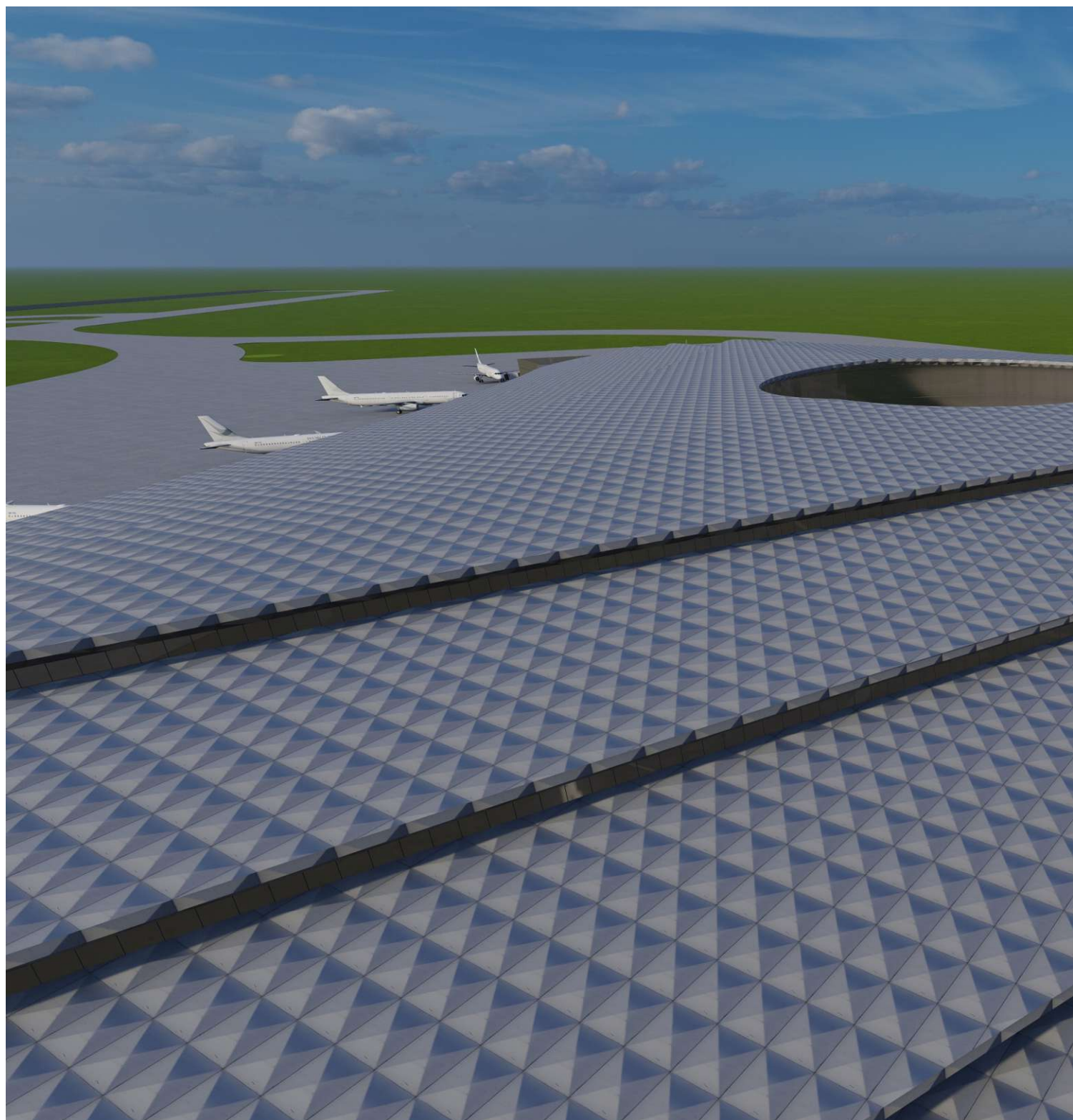


Vis. 8 Close-Up Roof and Opening



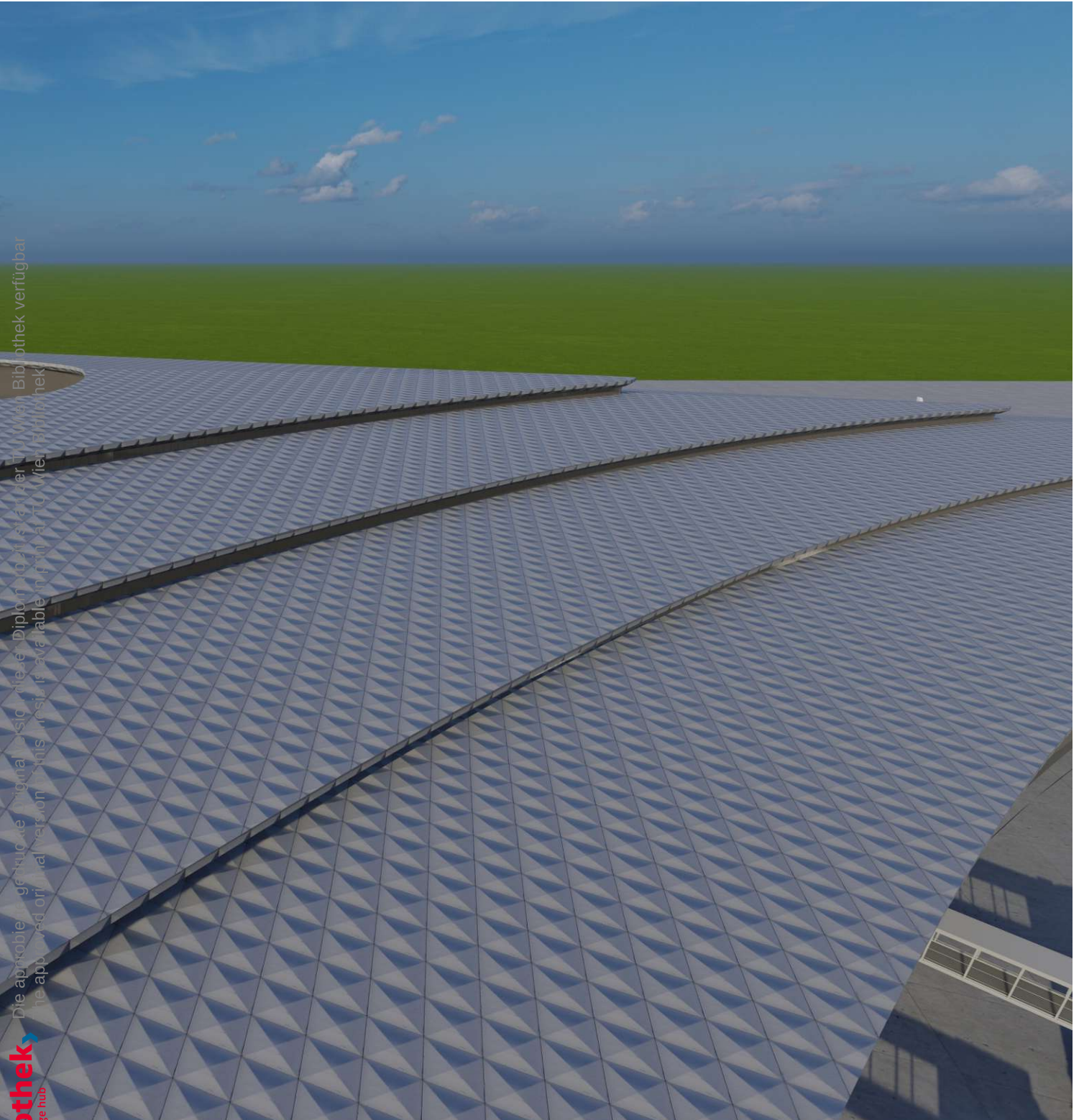
Die abgebildete gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

