



KB nationale
bibliotheek

Building Balance

Spatial Strategies for Research and Public Functions at the Koninklijke Bibliotheek

AR3AH115 Heritage Graduation Studio

Revitalising Heritage

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Building Balance

Spatial Strategies for Research and Public Functions at the Koninklijke Bibliotheek

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Abstract

The role of libraries has undergone significant changes in recent years. They evolved from a static repository into a multifunctional 'third space' that fulfils a diverse range of social needs. For a national library such as the Koninklijke Bibliotheek (KB) in The Hague, this poses a clear challenge: how can the building accommodate more public functions without losing the quiet and research-oriented character that is essential to many users? Therefore, this research focuses on the question: *How can spatial strategies within the existing Koninklijke Bibliotheek (KB) contribute to an effective balance between research and public needs?*

The research combines literature study, case studies, and user data from surveys and interviews. The results show that clear zoning, acoustic separation, variation in workspaces, and better orientation are essential strategies for ensuring that the various functions can coexist effectively. At the same time, it should be noted that the case studies mainly concern public, newly built libraries and therefore do not fully correspond to the situation at the KB. In addition, the user survey only provides insight into the experiences of current visitors, leaving non-users out of the picture.

The results of this research form guidelines for the redesign of the KB. They are not fixed solutions, but a basis that needs to be further developed and tested within the context of the existing building and the specific function of the KB.

Keywords: Koninklijke Bibliotheek, spatial strategies, research and public functions, multifunctionality, redesign, reuse, redevelopment, building transformation

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1. Introduction

1.1 The Evolving Role of the Library

In recent decades, the role and function of libraries have undergone a significant transformation. Traditional 19th and 20th century libraries, such as Bibliothèque Sainte-Genève and the Stockholm City Library (Figure 1&2), were characterised by their static design and the quiet and orderly atmosphere focused on individual study and (book) collections. However, digitisation and the changing needs of society have led to the dynamic library designs of the 21st century (Figure 3&4). These modern libraries are evolving into welcoming social hubs, characterised by their open and flexible design. This transformation enables them to accommodate diverse programmes with a strong focus on the user, beyond their traditional function (Aabø & Audunson, 2012; Jochumsen et al., 2012; Latimer, 2018; Lushington et al., 2016; Publieke Ruimte Onder Druk, n.d.; Vinden En Binden van Publiek, n.d.).

In the articles by Mady & Hewidy (2025), Mickiewicz (2016) and Wood (2020), this change is regarded as an opportunity for 21st-century libraries. Libraries are increasingly regarded as “third spaces”. Integrating diverse functions and activities facilitates broader community engagement, fostering the development of vibrant community hubs. Furthermore, adopting flexible and open architectural designs enables libraries to readily accommodate the evolving needs of their users, ensuring their continued relevance in the present and future.

Nevertheless, this transition from traditional, static libraries to multifunctional spaces poses several challenges. As Mady & Hewidy (2025) have observed that the pursuit of openness and flexibility may make it challenging to provide each user with a consistent environment. This issue arises from the necessity for libraries to cater to a diverse range of users in addition to fulfilling their primary function. While traditional users, such as researchers, prioritise quiet and private work areas, public users place great value on social interaction and a sense of community, considering interactive zones, such as makerspaces, cafés and workshops, to be essential. Consequently, many public libraries now prioritise social engagement, a shift that sometimes comes at the expense of their traditional functions (Athens, 2007; Farmer, 2016; Lehmann, 2024; Lushington et al., 2016).

Examples such as The Seattle Public Library and the Tianjin Binhai Library illustrate these challenges. Despite their success as multifunctional institutions in attracting and accommodating a diverse audience, some user groups report noise disturbances and a lack of quiet study or meeting spaces (Athens, 2007; Lehmann, 2024). As Schloffel-Armstrong et al. (2021) note in their article, “Sometimes it is a posing challenge to accommodate new functions within traditional functions.” The fact that libraries now cater to diverse user groups indicates that their multifunctional roles significantly influence their spatial design requirements (Abulude et al., 2024).



