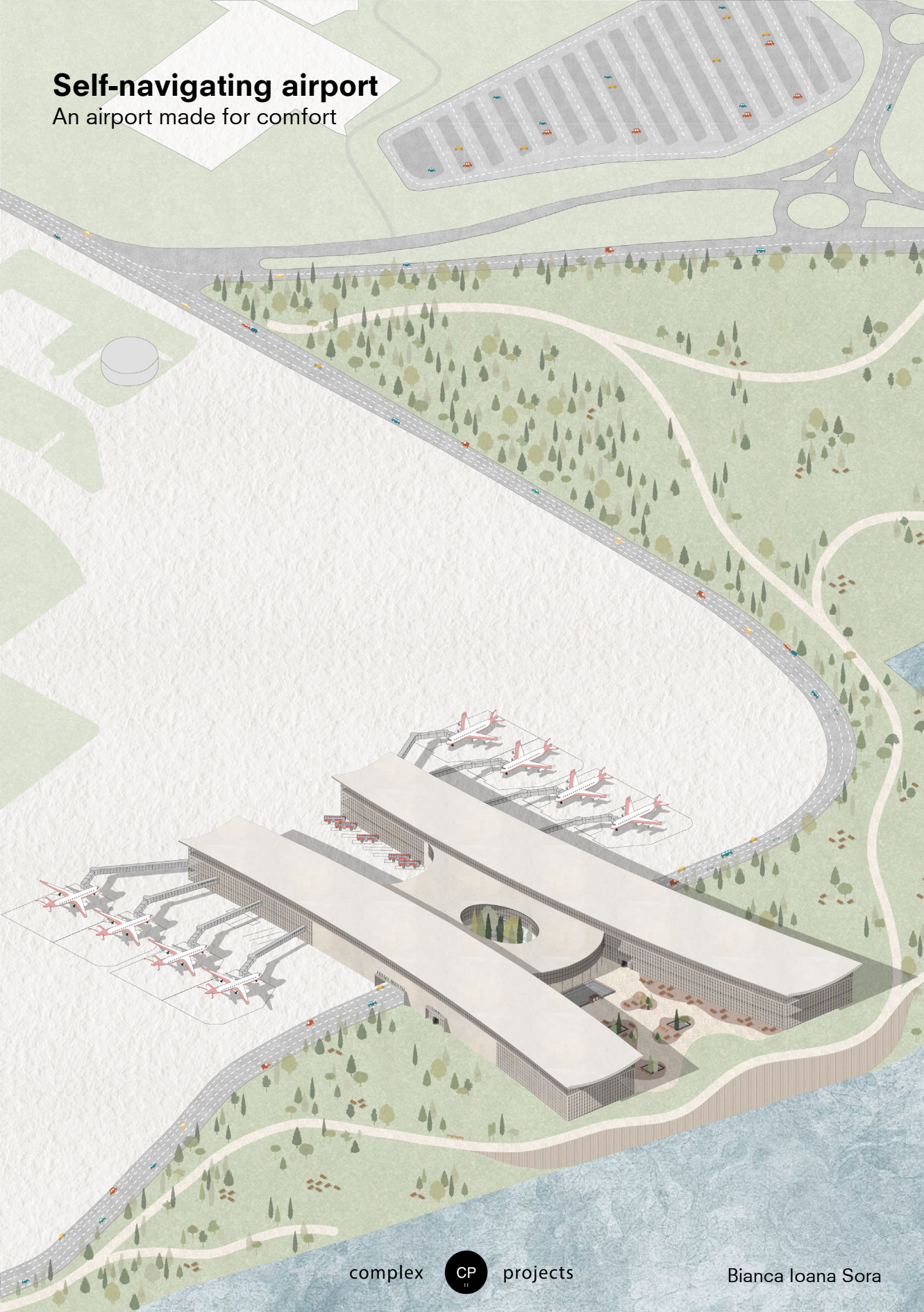
# Self-navigating airport

An airport made for comfort



complex CP projects

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**2025**

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**Bodies and Building Milan**
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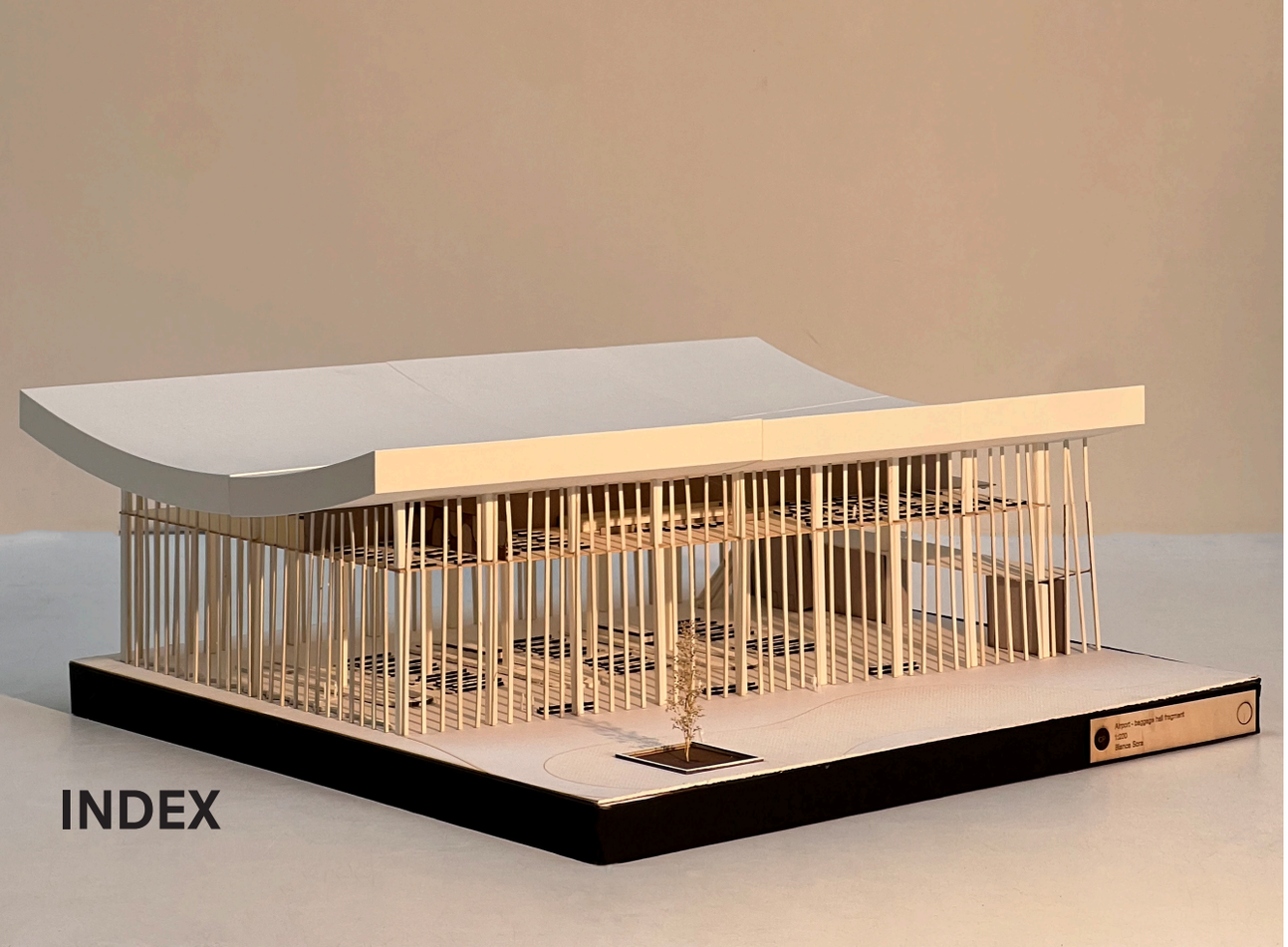
# Bodies and Building Milan

Health

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RESEARCH PAPER

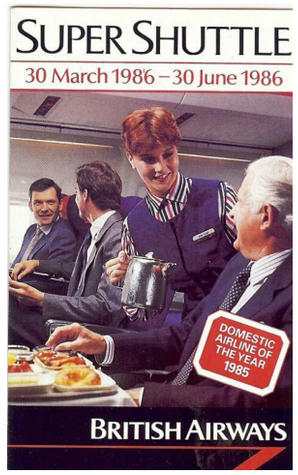
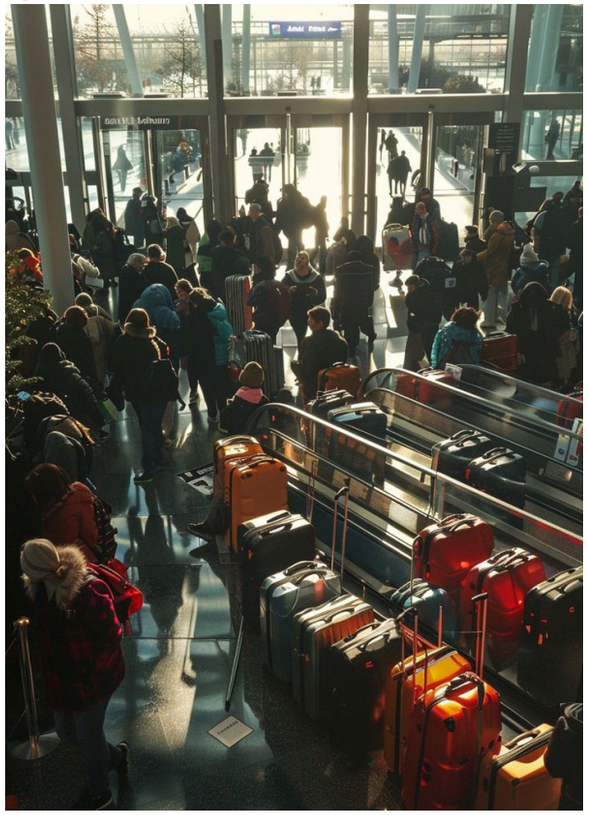





**Fig 1,2,3:** old airline promo

**Fig 4:** old airport interior



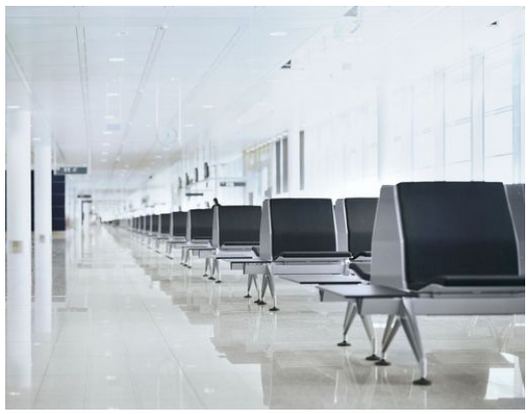


**Fig 5,6,7:** curent airport





## Problem Statement

The first airports as we know nowadays came up in the 1930s as a gateway between land and air (Nagy, 2012). It was a place of wonder, meant to showcase and admire the novelty of air traveling, inspiring feelings of excitement and anticipation for new adventures (Smith, 2018). Both the airlines and the airport design promoted comfort, luxury, convenience, and fast travel to exotic destinations. This celebratory attitude around flying has been lost through time through a series of dehumanizing processes and procedures. The airport has evolved from a place of comfort, luxury, and excitement to a stressful, mass-processing machine, with overwhelming crowds, claustrophobic and confusing spaces, an overstimulating environment, and an authority feeling. The luxurious bars became the fast-food chains, the comfortable couches, and carpeted floors became plastic chairs and grey walls, and the welcoming atmosphere became infinite queues and crowds. The focus on mass processing and increased profits has stripped these buildings of any humanizing elements, forgetting to differentiate between processing luggage or passengers. For passengers, the airport experience has been minimized to passing through the terminal as quickly as possible, due to a lack of incentive to linger or even visit at all. Just a few of the elements that contribute to this are uninspiring interior designs, crumbling infrastructure, claustrophobic spaces, security hassles, and a lack of access to food, shops, services, and entertainment (Nagy, 2012).

On top of this, the increased security requirements generated by 9/11 as well as the growing number of people and cargo that needs to be processed has put increased pressure on the airports as a system. The modern airport has become a puzzle of many parts, each with its respective functions and procedures in processing the passenger and cargo from land to air. This has influenced the journey through the modern airport to evolve into a relatively dehumanizing process that lost its connection with the emotional and mental needs of the passengers, leading to the experience of stress (YEUNG, 2021).

The increasing competition between airports has led to growing pressure on airport managers to attract more passengers and airlines by providing a desirable airport experience. There is a growing understanding of the influence that the airport experience has on travel experience and satisfaction, the generated non-aeronautical revenue of airports, the competitiveness of the airports, and the loyalty of the passengers and airlines in choosing their transit hub (Amir Batouei, 2020).

## Thesis topic

This thesis intends to analyze how can the stress in airports be reduced and what is the contribution of the architecture in this discussion. It investigates what influences the airport experience, what generates positive and negative reactions in passengers, what is airport service quality composed of, and what architectural elements can raise its levels. The goal of this paper is to determine what architectural topics influence air travel stress and how they can be further investigated through designing a prototype of an airport in Linate, Milan where the conclusions of this paper can be tested.





## Research question

How can the design of an airport reduce stress and improve the level of service quality with the end goal of improving passenger experience?

## Definitions:

**Reducing stress:** refers to the actions or strategies adopted to lower physical, mental, or emotional tensions and alleviate feelings of anxiety or pressure experienced by the passengers.

**Airport service quality:** refers to the overall standard of services and facilities provided in an airport and the degree to which it meets or exceeds the expectations and needs of the passengers.

**Passenger satisfaction:** is an inclusive reaction to a perceived difference in one's expectation and their perceived impression after use (Cronin Jr, 2000)

**Passenger experience:** encompasses the events encountered in the entire journey from the moment they start planning their trip to the moment they reach their destination.

This question explores how airport design can be used to transform air travel into a more pleasant and comfortable experience that considers the physical and psychological needs of the passengers.

The research will analyze various reference projects from different countries but will take into account factors and rules specific to the location of the site which is Milan, Italy.

## Theoretical framework

The theoretical framework of this research is based on Fodness and Murray's model of airport service quality expectations which divides it into three preliminary dimensions: servicescape, service personnel, and services, each of them being further divided into three subdimensions explained in the next chapter (Dale Fodness, 2007). Following Fodness and Murray's definition, the servicescape dimension is based on Bitner's conceptual framework about the impact of the physical surroundings on the behavior of both customers and employees (Bitner, 1992).

Another key aspect of the research is determining the aspects that influence the passengers' perception of airport service quality. This information is taken from various sources that conducted qualitative research on samples of airport passengers. The main one is Fodness and Murray's list of 65 airport service quality themes (Dale Fodness, 2007) that was generated through in-depth interviews, focus groups, and content analysis of verbatim comments on passengers' expectations.


**Fig 8:** Airport Service Quality diagram (own work)





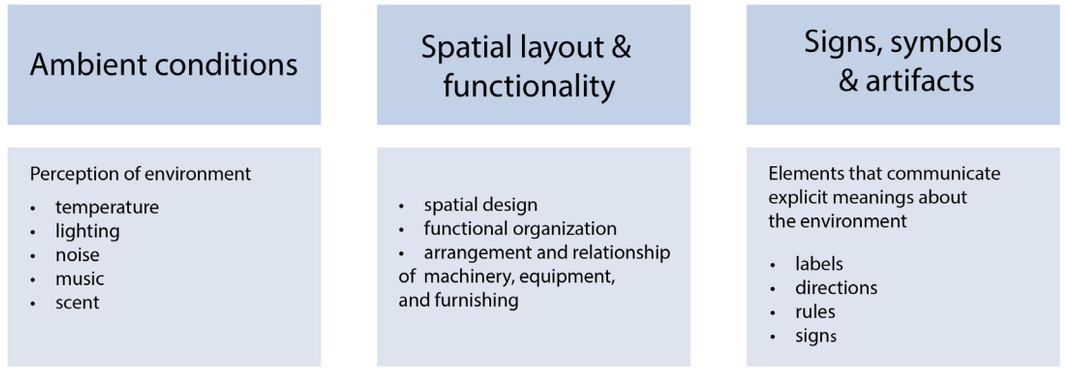



**Fig 9:** Servicescape diagram (own work)

## Theoretical argumentation

The demanding nature of air travel can provoke air travel stress in persons who would not normally experience stress (Bricker, 2005). Air travel stress can manifest as acute stress (a short-term stress that comes and goes triggered by a certain situation) and it can have physical reactions (i.e., a racing heart, headaches, dizziness, shaking, high blood pressure), psychological symptoms (i.e., anxiety, irritability, panic attacks), or behavioral symptoms (i.e., substance use like alcohol and smoking or impulsive shopping or eating) (Cleveland Clinic, 2024).

The main reason that makes air travel stress distinct from other forms of transit stress is the lack of autonomy and control that characterizes this environment (when the basic goal is to transit safely and comfortably from one location to another can be compromised by many uncontrollable situations) (Bricker, 2005).

To comprehend all the elements that cause air travel stress, this study uses Fodness and Murray's Airport Service Quality model that divides it into three dimensions: servicescape, service personnel, and services.

Bitner (1992) refers in her studies to servicescape as the physical environment and categorizes it into three subdimensions: ambient conditions, spatial layout & functionality, and signs, symbols, & artifacts (Bitner, 1992). Ambient conditions refer to factors that influence the perception of the environment (i.e., temperature, lighting, noise, music, scent). Signs and symbols are the elements that communicate explicit (i.e., posted labels, directions, rules, signs) and implicit (quality of materials, design, furniture, colors) meanings about the physical environment. Lastly, spatial layout and functions refer to spatial design, functional organization, and the arrangement and relationship of machinery, equipment, and furnishing (Dale Fodness, 2007). Bitner (1992) explains that customers' and employees' internal (cognition and emotion) and external (staying and revisiting) responses can be


**Fig 10:** stressors encountered by the passenger on their way (own work)



influenced by all the measurable physical factors that can be controlled by the service firm (Smith, 2018).

The service personnel refer to the employees of the airport and airlines, their attitudes, behaviors, and expertise (Smith, 2018). From the perspective of this thesis, the service personnel do not present an area of interest since it cannot be influenced through the architecture. The same goes for the services which are divided into productivity, maintenance, and leisure (Dale Fodness, 2007).

Air travel stress can generate three types of reactions: anxiety towards adverse air travel events, anger towards other passengers or staff members, and lack of trust in the airport and the airline's capability to ensure their comfort and safety (Bricker, 2005). Anxiety is a negative emotional response that can result in a decrease in customer satisfaction (John Gountas, 2007). In mild cases, anxiety can reduce the joy of travel and cause physical and mental exhaustion, while more severe cases can cause social and professional impairments (Amir Batouei, 2020). Air travel anger can result in hostile thoughts, angry affect, aggressive intentions, and physiological arousal (Bricker, 2005). The lack of trust in an airline or airport has a significant impact on airport experience since a passenger can experience distress while in transit if they believe that their safety and comfort are not satisfied (Bricker, 2005).

The focus of this study is the passengers' experience from entering the airport to boarding the plane since this journey is made through a series of areas, each with its unique requirements and different stress levels induced. The North America Airport Satisfaction Study by JD Power and Associates identified six terminal elements as crucial factors influencing airport passengers' satisfaction: accessibility, security check, baggage claim, check-in/baggage check, food & beverage concessions, and retail (Smith, 2018). Research shows that security screening procedures and inefficient airport facility layouts are the main sources of passengers' dissatisfaction. Additionally, poor security processing procedures, long queuing lines, and too little or hard-to-read signage can threaten an otherwise positive passenger experience (Bogicevic, 2013). Other studies have shown that travelers' anxiety increases from the moment of entry into the airport till its peak during security and passport control and begins to diminish only after all the processing stages have been cleared (Sickert, 2011). Another study from Rendeiro Martin-Cejas (2006) shows that passenger satisfaction is positively influenced by well-executed check-in procedures and shorter waiting times (Smith, 2018)

## Global, Architectural and Studio Relevance of the topic

First of all, passenger satisfaction influences the volume of tourists visiting Milan and their opinion of the city. Airports are considered a representation of the destination in travelers' minds since they are the first and last place visited on their trip. (W. Wattanacharoensil, 2016) indicate that the travelers' negative experiences can influence their perspective on the destination, going as far as to influence the decision to return or not to the respective destination (Amir Batouei, 2020). Furthermore, since airports are major infrastructures in the transportation industry and they are significantly contributing to a nation's economy, their performance can have an impact on regional development and tourist attractiveness (Amir Batouei, 2020). As such, airports can be considered near-destination links that contribute to the development of tourism in the region where they are located (George C.L. Bezerra, 2019).

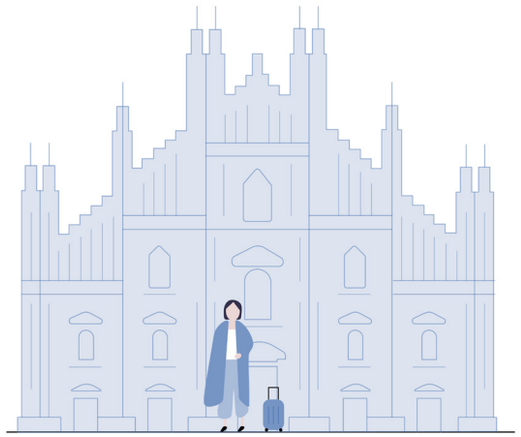


**Fig 11:** relevance to Milan (own work)

As for the airport, increasing competition among airports worldwide has driven managers to attract more passengers and airlines, aiming to boost both aeronautical and non-aeronautical revenue (Smith, 2018). There is a growing understanding that a desirable Airport Experience can improve a travel experience, increase passengers' satisfaction and non-aeronautical revenues, elevate airport competitiveness, and influence the travelers' and airline's choice of airport in an area where there are multiple transit hubs available (as is the area of Milan) (Amir Batouei, 2020). Aviation publications and press releases show that airport managers recognize the importance of passenger satisfaction, prompting renovations, improving retail and dining, and adding a better flow management to enhance service quality. These types of modernization efforts are essential, as passengers' impressions of the airport's physical environment impact their perceptions of the quality of service provided (Smith, 2018). A satisfied passenger spends 45% more than a disappointed one (Smith, 2018) and has a higher intention of spreading positive word-of-mouth, as well as returning to this airport over other airports in the region (Amir Batouei, 2020).


**Fig 12:** relevance to Linate (own work)



Overall, this research will provide insight into designing efficient mobility hubs, focusing on movement flows and spatial organization for large crowds. The findings can be applied to a variety of high-traffic environments, including airports, train stations, stadiums, and other public venues. By addressing how people navigate and interact within these spaces, this study seeks to inform design strategies that improve crowd flow, reduce congestion, and enhance user experience across diverse architectural settings.

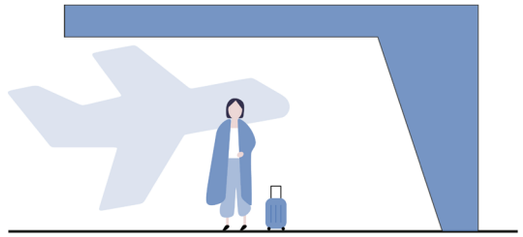


**Fig 13:** relevance to airports (own work)

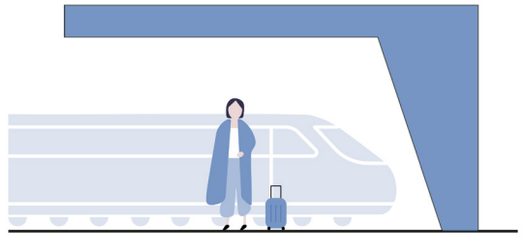


**Fig 14:** relevance to train stations (own work)

**Fig 15:** relevance to stadiums (own work)

## Linate airport

The topic will be investigated by redesigning the Linate Airport in Milan, Italy. Linate is one of the three airports that form the Milan Airport System together with Malpensa and Bergamo.

The site is located 8km from the center of Milan and is connected by metro and bus to the city center. Currently, it has two runways, 41 aircraft stands, and a terminal size of 70 000 sqm with 24 boarding gates and 71 check-in desks. The main clients are SEA and Milan Municipality.

For the next step of the research, the current program will be reevaluated together with the urban and socioeconomic context to determine if any changes should occur. The result will be a detailed design brief that will then be developed into a design proposal. The goal is to test through the design proposal solutions for improving the airport service quality with the final design serving as an architectural example that can be inspired from and implemented in various other airports or mobility hubs.

From the research showed above, seven topics of interest have been created to be further analyzed through the design process. They are a result of Fodness and Murray's list of 65 airport service quality themes combined with findings from various other research papers to create a comprehensive list of elements that have an influence on the airport experience and that have been categorized in the Airport Service Quality division. The full list is attached in Appendix.

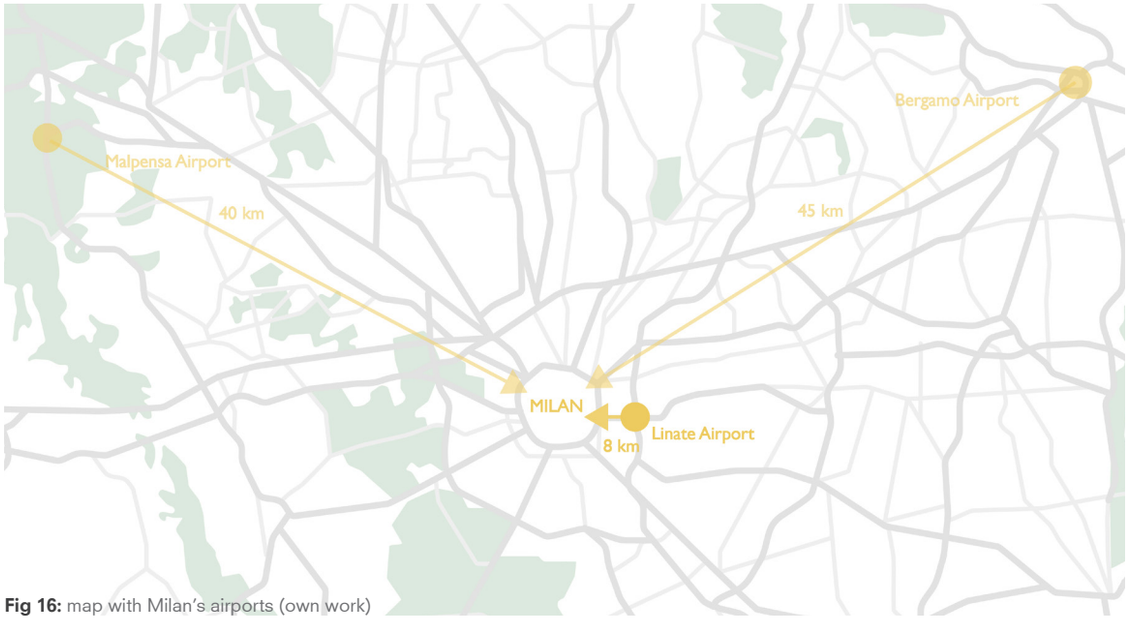



**Fig 16:** map with Milan's airports (own work)



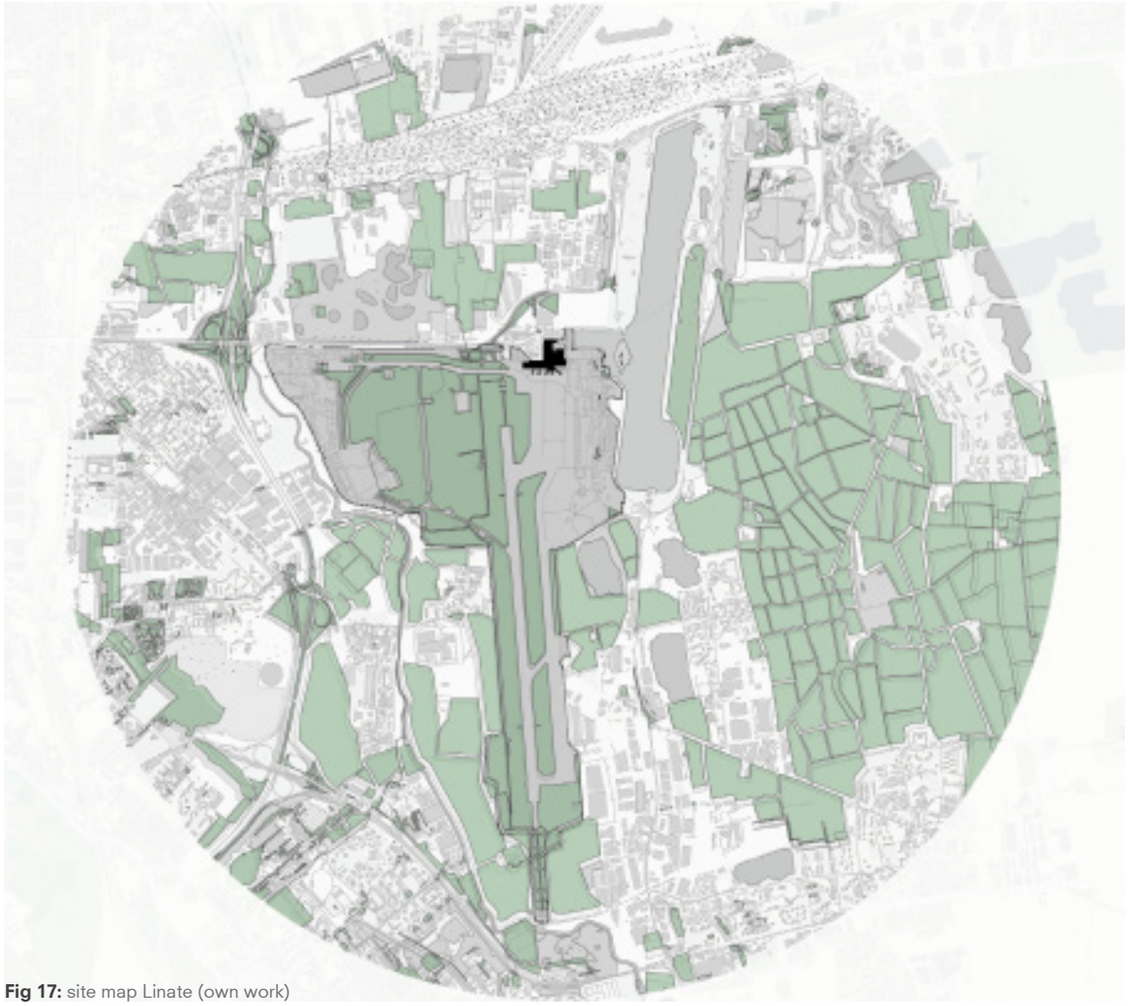


**Fig 17:** site map Linate (own work)

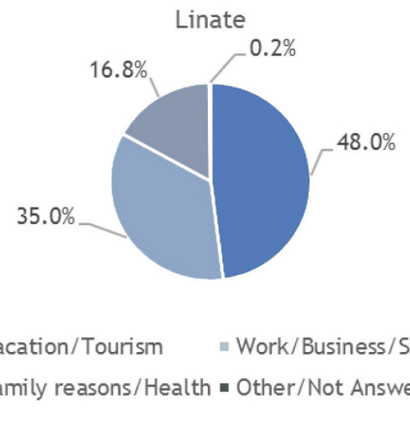



**Fig 18:** passengers' reasons to travel in Linate (SEA 2018)

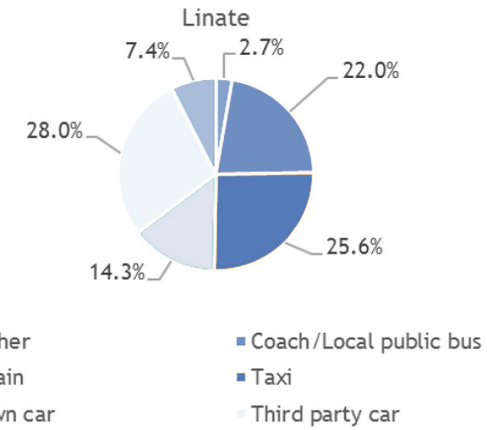



**Fig 19:** passengers' ways to travel to Linate (SEA 2018)

## Seven research topics

The primary topic is Wayfinding, including floorplan layouts, routes, flow of people and signs. This topic is prioritized since wayfinding consistently emerges as a key factor in studies on airport stress and service quality. The author will analyze floorplans of airports with various user feedback, to asses layout functionality and route clarity. User feedback and interior photographs will provide firsthand insight into passenger's experience. Research on wayfinding in public spaces and airport terminals will further enhance understanding of this essential topic.

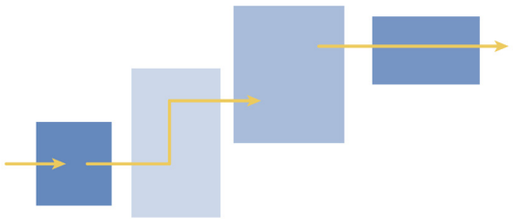


**Fig 20:** clear flow diagram (own work)

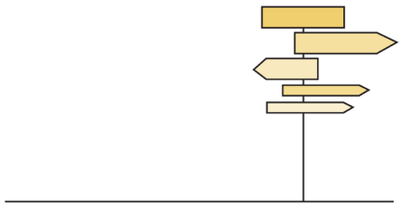


**Fig 21:** clear signage diagram (own work)

**Fig 22:** short commute diagram (own work)

The second and third topics are a natural continuation of Wayfinding, focusing on Diminishing the crowds and Returning agency to the user. Diminishing Crowds addresses congestion by examining how layout, signage, and function placement impact crowd flow, aiming to understand what causes people to stop and how design can alleviate bottlenecks. This expands the initial flow research by analyzing elements like furniture, spatial layout, and signage in congested areas.