OUTCOME



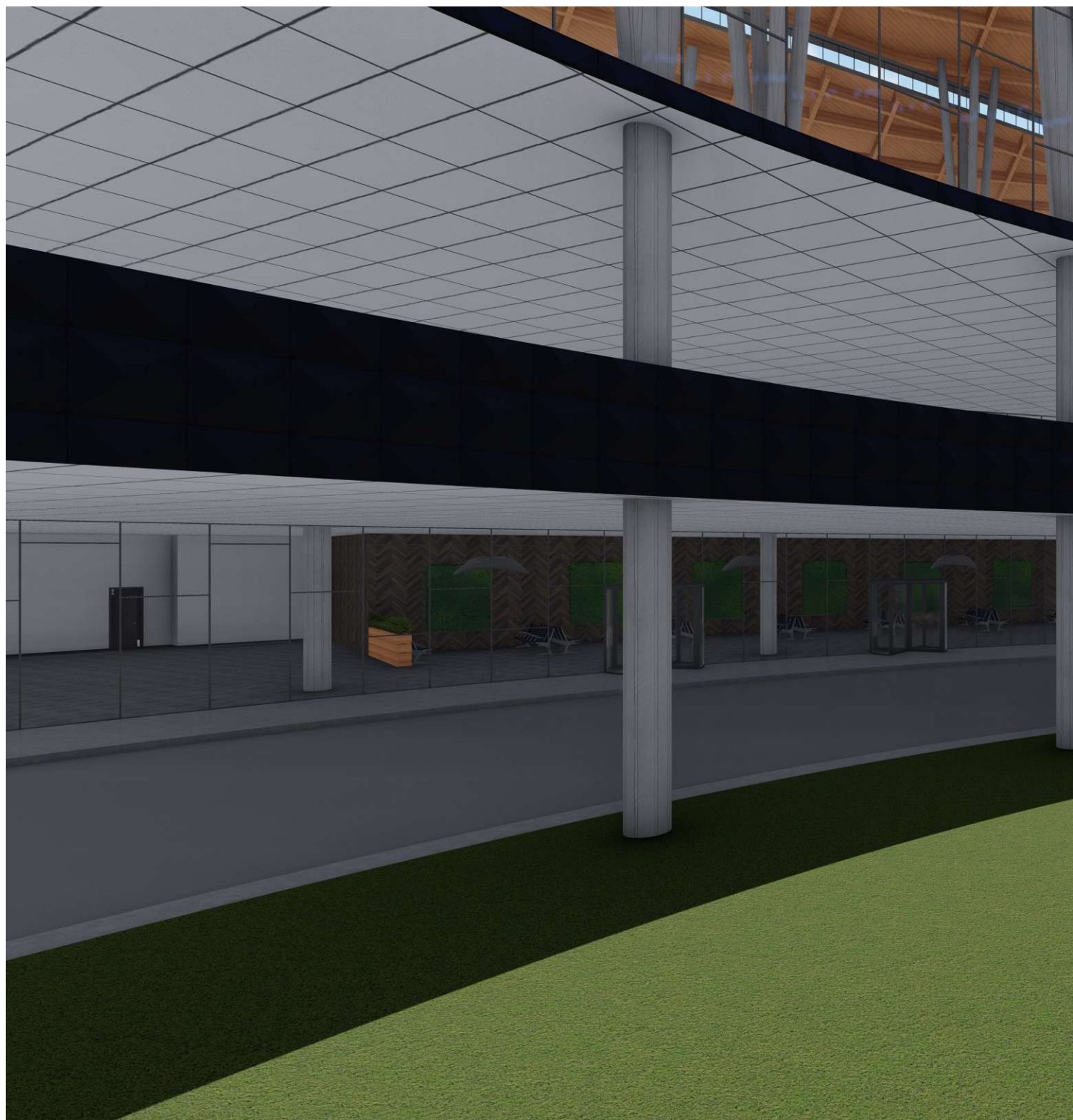
Vis. 9 Roof Levels

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



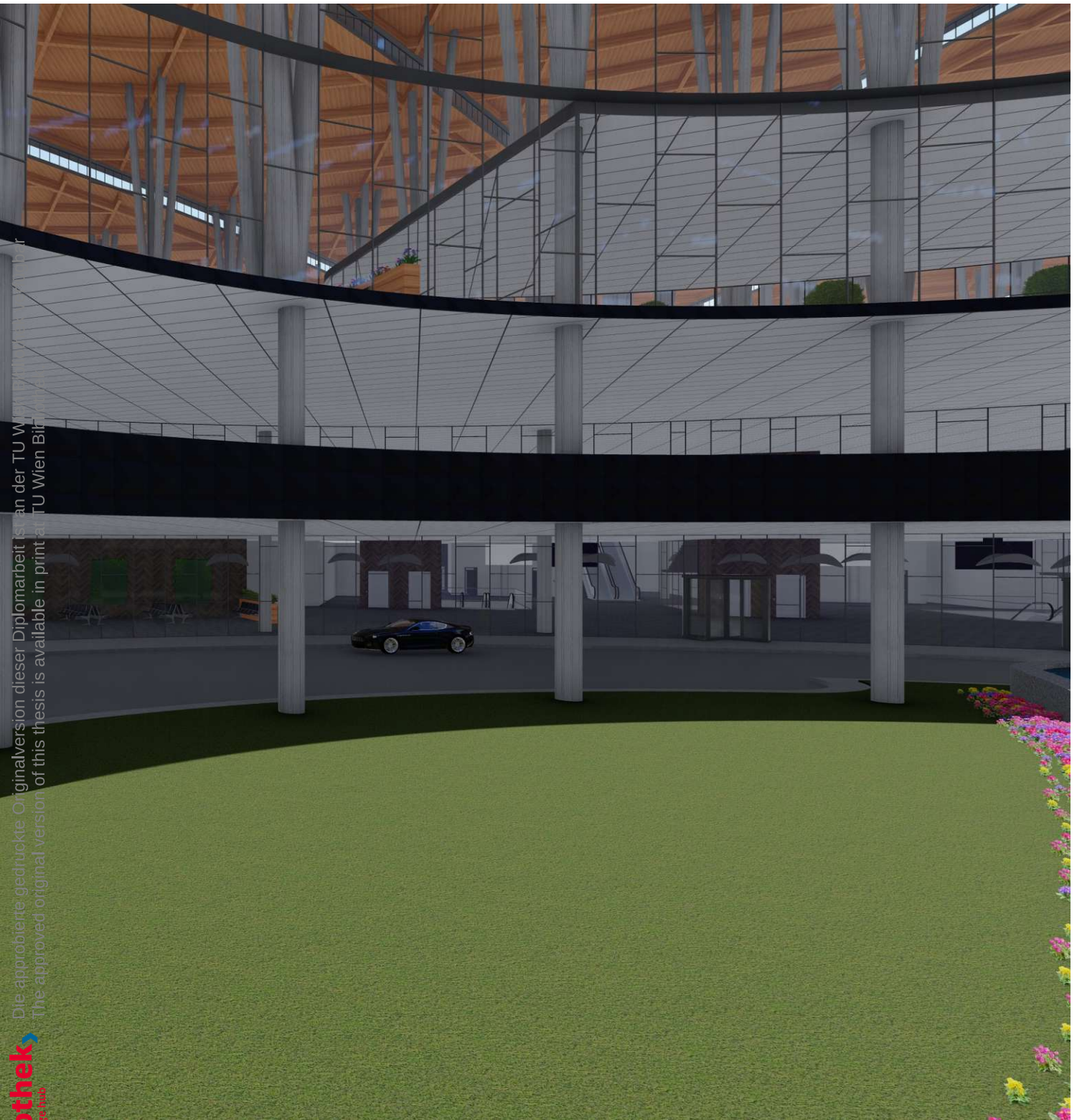
Die abgebildete grafische Originalversion dieses Diploms ist ausschließlich für die TU Wien Bibliothek verfügbar.
The above-mentioned original version of this diploma is available only for the TU Wien Bibliothek.