Figure 1 | Stockholm City Library



Figure 2 | Bibliothèque Sainte-Geneviève, Paris, 1850



Figure 3 & 4 | Public Library Amsterdam, OBA (left) & Seattle Public Library (right)

1.2 National Libraries: Between Tradition and Transformation

The influence of the multifunctional role on the spatial design of libraries has already been examined in the literature, focusing on public libraries as social hubs, educational centres, and cultural meeting places (Latimer, 2018; Lushington et al., 2016; Mady & Hewidy, 2025; Stanwicks, 2016). While public libraries have been the primary subject of these studies, it is important to recognise that different types of libraries exist, each serving different functions; see *Figure 5* (Lushington et al., 2016).

National libraries, such as the Koninklijke Bibliotheek (KB) in The Hague, exhibit a fundamental difference from public libraries regarding their traditional mission. Their primary functions are preserving the cultural heritage and facilitating research. This contrasts with public libraries' open-access and community-participation model, as national libraries have traditionally functioned within more closed and specialised frameworks (Hoogstraten, 2007; Lushington et al., 2016).

Despite these distinctions, recent research indicates a clear shift in the role of national libraries. This change is driven by broader societal developments and evolving user expectations, which increasingly prompt national libraries to broaden their public-facing functions (Stephens, 2016). This transformation is reflected in initiatives to enhance public engagement, including curated exhibitions, cultural events, educational programmes, and incorporating more commercially orientated functions within library spaces.

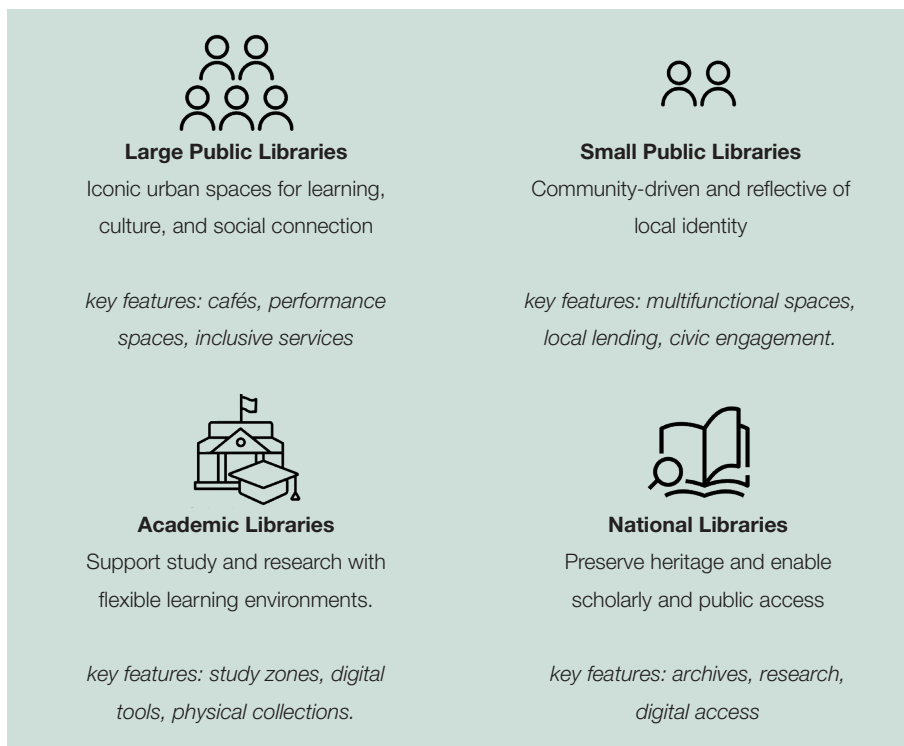


Figure 5 | Types of libraries according to Lushington et al. (2016). Own illustration.