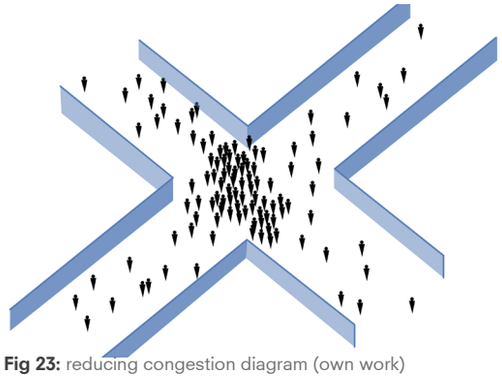


**Fig 23:** reducing congestion diagram (own work)

Returning agency to the user come from the findings of Yeung that the main reason for air travel stress is the lack of autonomy (in movement, path, speed) (YEUNG, 2021). Recognizing diverse passenger needs (from quick transit to leisurely exploration) this topic will investigate traveler types through surveys to design adaptable layouts and flows that allow each type of passenger to choose their preferred experience.

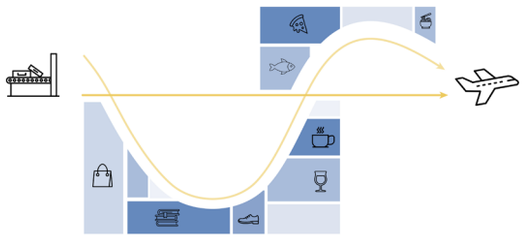


**Fig 24:** returning agency to the user diagram (own work)



The fourth topic is Ambience focuses on minimizing overstimulation in terminals by managing ambient factors like temperature, lighting, sound, and scent. This topic will involve an in-depth review of various studies and analyses of existing airports, supplemented by user interviews, to identify sensory issues in the ambient environment.

**Fig 25:** reducing overstimulation diagram (own work)

The fifth topic, Functions, also draws on passenger interviews to identify necessary amenities like shops, dining, relaxation, and entertainment areas. Based on survey data and floor plan analysis, this section will suggest optimal placement and spatial arrangements for these functions within the terminal layout.

**Fig 26:** functions diagram (own work)

The next topic covers Aesthetics, encompassing design elements that enhance comfort, beauty, and character in space. This will involve analyzing reference projects and reviewing surveys and questionnaires to identify preferred materials, colors, greenery, furniture types, and spatial arrangements.

**Fig 27:** pleasent design diagram (own work)

The final topic addresses a common issue in current airports: Humanizing the Airport. This analysis focuses on creating user-centered spaces that make travelers feel valued rather than part of a mass-processing system. It will draw on analyses of traditional airport designs, examples of modern luxury spaces, and insights from relevant research papers.

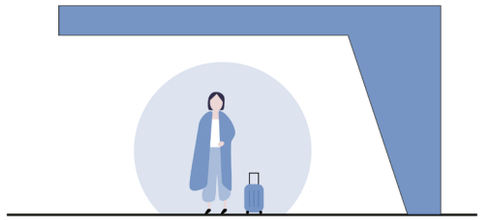


**Fig 28:** humanizing the airport diagram (own work)

## Conclusion

The design assignment will constitute of an airport prototype that will focus on transforming the air travel experience into a more human cantered process, reducing the levels of stress and anxiety and overall increasing the service quality provided to the passengers. The research will conclude with a design proposal for a new Linate airport in Milan, that will investigate the seven topics mentioned in the previous chapter. The goal is to create an airport that:

- Has an easy and clear wayfinding
- Has a layout that reduces the walking and waiting time and diminishes the congestion areas
- Provides all the necessary functions to increase the passenger satisfaction
- Has a pleasant, comfortable and relaxing design that bring personality back into the terminal spaces
- Serves as a gateway to the city by representing the culture of Milan
- Brings back the human scale into the design
- Creates a space that does not cause overstimulation to the users





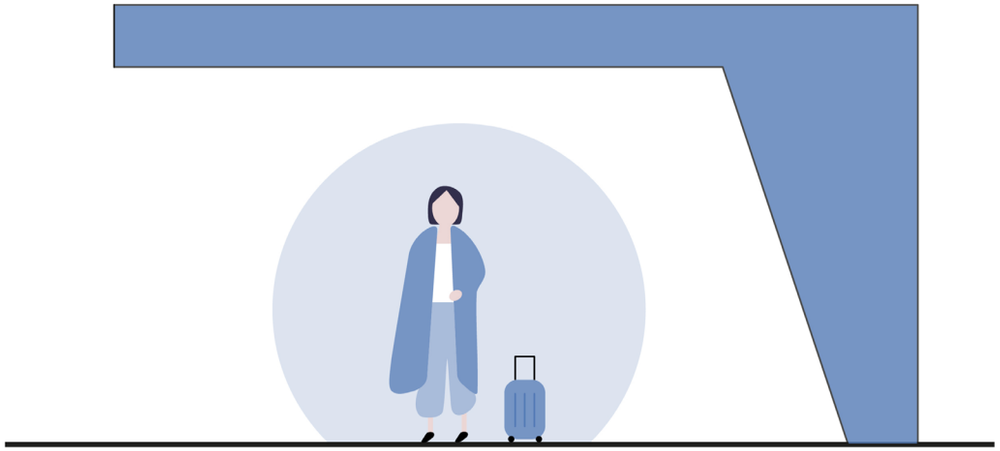


**Fig 29:** humanizing the airport diagram (own work)

# DESIGN BRIEF

## 04.1 Program

The program analys part is divided into Spatial division, Program division, and Key spaces to fully understand the requirements.

### 04.1.1.1 Spatial division: Horizontal

Airport terminal designs are structured to efficiently manage passenger flows and ensure seamless operations. Four typologies of airport models exist: the finger model, satellite model, concourse model, and linear model, each with distinct characteristics and advantages.

**Finger Model:** this design features a central terminal building connected to multiple elongated concourses or "fingers," where gates are located. Passengers move from the central area through these fingers to board their flights. The finger model is efficient for managing large passenger volumes and allows for centralized check-in, security, and amenities. However, it can lead to long walking distances for travelers.

**Satellite Model:** in the satellite model, gates are housed in separate buildings (satellites) connected to the main terminal via underground tunnels, trams, or walkways. This design reduces congestion in the main terminal and offers flexibility for expansion. However, it requires efficient transportation systems to move passengers between satellites and the terminal.

**Concourse Model**: the concourse model involves a central terminal building with one or more concourses directly connected to it. Each concourse contains gates and passenger services, with amenities often distributed throughout. This layout strikes a balance between centralized and decentralized operations, allowing for moderate walking distances and efficient use of space.

**Linear Model:** in the linear model, gates are arranged in a straight line along a single terminal building. This compact layout minimizes passenger movement and simplifies operations, making it ideal for smaller airports. However, it may lack the capacity to handle high passenger volumes or future expansion needs.

The primary differences among these models lie in passenger flow management, walking distances, scalability, and operational efficiency. While the finger and satellite models are better suited for large hubs handling significant passenger traffic, the linear model works well for smaller or regional airports. The concourse model offers a middle ground, balancing centralized services with manageable walking distances.

Analyzing airports across various typologies reveals that the linear model is the optimal choice for ensuring passenger satisfaction in relatively small airports like Linate. This layout offers convenient access to all 24 gates, minimizes walking distances, and provides a clear, uninterrupted path from security to the gates. Additionally, it boasts a high degree of flexibility, making it well-suited for potential future expansions.

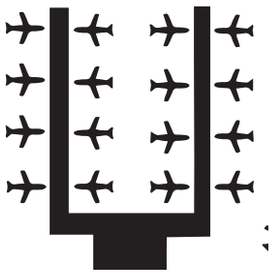


**Fig 30:** finger model (own work)

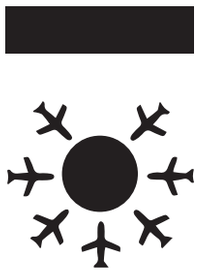


**Fig 31:** satellite model (own work)

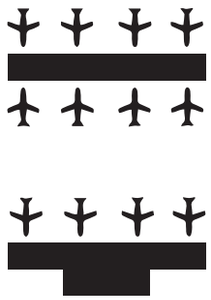


**Fig 32:** concourse model (own work)

**Fig 33:** linear model (own work)



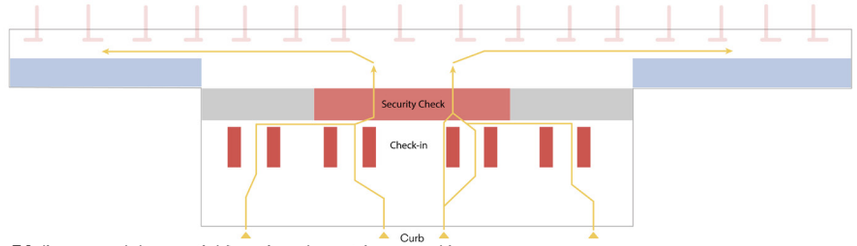



**Fig 34:** linear model essential functions layout (own work)

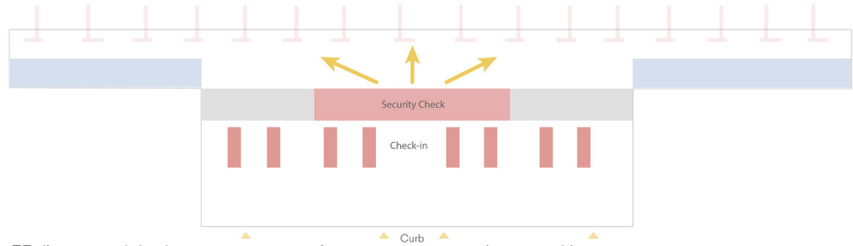



**Fig 35:** linear model advantages - convenient access to gate (own work)

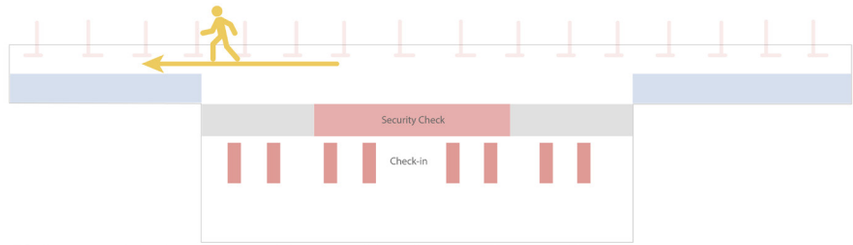



**Fig 36:** linear model advantages - minimum walking distances (own work)

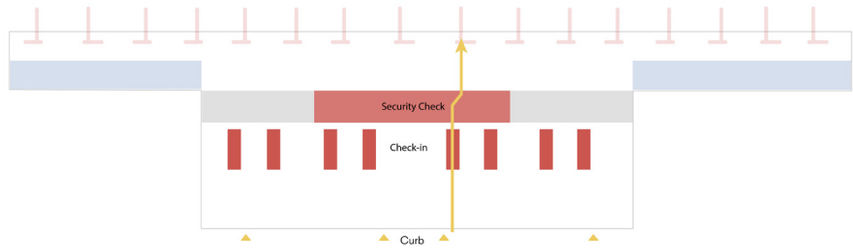



**Fig 37:** linear model advantages - all processing areas in one line (own work)

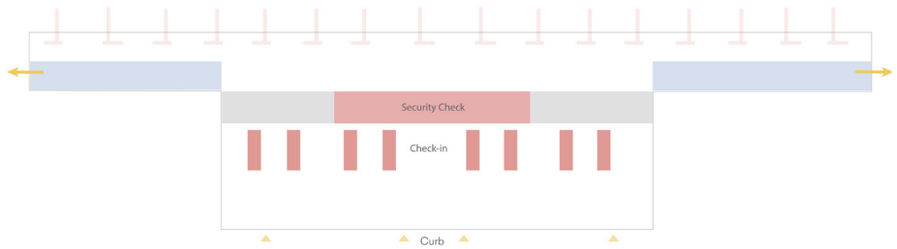



**Fig 38:** linear model advantages - easy extension (own work)

### 04.1.1.2 Spatial division: Vertical

In addition to the horizontal layout of spaces, airports can also utilize vertical divisions to manage the flow of passengers. This can be achieved through three main configurations.

The first option features a single entrance hall and two distinct levels: one for all passengers and another for staff and baggage. This design ensures smooth passenger movement at the aircraft door level while facilitating efficient baggage transport at ground level.

The second configuration separates passenger flows for departures and arrivals while maintaining a shared entrance hall and curbside area.

The third option goes a step further by dividing the entrance hall and curbside between departures and arrivals, creating fully independent flows. This layout minimizes congestion, enhances wayfinding, and provides the highest level of comfort and convenience from the passenger experience perspective.

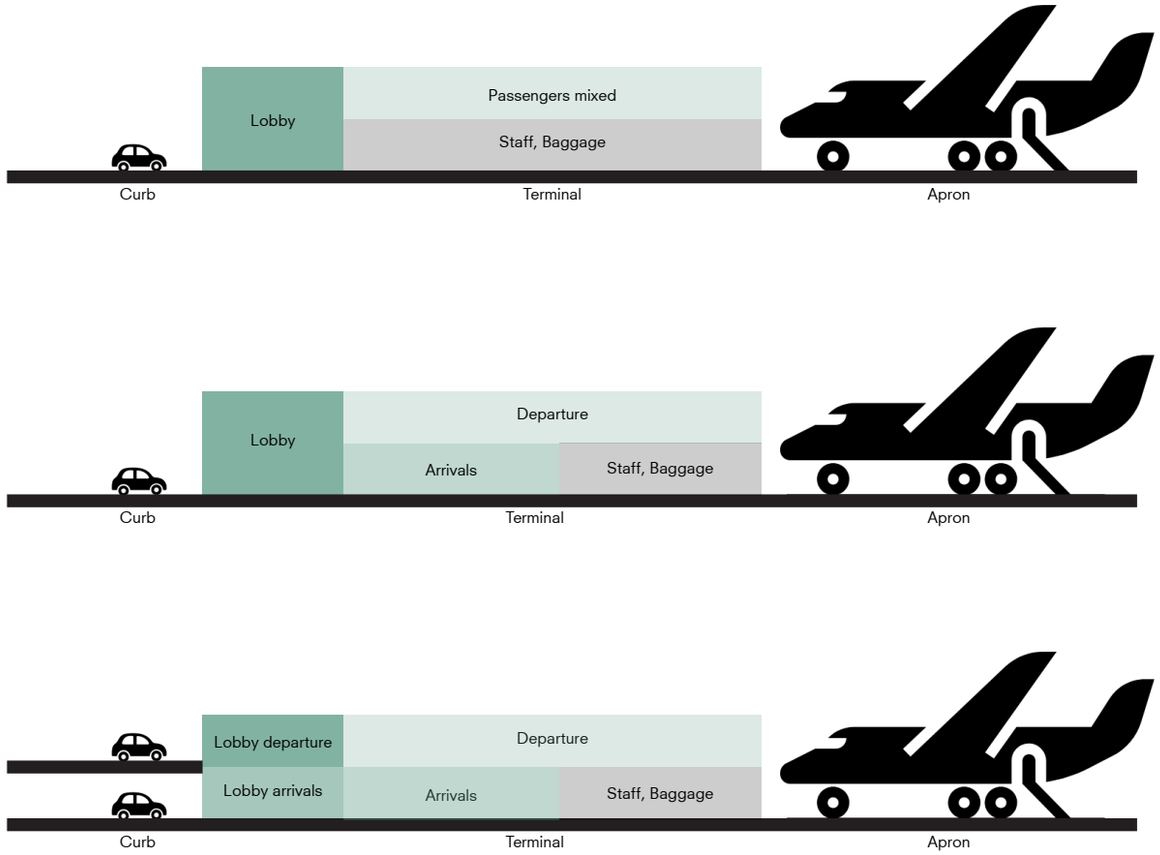



**Fig 39:** vertical division variants (own work)

## 04.1.1.3 Spatial division: Configuration

Looking at the flow chart of the current layout of Linate the common entrance hall for both arrivals and departures is visible and the departure passengers have a significant-sized shopping area in their flow between security and the gates.

Based on prior research, several principles can be extracted and applied to design a passenger flow chart that prioritizes user experience.

Firstly, all processing areas should align in a continuous, uninterrupted sequence. This minimizes walking distances, reduces stress by completing mandatory tasks efficiently, and allows passengers more time to relax and enjoy the amenities.

Secondly, as indicated by the vertical division concept, arrivals and departures should have fully separated flows to ensure clarity and prevent congestion.

Finally, recreational facilities should be positioned as optional detours, ensuring they do not disrupt the main passenger flow. By applying these three rules the following relation scheme is proposed.

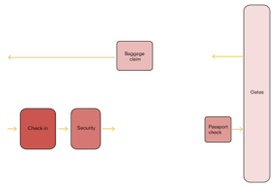



**Fig 40:** relation scheme diagram step 1 - direct line between processing areas (own work)

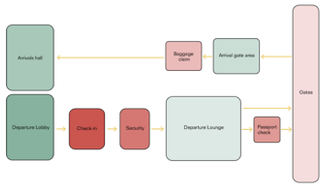



**Fig 41:** relation scheme diagram step 2 - separation between arrivals and departure (own work)

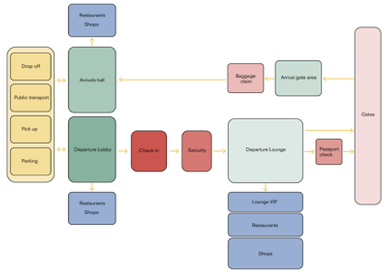



**Fig 42:** relation scheme diagram step 3 - facilities outside the essential flow (own work)



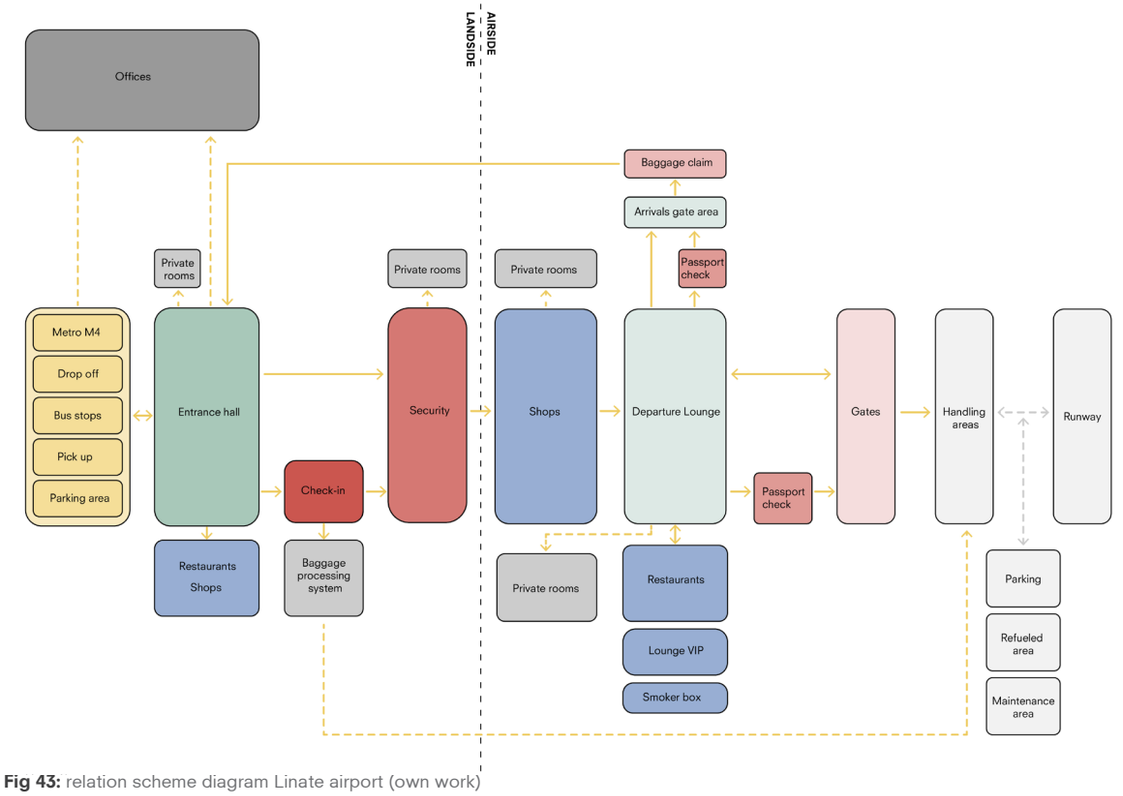



**Fig 43:** relation scheme diagram Linate airport (own work)

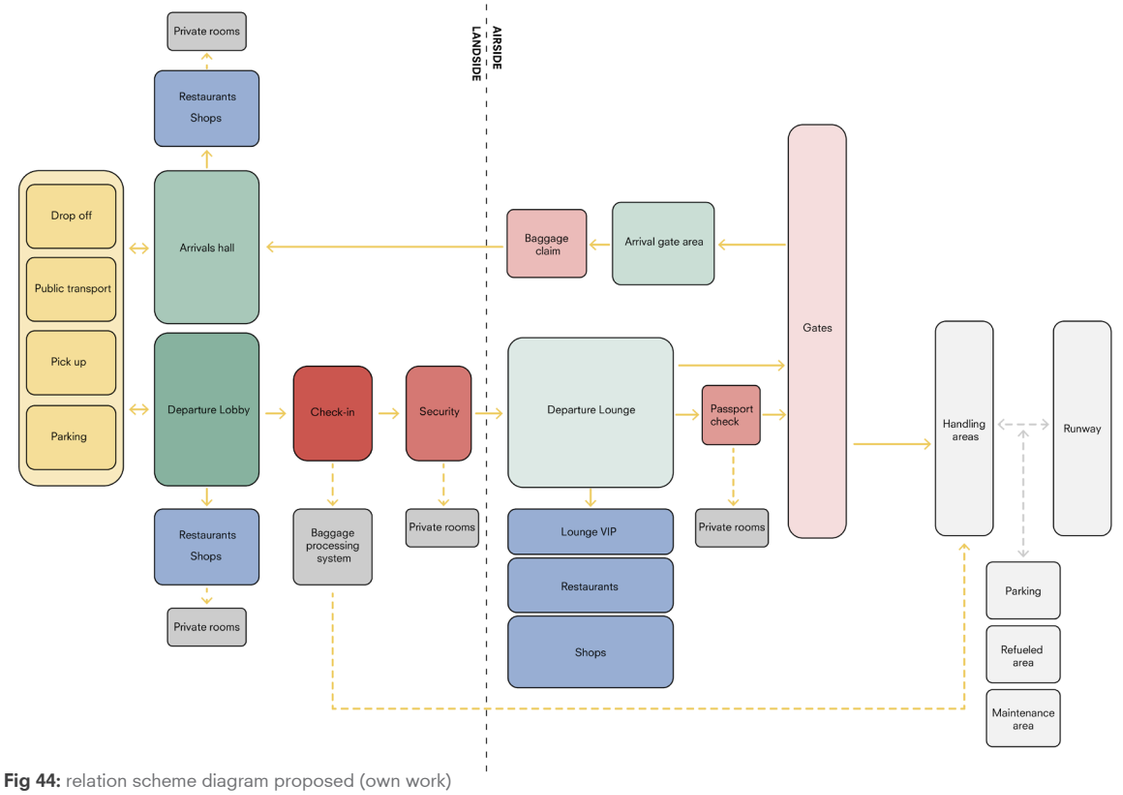



**Fig 44:** relation scheme diagram proposed (own work)

## 04.1.2 Program division

Linate Airport covers a total area of 87,000 sqm, with 24 gates serving approximately 9 million passengers annually. Of this area, 44,000 m² are accessible to passengers, divided into 14,000 m² before security and 31,000 m² after security. These figures will serve as a focal point for this research.

Looking at the division of these spaces, the facilities are by far the biggest percentage, followed by the passenger transit zones.

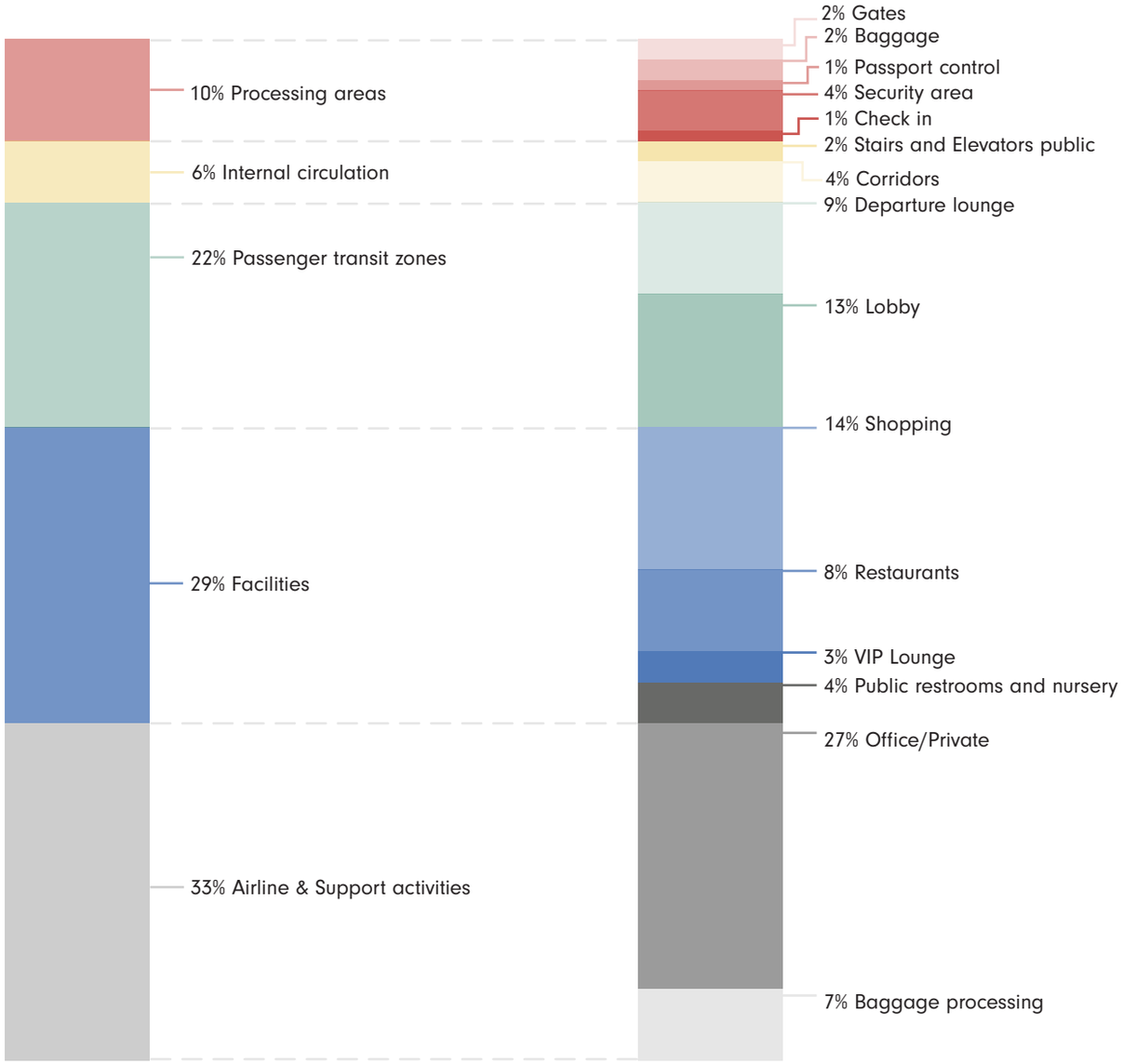



**Fig 45:** program bar Linate Airport (own work)





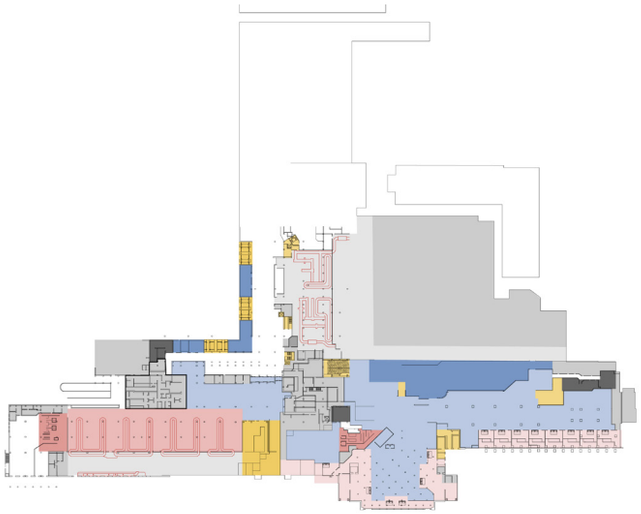


**Fig 46:** floorplan functions groundfloor Linate Airport (own work)

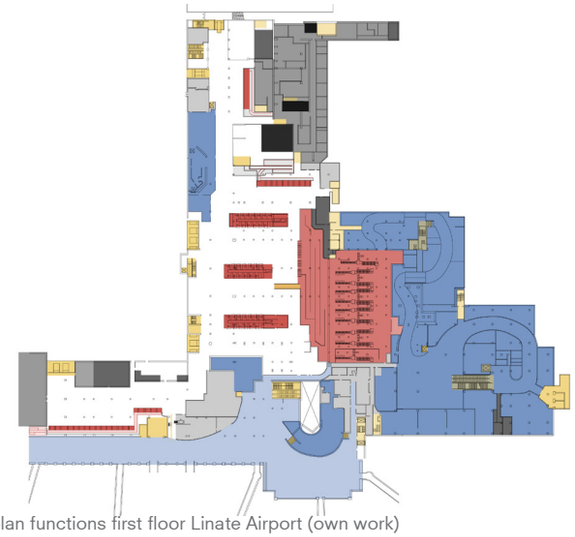


**Fig 47:** floorplan functions first floor Linate Airport (own work)


**Fig 48:** floorplan functions second floor Linate Airport (own work)

To better understand program requirements, case studies of three airports at varying scales were analyzed: large terminals (80 gates), medium terminals (50 gates), and small terminals (30 gates). Gates were chosen as the categorization criteria due to their impact on flight and passenger capacity. Terminals with fewer than 30 or more than 80 gates were excluded to ensure relevance to Linate's scale. The selected airports, known for their efficiency and passenger experience, are Zurich Airport (large scale), Haneda International Airport Terminal 3 (medium scale), and Luxembourg Airport (small scale).

By comparing these airports, an average allocation of space per function was determined. Compared to this average, Linate's facilities occupy almost three times more space, which, according to the literature, negatively impacts the passenger experience. Linate's circulation areas are notably smaller (just 4%, compared to the average of 9%), suggesting greater efficiency. By comparing these two percentage bars, a new average emerges, allowing for analysis and adjustments aligned with the project's three key goals: Flow, Facilities, and Ambience & Aesthetics.

For flow optimization, the circulation area is desired to be kept as low as possible and will be reduced from the average of 9% to the original 4%. Next, the departure lounge and departure lobby will be separated into departure and arrivals to create two separate flows for passengers.

Regarding facilities, the shopping volume will be reallocated to include entertainment options for a more qualitative experience, and the VIP Lounge will be reduced to make space for more restaurants. Airline support functions and processing areas remain consistent across all case studies and will be preserved.