OUTCOME



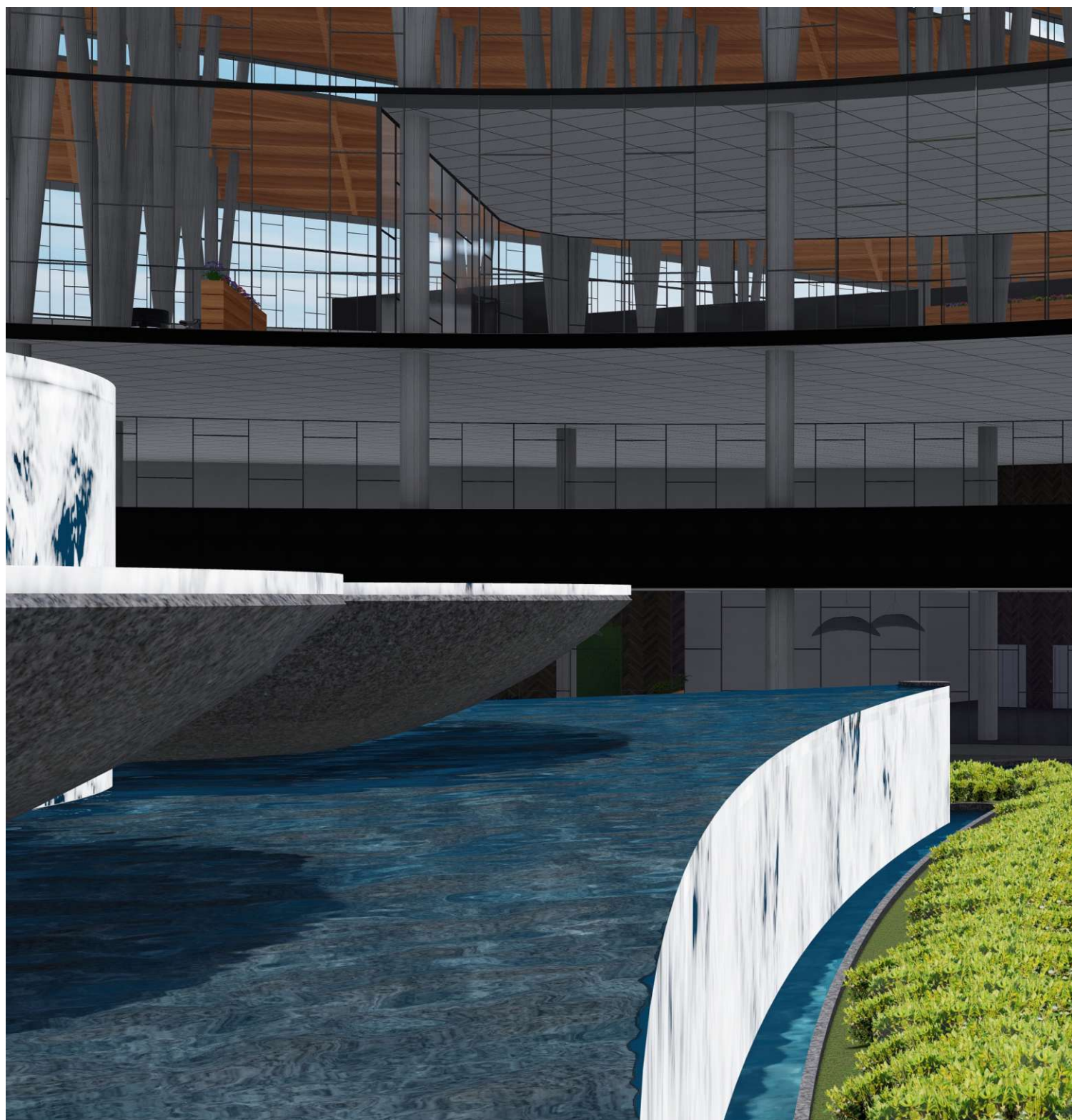
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

Vis. 10 Level -2 Traffic Access



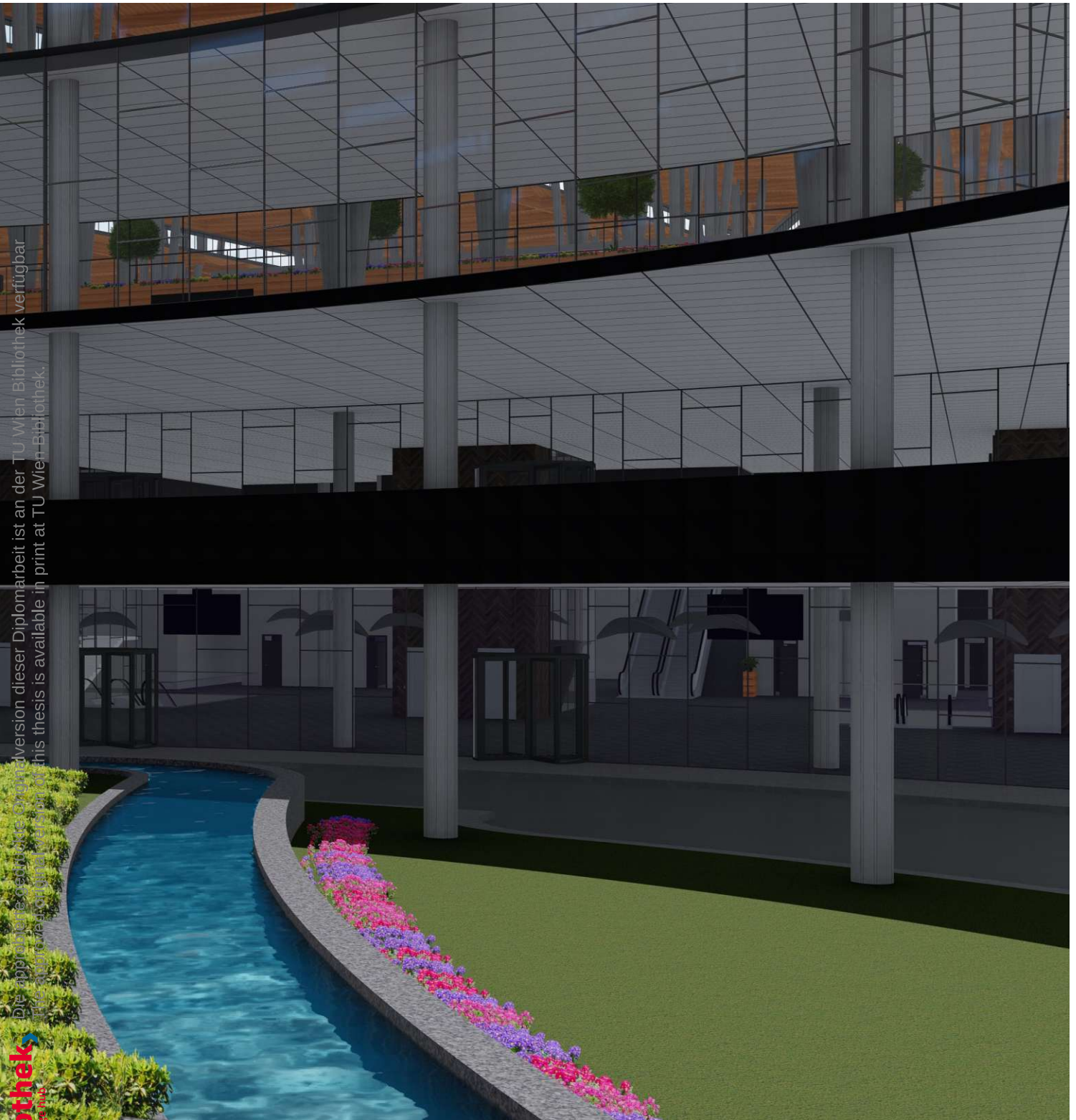
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

OUTCOME



Vis. 11 Fountain Close-Up

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



This thesis is available in print at TU Wien Bibliothek.
This thesis is available in print at TU Wien Bibliothek.