1.3 Knowledge Gap: Spatial Strategies in National Library Design

A significant knowledge gap remains concerning the impact of the multifunctionality section on the spatial design of national libraries. There is a noticeable scarcity of literature specifically addressing the spatial design of national libraries. This makes the current research particularly relevant.

This study focuses on the National Library Koninklijke Bibliotheek (KB) in The Hague to address this gap (see Figure 6&7). Designed primarily as a national institution for knowledge, heritage preservation and research, the KB has traditionally featured a closed architectural character with a strong focus on its research function, offering limited public accessibility and few public-oriented space (Hoogstraten, 2007).

However, recent documents outline a transformative vision for the national library that extends beyond its traditional function. They indicate that the KB aspires to be an accessible and welcoming space for all Dutch citizens, in addition to its function as a research institution. This evolving mandate presents a unique challenge: balancing the library's established function as a research institution with the need to cater to a more diverse, public audience (Berg, 2018; Hermans, 2018; Janssen et al., n.d.; Ministerie van Onderwijs, 2020).



Figure 6 | Building of the KB



Figure 7 | Reading room of the KB building

1.4 Research aim and societal relevance

This research project explores the potential of spatial strategies within the Koninklijke Bibliotheek (KB) to achieve a balance between its research and public functions. The KB will serve as a testing ground for identifying and developing spatial interventions that reconcile these dual purposes.

Library design literature, user surveys, interviews and comparative case studies of multifunctional libraries inform the research. The objectives of the research are to identify the challenges and opportunities in the current spatial design of the KB with regard to combining research and public functions. Secondly, it will determine the spatial needs of researchers and public users based on empirical data and an analysis of best practices. Thirdly, spatial strategies that foster inclusivity and multifunctionality should be developed without compromising the KB's archival and research function.

The findings from this research will give direction to the spatial (re)design of the KB and contribute to theoretical insights on reconciling multifunctional requirements within national libraries.

1.5 Research questions:

How can **spatial strategies** in the building of the Koninklijke Bibliotheek contribute to creating an effective **balance** between **research and public needs**?

- What are the challenges and opportunities in the library design to fulfil the researcher and public needs?
- What spatial functions and environments do researchers and public users require?
- How can spatial strategies for the Koninklijke Bibliotheek be formulated based on user surveys and case study analysis to balance research and public functions?

2. Definitions

Spatial strategies

These are design principles that organise the physical space of a building. They regulate how different functions are separated or combined, such as zoning, circulation, hierarchy, and thresholds, so that space is organised in an efficient and user-orientated way (Ching, 2007). However, spatial strategies also encompass acoustic considerations and the optimisation of space through multifunctionality (Abulude et al., 2024; Lushington et al., 2016).

Balance

The distribution of the elements of design, such as mass, colour, function and shape, within a composition ensures that no part of the design overpowers or feels heavier than another (Ching, 2007).

Research needs

Research needs refer to the facilities and resources necessary for in-depth research or study. This includes access to (specialised) collections and scientific databases, as well as the availability of quiet study environments and expert support (Choy & Goh, 2016; Farmer, 2016).

Public needs

Public needs emphasise the importance of open and free access to information, resources, and community programmes for all. This includes providing learning-rich and welcoming spaces, facilitating social connection, and bridging the digital divide (Garnar & Tonyan, 2021; MLA, 2010).

3. Methodology

A mixed-methods approach is applied to address the research questions, combining case study analysis, surveys, interviews and literature review. This chapter describes the different methods and explains how they will be used for each sub-question.

3.1 Sub-question 1: Challenges and Opportunities in Library Design

The first sub-question, “*What are the challenges and opportunities in the library design to fulfil the researcher and public needs?*”, will be answered through case study analysis. The selected case studies have been chosen based on their user-centred approach and the extent to which they accommodate the needs of diverse user groups. The selected modern libraries are the Oodi Central Library in Helsinki, Amsterdam Public Library (OBA) and the Seattle Public Library.