**Fig 49:** Zurich Airport

**Fig 50:** Haneda Airport

**Fig 51:** Luxemburg Airport

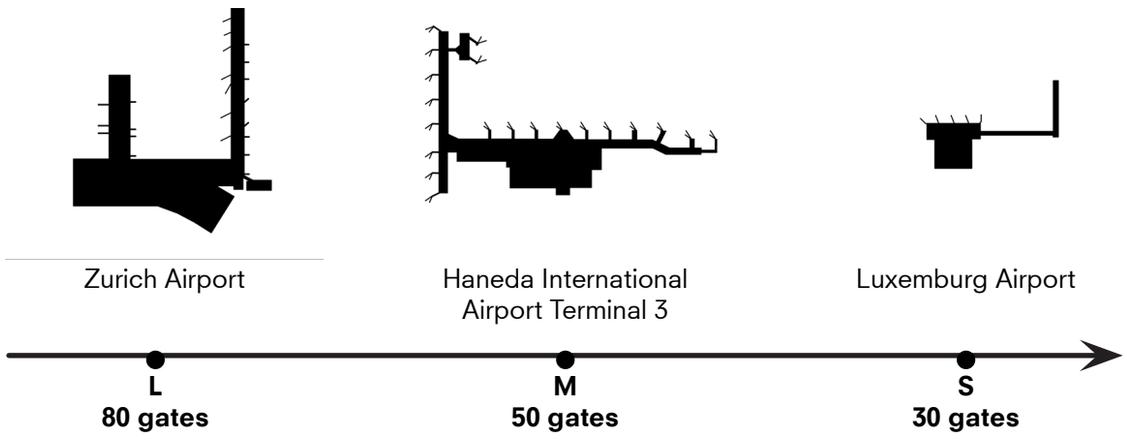



**Fig 52:** benchmark choices (own work)



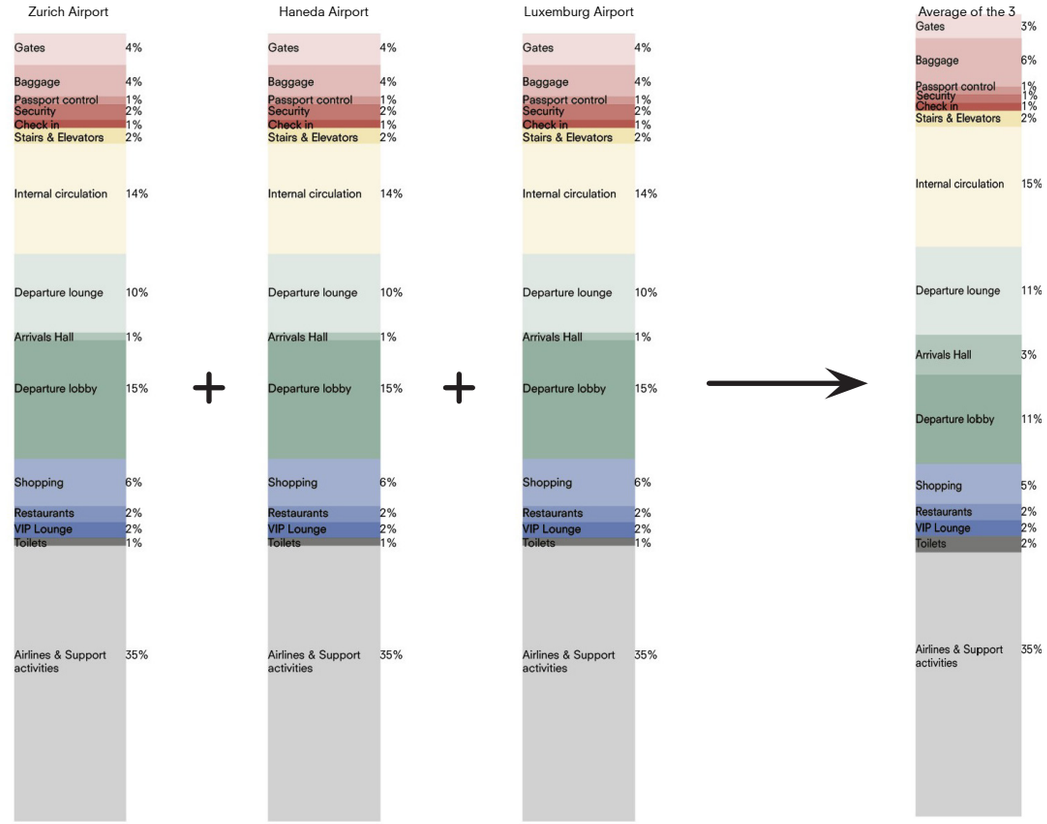



**Fig 53:** benchmark program bars comparison (own work)

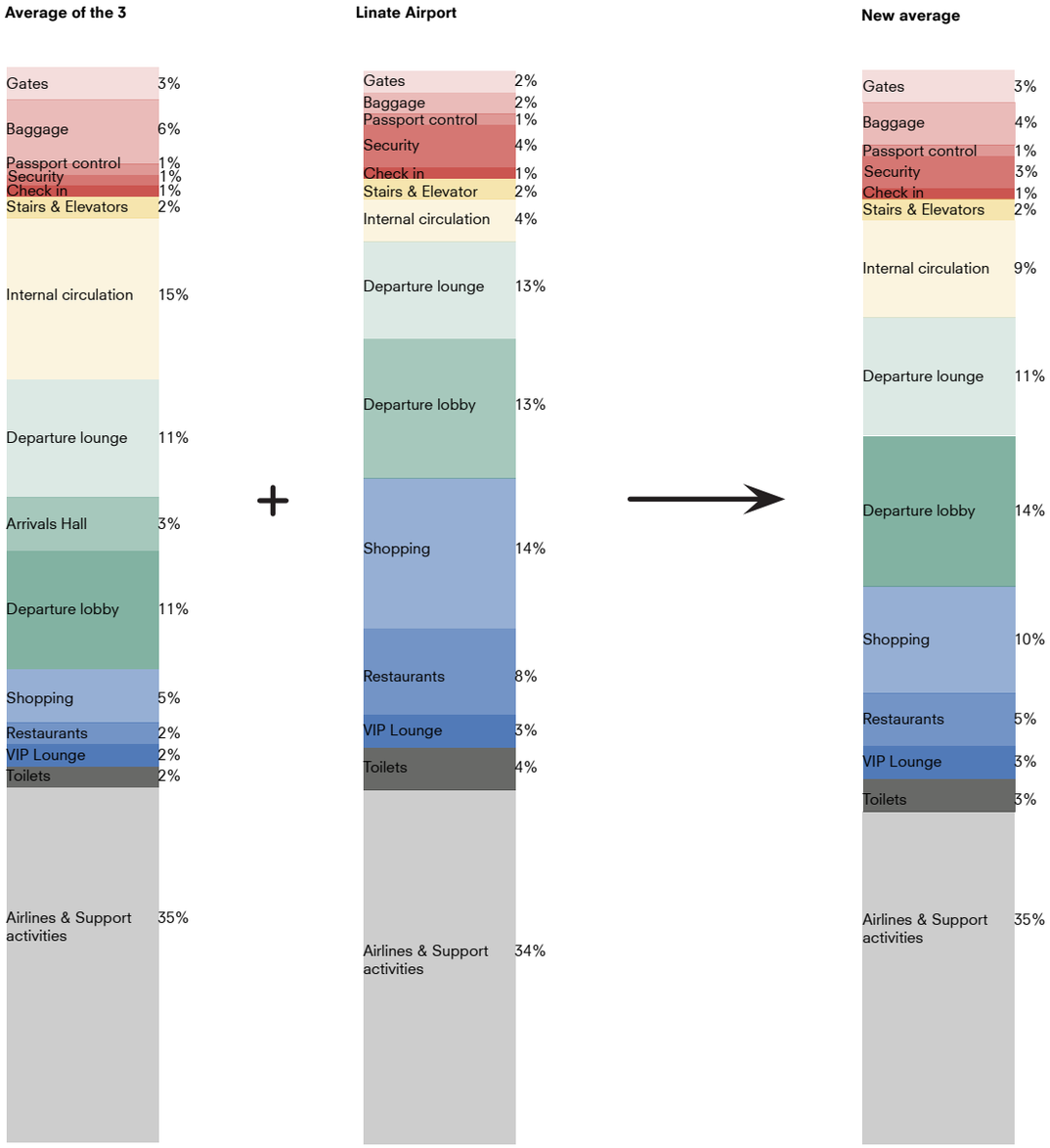



**Fig 54:** program bars comparison (own work)


**Fig 55:** program bars final result (own work)

To enhance the research, each group in this course is tasked with analyzing eight buildings in Milan through a specific lens. For this project, the chosen lens is Health, with the guiding question: How can the design and planning of public spaces in Milan be optimized to promote the physical and mental health of its residents?

To address this, the analysis is structured across four scales: S (Human scale), M (Building scale), L (Neighborhood scale), and XL (Urban scale), each with its own targeted question (see Figure 56). The design will incorporate four key elements— a patio, a public passage, a plaza, and a connection to the health belt—each contributing to a high-quality atmosphere and functional facilities. These elements will be integrated into the final program framework.

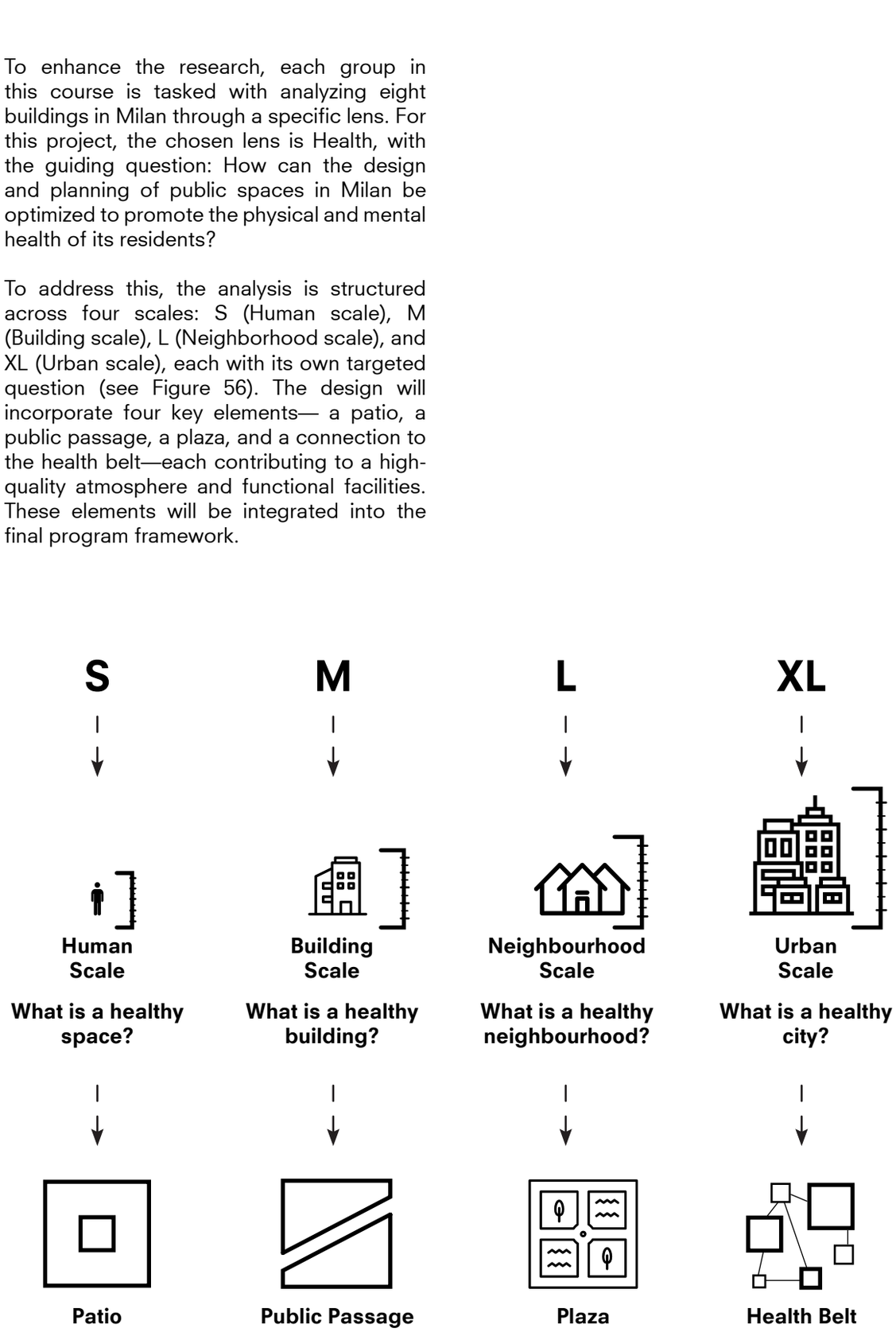



**Fig 56:** explanation of the health lens (own work)



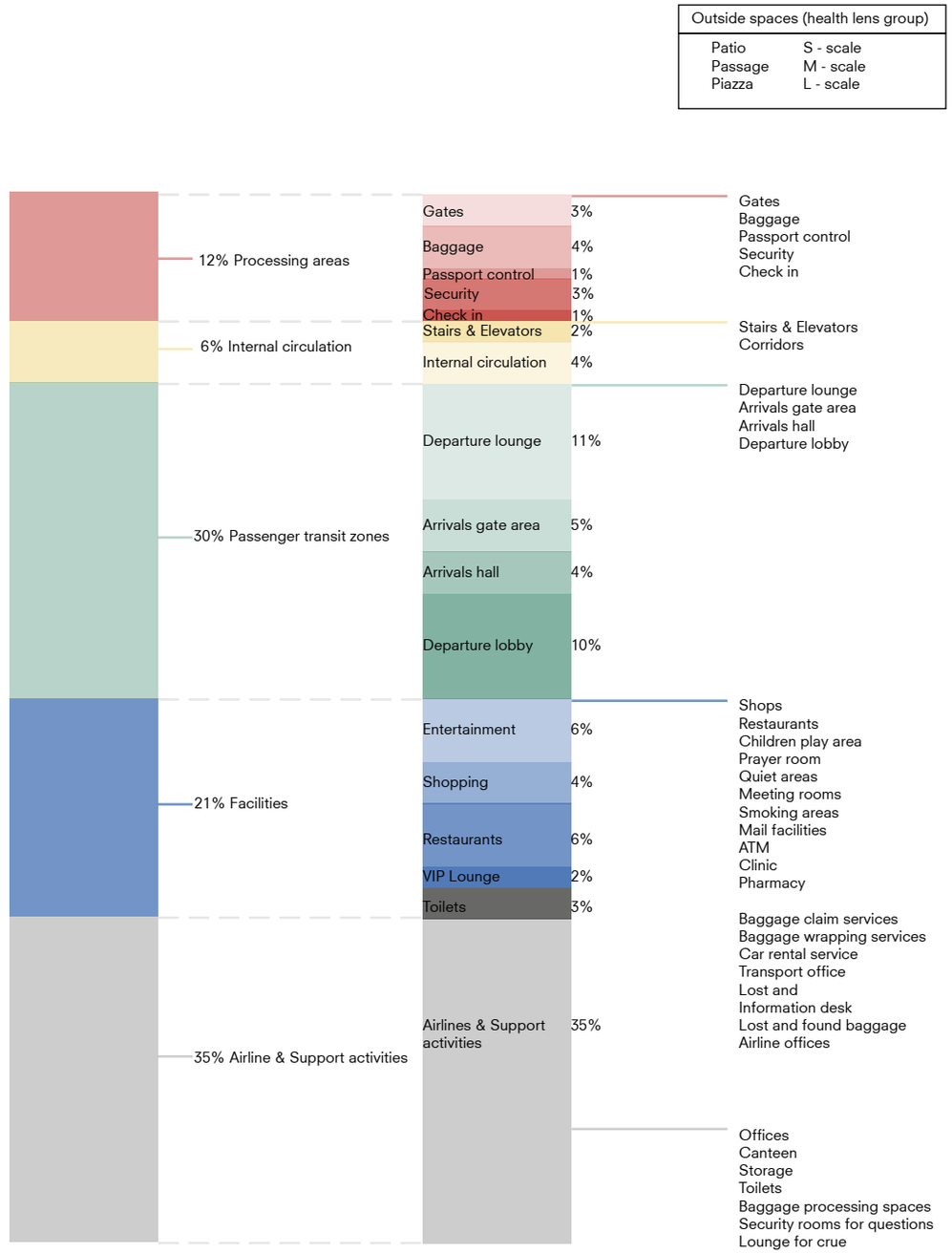



**Fig 57:** final proposal for the program bar (own work)

### 04.1.3 Key spaces

The literature review concluded that processing areas have the greatest impact on passenger satisfaction. As a result, each of these areas has been individually studied to establish specific design goals.

## Lobby:

To guarantee a clear flow, and easy wayfinding, and reduce confusion, the following guidelines have been developed:

- **Clear sightlines:** ensure unobstructed views of key areas such as check-in counters, information desks, and security checkpoints. This helps passengers easily orient themselves and reduces stress when navigating the space.
- **Zoning**: divide the space into functional zones, such as drop-off areas, check-in, waiting areas, and retail/amenities to improve clarity and functionality.
- **Avoid bottlenecks:** design spaces to prevent congestion, ensuring that lines for check-in or security do not obstruct entryways or passage areas.
- **Strategic signage**: incorporate visible, well-placed signage and digital displays to guide passengers efficiently without interrupting the flow of movement.

To create an environment that promotes relaxation and a sense of calm, the following elements are recommended:

- **Natural daylight:** maximize the use of daylight to enhance the overall ambiance and connect the interior with the outside world.
- **Thermal comfort:** maintain a comfortable indoor climate to accommodate the needs of diverse passengers.
- **Seating:** provide ample, comfortable seating throughout the terminal, with a variety of options to cater to different passenger preferences.
- **Acoustic design:** use materials and layouts that minimize noise pollution, ensuring a quieter and more peaceful environment for passengers.

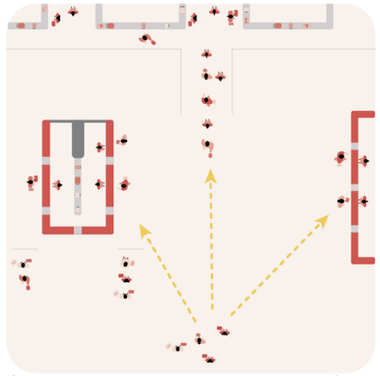


**Fig 58:** lobby guidlines - clear sightlines (own work)

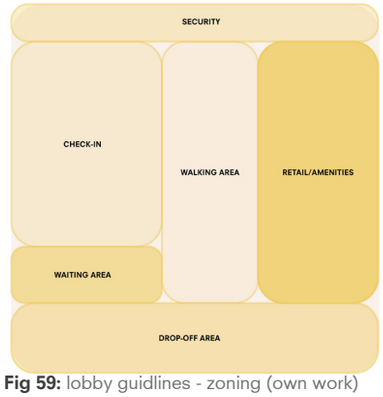



**Fig 59:** lobby guidlines - zoning (own work)

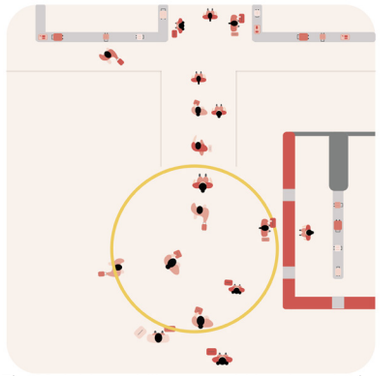


**Fig 60:** lobby guidlines - avoid bottlenecks (own work)

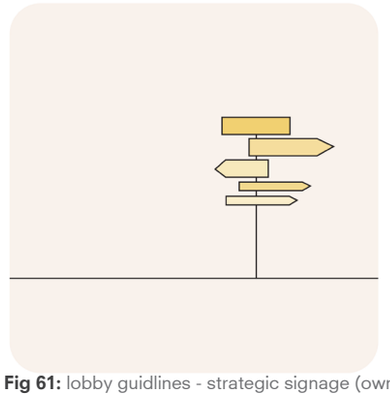


**Fig 61:** lobby guidlines - strategic signage (own work)



## Check-in:

There are two layouts for arranging the check-in desks: linear and island. The island layout is the most favorable since it leaves a corridor in between each of them for the passengers that do not require check-in while the linear layout tends to have way longer queues that extend into the circulation areas.

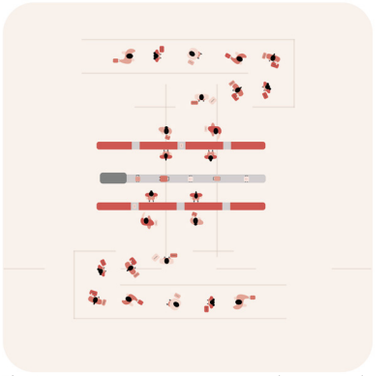


**Fig 62:** check-in typology - linear (own work)

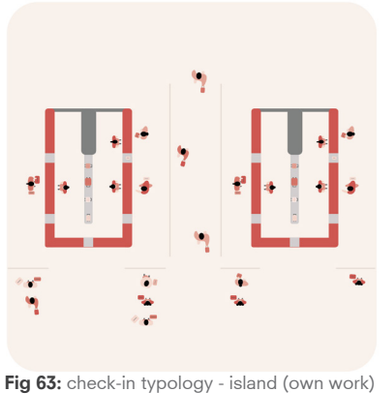


**Fig 63:** check-in typology - island (own work)

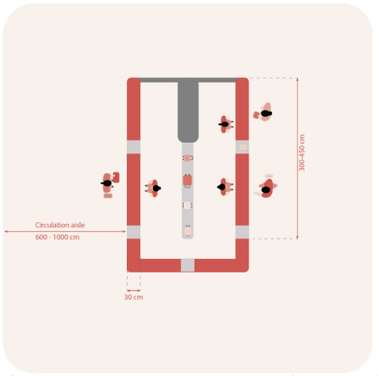



**Fig 64:** check-in island dimensions (own work)

## Security:

Security by default is a stressful space since it is an invasion of privacy; it is intimidating due to the sense of authority, and the rules that differ from airport to airport create fear that passage will be restricted. For this reason, this chapter has the longest list of requirements:

- **Clear layout:** positioning the security points in a clearly defined layout to reduce confusion.
- **Queue space:** allocate ample space for queuing to prevent congestion and ensure passengers can wait in a comfortable, organized manner since crowded and chaotic lines increase anxiety.
- **Sightlines:** seeing the end of the security and the next step reduces the stress of anticipation
- **Zoning:** divide the space into functional zones, such as queueing, screening, and post security activities to improve clarity and functionality.
- **Pre-security preparation zones:** provide clearly marked areas for passengers to organize belongings before screening.
- **Repacking areas:** spacious, separate areas for repacking that do not block the flow and the passengers do not feel pressured to hurry.
- **Passengersegmentation:** use dedicated lanes for families, business travelers, and general passengers to improve efficiency. Dedicated lanes, like fast-track for business travelers or priority for families, reduce bottlenecks and ensure smoother processes.
- **Advanced Technology:** integrate modern tools like dynamic ques that direct the passenger to the shortest line, digital screens or apps with estimated wait times to reduce anxiety, and use of latest technology to help with reducing the rules and the items that the passengers have to subtract from their suitcases. The amount of rules and restrictions is the main cause of stress during security.

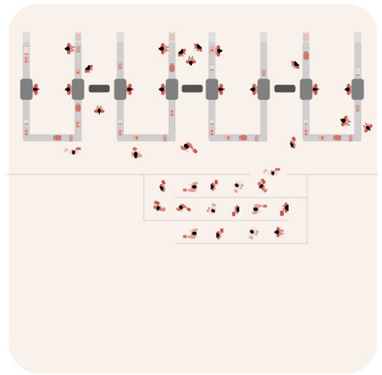


**Fig 65:** security guidlines - clear sightlines (own work)

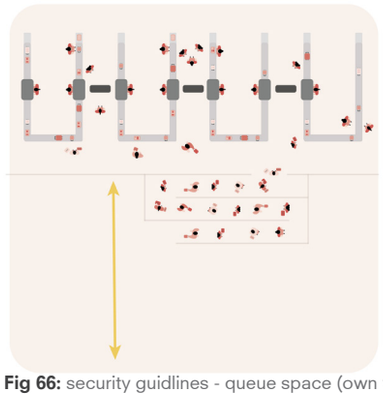


**Fig 66:** security guidlines - queue space (own work)

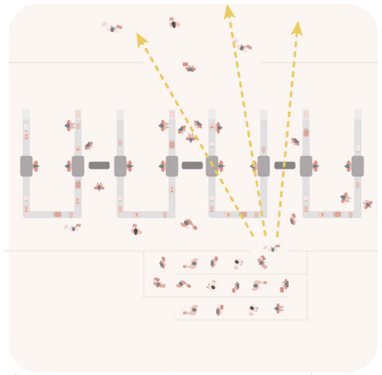


**Fig 67:** security guidlines - sightlines (own work)

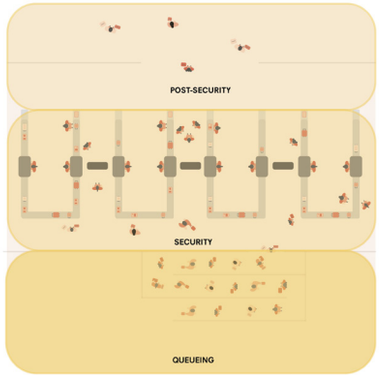



**Fig 68:** security guidlines - zoning (own work)

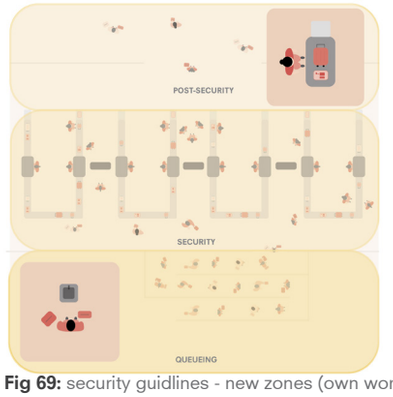



**Fig 69:** security guidlines - new zones (own work)

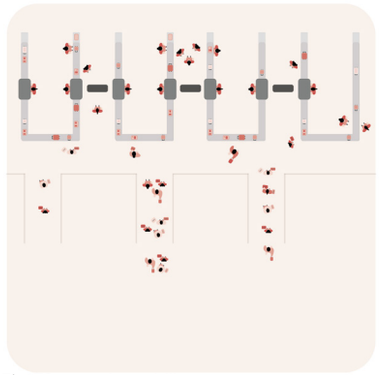


**Fig 70:** security guidlines - passenger segmentation (own work)

**Fig 71:** security guidlines - advanced technology (own work)

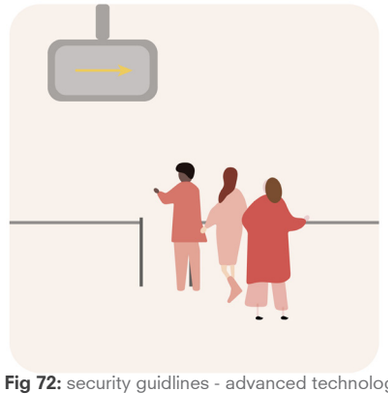


**Fig 72:** security guidlines - advanced technology (own work)

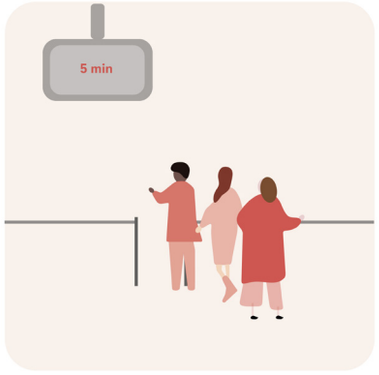



**Fig 73:** security guidlines - advanced technology (own work)

## Passport control:

Passport control is often a source of stress for travelers due to long queues, unclear processes, and the anxiety of navigating unfamiliar procedures. Efficient design and organization can significantly reduce these stressors, enhancing the passenger experience while maintaining security and operational efficiency. The following strategies aim to address common issues and streamline the passport control process:

- **Sufficient queueing space:** allocate ample space for queuing to prevent congestion and ensure passengers can wait in a comfortable, organized manner since crowded and chaotic lines increase anxiety.
- **Passenger segmentation:** separate flows based on passenger typologies, such as families, business travelers, EU, and non-EU citizens.

Dedicated lanes, like fast-track for business travelers or priority for families, reduce bottlenecks and ensure smoother processes.

- **Zoning:** divide the space into functional zones, such as pre-check, processing, and post-check to improve clarity and functionality.
- **Open layouts for visibility:** Utilize open or semi-open passport control booths to improve visibility, making the process feel more transparent and less intimidating. Open layouts also allow for better passenger monitoring, facilitating smoother operations.
- **Advanced Technology:** Use eGates and biometric technology to expedite passport control for eligible travelers, minimizing manual checks and speeding up the process. Advanced systems also reduce human error and enhance security.

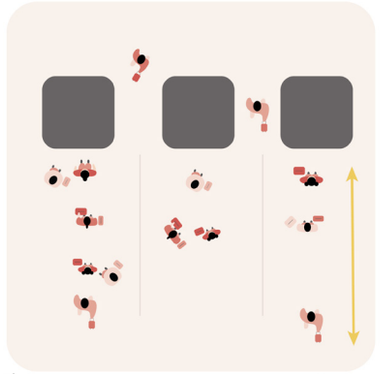


**Fig 74:** passport control guidlines - sufficient queueing space (own work)

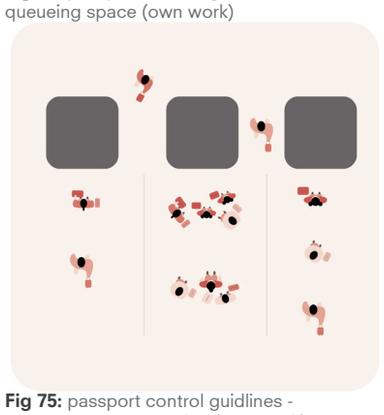


**Fig 75:** passport control guidlines - passenger segmentation (own work)

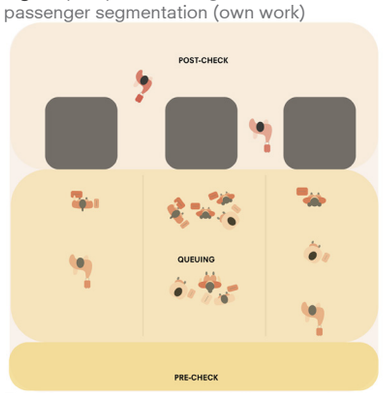



**Fig 76:** passport control guidlines - zoning (own work)

**Fig 77:** passport control guidlines - open layouts (own work)



## Departure lounge:

The departure lounge must be carefully designed to balance passenger comfort, efficient operations, and a pleasant ambiance.

- **Passenger Capacity**: accommodate approximately 90% of passengers, estimated number of passengers present 15 minutes before departure.
- **Queue Management**: Sufficient space must be provided for orderly queueing without obstructing other functions or passenger flow.
- **Exit Routes**: Clear and unobstructed pathways for deplaning passengers without interfering with those waiting to board.
- **Airline Processing and Information Areas:** allocate space for airline desks, check-in kiosks, and information counters.

Spatial Dimensions:

- **Lounge Area:** 300–450 cm² per passenger, depth of the lounge: 750–900 cm
- **Deplaning Corridor:** width of 300 cm
- **Circulation Corridor:** width of 600 cm, capacity of 330–600 persons per minute.

Ambience:

- **Comfortable furniture and sufficient seating**
- **Seating orientation:** face outward (toward windows or greenery) instead of toward the flow of people to reduces stress.
- **Minimizing Overstimulation:** Avoid excessive flashing screens or promotional materials, which can contribute to passenger fatigue.
- **Acoustics:** Implement sound-absorbing materials and designs to minimize noise pollution and maintain a calm atmosphere.
- **Greenery:** Use plants and natural elements to create a serene environment and improve air quality.

By addressing these functional, spatial, and sensory aspects, the departure lounge can be transformed into an efficient and comfortable space that supports both operational needs and passenger well-being.

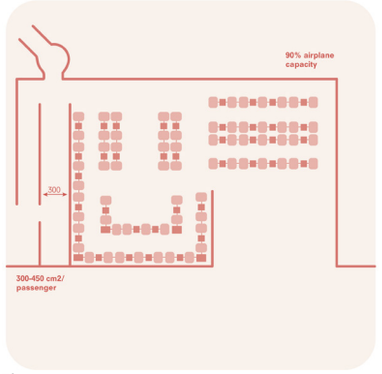



**Fig 78:** departure lounge guidlines - dimensions (own work)

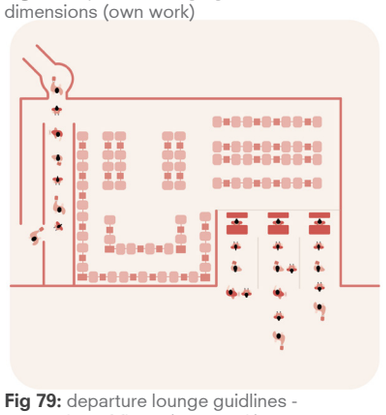


**Fig 79:** departure lounge guidlines - separation of flows (own work)

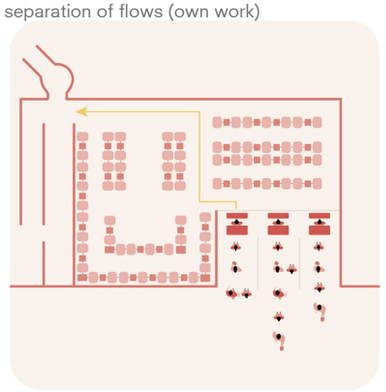


**Fig 80:** departure lounge guidlines - queueing positions (own work)

## 04.2 Site

The site analyses are divided into 5 scales: XXL, XL, L, M, and S. From a regional level to the details of the plot, the site analyses are done in such a way as to grasp a full understanding of the location of the airport and help prepare for the later stages of design.

### 04.2.1 XXL: Italy

The site is located in Milan, one of the biggest cities in Italy located in the North of the country in the region of Lombardy. Lombardy is Italy's economic leader, contributing over 20% of the national GDP and 25% of exports while ranking as Europe's second-largest manufacturing region(Lombardia | Vanguard Initiative, n.d.). Strategically located in northern Italy, Lombardy serves as a gateway for European trade and investment, reinforcing its vital role in Italy's industrial, cultural, and economic landscape (zope, n.d.). This economic prominence significantly influences air travel to the region, particularly among business travelers. In 2022, Lombardy was the primary destination for domestic business tourists in Italy, accounting for over 16% of all such trips (Italy, n.d.). This economic vitality not only attracts domestic business travelers but also international visitors, contributing to the region's overall tourism numbers. In 2023, tourism spending from abroad in Italy reached 51.6 billion euros, with a significant portion concentrated in economically robust regions like Lombardy (RBS, 2024).

### 04.2.2 XL: Milan airport system

Milan is Italy's economic powerhouse, contributing over 10% of the nation's GDP and serving as the country's financial hub (marco.barbarini, n.d.), home to the Italian Stock Exchange and leading banking institutions (zope, n.d.). Renowned for its innovation, fashion, and design industries, Milan drives both domestic and international business activity, attracting around 8.5 million visitors in 2023 (Tourism. With 8,5 Million Arrivals in the City, 2023 Is the Best Year Ever - Municipality of Milan, n.d.).


**Fig 81:** Milan on the map of Italy (own work)



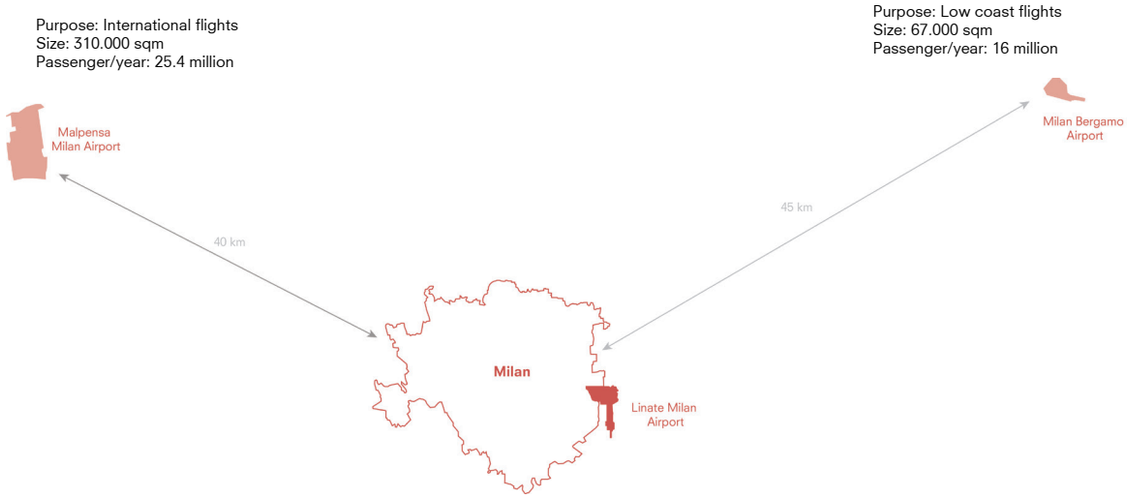



**Fig 82:** Milan airport system (own work)

Milan airport system is the largest airport system in Italy and comprises three airports: Malpensa Airport, Linate Airport, and Bergamo Airport, and together they handled 58.7 million passengers in 2023 (2023 Annual Report | SEA Corporate, n.d.) (Lassetter, 2024).