OUTCOME



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

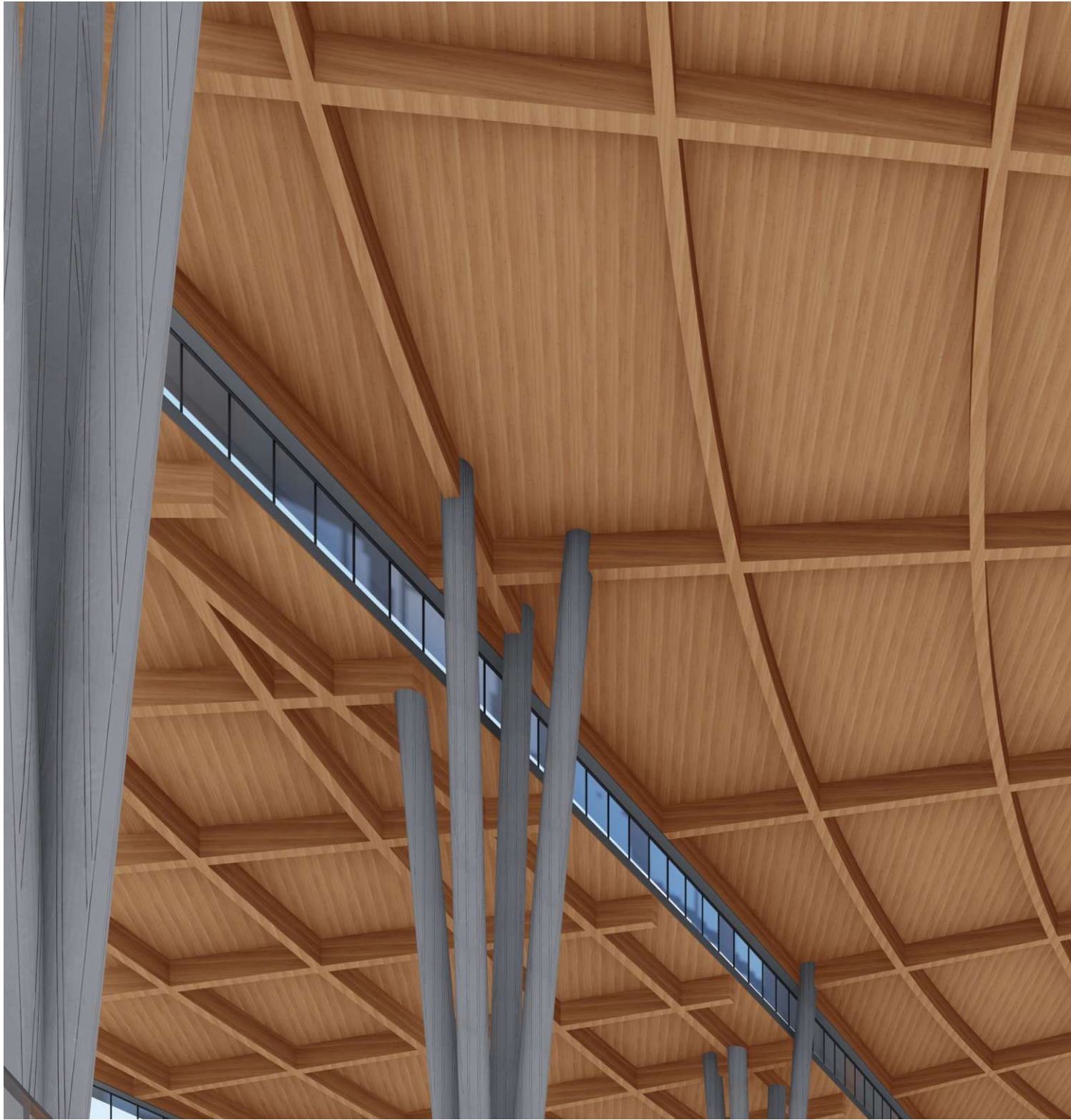
Vis. 12 Check-In Desks



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

OUTCOME

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



Vis. 13 Roof Details



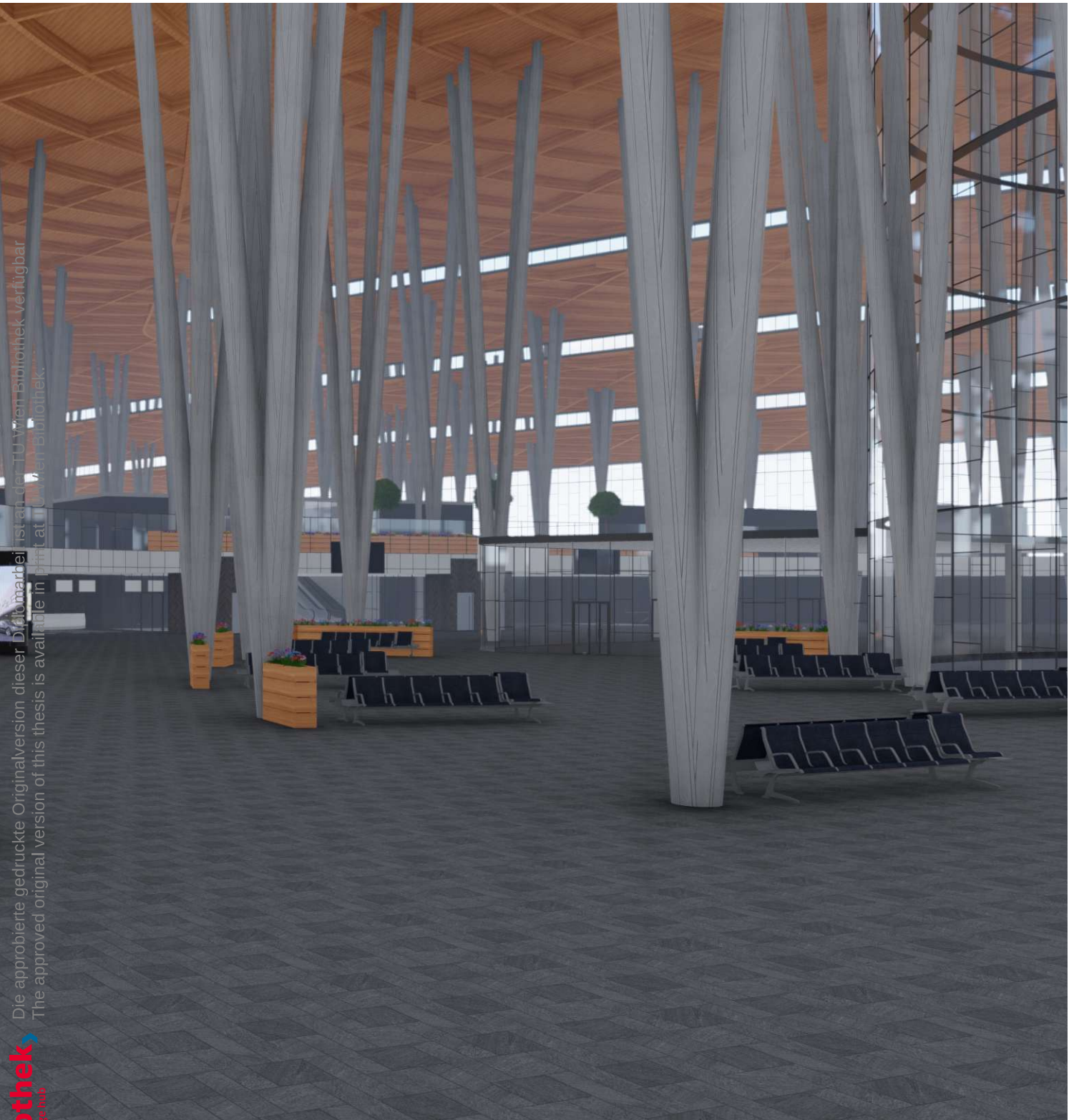
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

OUTCOME

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



Vis. 14 Check-In and Departures Lobby



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at the TU Wien Bibliothek.