The analysis focuses on four spatial themes categorised under spatial strategies, which are common factors in designing multifunctional buildings (Caan, 2011; Ching, 2007; Jochumsen et al., 2012; Lehmann, 2024; Lushington et al., 2016). Themes are explored through architectural drawings, floor plans and photographs. To structure and deepen the analysis, a set of guiding questions has been developed for each theme. The four spatial themes are:

- 1. Zoning and functional layout**, with particular attention to the spatial organisation of functions and the relationship between quiet and active zones.
- 2. Accessibility circulation**, focusing on circulation, orientation and the relationship between public and research areas.
- 3. Acoustic strategies**, focusing on sound control and spatial separation.
- 4. Flexibility and multifunctionality**, focusing on spaces accommodating multiple uses.

By answering this question, the study aims to understand how modern libraries have shaped their designs to accommodate different user groups.

3.2 Sub-question 2: Spatial needs of researchers and public users

A mixed-methods approach is employed to address the second sub question, “*What spatial functions and environments do researchers and public users require?*”. To gain a comprehensive understanding of current user needs, a survey will be conducted among visitors of the KB. This survey will be conducted in collaboration with fellow group members of the Heritage Studio and will take place both online and on-site, in and around the KB. A crucial analysis element is the clear distinction between the various user groups within the KB. In this study, a distinction is made between researchers and public users. Figure 8 outlines the methodology of the survey.

The survey results will be analysed separately for each group, followed by a comparative analysis to identify differences and similarities in the spatial

needs of researchers and public users. This will facilitate a more nuanced understanding of the spatial functions and environments required within the KB and how these align with findings from the literature on other libraries. As this research is conducted in parallel with a group research about the KB, the results of interviews held with KB users as part of the group research will also serve as data for answering this sub-question.

3.3 Sub-question 3: Spatial Strategies for the KB

The third sub-question, *“How can spatial strategies for the Koninklijke Bibliotheek be formulated based on user surveys and case study analysis to balance research and public functions?”*, focuses on the development of a strategic framework that aligns the spatial design of the KB with the needs of both user groups.

To address this question, the study will first explore spatial strategies currently employed in library architecture. This will be followed by a data analysis of the findings from sub-questions 1 and 2 to identify which of these strategies are most relevant and applicable to the context of the National Library.

3.4 Research Limitations

While this research can provide valuable insights, there are also some limitations to consider. Primarily, the selected case studies are leading in public-oriented library architecture. However, it should be noted that these examples arise from national and cultural contexts that differ from those of the KB. Moreover, the case studies focus on newly designed libraries, in contrast to the KB. Consequently, the findings may not universally apply to the KB's context, though they may serve as a source of inspiration or a basis for comparison.

The user survey also has its limitations. Despite the design aiming to distinguish between different user groups, certain groups, such as occasional visitors or employees, may remain underrepresented. Furthermore, there is a risk that the response per group is unevenly distributed, which may lead to a distorted view of actual needs.

What spatial functions and environments do researchers and public users require in the KB?