Malpensa airport is the largest in northern Italy with an area of 310.000 sqm, processing around 25.4 million passengers a year and focusing on International flights outside Europe (2023 Annual Report | SEA Corporate, n.d.). It is located 40 km northwest of Milan.
Bergamo airport has an area of 67.000 sqm and focuses on low-cost flights. It is located 45 km northeast of Milan and has a volume of around 16 million passengers a year.

The third airport, Linate Airport, is also the subject of this paper. It is the closest to the city, only 8 km from the city center, serves mainly domestic flights or EU flights, and has a volume of 9 million passengers per year.

### 04.2.3 L: Milan

Linate airport has a strong public transport connection by Metro M4 and bus to the center of the city. The travel commute time is around 25 min by bus and less than 12 min by subway. This connection makes Linate the easiest and most accessible option. This proximity is a significant advantage for convenience and accessibility, but also imposes constraints due to its urban location, limiting potential expansion and requiring careful noise management.

### 04.2.4 M: Linate region

The airport is situated in a densely populated urban area, bordered by residential neighborhoods, industrial zones, and infrastructure such as the A51 motorway. This context necessitates careful integration with the local environment to minimize disruption and maintain strong connectivity.

Linate Airport emerged as Milan's primary airport in the 1930s, replacing the older Taliedo Airport, which had become inadequate for

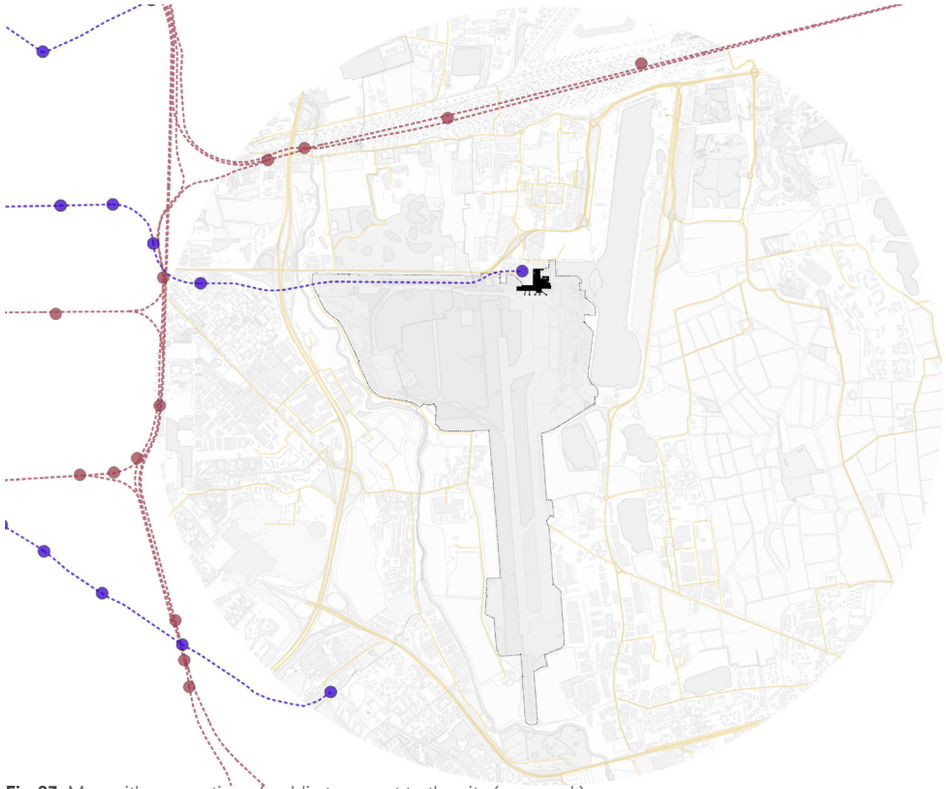


**Fig 83:** Map with connection of public transport to the city (own work)

the growing demands of air traffic. Taliedo, established in 1910 as Milan's first airport, was originally a military airfield and once it began accommodating commercial flights, its facilities could not keep pace with the expanding aviation industry, leading to its decline ('Taliedo', 2021).

The plot has a total surface of 3,500,000 m² and it is bordered by the Lambro River to the west and the Idroscalo basin to the east. The Idroscalo basin was artificially built in 1930 as a result of Italy's belief that commercial aviation would develop over the sea. In 1926 plans to improve Milan's Taliedo aerodrome included merging seaplane and airplane operations, leading to the construction of this 2500-meter-long and 450-meter-wide basin. This belief leads to the choice of the plot next to the basin. Since the seaplanes became obsolete, the basin's focus shifted towards recreational use. The plot location near Idroscalo Park provides a unique opportunity for incorporating leisure spaces into airport planning.

The land east of the basin is mainly agricultural, while the majority of buildings can be seen on the west of the plot towards the city. Their functions are predominantly residential, with some commercial buildings and very few public ones. On the north side of the plot, there is the Milano Smistamento Railway Depot, a significant railway depot, and marshalling yard that covers an area of approximately 240,000 m² (Milano Smistamento, n.d.). Historically, Milano Smistamento has been a central hub for railway operations in Milan (Bartolomeo Fiorilla, il mio viaggio su rotaia…, 2022) . Plans are underway to build a new transshipment terminal at Milano Smistamento, set to boost capacity and efficiency by 2026 (Milan to Welcome New Transshipment Terminal, Easing Road Traffic by 150,000 Trucks Annually | RAILTARGET, n.d.).



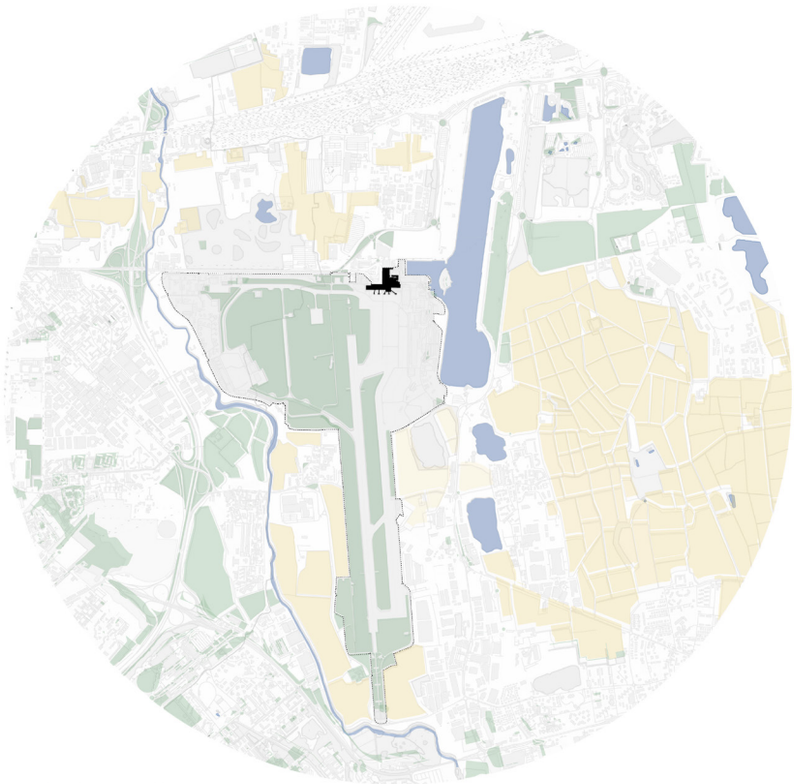


**Fig 84:** Overall impression (own work)

**Fig 85:** Plot line (own work)

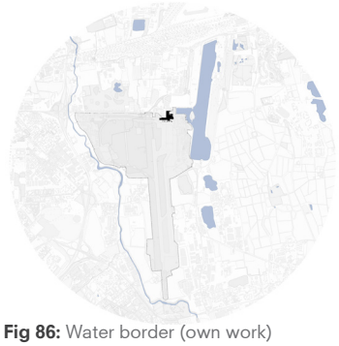


**Fig 86:** Water border (own work)

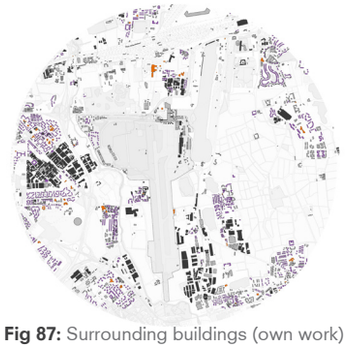


**Fig 87:** Surrounding buildings (own work)


**Fig 88:** Plans for the commercial line Torino - Trieste

**Fig 89:** Image with Idroscalo Park now (own image)

**Fig 90:** Connection between terminal and water lost (own work)

**Fig 91:** Connection between city and water blocked (own work)

## 04.2.5 S: Plot

The position of the current terminal is on the northeast side of the plot close to the basin. On the west side of the terminal is the curb with the drop-off area, arrivals pick-up, bus and taxi lanes, and the metro station. The airport occupies a relatively small area compared to other major airports, emphasizing efficiency in spatial organization. The compact layout requires innovative design solutions to manage passenger flow, aircraft movements, and parking.

Besides the terminal, the plot hosts numerous other smaller buildings that serve as supporting functions (such as hangers, maintenance facilities, cargo terminal, offices, and maintenance apron). North of the plot there is a small district called Novergo where other supporting functions are, such as hotels, car rentals, and offices. Linate has a single runway (2,442 meters long), limiting its capacity for takeoffs and landings. This makes it ideal for short-haul domestic and European flights but unsuitable for long-haul operations or large-scale expansion of traffic.

The position of the terminal and the supporting functions close to the water disturbed the connection between the city and the park. To arrive at the Idroscalo park, the same public transport as for the airport is used. From there, visitors are required to walk 15 minutes to the entrance to the park on an unpleasant pedestrian walk bordered by car streets and fencing for the airport. Even tho this connection is interrupted by the terminal's proximity to the water, the original intention of connecting the two has been lost, and the terminal has no qualitative advantages about the Idroscalo basin. These two elements are problematic to the current situation and therefore became goals for the design.

Regarding approaching the airport, the current architecture does not stand out; the only indication of the presence of the airport is the signs. The facade lacks an inviting atmosphere or a sense of a landmark to the city. The literature research showed the advantages of treating an airport as a gate to the city and a representation of Milan for the visitors, therefore a new goal for the design is to treat Linate as a gate to Milan.

The municipality of Milan also has two goals for the airport: to integrate public spaces, reconnect the environment and park, and promote sustainable mobility, including electric vehicles, sharing facilities, and enhancing seamless public transport. These will be added to the goals list for the site part.



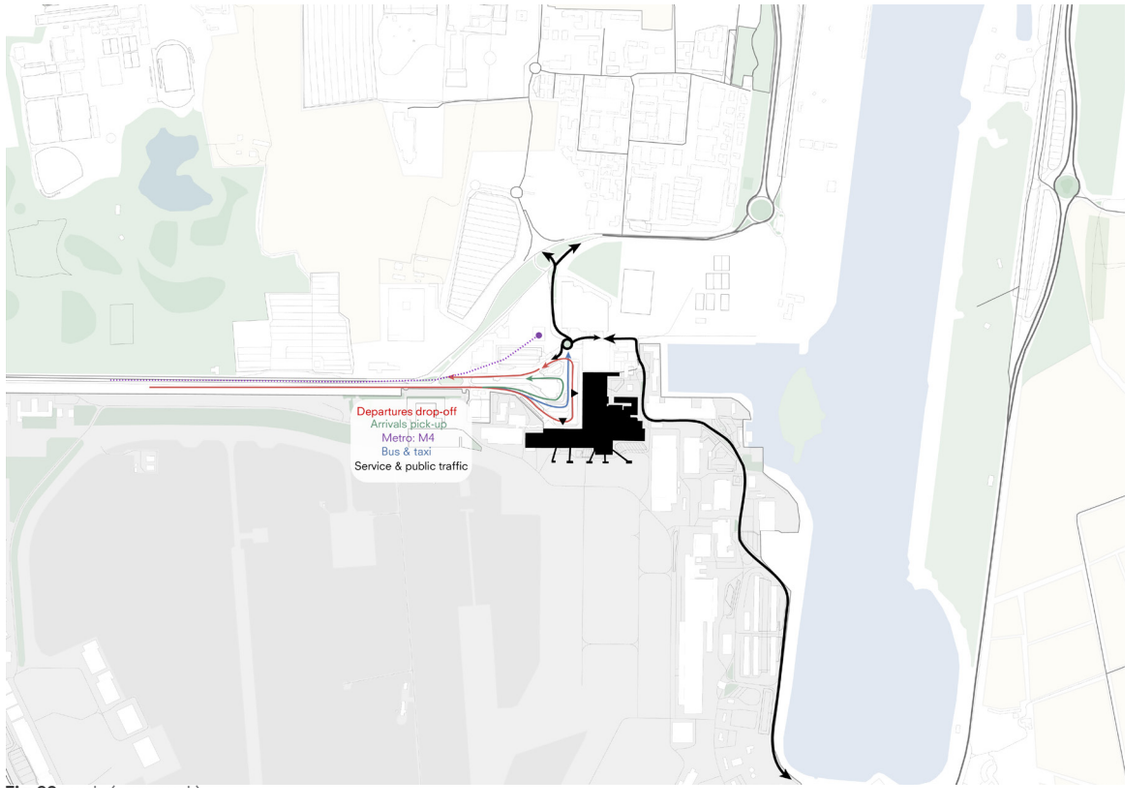



**Fig 92:** curb (own work)

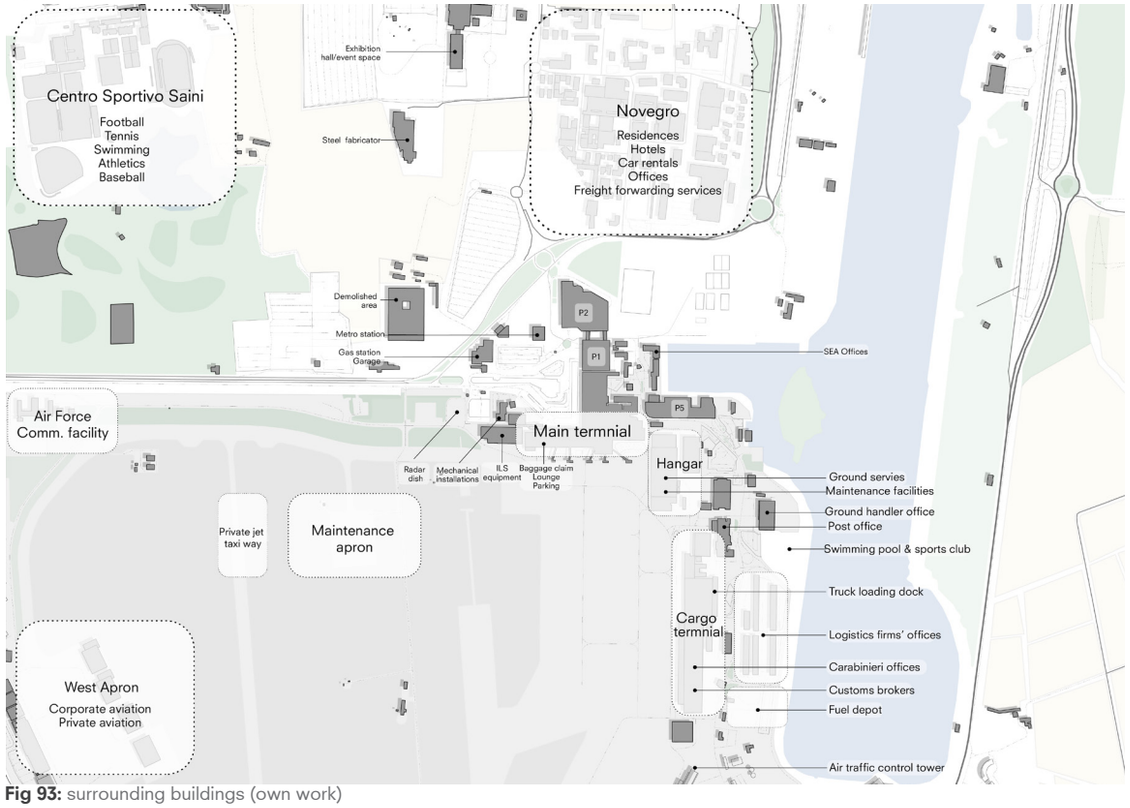



**Fig 93:** surrounding buildings (own work)


**Fig 94:** approaching the curb (own work)


**Fig 95:** surrounding path to the park (own work)

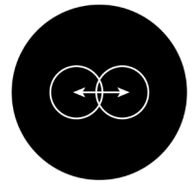


## Goals

Smart city & innovation

Urban development & Local Engagement

The airport as a gate to the city



Reestablish connection to the water

**Fig 96:** goals for the Site part (own work)

## 04.3 Client

There are three relevant clients for the project: the operator, the airlines, and the municipality of Milan.

### 04.3.1 SEA Group

SEA Group is the manager and operator of Linate Airport as well as Malpensa Airports. The company plays a critical role in the aviation and transportation industry in Italy, managing a wide range of services that ensure the functionality and competitiveness of these airports. SEA group's responsibilities are to oversee passenger and cargo operations, maintain and upgrade the airport infrastructure, manage any commercial operations in the airports and oversee the ground handling services such as baggage processing, aircraft cleaning, and passenger assistance (Profile | SEA Corporate, n.d.).

Besides the two main airports, SEA Group also owns Milano Prime, a brand under that specializes in business and general aviation services at the Milan airports. It is a premium offering catering to private and business aviation needs, providing high-end facilities and services to ensure a seamless and luxurious travel experience and it has an exclusive terminal at both Malpensa and Linate (Welcome to SEA Prime | SEA Prime, n.d.). SEA Group has two main shareholders, the municipality of Milan and F2i.

F2i is Italy's largest independent infrastructure fund manager, with assets under management exceeding 8 billion EUR. Established in 2007, F2i focuses on investing in key sectors of the national economy, including transport and logistics, energy transition, distribution networks, telecommunications, health and social care facilities, and the circular economy (English - F2i Sgr, n.d.). It is a shareholder in multiple airports and port terminals throughout Italy.

The F21 goals for Linate focus on enhancing the efficiency, sustainability, and overall passenger experience at Linate Airport. Its two key goals for Linate are:

- **Sustainability:** reducing greenhouse gas emissions and achieving higher levels of airport carbon accreditation.
- **Modernization and passenger experience**

(2i Aeroporti Announces New Financing of up to 540 Million for the Development and Consolidation of Its Business - F2i Sgr, n.d.)

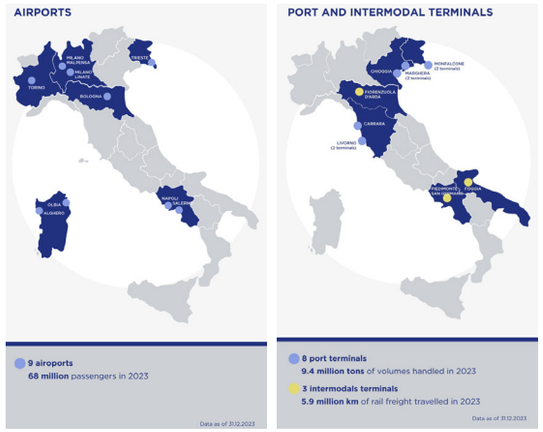



**Fig 97:** F2i investments

### 04.3.2 Municipality of Milan

Through its stake in SEA, the municipality of Milan is ensuring that Linate aligns with the city's economic and environmental goals, particularly concerning mobility, tourism, and sustainability.

Some of the municipality's goals for Linate are:

- **Sustainability**: Reduce the airport's carbon footprint by increasing energy efficiency, incorporating renewable energy, and minimizing waste. Expand green spaces, and implement measures to reduce noise pollution.
- **Modernization & Passenger Experience:**

Enhance the airport's facilities to provide a world-class passenger experience, including updated terminals and streamlined operations, incorporating smart technologies for faster check-ins, security, and baggage handling.

- **Urban development and local engagement:**

integrate public spaces, reconnect the environment and park. Address community concerns, while ensuring the airport continues to deliver economic benefits to the local population.





- **Smart city and innovation:** Promote sustainable mobility, including electric vehicles, sharing facilities, and enhance seamless public transport.
- **Culture and economic leadership:** Strengthen Milan as a global hub for culture to attract international events and tourism. Position Linate as a hub for business travelers and short-haul European routes to support Milan's role as a business and cultural destination.


**Fig 98:** shareholders for SEA Group (own work)

### 04.3.3 Airlines

The last client in this chapter is the airlines. Italian Airlines owns the majority of the market share, since it is a mostly domestic airport. Some of these airlines are planning to increase the number of flights and destinations that they provide which will result in a need for high efficiency to deal with an increase in the capacity. It is also in their interest for the airport to be as attractive as possible to be chosen by the passengers over other destinations.

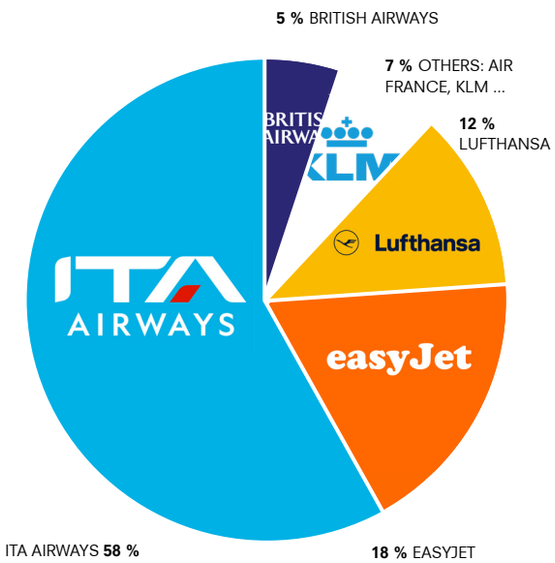



**Fig 99:** marketshare distribution between airlines (own work)

### 04.3.4 Passengers

My interest in flows centers on how users experience spaces, which is why the research question is framed to place passengers at the heart of this project. The goal is to understand the different types of passengers and to tailor the design to meet their specific needs. Therefore, it is essential to include them in this chapter.

In 2023, Linate Airport handled 9.4 million passengers, with the majority—5.1 million—traveling for leisure, while a significant

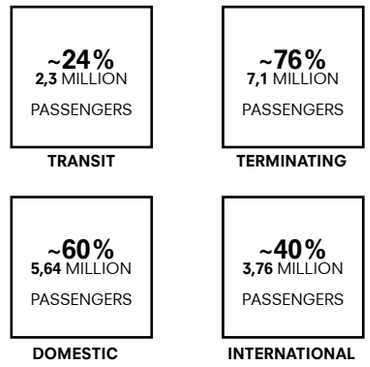



**Fig 100:** types of passengers (own work)

portion was flying for business purposes. The large volume of tourists highlights Linate's role as a first impression of Milan for many visitors. As such, the airport should reflect the city's culture and values. This aligns with the municipality's objectives of promoting Milan as a center of culture and economic leadership, as well as the site's goal of positioning the airport as a gateway to the city.

At the same time, the substantial number of business travelers must also be considered. Their priorities include minimizing time spent at the airport and having access to facilities such as quiet areas or meeting rooms.

Linate primarily functions as a destination airport, with 76% of passengers ending their journeys there. Furthermore, 60% of these passengers travel domestically. This means the flow should be designed primarily with terminating passengers in mind.

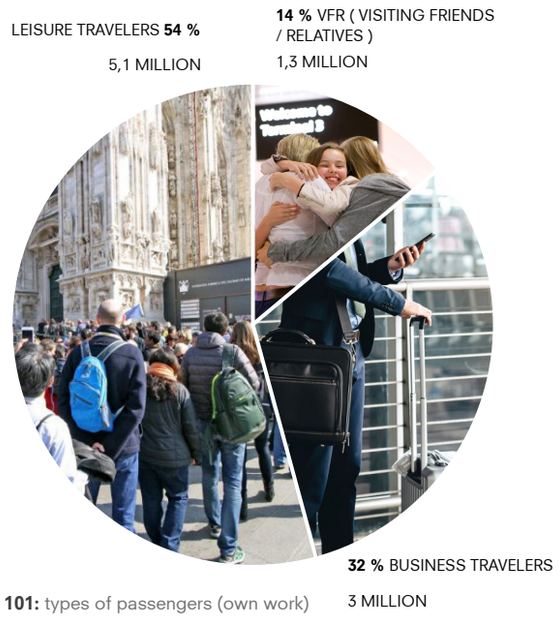



**Fig 101:** types of passengers (own work)


**Fig 102:** conclusion goals for Client (own work)

# DESIGN

## Massing

An extensive volume study has been conducted from three key perspectives—site, program, and client—through the development of multiple study models. The site analysis examined the optimal positioning of the terminal within the plot, while the programmatic investigation focused on determining the most efficient spatial configuration for passenger flow. Finally, the client's requirements were addressed by exploring architectural forms that embody Milanese cultural identity while simultaneously serving as an iconic urban landmark.

**Site Analysis and Massing Criteria:**
The site analysis yielded two primary criteria for massing: (1) the relationship between the terminal and the lake, and (2) the positioning of the curb. A third objective—enhancing urban connectivity—aimed to facilitate seamless access between the city and the adjacent park. Based on these considerations, three distinct massing strategies were developed, each proposing a different spatial relationship with the waterfront.

**Massing Options:**
**Option 1:** Retaining the original Linate Airport's configuration, including the U-turn curb and southern gate placement, but relocating the terminal closer to the lake. This adjustment allowed the park to extend up to the curb, improving accessibility from the street.
**Option 2:** Extending the curb southward along the lake, orienting the terminal entrance toward the water, and situating the gates on the western side. This layout used the street as a natural boundary between the airport and park while enabling the park to envelop the lake.
**Option 3:** Maintaining the U-turn curb from Option 1 but reorienting the gates (and consequently, the passenger lounge) toward the lake.

Position as original Linate

Entrance to the water

Gates to the water



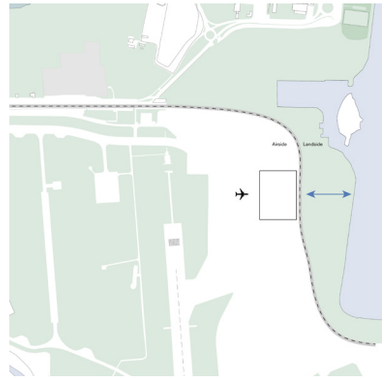
The second option was ultimately selected due to its strong connection between the terminal and the lake and its facilitation of direct park-city connectivity. This configuration also uses the curb as a natural delimitation between airside and landside operations while allowing the park to fully encircle the lake.

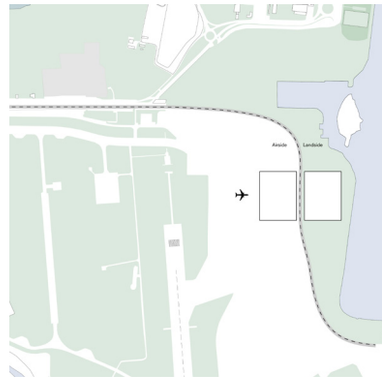
**Programmatic and Passenger Flow Considerations:**
To optimize passenger circulation, a secondary volume was introduced on the landside to accommodate arrival and departure halls. The massing was segmented to align with passenger movement patterns—from the lake to the gates and back. Additionally, the two wings of the terminal were angled outward to enhance views of both the lake and the runway.

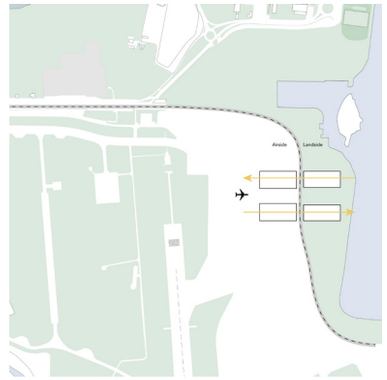
**Health lens design integration:**
The design is further developed from the perspective of the health lens by introducing:

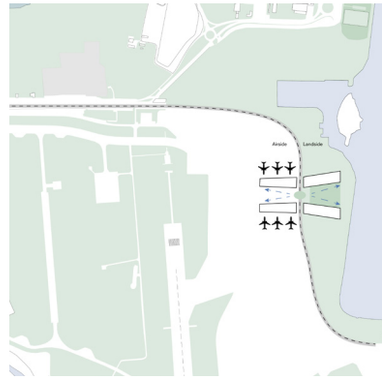
- A central interior courtyard
- A public passageway through the terminal that serves as the curb
- A piazza situated between the landside section and the park
- A "health belt" under the form of the park

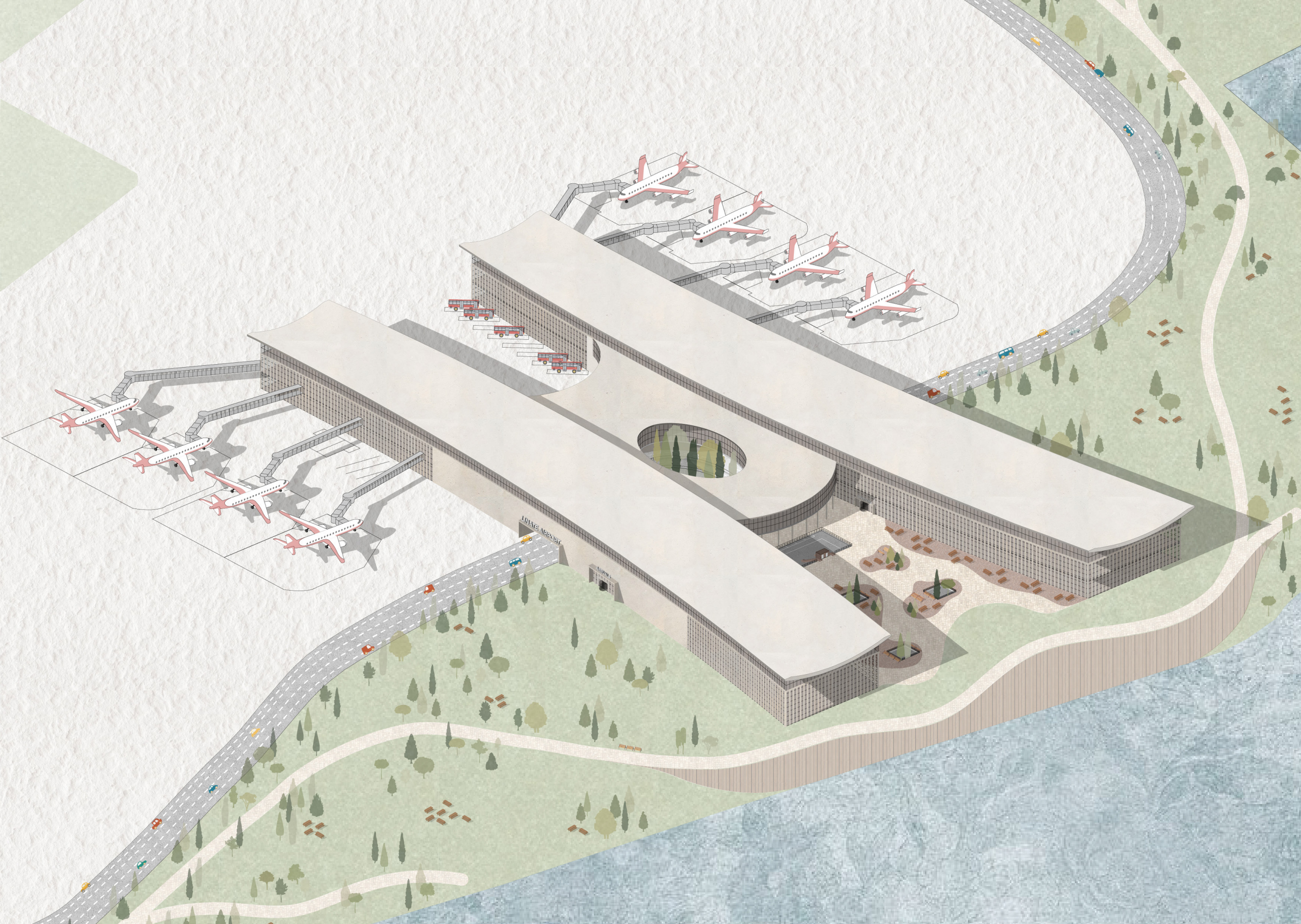
These elements not only address wellness considerations but also fulfill the client's dual objectives of anchoring the terminal within Milan's cultural context and establishing it as an urban landmark.