OUTCOME



Vis. 15 Escalators to Security and Gates



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek

OUTCOME



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

Vis. 16 Gates and Waiting Areas



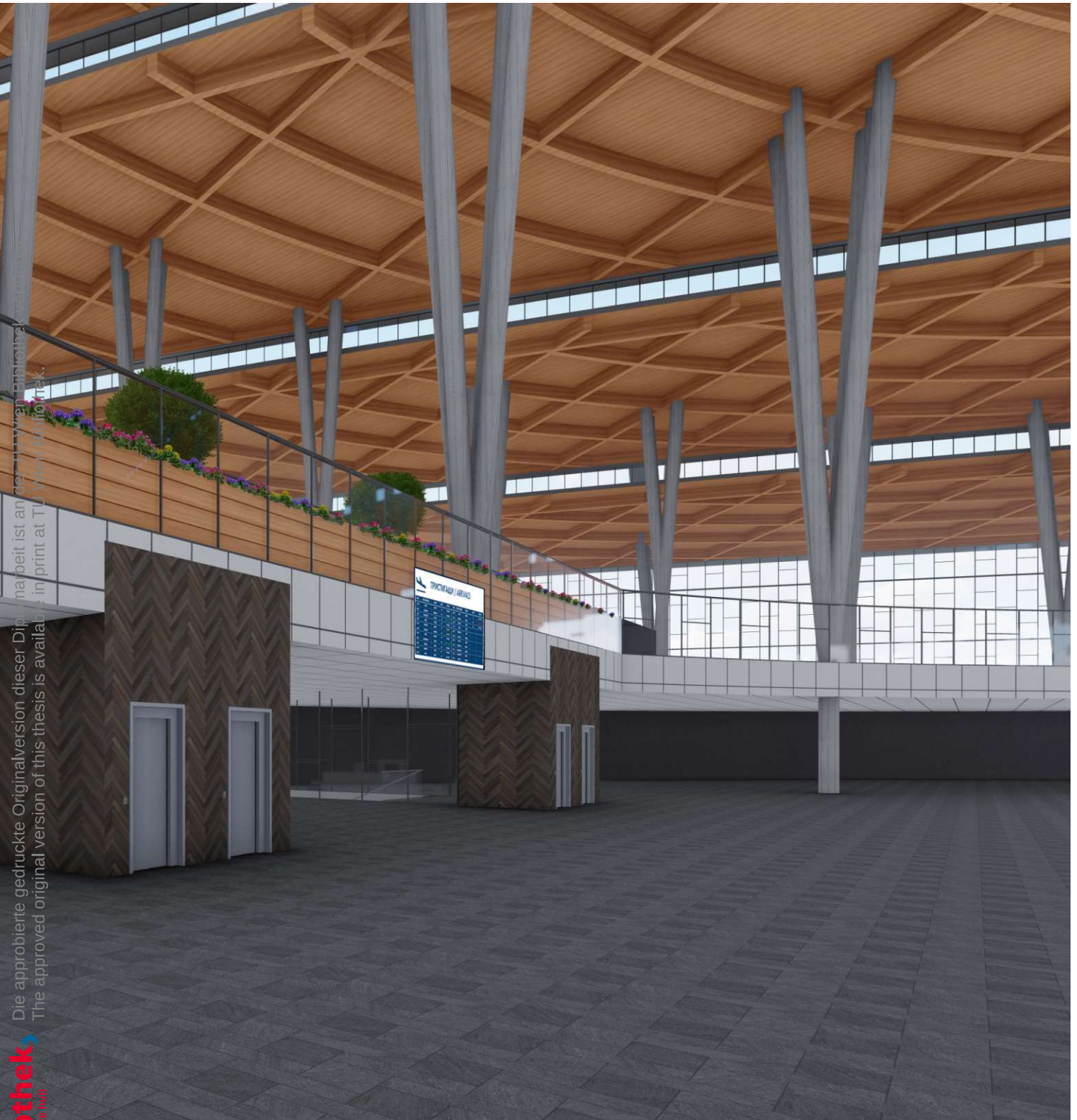
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek
The approved original version of this thesis is available in print at TU Wien Bibliothek

OUTCOME



Vis. 17 Flight Info Screens in Departures Lobby

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der Universitätsbibliothek der TU Wien verfügbar.
The approved original version of this thesis is available in print at TU Wien Bibliothek.

06

AREA CALCULATION

AREA CALCULATION

Total Gross Floor Area - 274 707 sq.m.