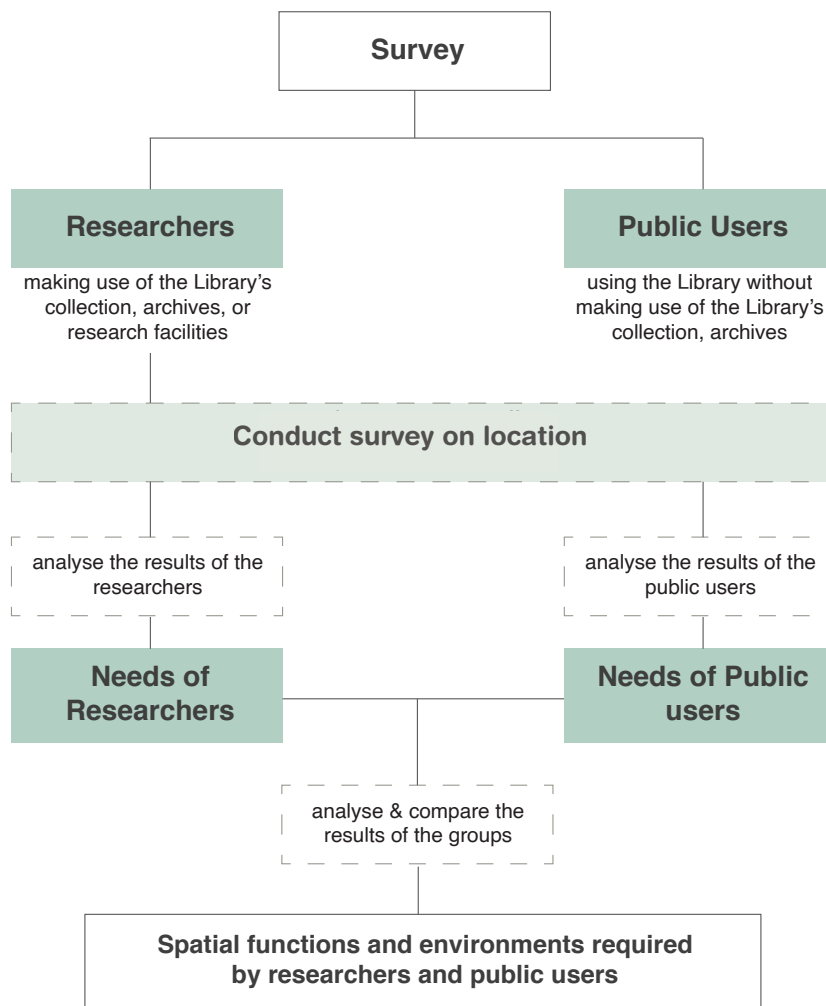


Figure 8 | Method for Survey, own illustration

4.

What are the challenges and opportunities in the library design to fulfil the researcher and public needs?

This chapter explores how library design can address the spatial needs of both researchers and public users. Through the analysis of three case studies, Oodi Central Library (Helsinki), Amsterdam Public Library (OBA), and Seattle Central Library, this chapter examines how these multifunctional buildings respond to the diverse needs of their user groups, and what challenges and opportunities arise in the process. The analysis is organised around four key spatial themes: (Caan, 2011; Ching, 2007; Jochumsen et al., 2012; Lehmann, 2024; Lushington et al., 2016).

- *Zoning and functional layout*, with particular attention to the spatial organisation of functions and the relationship between quiet and active zones.
- *Accessibility circulation*, focusing on circulation, orientation and the relationship between public and research areas.
- *Acoustic strategies*, focusing on sound control and spatial separation.
- *Flexibility and multifunctionality*, focusing on spaces accommodating multiple uses.

4.1 Oodi Helsinki Central Library

Helsinki | ALA Architects | 2018 | 17.250 m²

The Oodi Library in Helsinki was designed by ALA Architects (Figure 9 & 10). The library opened in 2018. The starting point of the design of the building was that it should be a public, open to everyone, safe, and free-of-charge city space in the heart of the city. Oodi combines traditional library services with flexible space for study, relaxation, and social activities. The design focuses on adaptability, so that the building can evolve with the changing needs of society (Oodi's Architecture', 2025).