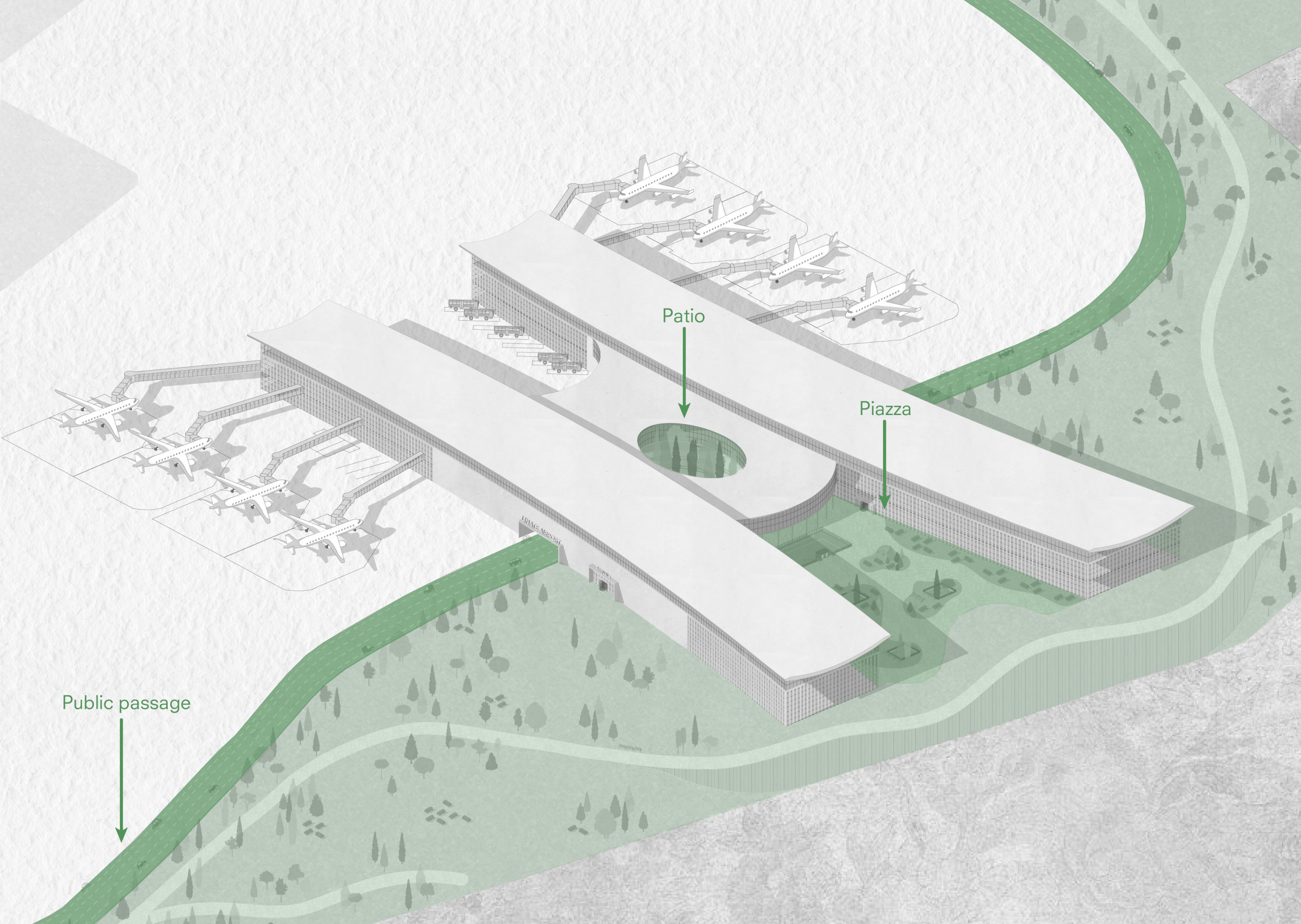









LINATE AIRPORT


Patio
Piazza
Public passage

## Spatial organization

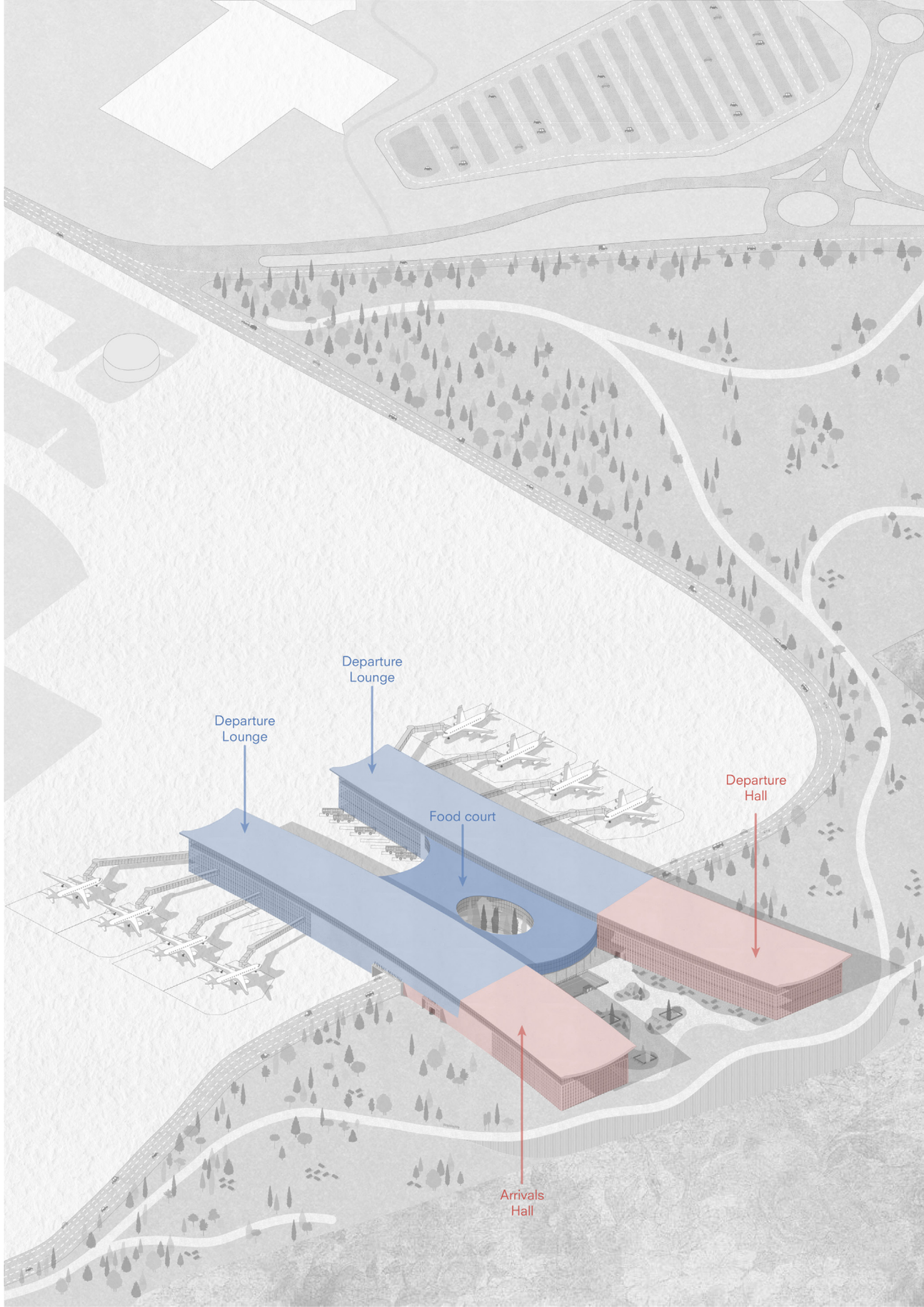
The car road acts as a primary delineation between the airside and landside zones, not only in terms of physical separation but also in functional distribution. The landside accommodates departure and arrival halls, while the airside contains lounge and gate areas.

Passenger flows further influence the functional layout: departure operations are concentrated in the north wing, whereas arrivals are situated in the south wing. This configuration ensures the required separation between arrival and departure streams, as mentioned in the design brief. However, unlike conventional terminals where these flows are separated across different floors, this design achieves separation through a lateral division, creating a circular loop for passenger movement.

A central space connects the two wings, serving as the project's core. This area houses a food court and an interior garden, promoting a sense of cohesion and relaxation.

The second floor is designated for private functions, including offices and a VIP lounge overlooking the lake. Meanwhile, the underground contains support facilities such as parking and baggage handling units.





## Landside arrival circulation

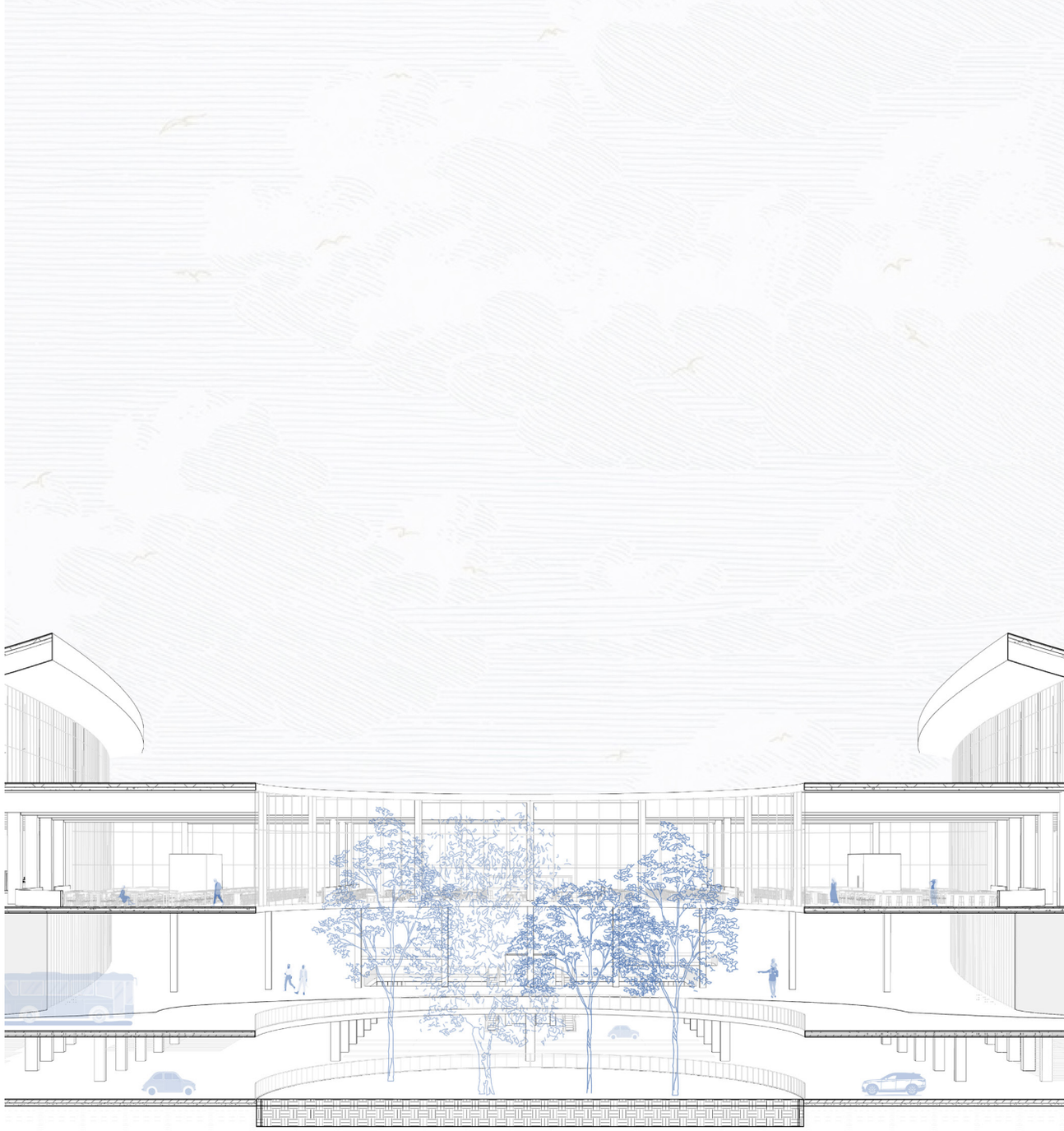
Vehicular access from Milan—including cars and buses—approaches the building from the northern side, passing the aircraft aprons and adjacent park.

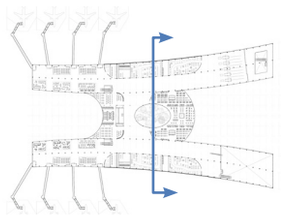
The interior garden spans vertically from the underground level (-1) to the first floor (1), with tree canopies extending upward, creating a visual connection between levels.

Vehicular circulation is organized around the garden across two levels:

- Underground Level (-1): Serves as the primary zone for private vehicles, including taxis and passenger drop-offs, with direct access to parking.
- Ground Level (0): Accommodates buses, which stop at designated boarding areas.

On the first floor, the garden is enclosed by a glass wall from the food court, offering passengers views of the arrivals below while providing a space for interaction between departing travelers post-security and newcomers.





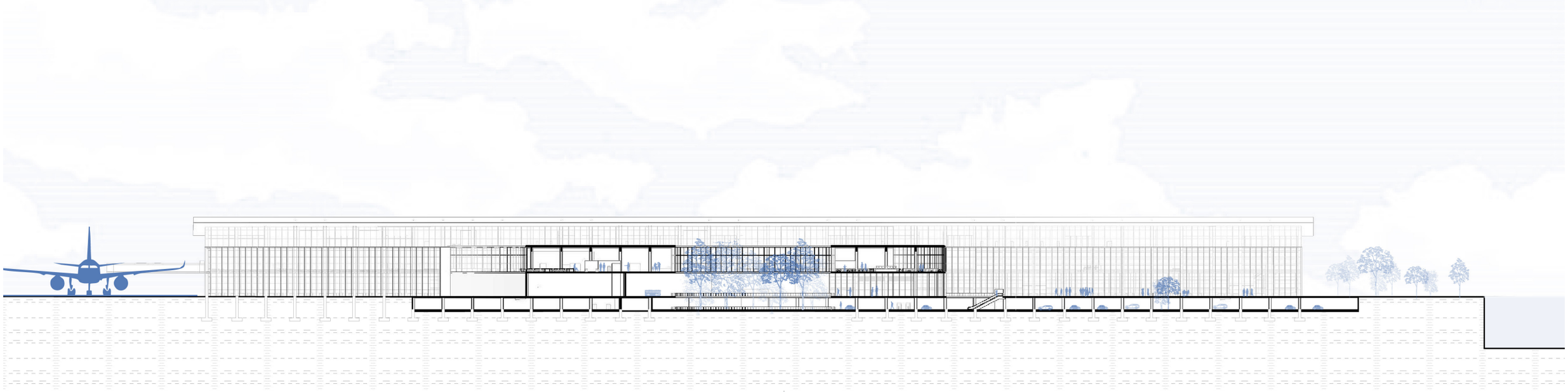

Urban plan - Scale 1-7000

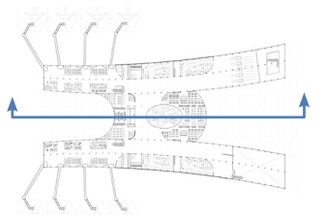

LINATE AIRPORT

## The Piazza: a central gathering space

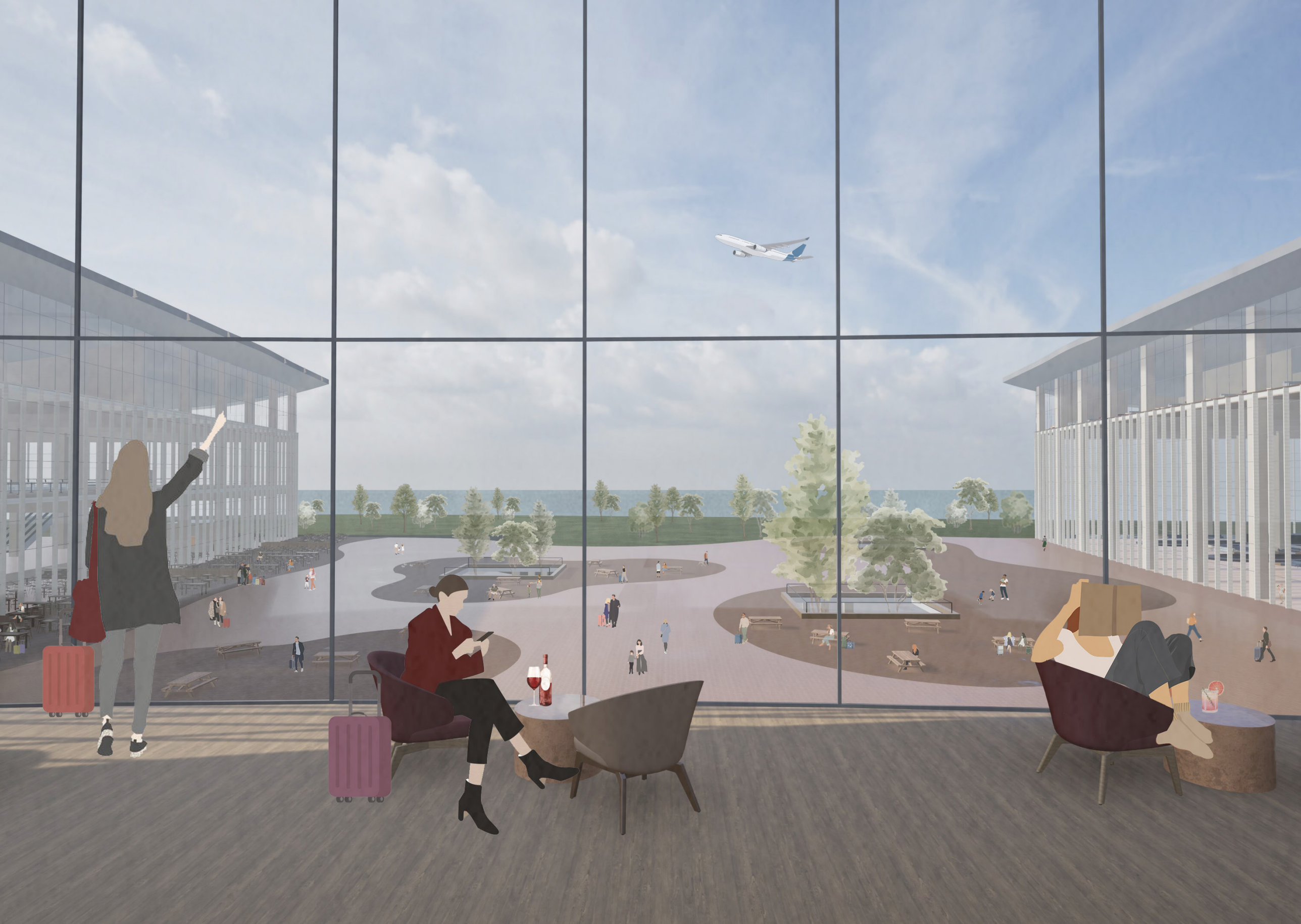
Regardless of their mode of arrival, all passengers converge in the piazza—an expansive public plaza framed by the departure and arrival halls that opens toward the lake and park. Designed as a transitional yet immersive space, it features shaded trees, seating areas, and terraces, welcoming not only travelers but also accompanying visitors and park guests.

As the first point of contact with both the airport and Milan, the piazza serves as a social hub where arriving and departing passengers intersect. Its green, open design, coupled with its proximity to the lake, fosters a sense of calm, reducing travel-related stress and encouraging moments of pause and leisure.






DEPARTURES



Urban implementation - Scale 1-500

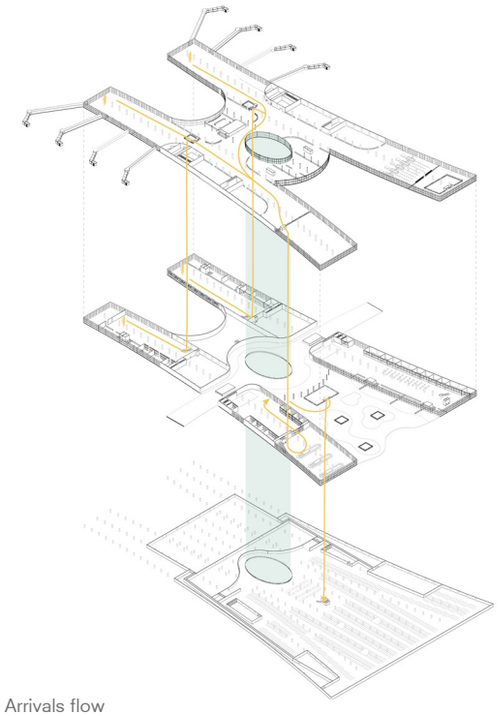
## Flow design and Passenger experience

The primary objective of the circulation design was to establish an intuitive, linear pathway that minimizes confusion and prevents bottlenecks. To achieve this, all processing areas are aligned in a continuous, unobstructed sequence, enabling passengers to finalize stressful procedures efficiently. This spatial organization reduces anxiety caused by uncertainty and delays, freeing passengers to engage with leisure amenities afterward.

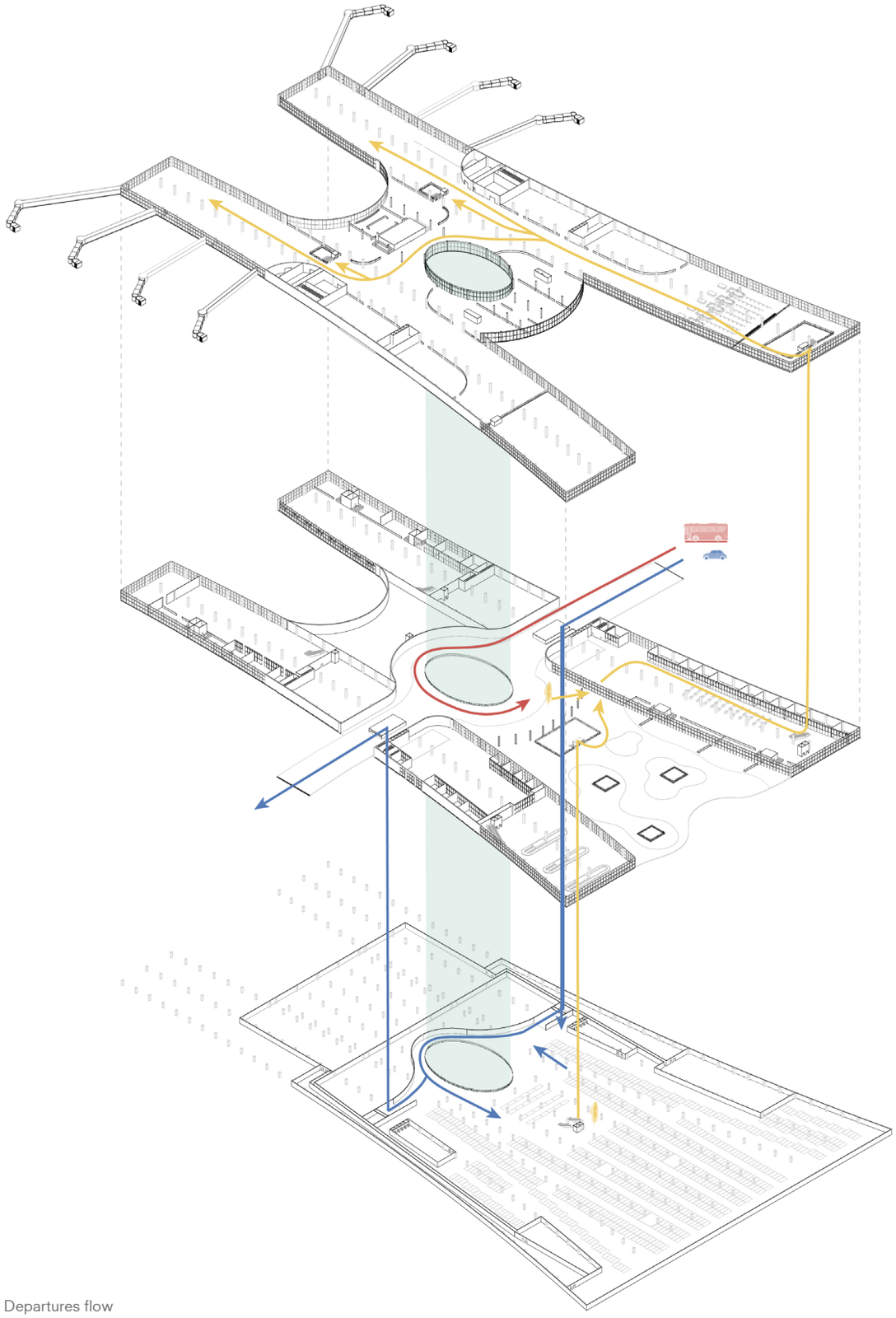
Retail and dining facilities are strategically positioned along the sides of the main corridor, ensuring passenger autonomy—individuals may opt to use these services without disrupting the primary flow—while maintaining the shortest possible walking distance to gates.

Gates are divided into two clusters, North Wing (A Gates) and South Wing (B Gates), each having 4 jet bridge gates and 8 bus gates. Two centralized staircases provide access from the departure lounge to the bus gates, ensuring efficient vertical circulation.

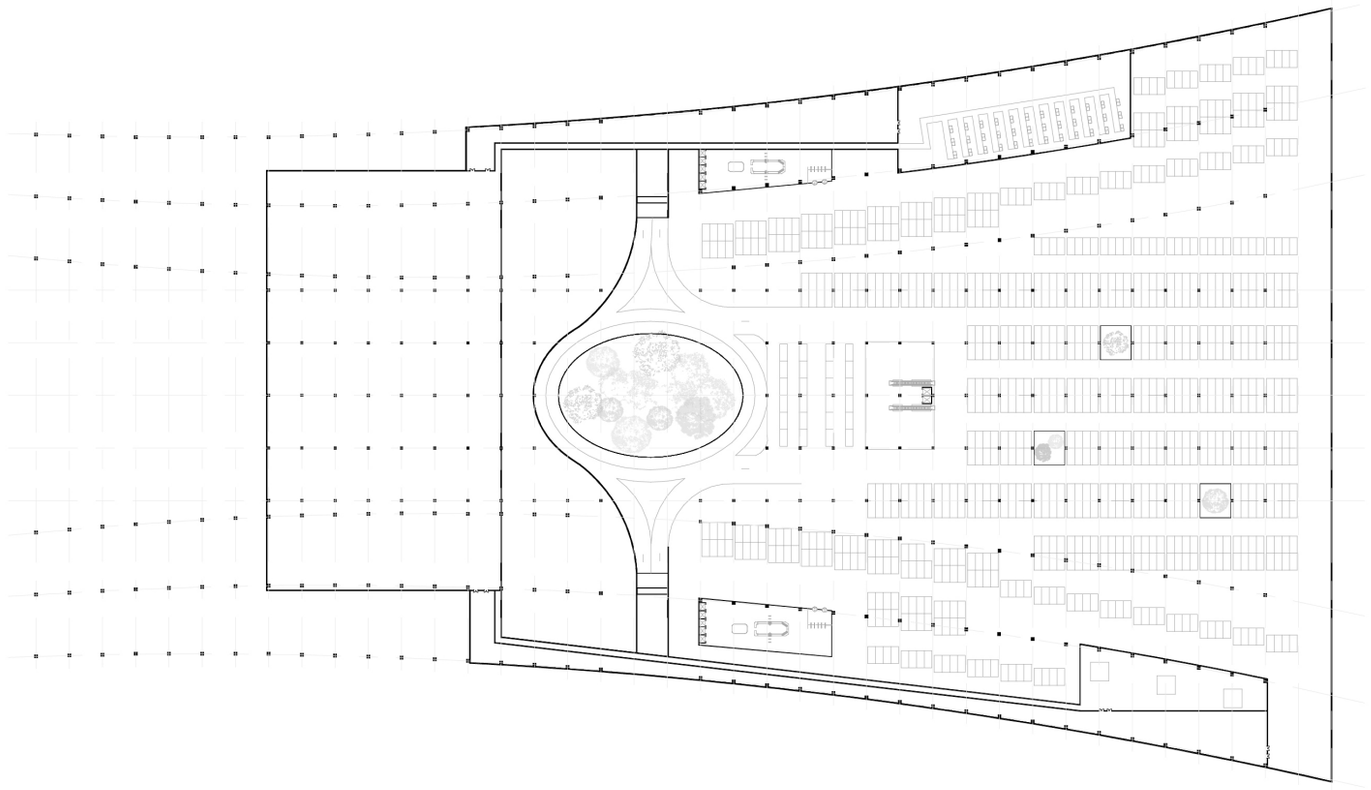
The interior garden serves as the airside's focal point, where arrivals, departures, and both wings converge—the sole intersection of passenger flows post-security. By concentrating circulation around this naturally lit, green core, the design mitigates stress and enhances comfort.



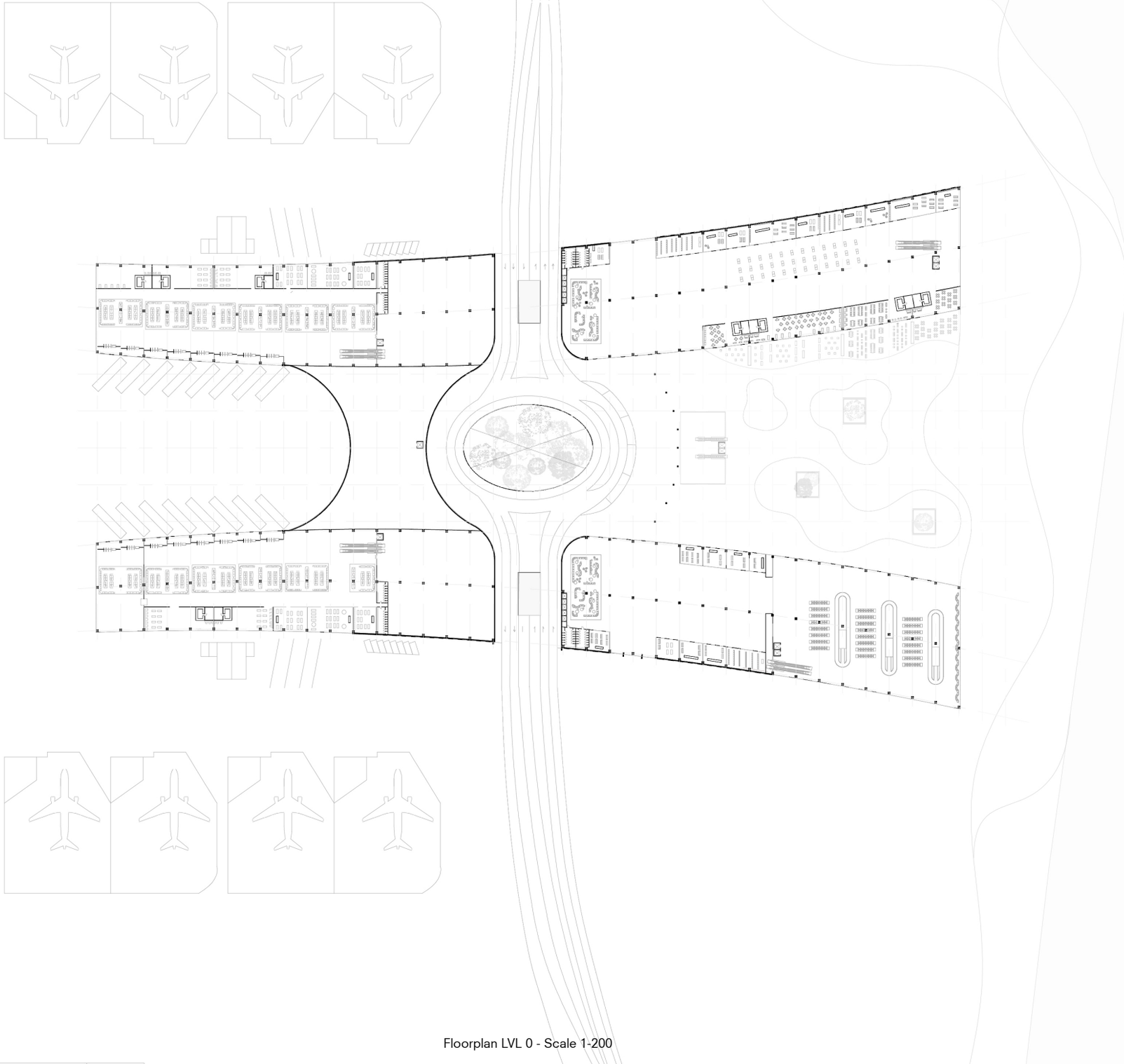
Arrivals flow



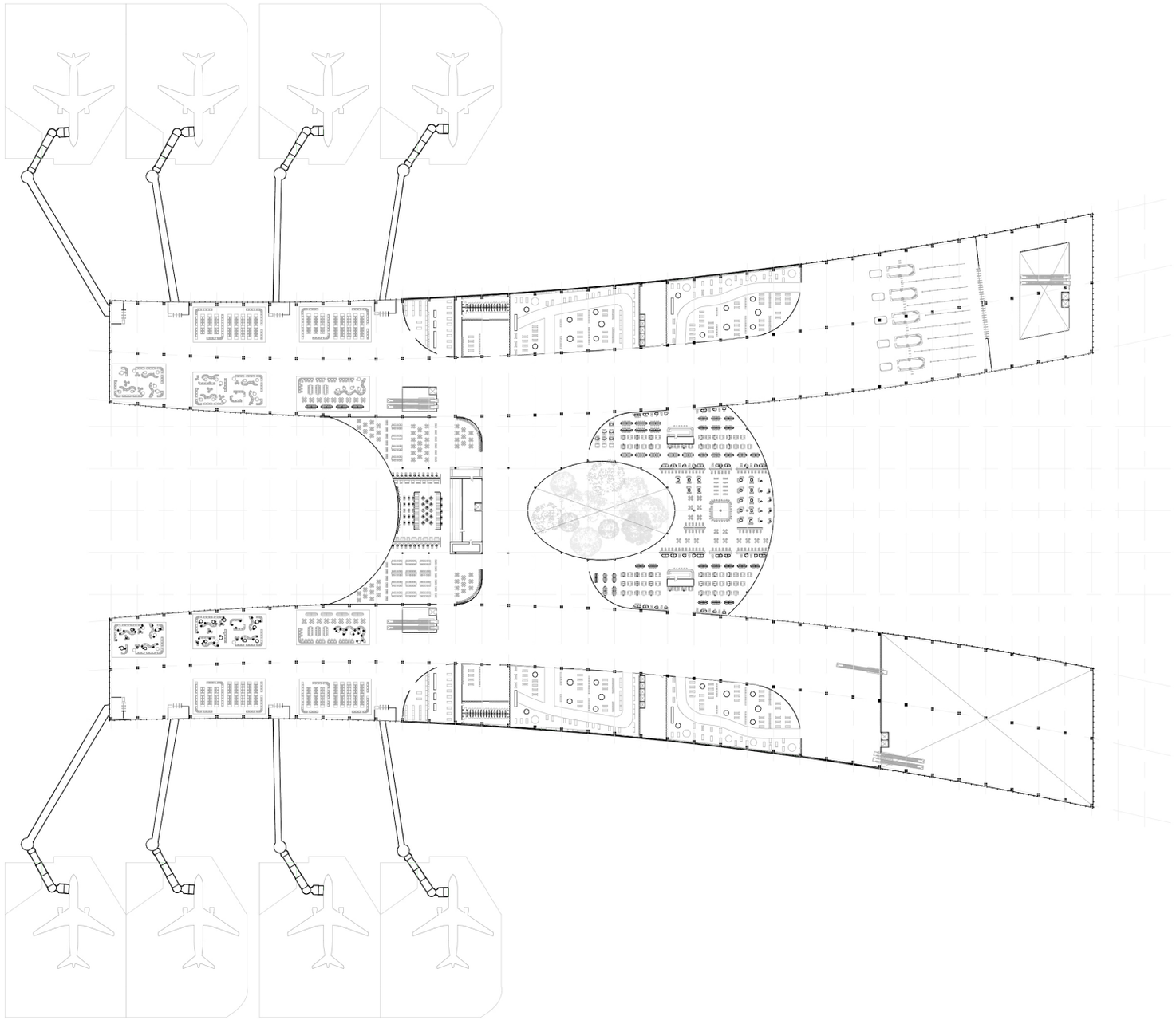
Departures flow



Floorplan LVL -1 - Scale 1-200



Floorplan LVL 0 - Scale 1-200



Floorplan LVL 1 - Scale 1-200

Floorplan LVL 2 - Scale 1-200

## Processing areas

**Departure hall:**
The design process was guided by a set of requirements derived from the literature research, which informed the development of the main spaces. These criteria served as foundational principles throughout the project's evolution.