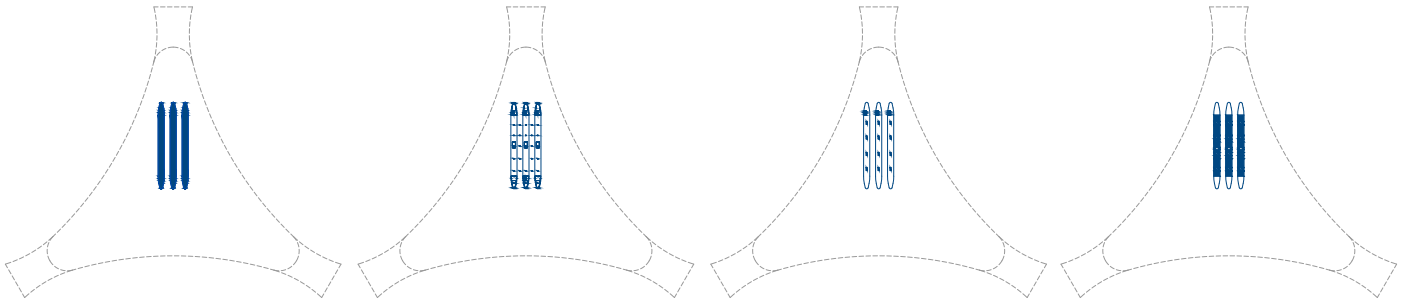
Level -4

Gross Floor Area
3914 sq.m

Construction Floor Area
122 sq.m

Useable Area
175 sq.m

Circulation Area
2806 sq.m



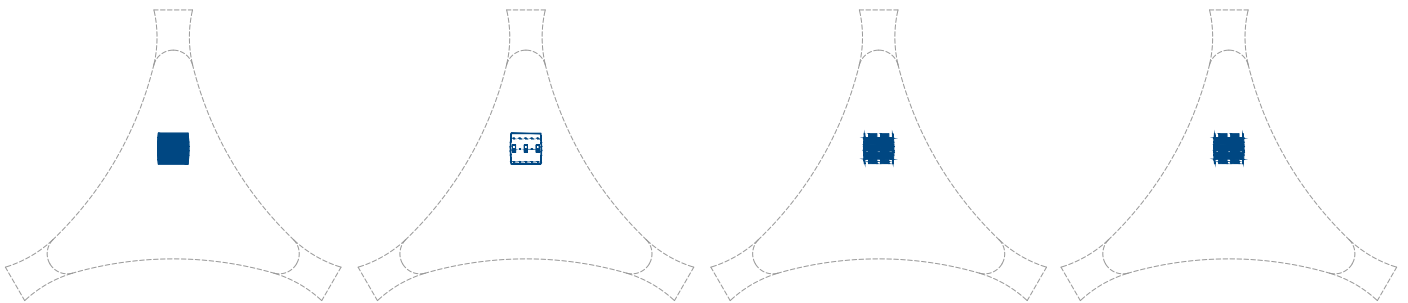
Level -3

Gross Floor Area
2499sq.m

Construction Floor Area
176 sq.m

Useable Area
1009 sq.m

Circulation Area
1009 sq.m



Level -2

Gross Floor Area
47778sq.m

Construction Floor Area
1738 sq.m

Useable Area
1456 sq.m

Circulation Area
7230 sq.m

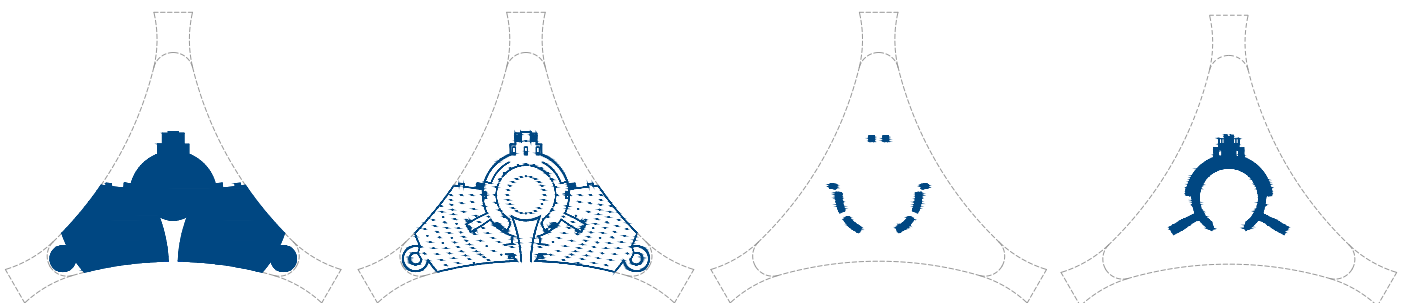


Fig. 37 Area Calculation Diagrams

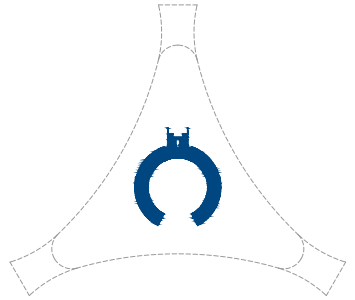
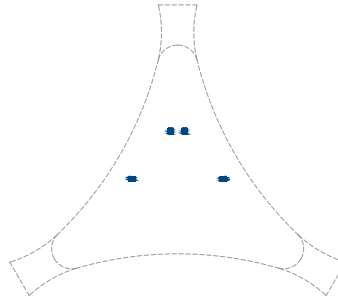
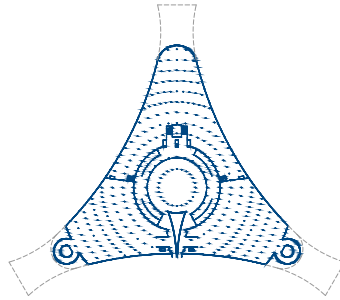
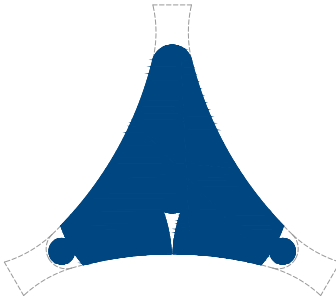
Level -1

Gross Floor Area
68606 sq.m

Construction Floor Area
1640sq.m

Useable Area
232 sq.m

Circulation Area
7185 sq.m



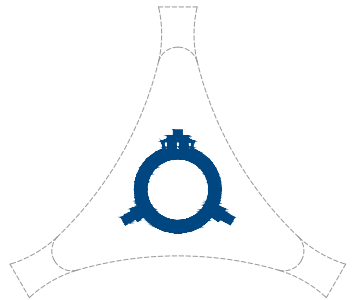
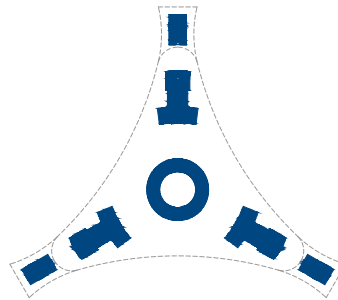
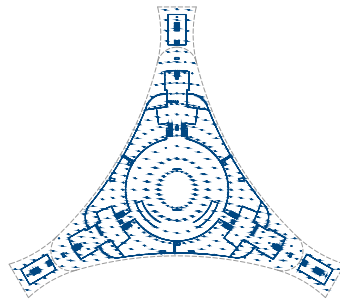
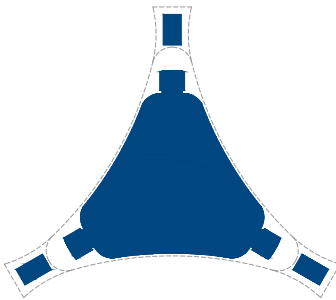
Level 0

Gross Floor Area
61227 sq.m

Construction Floor Area
1155 sq.m

Useable Area
17337 sq.m

Circulation Area
9195 sq.m



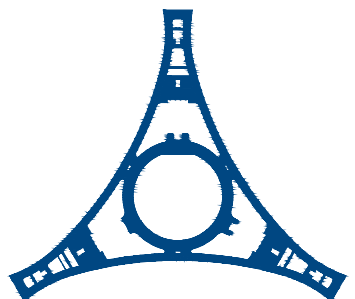
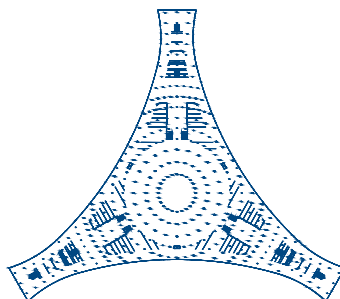
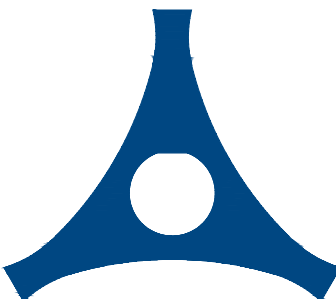
Level +1

Gross Floor Area
67900 sq.m

Construction Floor Area
1197 sq.m

Useable Area
36825 sq.m

Circulation Area
27776 sq.m



AREA CALCULATION

Level +2

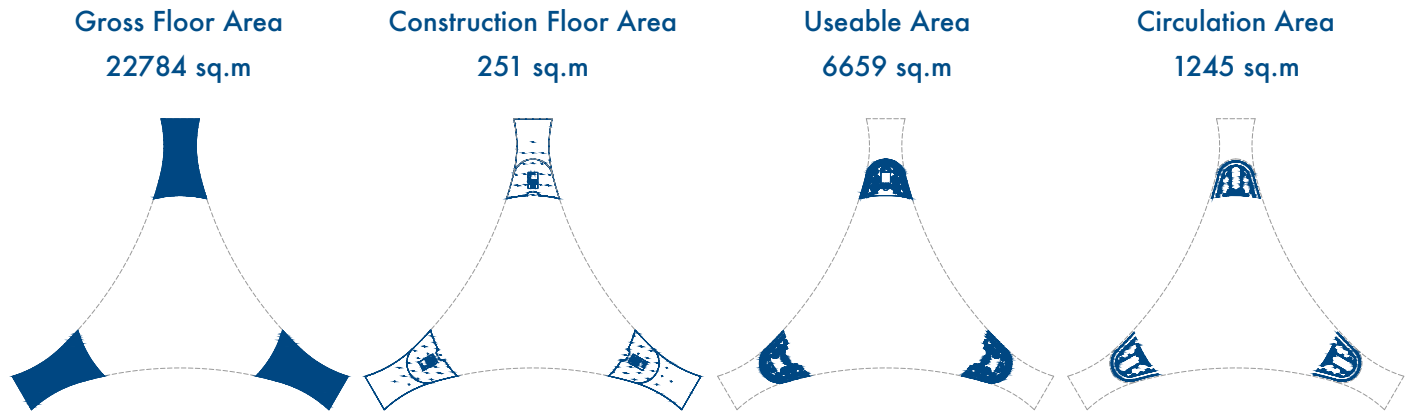


Fig. 37 Area Calculation Diagrams

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

07 CONCLUSION

CONCLUSION

Designing a New Terminal is a complex task that requires research and planning. In this project, those two concepts were integrated with the needs of the modern flyer to address their needs and provide a comfortable, stress-free stay.