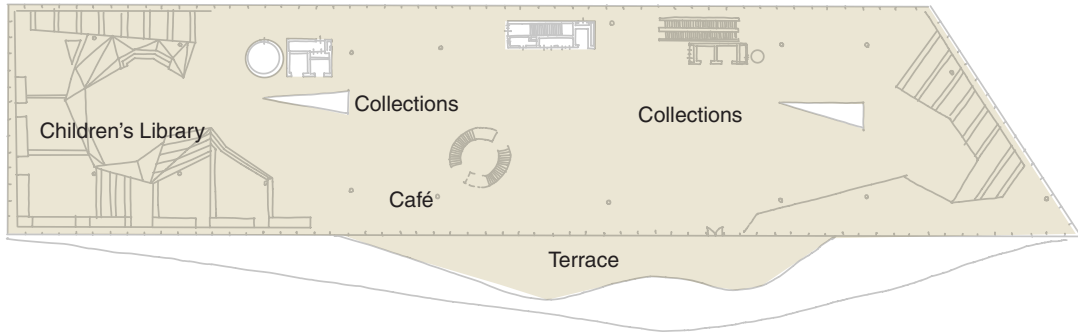


Figure 9 | Oodi Helsinki Library, ('Helsinki Central Library Oodi', n.d.)

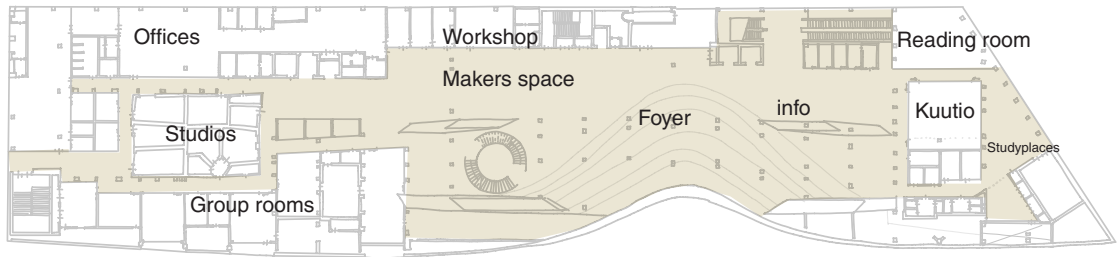


Figure 10 | "Book Heaven" ('Helsinki Central Library Oodi', n.d.)