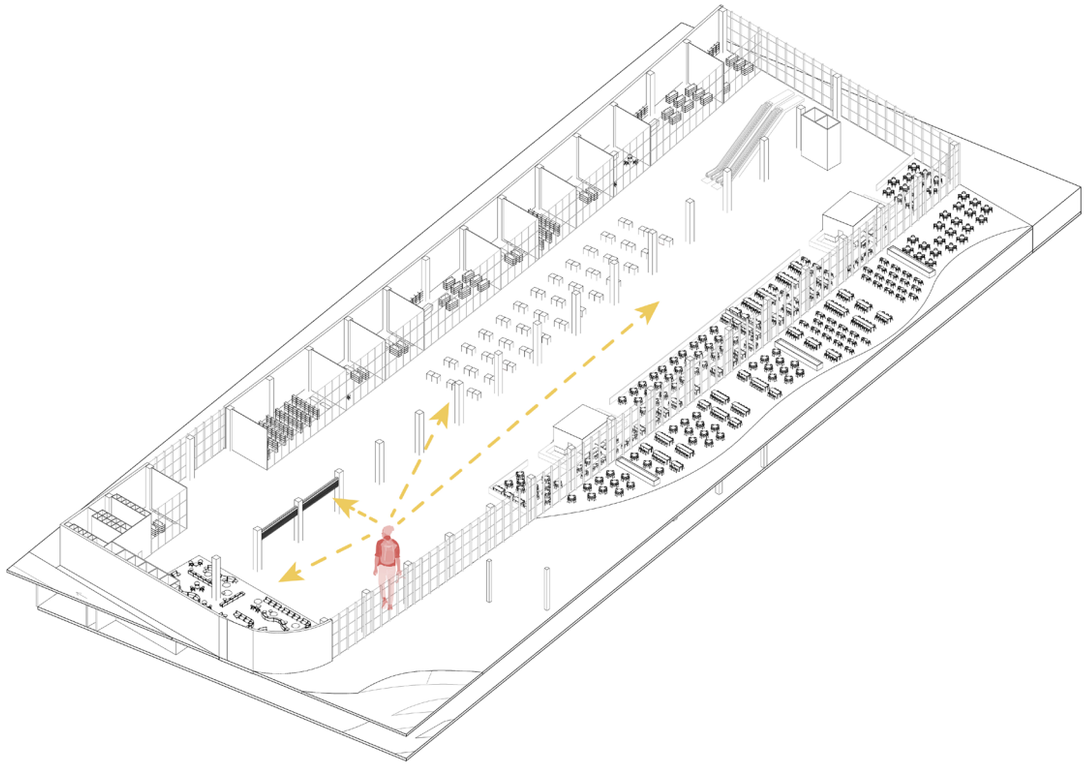
As the initial point of contact for departing passengers, the departure hall prioritizes clarity and spatial legibility upon entry. The entrance zone is designed to be expansive and unobstructed, with deliberate visual connections to key functional nodes:

- Flight information displays are positioned centrally ahead
- A seating/waiting area to the left
- Check-in counters to the right

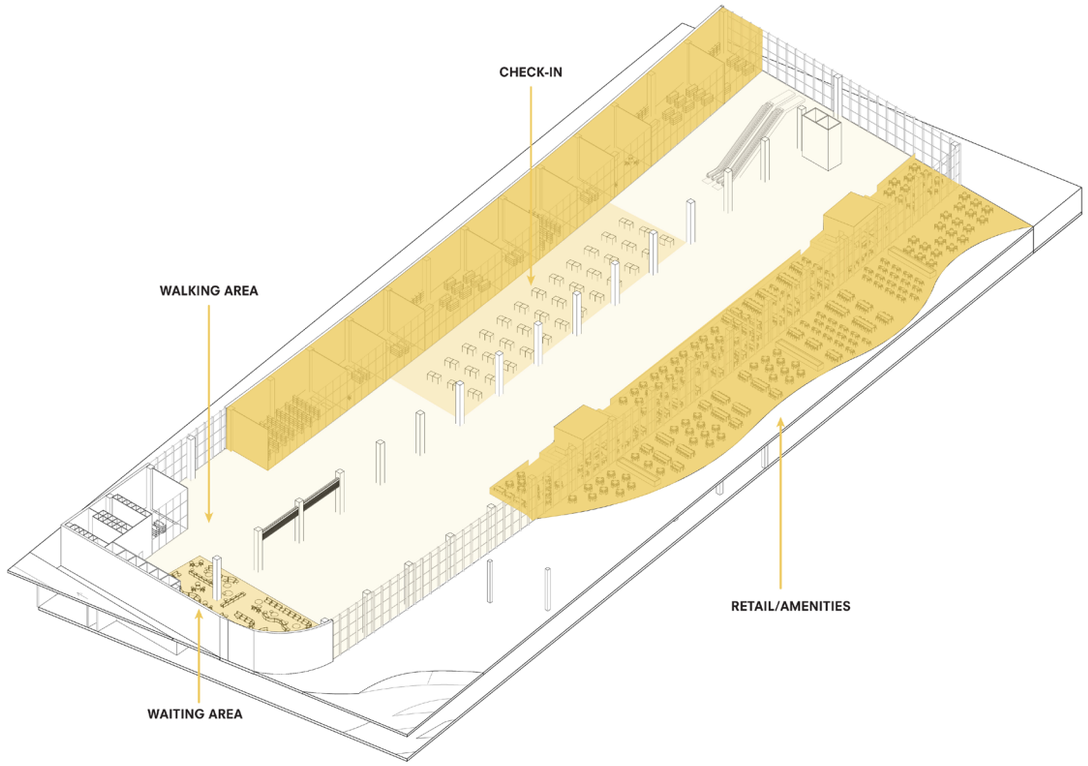
This zoning ensures immediate spatial comprehension, minimizing disorientation in an unfamiliar environment and mitigating potential bottlenecks.

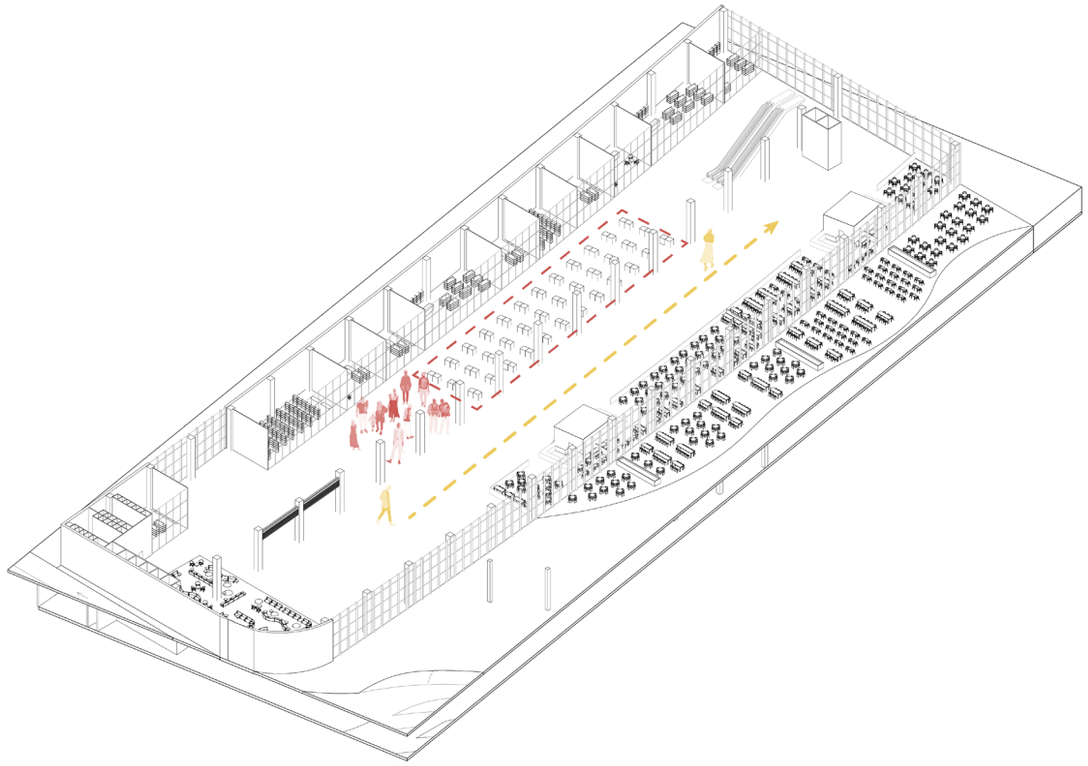
Further enhancing efficiency, the check-in area is positioned along one side of the hall, with generous queueing space that does not interfere with the traffic toward security.

A single, well-defined corridor channels passengers seamlessly to subsequent destinations, eliminating ambiguity in circulation paths.







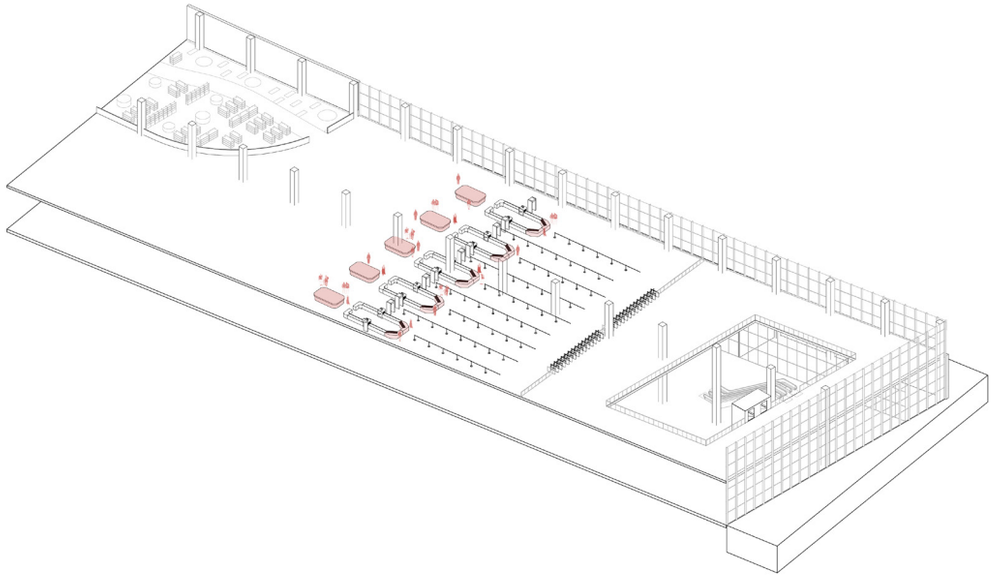
## Processing areas

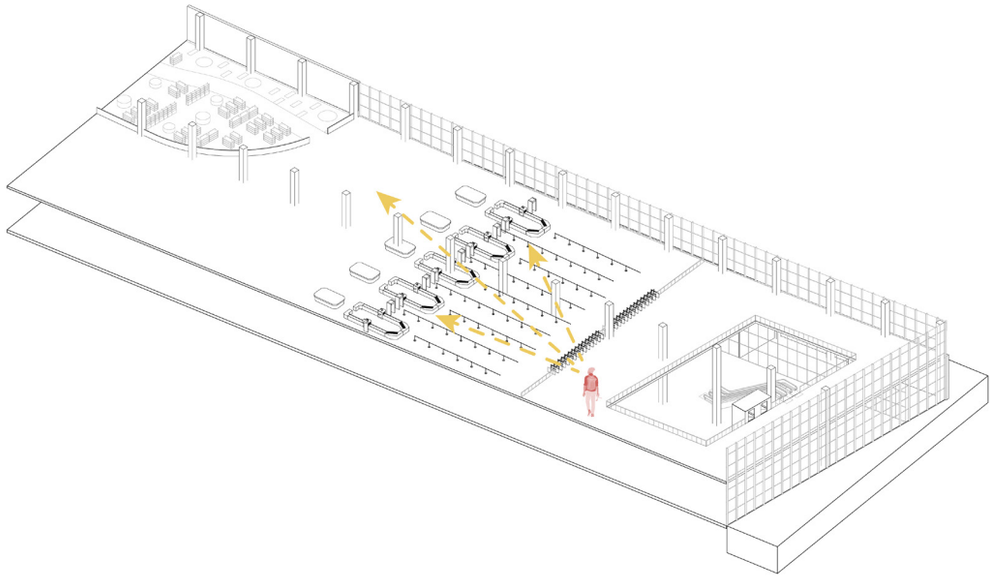
**Security:**
Recognized as the most stressfull component of air travel, the security checkpoint was designed to prioritize passenger comfort and operational efficiency.

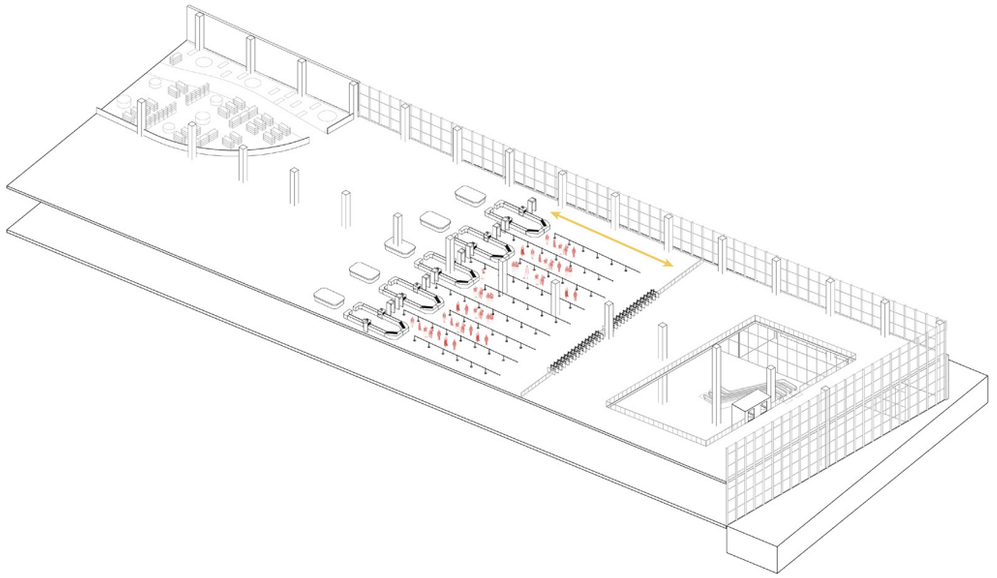
The layout adopts a clean, linear configuration featuring ten security lanes, with clearly demarcated zones for queuing, screening, and post-security regrouping. Ample queueing space prevents congestion, while a generously proportioned approach corridor eliminates potential bottlenecks near staircases.

**Wayfinding and Stress Reduction**
The space is intentionally open and visually transparent, allowing passengers to maintain clear sightlines toward subsequent procedures. Research confirms that such visibility reduces stress by diminishing uncertainty about forthcoming steps. Additionally, the furniture design provides sufficient room for unpacking and repacking luggage outside the primary circulation path - a design intervention that directly addresses a major contributor to delays.

**Connection to the lake**
Strategically positioned at the terminus of the north wing, the security area benefits from a three-sided glass façade that floods the space with natural light and establishes visual connections to the exterior (North and East Facades: Panoramic views of the lake and park; West Facade: Overlooks the terminal's central piazza). This design decision to incorporate natural light and greenery creates an atmosphere of calm, counteracting the inherent stress of security procedures.








Departures A1-12
Departures B1-12
Flights

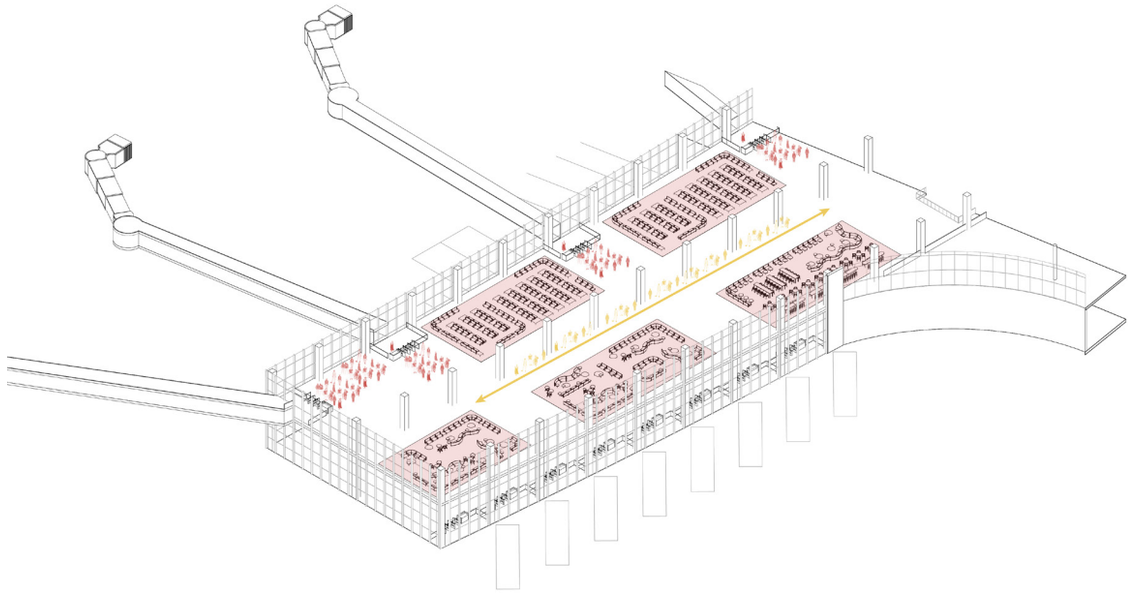
## Processing areas

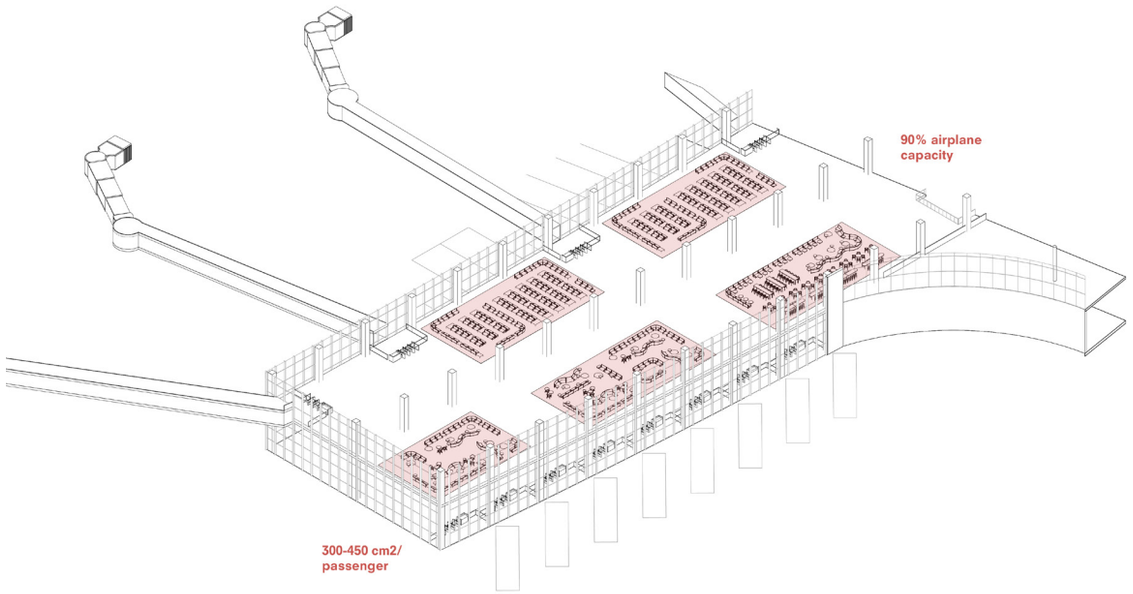
**Departure Lounge:**
The departure lounge is designed to maximize passenger comfort while ensuring operational efficiency, creating a calm and pleasant pre-boarding environment.

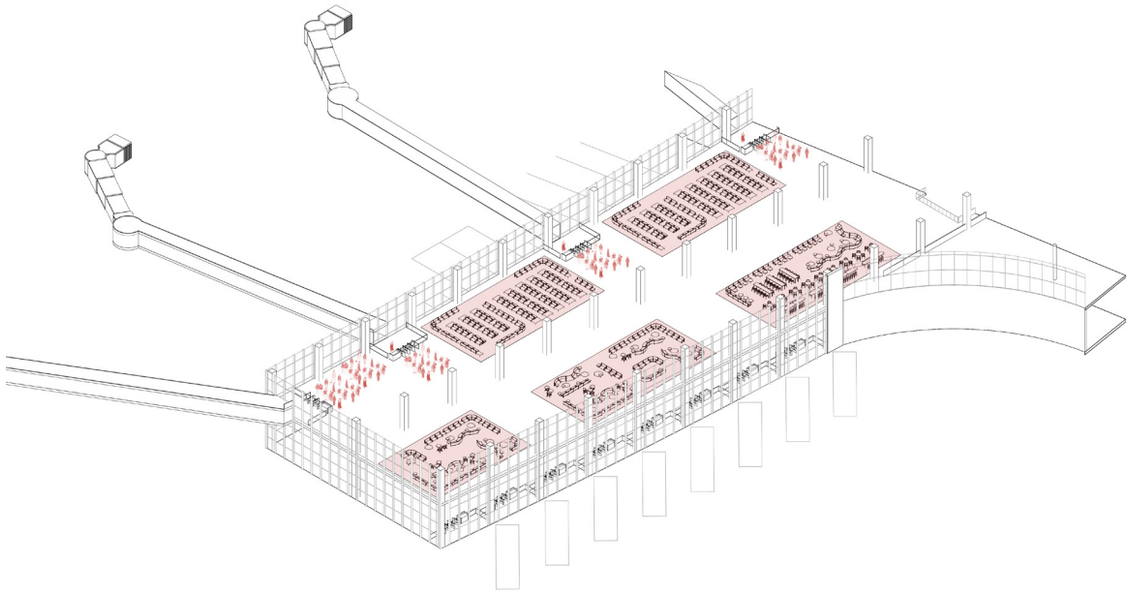
**Spatial Organization and Zoning**
The layout employs a clearly defined zoning between the waiting areas, queuing zones, and unobstructed corridors to facilitate smooth passage flow. This prevents the stressful scenarios commonly observed in airports, where passengers waiting to board often cluster between chairs and luggage, creating chaotic conditions.

**Capacity Planning and Passenger Comfort**
The lounge is designed to accommodate 90% of the aircraft's seating capacity, ensuring sufficient space for passengers while avoiding overcrowding. Key comfort considerations include:

- Ample seating provisions with appropriate spacing between seats
- Integrated luggage storage solutions to maintain clear walkways
- Strategic placement of amenities (e.g., power outlets, workstations) within easy reach of seating areas





## Interior design

The interior material selection was a key conclusion from research analyses, as the atmosphere of spaces significantly impacts passenger comfort and emotional state. Passenger surveys further confirmed these findings, revealing preferences for more comfortable furniture and colorful environments.

Consequently, the interior design prominently features wood, marble, and stone—all-natural, locally sourced materials. This palette creates a rich interior that reflects Milanese architectural traditions and cultural identity. The extensive glazed facades provide constant views toward the lake and park, and together with the interior garden allow greenery to slip into the interiors.

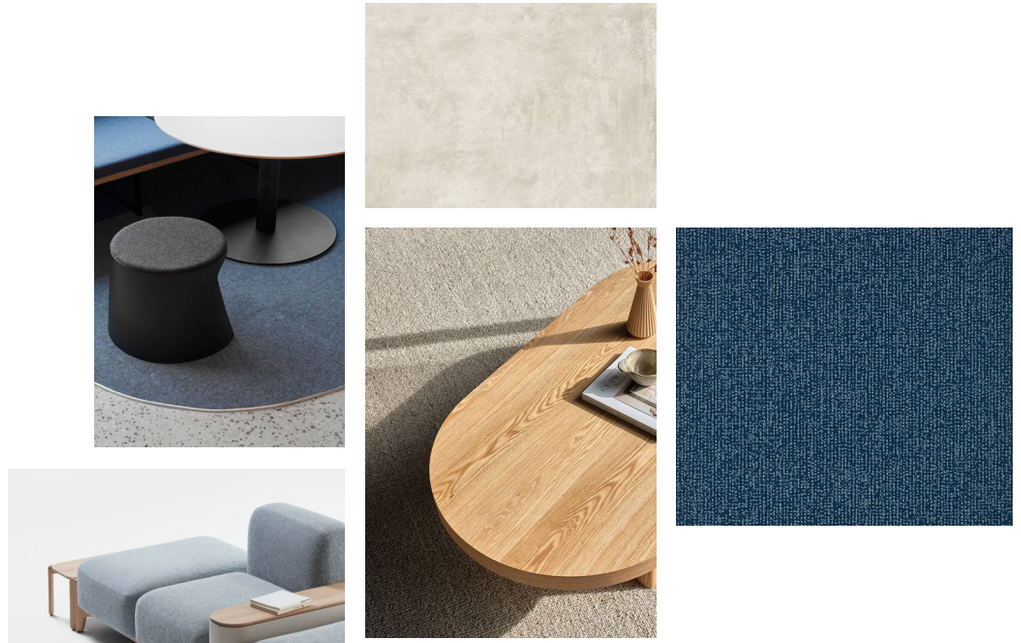
To assist with wayfinding, different zones employ distinct color schemes that subconsciously guide passengers:

- Restaurants feature darker wood, red tones, and pink marble, embodying Italian craftsmanship
- The departure lounge utilizes softer colors and textiles to create a calm, relaxing atmosphere, transforming the gate area into a comfortable living space

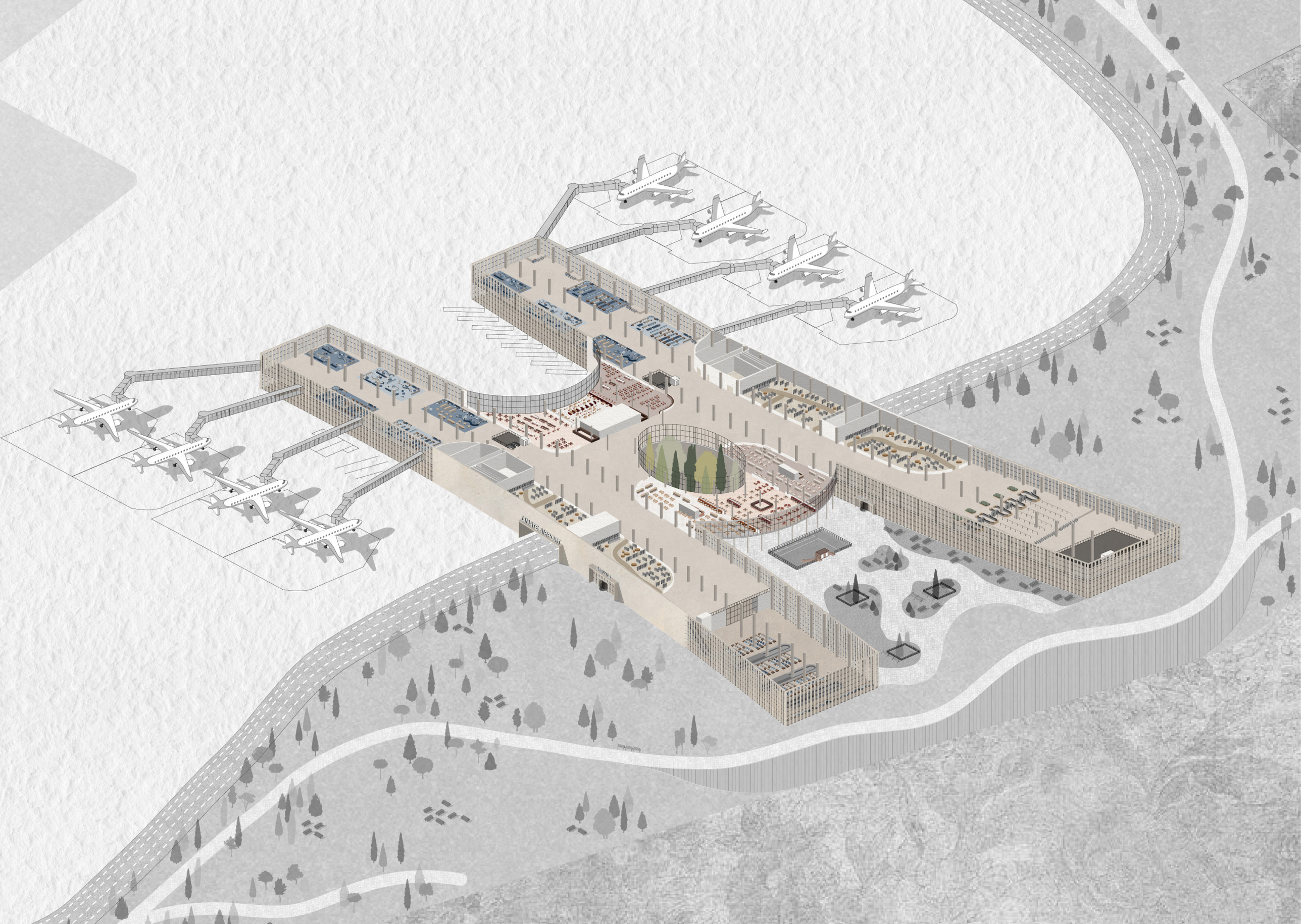




Materialization for restaurants



Materialization for lounge


LIMA AIRPORT

## Interior design

### Departure Lounge:

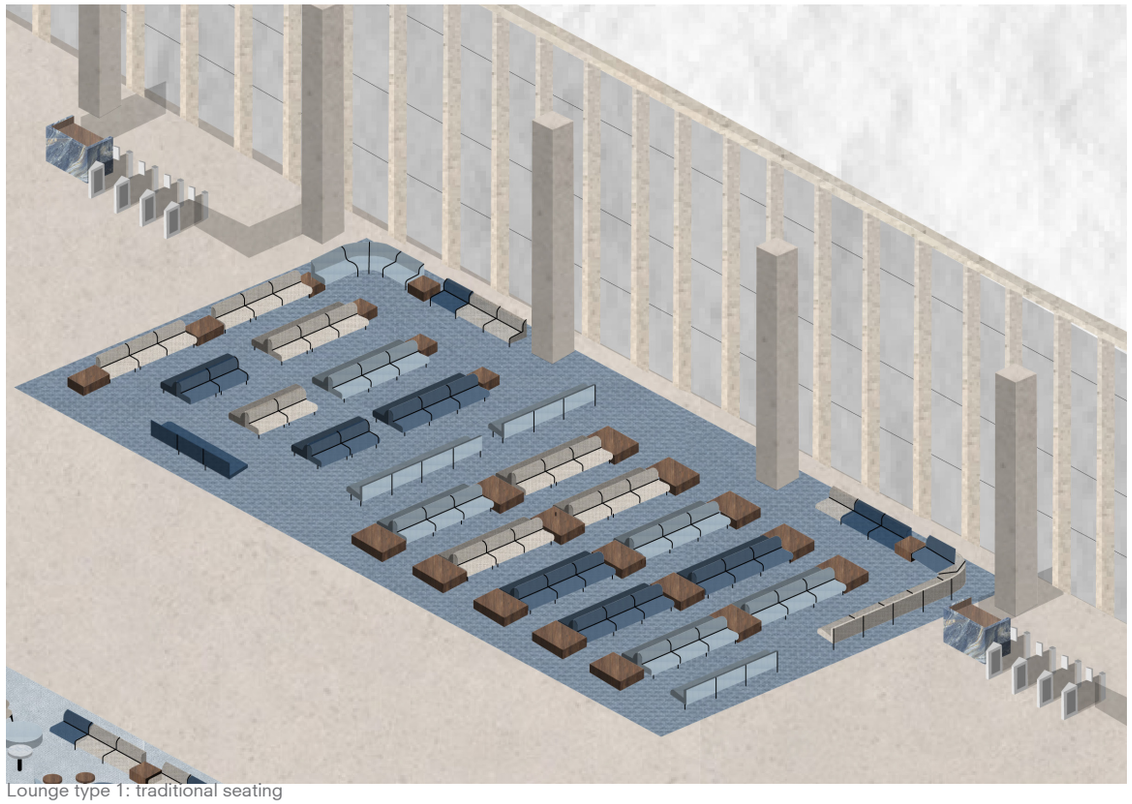
Passenger survey data revealed a clear demand for varied lounge typologies that address different traveler needs and behaviors. In direct response to these findings, the terminal design incorporates three distinct lounge configurations within each wing, each tailored to specific usage patterns and comfort requirements.