The focus of this project is to create a simply laid-out plan, that is easy to navigate and provides a fast and direct connection for passengers traveling to and from Sofia. The Terminal is designed to accommodate the needs of future passenger growth and space for expansion within the terminal without the need for new outside construction.

The fast and direct way to and from your flight is a modern passenger need and that is what this terminal provides. This project intends to boost forward the air traffic to the capital and even become the new South Eastern European airport hub.

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

08

DIRECTORIES

08.01 List of Figures

Fig. 1 - Old Sofia Airport Building | <https://sofia-airport.eu/wp-content/uploads/2021/11/a1a-min.jpg> | 19.01.2023

Fig. 2 - Destinations Map | Made by Iliyan Kukutsov in Photoshop + Illustrator with information from <https://www.flightsfrom.com/explorer/SOF?mapview> | 23.01.2023

Fig. 3 - Map of Bulgaria | Made by Iliyan Kukutsov in Photoshop + Illustrator with image from <https://freevector-maps.com/bulgaria/BG-EPS-02-0001> | 25.01.2023

Fig. 4 - Sofia Airport Location | Made by Iliyan Kukutsov in Photoshop + Illustrator | Bought DWG - <https://schwarzplan.eu/en/figure-ground-plan-site-plan-sofia/> | 26.01.2023

Fig. 5 - Sofia Airport Map | https://eea.government.bg/bg/dokladi/plan_za_deystvie_letishche_sofiya.pdf | 27.01.2023

Fig. 6 - Passenger Graph | Made by Iliyan Kukutsov in Photoshop + Illustrator with information from <https://sofia-airport.eu/wp-content/uploads/2023/01/Statistics-2023-01.pdf> | 27.01.2023

Fig. 7 - Terminal 2 Floor Map | https://sofia-airport.eu/wp-content/uploads/2021/11/MAP_TERMINAL2_EN.pdf | 27.01.2023

Fig. 8 - Outside Picture of Sofia Airport | Author Unknown | https://en.wikipedia.org/wiki/Sofia_Airport#/media/File:SA-06-NOvember-2015.jpg | 28.01.2023

Fig. 9 - Outside Picture of Sofia Airport | Author Unknown | <https://www.meridiam.com/projects/sofia-airport/> | 28.01.2023

Fig. 10 - Terminal 2 Check-in | Author: Apostoloff | https://commons.wikimedia.org/wiki/File:Inside_Sofia_Airport_20090409_018.JPG | 28.01.2023

Fig. 11 - Terminal 2 Cafe | Author Unknown | <https://sofia-airport.eu/en/news/transformatsia-na-letishte-sofia/> | 28.01.2023

Fig. 12 - SofConnect's Vision (screengrab) | Author SofConnect | https://www.munich-airport.com/_b/000000000000009904157bb5f8ea703/sofia-airport-vision.jpg | 03.02.2023

Fig. 13 - SofConnect's Airport Rendering | https://www.bstadb.org/news-and-media/press-releases/press-releases_5775 | 04.02.2023

Fig. 14 - SofConnect's Terminal 3 (screengrab) | Author SofConnect | https://www.youtube.com/watch?v=C96TkDyja_o | 03.02.2023

Fig. 15 - SofConnect's Terminal 3 (screengrab) | Author SofConnect | https://www.youtube.com/watch?v=C96TkDyja_o | 03.02.2023

Fig. 16 - SofConnect's Terminal 3 Interior (screengrab) | Author SofConnect | https://www.youtube.com/watch?v=C96TkDyja_o | 03.02.2023

Fig. 17 - SofConnect's Terminal 3 Interior (screengrab) | Author SofConnect | https://www.youtube.com/watch?v=C96TkDyja_o | 03.02.2023

Fig. 18 - Landside and Airside Diagram | Airport Passenger Terminal Planning and Design, Volume 1: Guidebook (2010), p.10 | <https://doi.org/10.17226/22964> | 04.02.2023

Fig. 19 - Components of a Terminal | Aviation Public Health Initiative Assessment of Risks of SARS-CoV-2 Transmission (2021), B. Prezant, J. Spengler, J. McCarthy, E. Nardell, Edward, R. Sanchez, J. Laurent, J. Srebric, Sh. Zhu, L. Marcus, p. 12 | https://www.researchgate.net/publication/349393219_Aviation_Public_Health_Initiative_Assessment_of_Risks_of_SARS-CoV-2_Transmission_During_Air_Travel_and_Non-Pharmaceutical_Interventions_to_Reduce_Risk_Phase_Two_Report_Curb-to-Curb_Travel_Through_Airp | 04.02.2023

Fig. 20 - Terminal Profiles | Made by Iliyan Kukutsov in Photoshop + Illustrator | 05.02.2023

Fig. 21 - Terminal Functional Configuration | Made by Iliyan Kukutsov in Photoshop + Illustrator | 05.02.2023

Fig. 22 - New Terminal Location | Made by Iliyan Kukutsov in Photoshop + Illustrator | Bought DWG - <https://schwarzplan.eu/en/figure-ground-plan-site-plan-sofia/> | 09.02.2023

Fig. 23 - Aircraft Wingspan Table | Made by Iliyan Kukutsov in Photoshop + Illustrator with data from Axon Aviation | <http://www.axonaviation.com/commercial-aircraft/aircraft-data/aircraft-specifications> | 11.02.2023

Fig. 24 - Ininitial Form Diagram | Made by Iliyan Kukutsov in Photoshop + Illustrator with picture from | https://en.wikipedia.org/wiki/Boeing_X-48 | 14.02.2023

Fig. 25 - Final Form Diagram | Made by Iliyan Kukutsov in Photoshop + Illustrator | 14.02.2023

Fig. 26 - Current Situation | Made by Iliyan Kukutsov in Photoshop + Illustrator using data from Google Maps | 15.02.2023

Fig. 27 - Phase 1 | Made by Iliyan Kukutsov in Photoshop + Illustrator using data from Google Maps | 15.02.2023

Fig. 28 - Phase 2 | Made by Iliyan Kukutsov in Photoshop + Illustrator using data from Google Maps | 15.02.2023

Fig. 29 - Program Diagram | Made by Iliyan Kukutsov in Photoshop + Illustrator | 17.02.2023

Fig. 30 - Axxo Program Diagram | Made by Iliyan Kukutsov in Photoshop + Illustrator | 17.02.2023

Fig. 31 Structure Raster + Grid Zoom | Made by Iliyan Kukutsov in Photoshop + Illustrator | 18.02.2023

Fig. 32 Roof Raster axxo | Made by Iliyan Kukutsov in Photoshop + Illustrator | 19.02.2023

Fig. 33 Blown-up Axxo Overground Structure | Made by Iliyan Kukutsov in Arhcad 26 + Illustrator | 22.02.2023

Fig. 34 Visualisation Frame and Column | Made by Iliyan Kukutsov in Archicad 26 | 23.02.2023

Fig. 35 Visualisation Roof | Made by Iliyan Kukutsov in Archicad 26 | 24.02.2023

Fig. 36 Roof Light Concept | Made by Iliyan Kukutsov in Photoshop + Illustrator | 25.02.2023

Fig. 37 Area Calculation Diagrams | Made by Iliyan Kukutsov in Photoshop + Illustrator | 06.05.2023