The first lounge type employs a traditional seating arrangement commonly found in airport environments, prioritizing spatial efficiency to accommodate maximum passenger capacity.

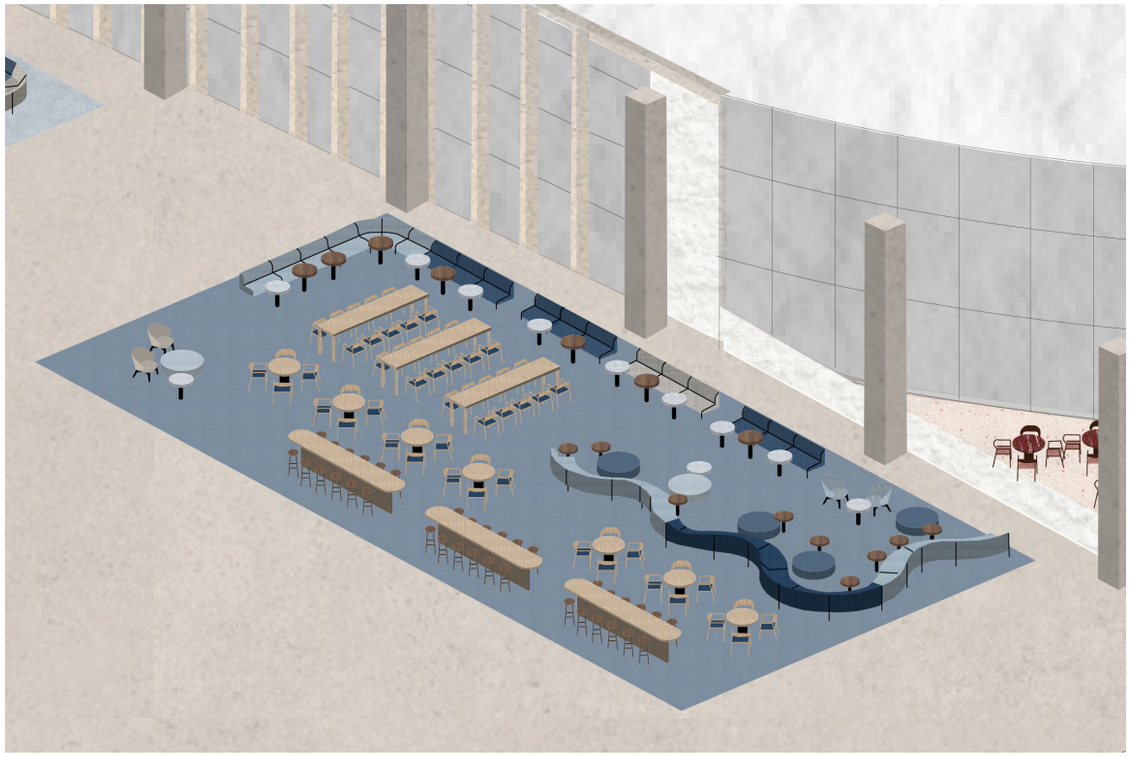
A second lounge variant offers a more relaxed atmosphere, featuring armchairs and spacious couches designed for passengers facing extended wait times.

The third lounge type functions as a dedicated workspace, designed to support productivity with laptop-friendly surfaces and meeting areas. This configuration responds to the growing need for work facilities within transit environments, catering to business travelers and remote workers alike.

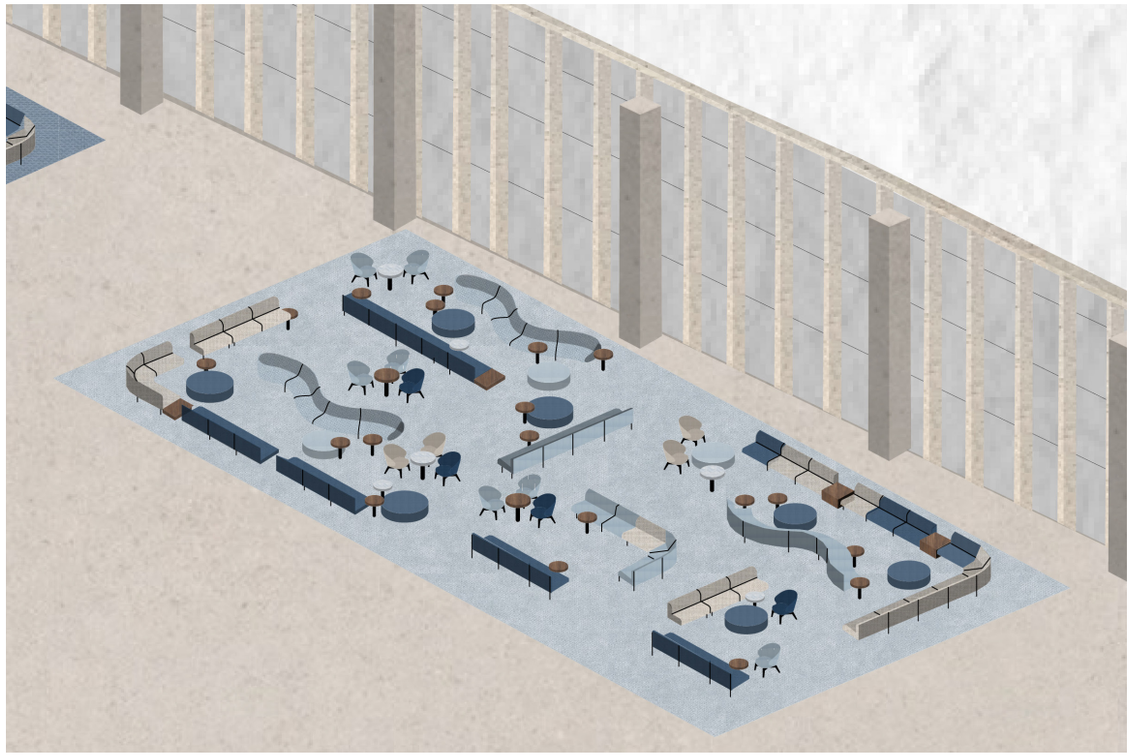
All lounge variations incorporate shared comfort-enhancing elements, including sound-absorbing carpeting, accessible side tables, integrated power outlets, and charging stations. These universal features ensure a baseline level of functionality and comfort across all lounge environments, while the distinct spatial configurations address specific passenger needs identified through user research.



Lounge type 1: traditional seating



Lounge type 3: work space



Lounge type 2: relax space


A3

## Interior design

**Restaurants:**

Six restaurants surround the interior garden, complemented by additional dining options on the ground floor of both airside and landside.

The food court encircling the garden serves as the heart of the terminal, functioning as a central hub where all passengers congregate, relax, and spend time between flights. This strategically designed space offers multiple visual connections that enhance the passenger experience:

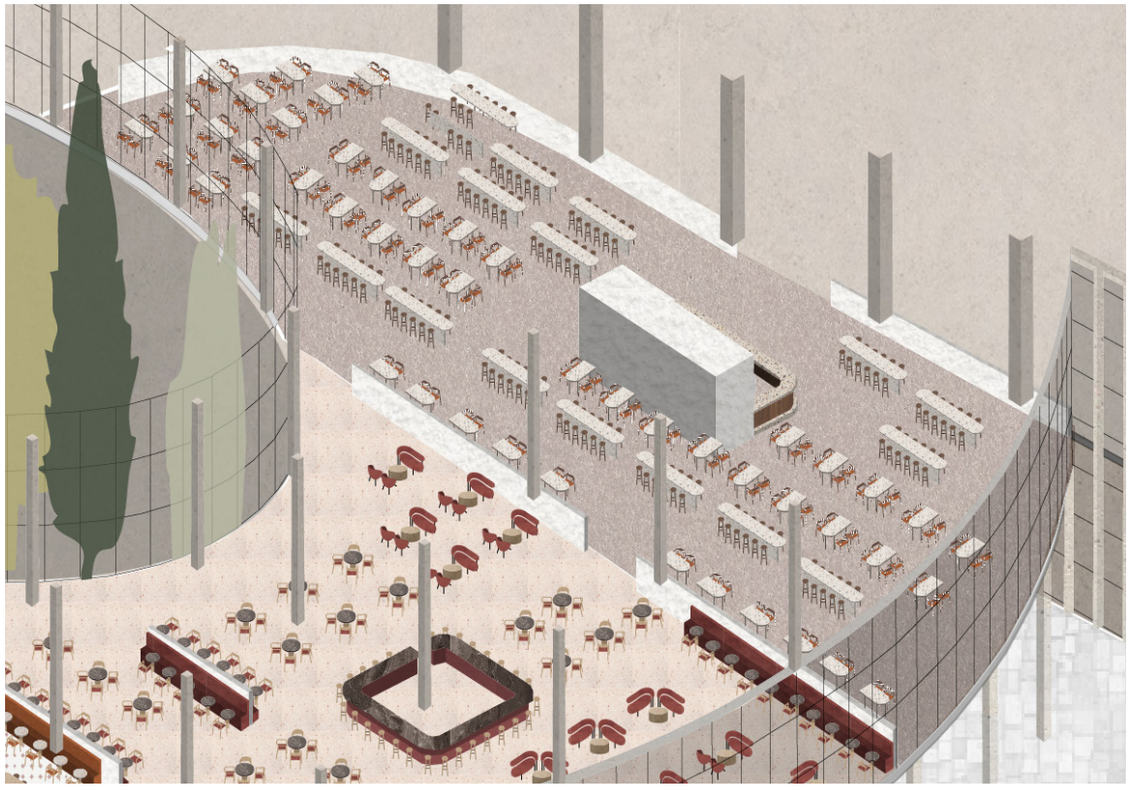
- Views toward the park and piazza (landside)
- Perspectives of the runway and airside operations
- Sightlines to the curb and parking areas through the garden

These visual linkages create a unique spatial narrative where travelers can simultaneously observe:

- The beginning of their journey (represented by the piazza)
- The upcoming phase of travel (symbolized by the runway)

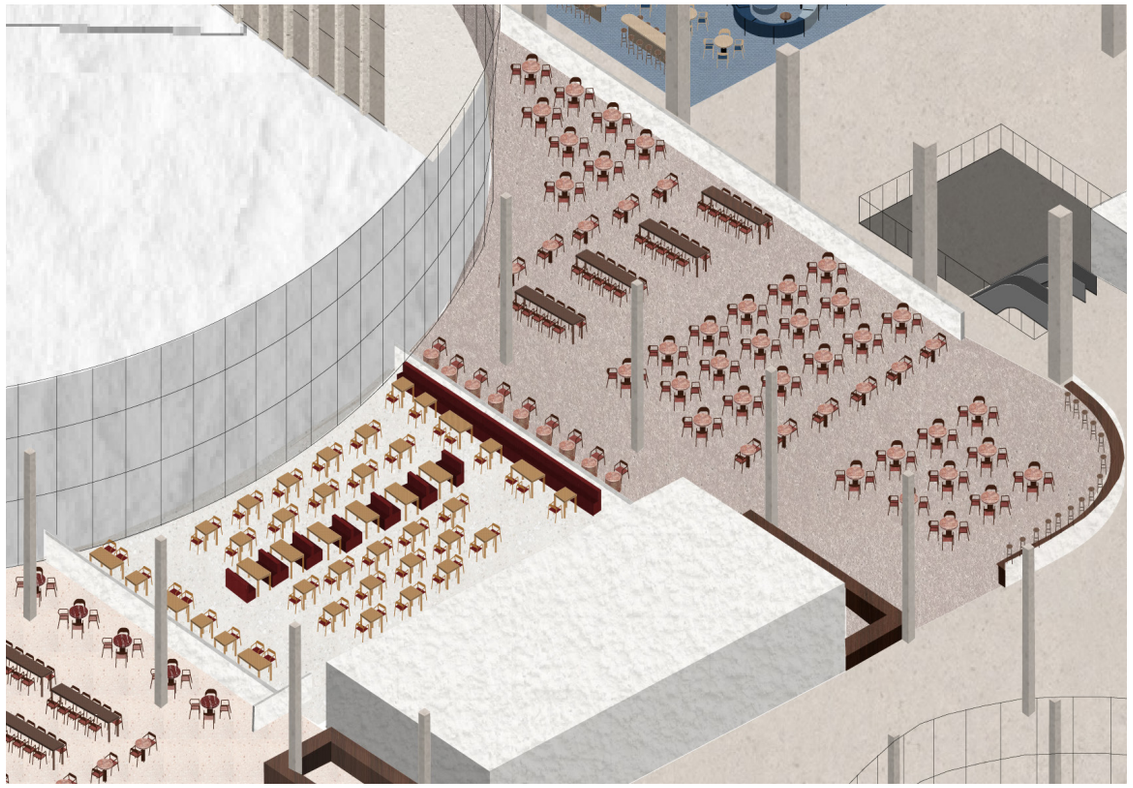
This configuration physically manifests passengers' transitional position in their travel experience - the midpoint of their journey.

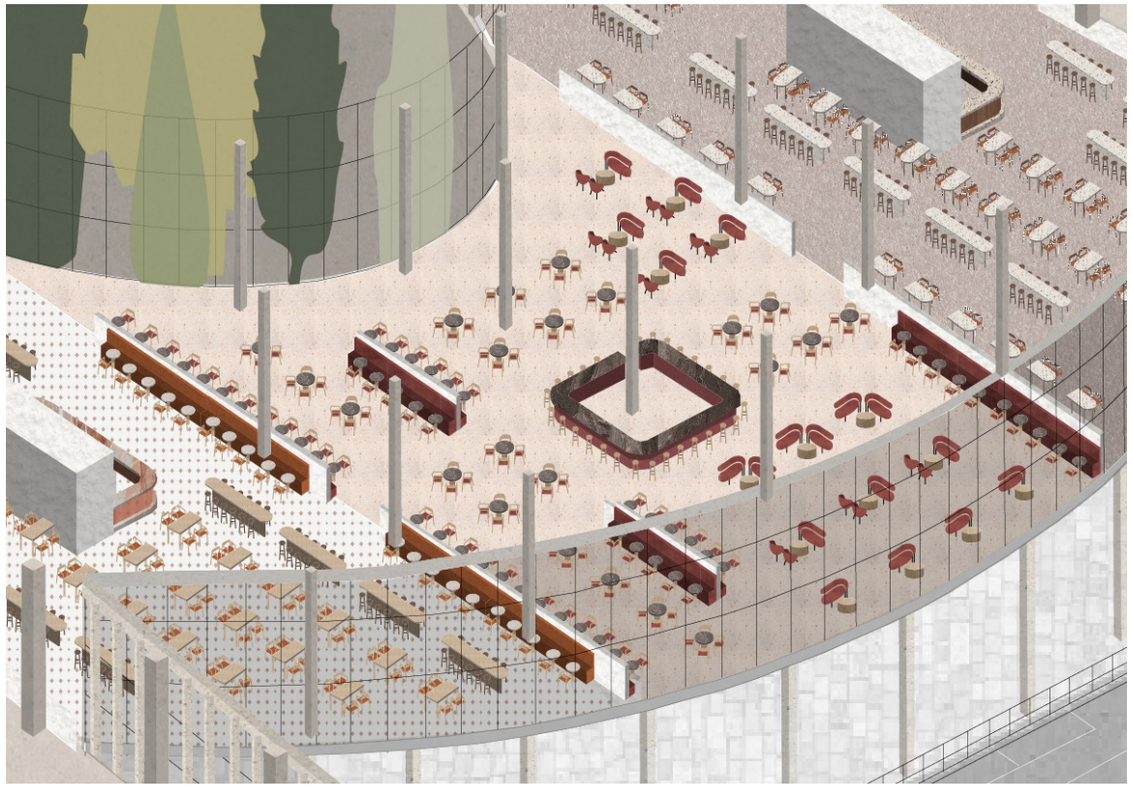
To reinforce this concept, each restaurant features distinctive material palettes and spatial layouts that contribute unique character to the dining precinct.











## Interior design

### Baggage hall:

The baggage hall occupies a double-height space at the landside terminus of the south wing. Three fully glazed walls provide panoramic views of the park and lake, creating an immersive natural environment that gives arriving passengers the immediate sensation of being within the park.

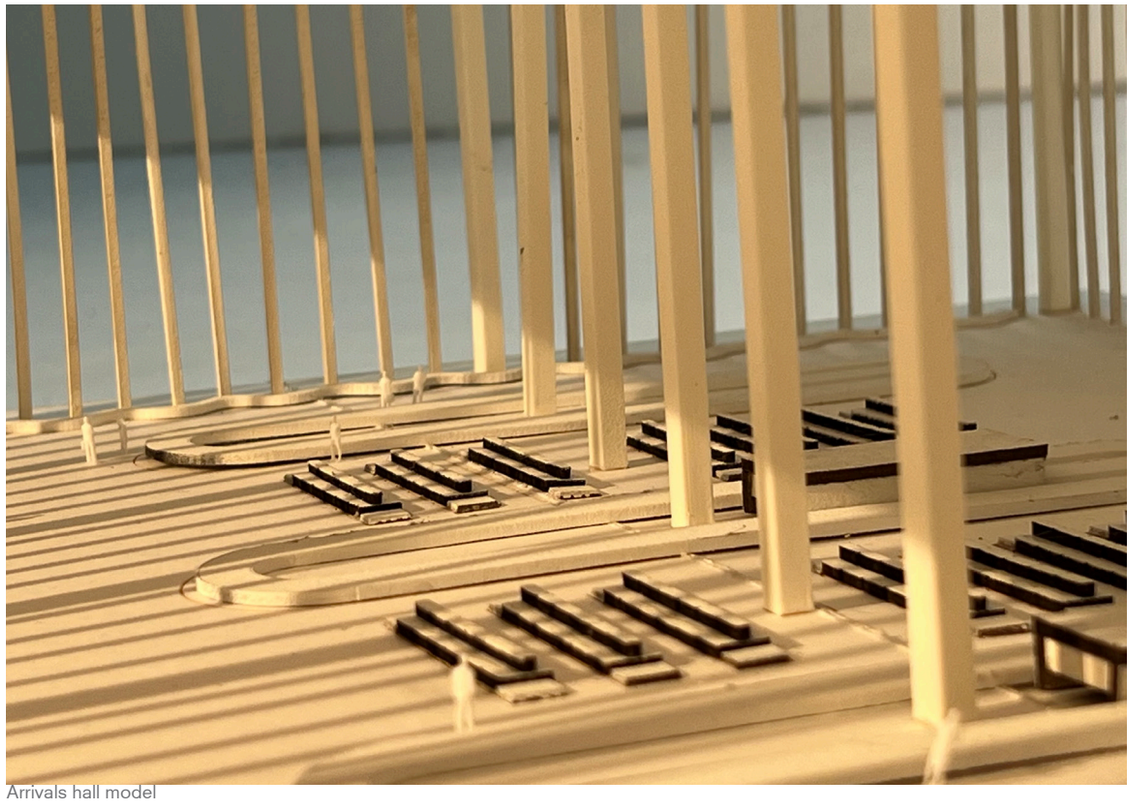
As this space serves as the sole waiting area for arriving passengers, particular attention was given to ensuring both comfort and visually engaging surroundings. The fourth wall, facing the piazza, offers views of the journey's starting point - including the curb, arriving passengers, departure hall entrance, and even the security area.

This configuration establishes a rare visual connection between the baggage hall and security zones, achieving two significant effects:

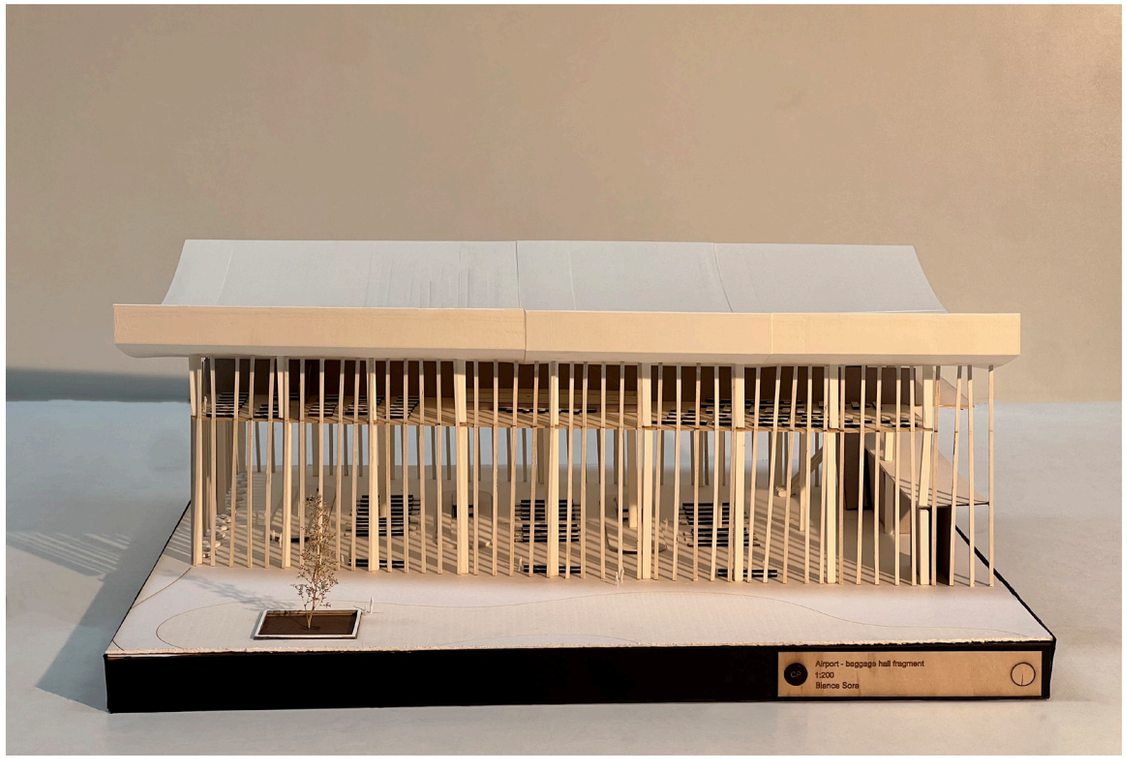
- Completing the physical loop of passenger circulation
- Creating a metaphorical closure to the travel journey through visual continuity