08.02 List of Literature

1. History of Sofia Airtport | <https://sofia-airport.eu/en/about-us/history/> | 19.01.2023
2. Information about the construction of "Terminal 2" | <http://sofair.atSPACE.com> | 19.01.2023
3. Statement of SofConnect on the website of Munich Airport, conessioner of Sofia Airport. | <https://www.munich-airport.com/international/sof-connect-s-vision-for-sofia-airport> | 03.02.2023
4. Staement from SofConnect's CEO Jesus Caballero | <https://airport.buzz/bulletin/sofia-airport-a-transformation-begins/#:~:text=A%20completely%20new%20terminal%20at,preserving%20the%20building%20as%20a> | 04.02.2023
5. Nasa Blended Aircraft FactSheet - <https://www.nasa.gov/centers/langley/news/factsheets/FS-2003-11-81-LaRC.html> | 10.02.2023
6. An Overview of Manufacturing Process of Glued-Laminated Timber - https://www.researchgate.net/publication/306401137_An_Overview_of_Manufacturing_Process_of_Glued-Laminated_Timber | 18.02.2023
7. First Airport Terminal made of Wood - <https://airwaysmag.com/worlds-first-airport-terminal-wood/> | 18.02.2023
8. PDX gives airport visitors a reason to look up ... in 2024 - <https://www.opb.org/article/2022/07/14/pdx-portland-airport-roof-oregon-pacific-northwest-timber/> | 18.02.2023
9. Operational efficiency analysis of Beijing multi-airport terminal airspace - https://www.researchgate.net/publication/349366161_Operational_efficiency_analysis_of_Beijing_multi-airport_terminal_airspace | 20.02.2023
10. Advisory Circular - US Department of Transportation on Terminal Planing - https://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5360-13 | 21.02.2023
11. Planning and Design of Aiport | Authors - R. Horoneff, F. Mckelvey, W. Sproule, S. Young | 22.02.2023
12. Airport Development Guidelines | Authors - D. Ducey, J. Halikowski, M. Kies | 24.02.2023
13. Standards for Specifying Construction Of Airports | Author - D. Brill | 2013 | 25.02.2023
14. THE UTILIZATION OF BIM SOFTWARE ON VANCOUVER INTERNATIONAL AIRPORT, TERMINAL RENOVATION PROJECT | Author - V. Okhoya | 2015 | https://www.researchgate.net/publication/278018059_THE_UTILIZATION_OF_BIM_SOFTWARE_ON_VANCOUVER_INTERNATIONAL_AIRPORT_TERMINAL_RENOVATION_PROJECT | 26.02.2023

08.03 List of Plans

- Pl. 1 - Site Plan in 1:10000 | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 2 - Level -4 | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 3 - Level -3 | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 4 - Level -2 | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 5 - Level -1 | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 6 - Level 0 | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 7 - Level 0 (Cut-out) | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 8 - Level 1 | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 9 - Level 1 (Cut-out) | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 10 - Level 2 | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 11 - Level 2 (Cut-out) | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 12 - Conceptual Plans | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 13 - Section AA' | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 14 - Section BB' | Made by Iliyan Kukutsov in AutoCAD 2023 + Illustrator
- Pl. 15 - Elevation AA1' | | Made by Iliyan Kukutsov in AutoCAD 2023 + Lumion 12

08.04 List of Visualisations

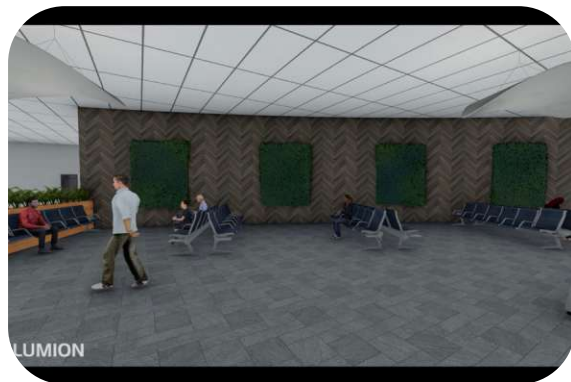
- Vis. 1 - 4 Detail Visualisations | Made by Iliyan Kukutsov in Archicad 26 + Lumion 12 + Illustrator
- Vis. 5 - 17 Exterior and Interior Visualisations | Made by Iliyan Kukutsov in Archicad 26 + Lumion 12

Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.

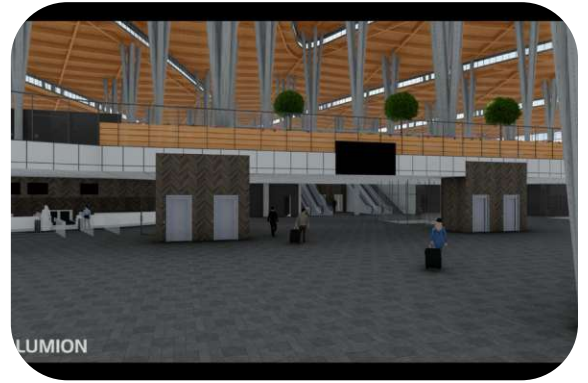
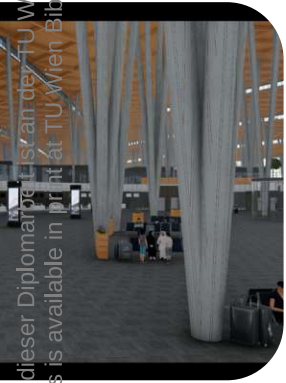
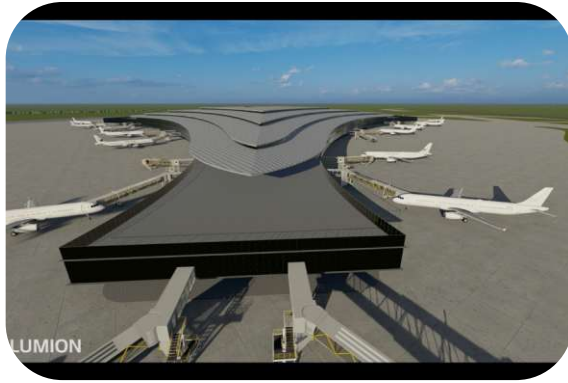
09

FILM STRIPS

FILM STRIPS



Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek.






Original version of this thesis is available in print at TU Wien Bibliothek
Die approbierte gedruckte Originalversion dieser Diplomarbeit ist an der TU Wien Bibliothek verfügbar
The approved original version of this thesis is available in print at TU Wien Bibliothek

10

CURRICULUM VITAE



ILIYAN KUKUTSOV

-  05/02/1995
-  Sofia, Bulgaria
-  @lambenstein / @lmbnstn

Skills

- AutoCAD
- ArchiCAD
- Revit
- Rhino + Grasshopper
- Lumion
- Adobe Photoshop
- Adobe Illustrator
- Adobe InDesign
- Adobe AfterEffects
- Adobe PremierPro
- MS Office

Profile

A motivated young architect interested in innovations focused on hybrid constructions and sustainable solutions in different fields and spheres of architecture.

Languages

- Bulgarian (native)
- English - C2 Level
- German - C1 Level
- Russian - B2 Level
- Italian - A2 Level

Certifications

- Managing Conflicts (2020)
- Sustainable Architecture in Tropical Climates (2020)

Education

School	2002-2009	96. SOU "Lev N. Tolstoy" - Sofia, Bulgaria
	2009-2014	91. Deutsches Gymnasium "Prof. K.Galabov" - Sofia, Bulgaria
University	2014-2018	Univeristy of Miami - USA
	2018-2020	Politecnico di Milano - Italy
	2021-2023	Technische Universitaet Wien - Austria

Work Experience

2016 -	Freelance Interior Designer
2020 -	Lambenstein Designs Ltd.