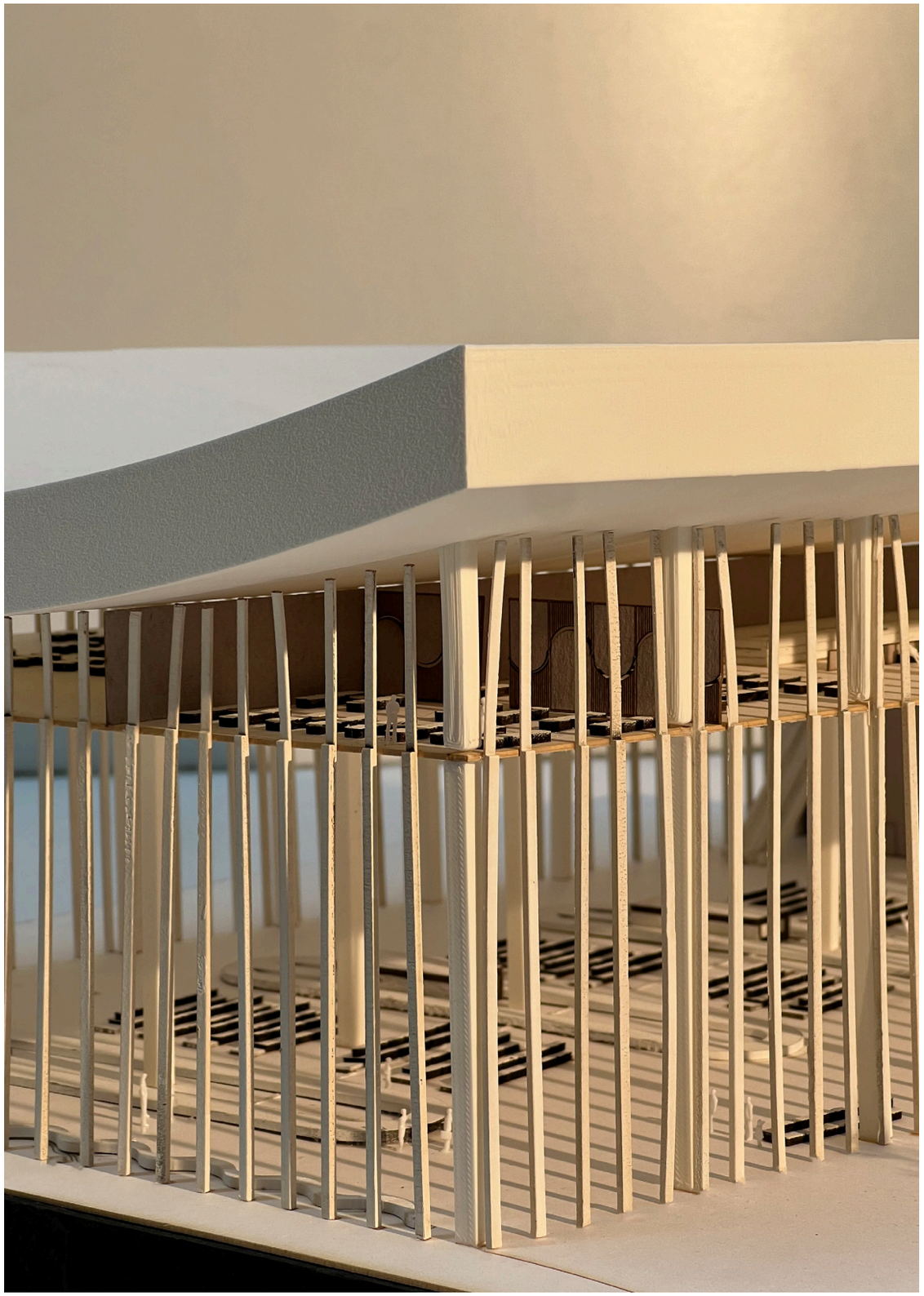




Arrivals hall model

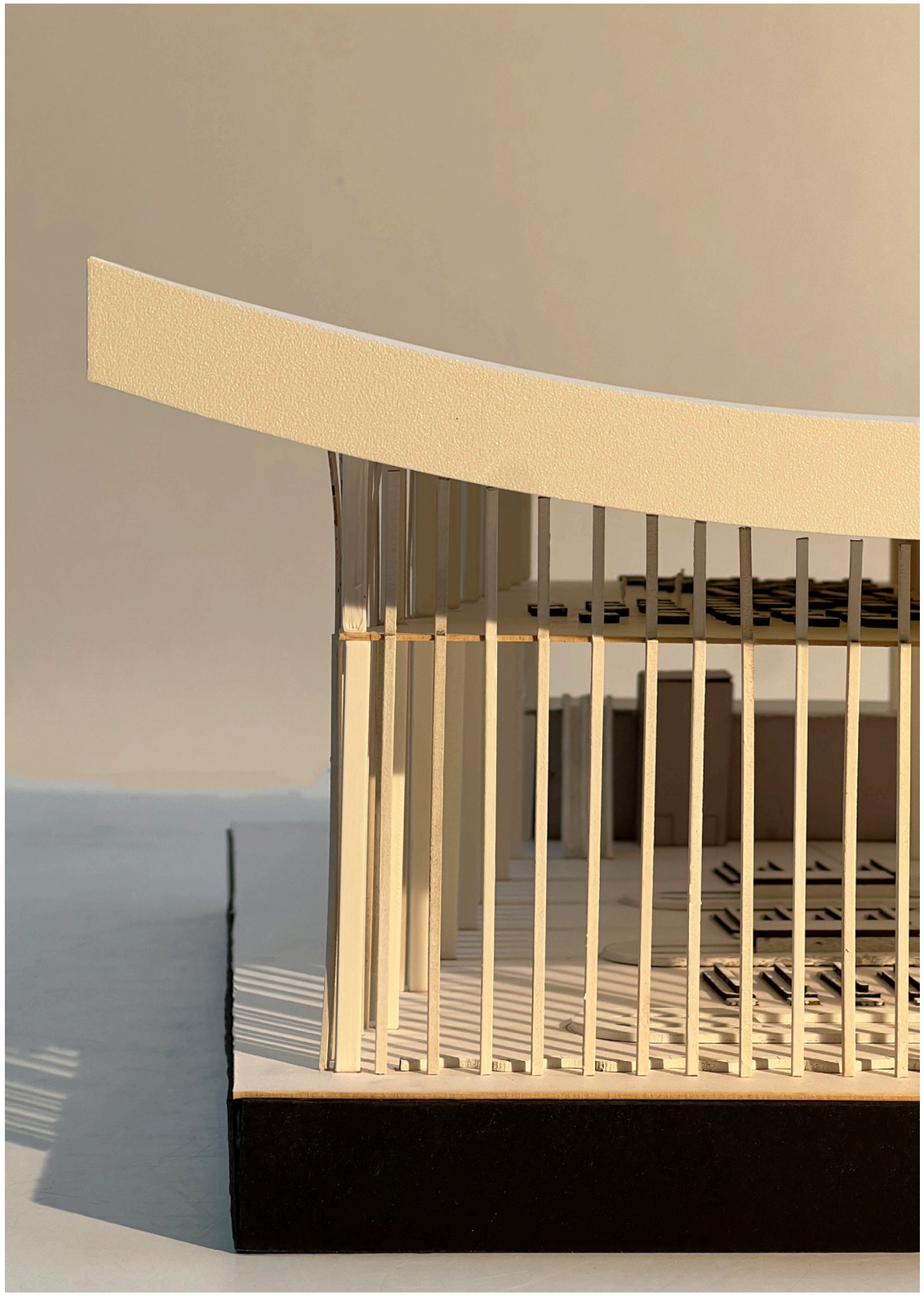



Arrivals hall model



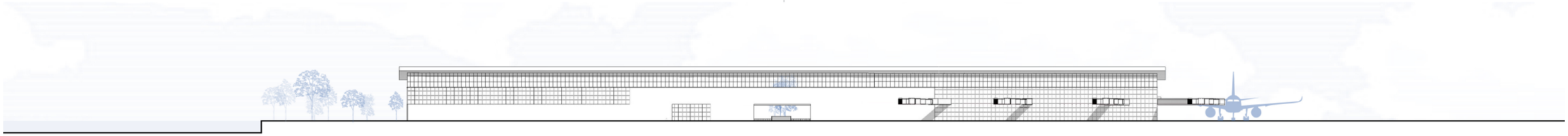
Arrivals hall model



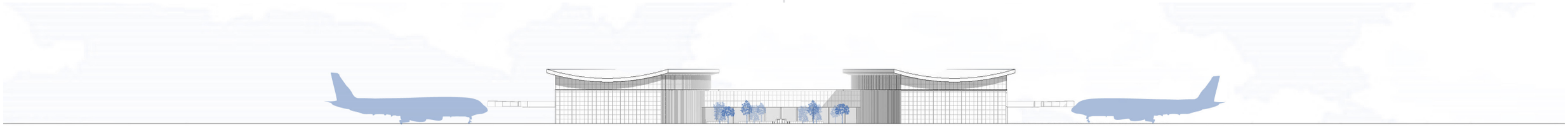


Arrivals hall model

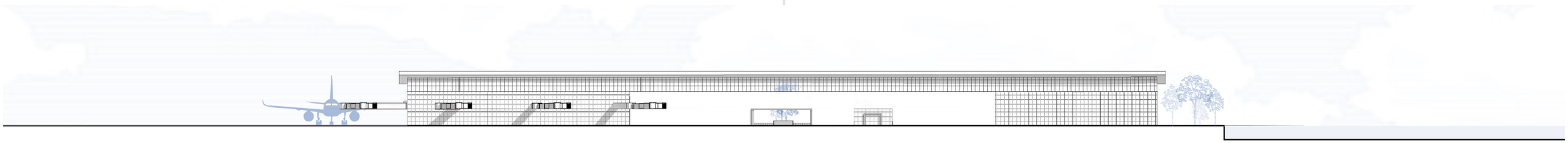

Belt 4
Belt 3
Belt 2



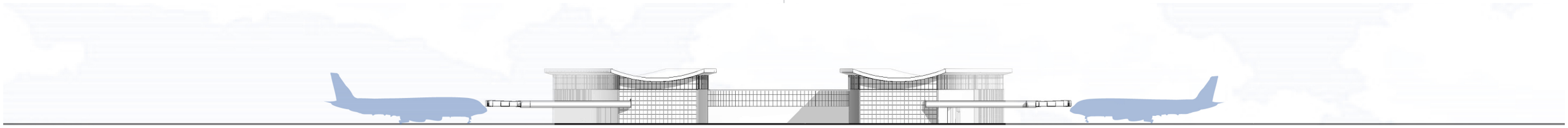
North facade



East facade



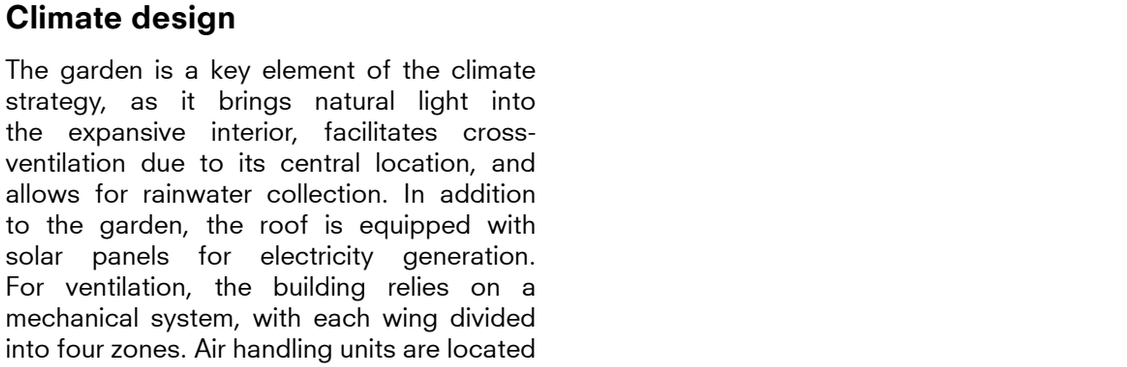
South facade

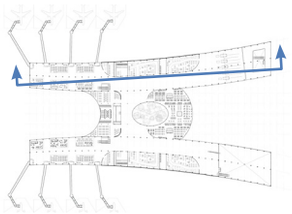


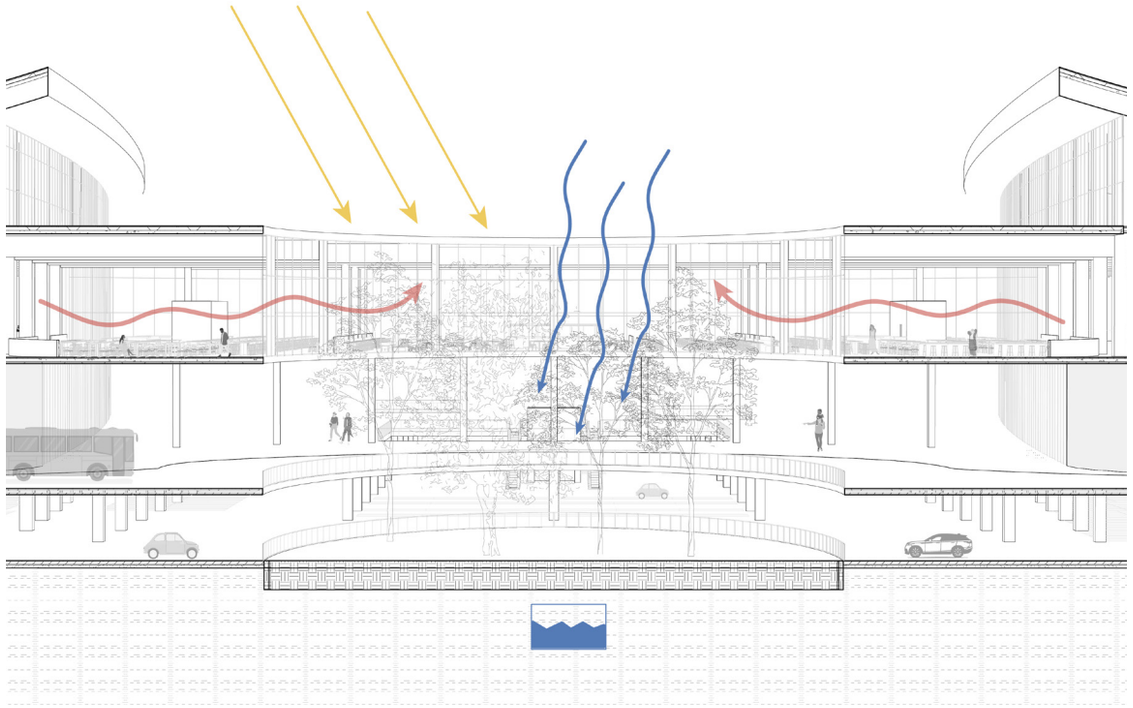
West facade

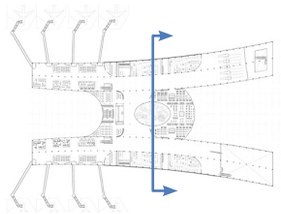
## Climate design

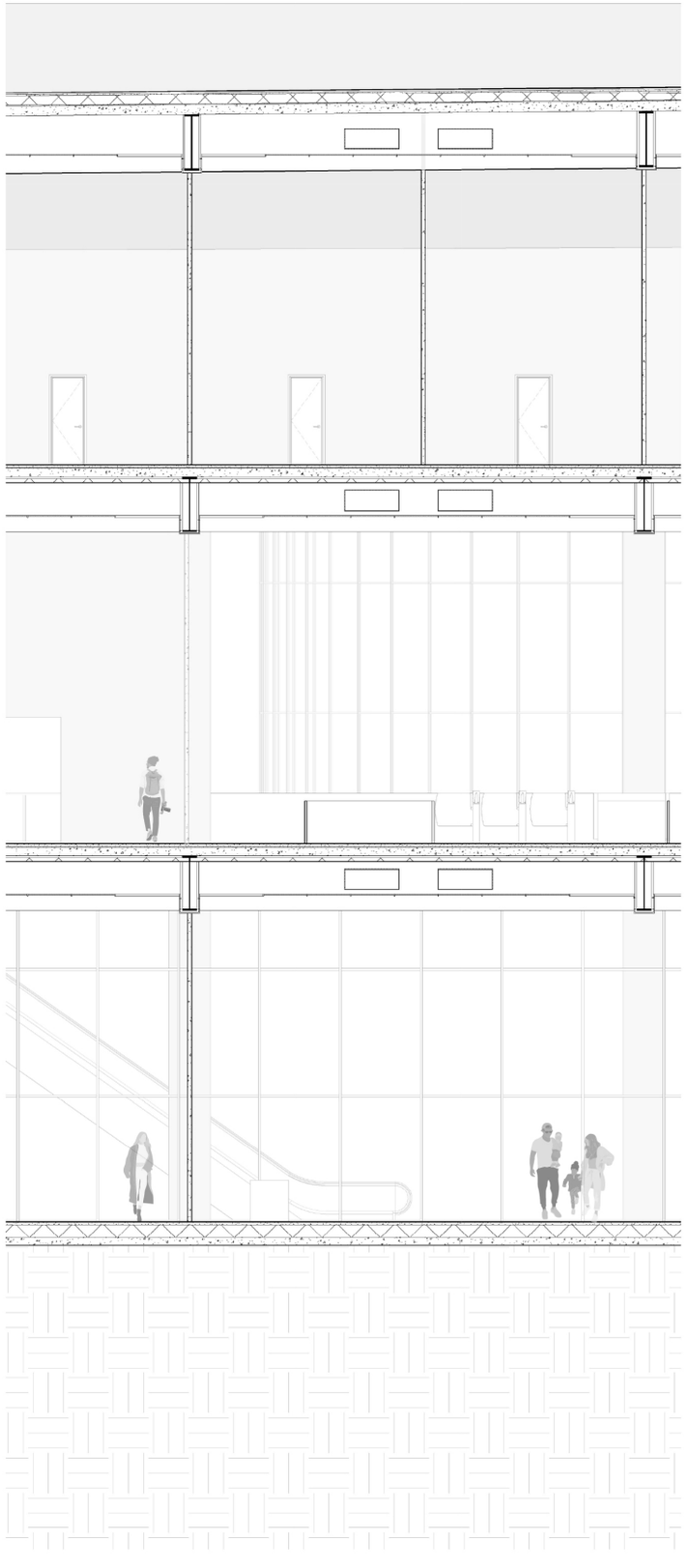
The garden is a key element of the climate strategy, as it brings natural light into the expansive interior, facilitates cross-ventilation due to its central location, and allows for rainwater collection. In addition to the garden, the roof is equipped with solar panels for electricity generation. For ventilation, the building relies on a mechanical system, with each wing divided into four zones. Air handling units are located on the top floor, while heat pumps are installed underground.

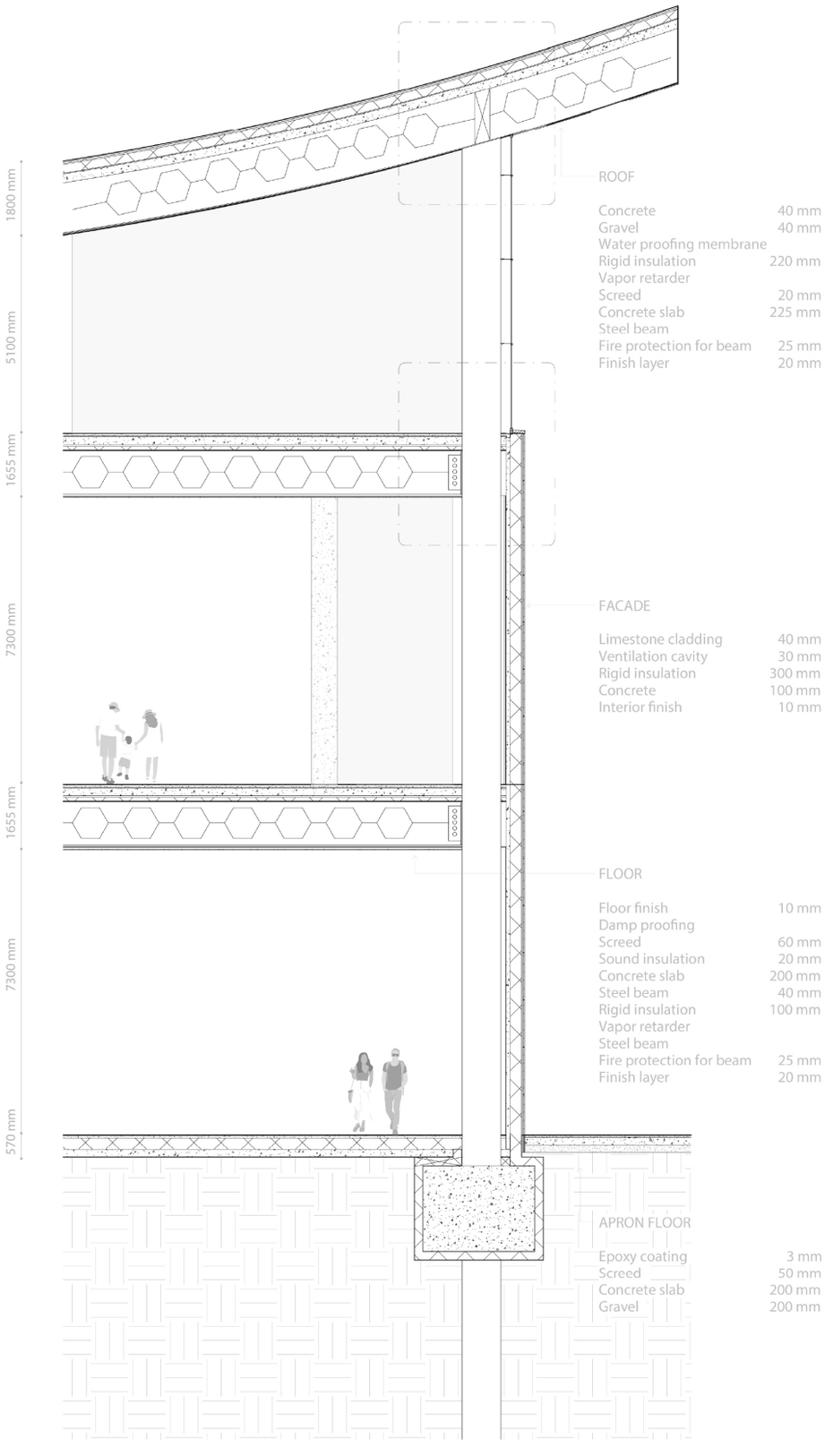


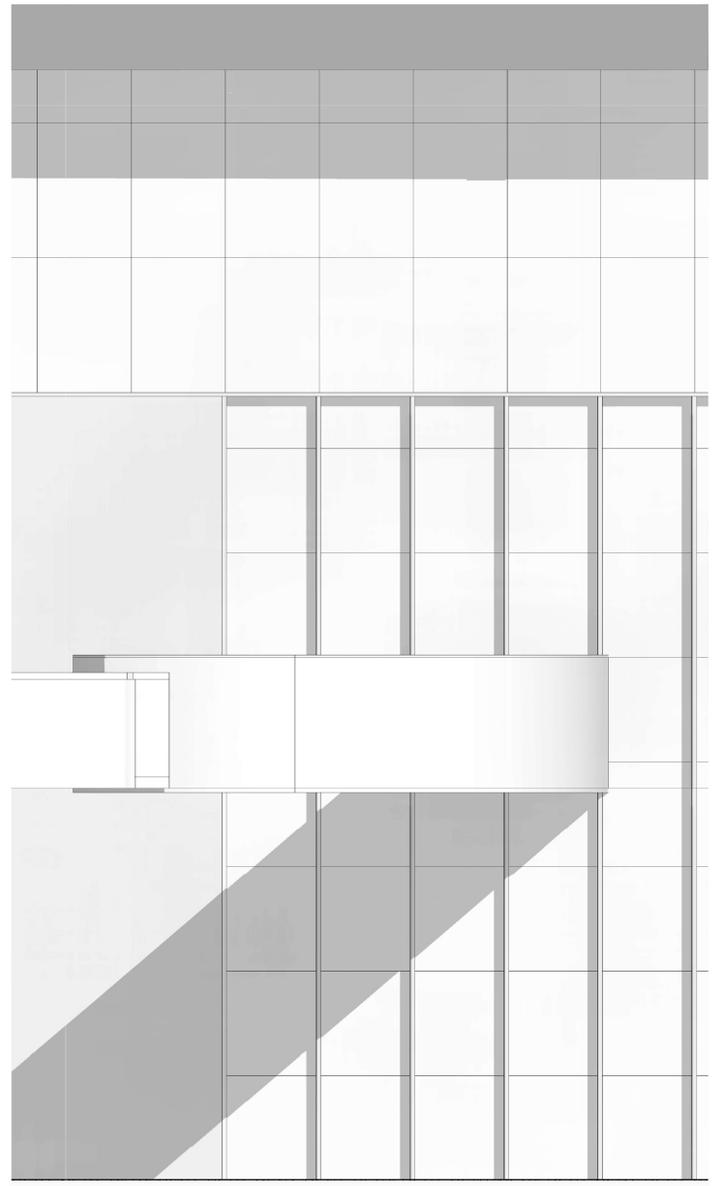







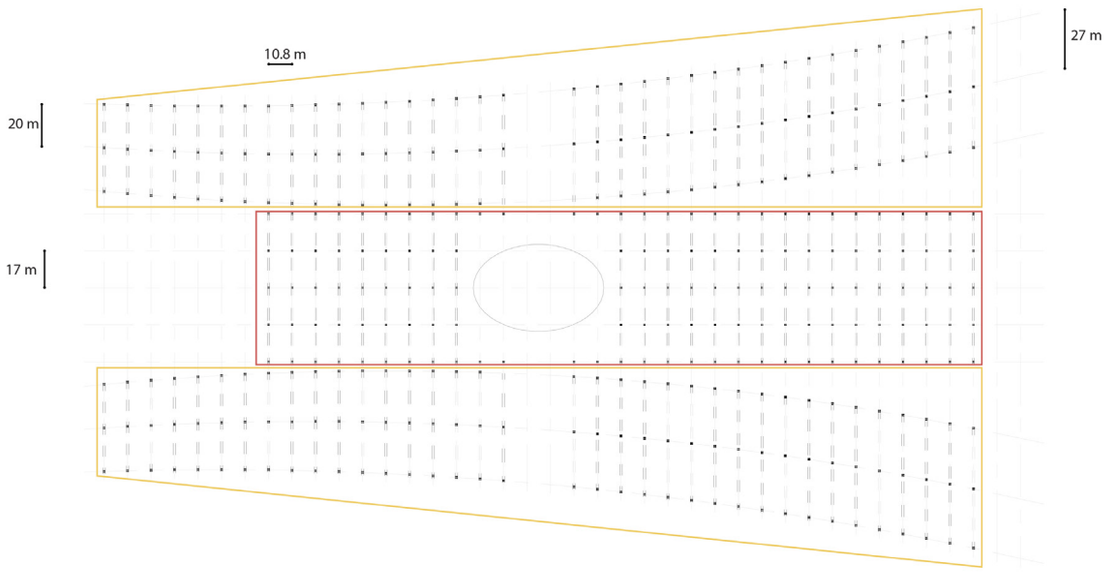



1800 mm
5100 mm
1655 mm
7300 mm
1655 mm
7300 mm
570 mm
ROOF
Concrete 40 mm
Gravel 40 mm
Water proofing membrane
Rigid insulation 220 mm
Vapor retarder
Screed 20 mm
Concrete slab 225 mm
Steel beam
Fire protection for beam 25 mm
Finish layer 20 mm
FACADE
Limestone cladding 40 mm
Ventilation cavity 30 mm
Rigid insulation 300 mm
Concrete 100 mm
Interior finish 10 mm
FLOOR
Floor finish 10 mm
Damp proofing
Screed 60 mm
Sound insulation 20 mm
Concrete slab 200 mm
Steel beam 40 mm
Rigid insulation 100 mm
Vapor retarder
Steel beam
Fire protection for beam 25 mm
Finish layer 20 mm
APRON FLOOR
Epoxy coating 3 mm
Screed 50 mm
Concrete slab 200 mm
Gravel 200 mm



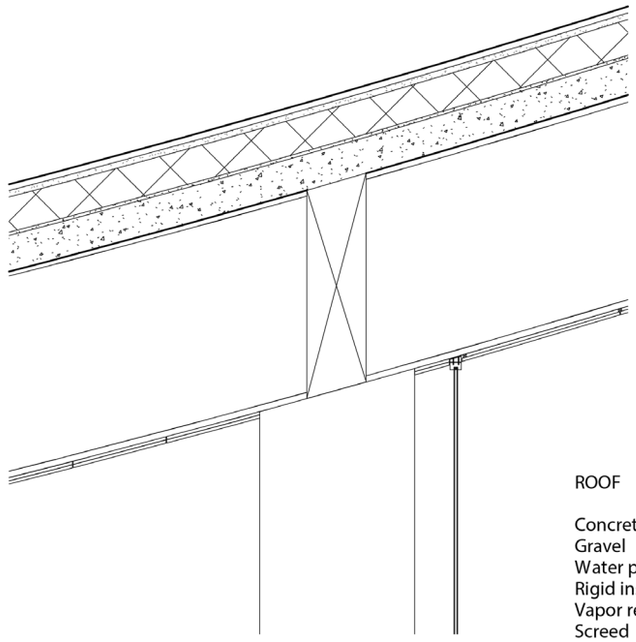
## Structure

The building is divided into two grid systems: one for the central section and another for the wings, which are mirrored on each side. The wing grid follows the curvature of the facade, with spans ranging from 27 meters on the landside to 20 meters on the airside. The central grid maintains a consistent span of 17 meters throughout, while the y-axis features a uniform 10.8-meter grid spacing. Structurally, concrete columns are positioned at each grid intersection, with steel beams spanning between them.







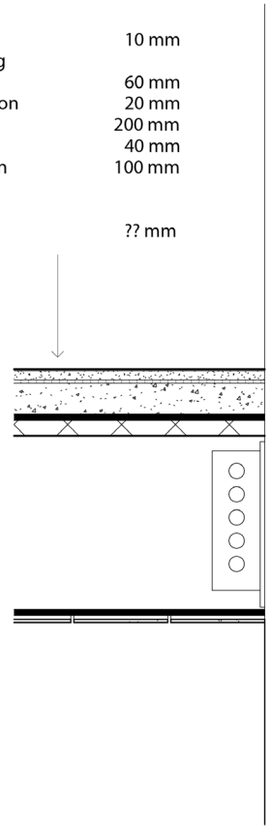



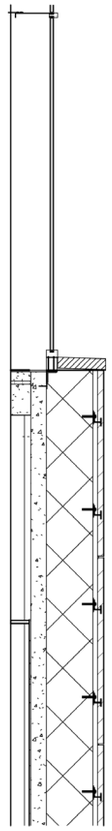
ROOF

| | |
|---|---|
| Concrete | 40 mm |
| Gravel | 40 mm |
| Water proofing membrane | |
| Rigid insulation | 220 mm |
| Vapor retarder | |
| Screed | 20 mm |
| Concrete slab | 225 mm |
| Steel beam | |
| Acoustic panel | ?? mm |

FLOOR

| | |
|---|---|
| Floor finish | 10 mm |
| Damp proofing | |
| Screed | 60 mm |
| Sound insulation | 20 mm |
| Concrete slab | 200 mm |
| Steel beam | 40 mm |
| Rigid insulation | 100 mm |
| Vapor retarder | |
| Steel beam | |
| Acoustic panel | ?? mm |





FACADE

| | |
|---|---|
| Limestone cladding | 40 mm |
| Ventilation cavity | 30 mm |
| Rigid insulation | 300 mm |
| Concrete | 100 mm |
| Interior finish | 10 mm |

# CONCLUSION

04

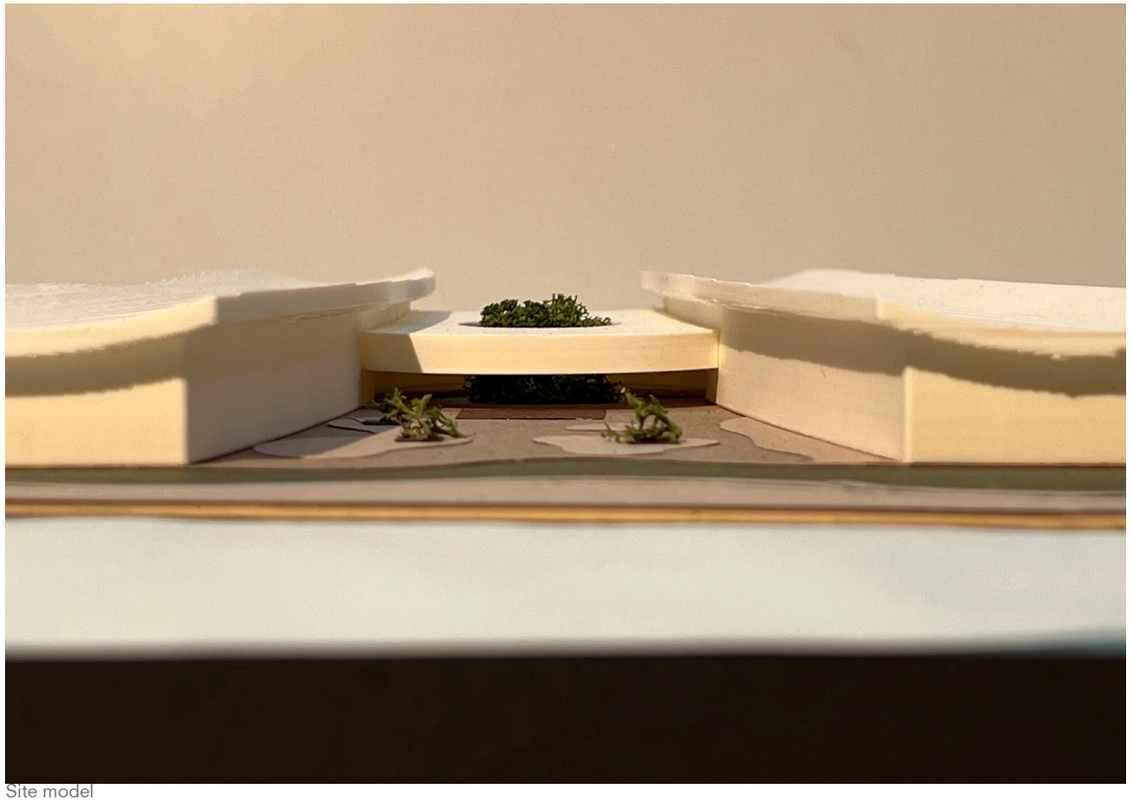
## Conclusion

The ambition of this project was to design an airport that brings back the human scale in the design by creating spaces that answer to the needs of the passengers. Guided by this ambition and the central research question, every design decision was carefully considered to achieve the final outcome.

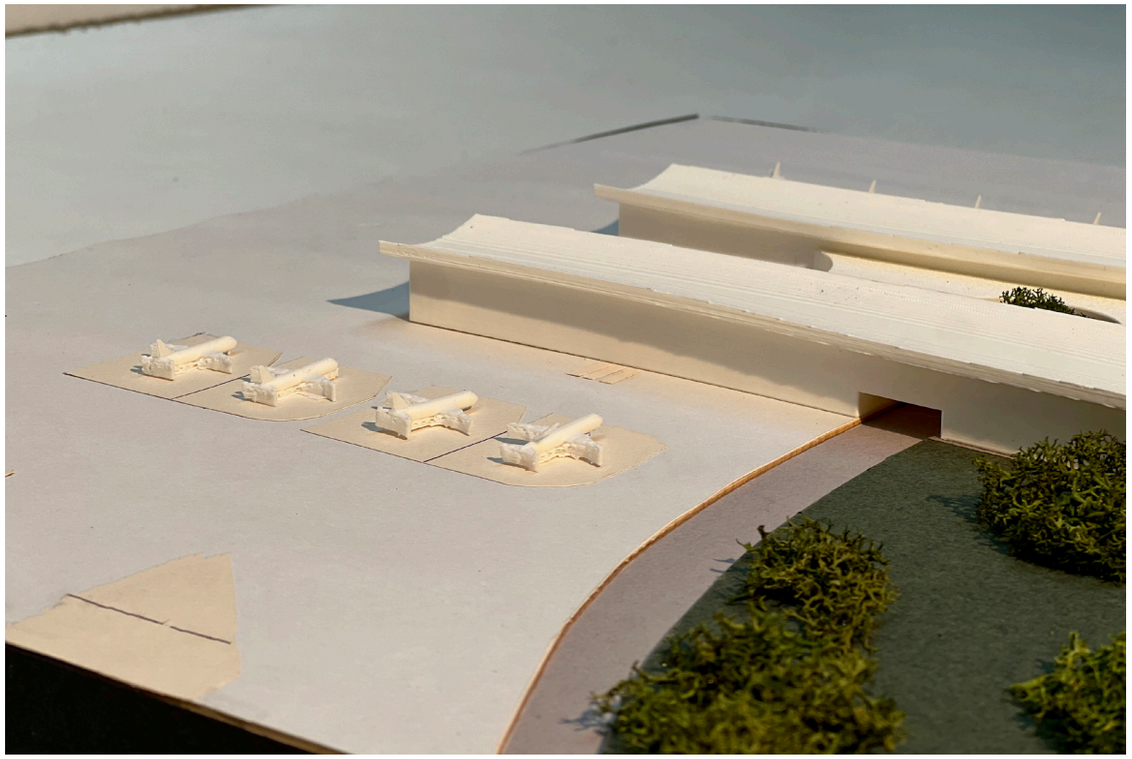
The new Linate Airport places passengers at its core, addressing their practical needs and emotional experience while balancing efficiency with comfort. The research question informed all scales of the project, shaping the airport's site positioning, form, interior layout, circulation, functional zoning, spatial quality, atmosphere, and materiality. Each detail was intentionally designed to transform air travel into a more enjoyable and relaxing experience.

As a conceptual framework, this project aims to inspire architects and contribute to the evolving discourse on the future of aviation architecture. It is the author's hope that it will serve as a catalyst for further innovation in redefining airports as a vital and human-centric architectural typology.





Site model



Site model



Site model

**Relationship between research and design**

The graduation studio prioritized extensive research to establish a solid foundation for all design decisions. Over six months, thorough investigation and analysis culminated in a comprehensive design brief that guided the entire creative process. This dedicated research period provided deep insight into three key areas: the site context, airport typology, and passenger experience – each critically informing the project's development.

Site analysis revealed both opportunities and challenges – the presence of the lake and surrounding park offered natural assets, while accessibility issues between the park and city presented design considerations. These findings directly shaped the building's massing, placement on the plot, and integration with the city. The research particularly illuminated how the building's positioning affects passengers' emotional experience during arrival and departure sequences.

The typological study and passenger experience research yielded specific design guidelines addressing all architectural scales – from overall functional organization to interior details. The resulting scheme features an efficient layout minimizing walking distances through intuitive wayfinding, while the massing reflects careful consideration of passenger flow patterns. Interior treatments combine materiality and spatial design to create a calming atmosphere that simultaneously celebrates Milanese identity, positioning the airport as a dignified gateway to the city.

This rigorous, research-based approach ensured every design decision responded to clearly identified needs and opportunities, resulting in a solution that is both conceptually grounded and detail-sensitive.

**Relationship between graduation topic and studio topic**

The graduation project was developed through the Complex Project studio, which cantered on the theme "Bodies and Buildings"—an investigative framework examining how large-scale architecture interacts with human perception and bodily experience. This conceptual foundation provided the ideal platform to critically reevaluate airport design, with a focus on the relationship between passengers and spatial experience.

The studio's lens allowed for an in-depth exploration of how to restore human scale and sensory comfort in an architectural typology typically dominated by efficiency-driven mega-structures.

By analyzing movement patterns, spatial perception, and psychological comfort, the design process sought to soften the overwhelming nature of air travel. The result was an architectural approach that balances the necessary complexity of airport operations with tactile materiality, calibrated proportions, and intuitive layouts—ultimately demonstrating that even in vast infrastructural projects, human experience can and should be the guiding priority.

**Research method and approach in relation to the graduation studio**

The research began by exploring passengers' emotional and perceptual experiences of airport spaces through interviews. This foundational work established human perception as the driving force behind all subsequent design decisions, framing the airport not merely as an complex building, but as a space shaped by user experience.

The methodology developed organically through multiple layers of investigation: firsthand accounts from travellers mapping emotional responses to specific spatial conditions, academic studies identifying common stress triggers in airport environments and comparative analyses of how different terminal layouts affect passenger wellbeing. This human-centric approach fundamentally shaped the architectural outcome. The building's form and site placement emerged directly from passengers' described experiences of movement and spatial awareness, allowing user needs to dictate both massing and functional organization.

As the research progressed, the project maintained its core premise of prioritizing the human perception of space, and every design decision served as an opportunity to translate research insights into spatial qualities that reduce stress and enhance clarity.

**Relationship between the graduation project and the wider social, professional and scientific relevance**

Dealing with the passenger experience in an airport focuses on designing flows of people and spaces for mobility, a topic of high importance in the current society. This research provides insight into designing efficient mobility hubs, focusing on movement flows and spatial organization for large crowds. The findings can be applied to a variety of high-traffic environments, including airports, train stations, stadiums, and other public venues. By addressing how people navigate and interact within these spaces, this study seeks to inform design strategies that improve crowd flow, reduce congestion, and enhance user experience across diverse architectural settings.

**Ethical issues and dilemmas:**

The research-based approach, while effective in minimizing ethical concerns through data-driven decisions, presented an inherent tension: its logical framework could appear disconnected from the emotional and human dimensions central to the project. This created a fundamental challenge in reconciling methodological rigor with the need to prioritize passenger experience and human scale.

However, the graduation studio reinforced that for complex projects of this nature – involving numerous stakeholders with competing priorities – an evidence-based methodology is not merely advantageous but necessary. It provides the most objective means to navigate diverse needs while limiting subjective bias.

Beyond these considerations, airport design carries significant environmental responsibilities. The aviation sector's substantial carbon footprint, contribution to urban heat islands, and resource-intensive nature cannot be ignored. While airports remain vital to global infrastructure, their climate impact demands ongoing attention and dedicated efforts to mitigate their ecological consequences.

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# APPENDIX

06

## List of elements that influence the airport service quality

Spatial Layout and Functions:

- clear layout
- airport amenities position
- airport services position
- connection with the parking lot
- presence of baggage cars
- presence of moving walkways and escalators
- queues
- long walking distances
- difficulty with wayfinding
- security process feels intimidating
- duty-free area is overstimulating and unavoidable
- baggage claim services
- difficulty to reach connection flight
- existence of electrical passenger transfer
- existance of comfortable seating for waiting
- open spaces
- many windows to view the planes
- means of optaining information on local attractions and hotels
- poor plan configuration

Ambient conditions:

- loud noises
- bright lights
- crowded spaces
- bilboards, advertisments, screens
- lack of natural light
- soothing music
- air quality
- furniture design

Functions:

- conference rooms
- church
- banking services
- children's play area
- business centers
- relaxing services
- recliner lounges
- national chain restaurants
- baby changing tables
- gym
- educational museums
- mail facilities
- smoking area
- restaurants that serve local food
- retails that portray local culture

Signs & Symbols:

- amount of information constantly delivered
- confusing signs
- difficulty with wayfinding
- not finding out about flight changes
- public announcements
- more flight information displayed
- external signs
- signs through airport directing to airport facilities
- flight information displays are confusing
- excesssive number of signs
- wish for display of art
- airport's decor should match the local culture and history
- modern decor

Service personnel:

- to be neatly dressed
- willing to solve problems
- never to be too busy to respond to questions
- to be able to direct the passenger to the destination
- available to offer individual attention
- easily identified as an employee
- fast respons to any complains
- knowledgeable about local areas of interest

Services:

- clean environment
- quality of basic facilities
- attractivness of space
- use of selfservice technologies
- flight delays
- cancellations
- being search at security creates stress
- can't pick your seat in the plane
- rude behaviour of other passengers
- forced to stay in close proximity to other passengers
- fear of terrorist attacks