+2



+1



0

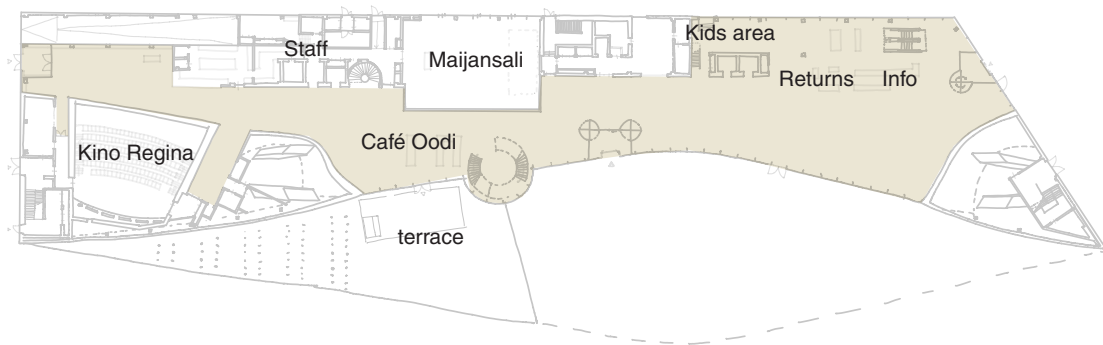


Figure 11 | Selected floorplans of the Oodi Library, own figure

4.1.1 Zoning & Functional Layout

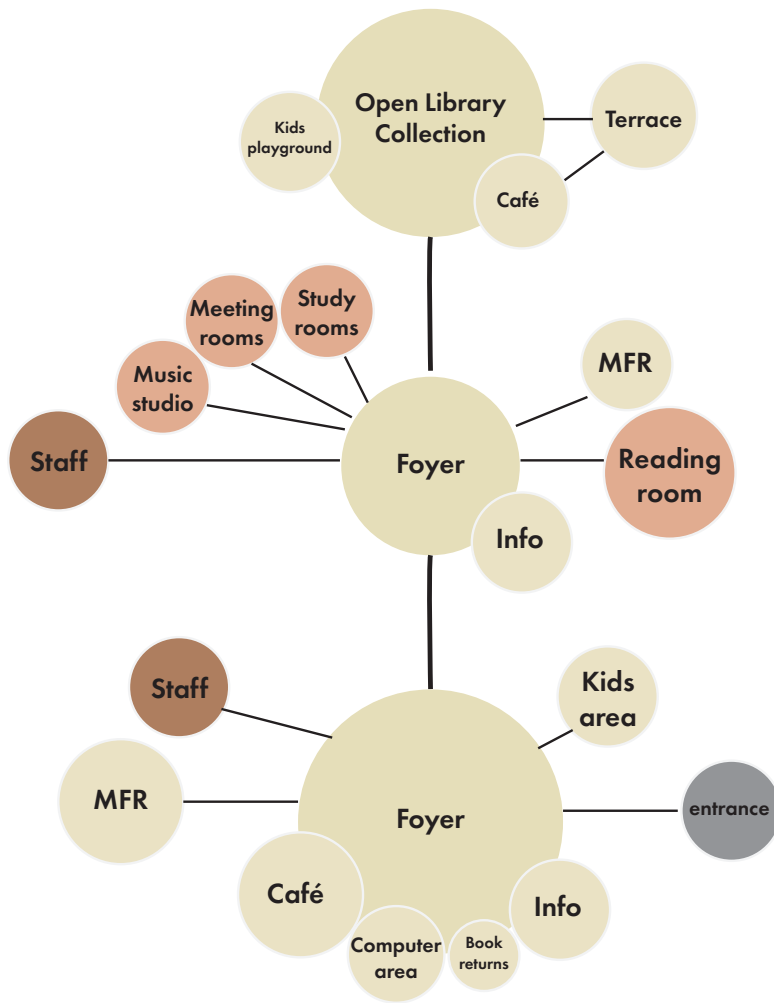
The design by Ala Architects shows a clear spatial and functional layering, with each floor having its own identity and user type. The ground floor is designed as an open, transparent space that connects with the outdoor space in front of the building. This floor serves as a lively meeting place that provides active public functions, such as the Oodi restaurant, the Kino Regina Cinema, the Maijansali multifunctional hall, and the children's play area. In this way, the architect aims to connect the building with the city and invite passersby to enter, see Figure 11 ('Helsinki Central Library Oodi', n.d.) .

The first floor focuses more on learning, creating, and collaborating/ Here we find group rooms, studio, workshop spaces, and makerspaces. The Reading room and quiet study areas are also located on this floor. All these functions centre around the central foyer, which serves as a meeting place, information point, and place to relax. Notably, a clear distinction has been made between quiet and active areas. Figure 11 & 15 show that the silent reading and study areas are often screened off and positioned along the building's façade or in corners, away from main routes and the foyer. More active functions, such as group work areas and workspaces, are directly next to the foyer.

On the second floor, the architect wanted to house the more traditional library functions, such as the collections and reading places, to create a peaceful atmosphere. This floor is also known as "book Heaven". In addition to the book collections, you will find a children's library and a café. The outside terrace next to the café, which overlooks the park at the front of the building, is a real attraction for the users (Igarashi et al., 2023).

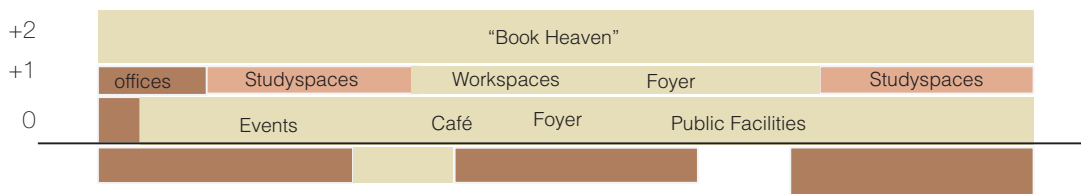
Figure 12 shows a schematic representation of how the functions within the building are connected. The layering in the programme is clearly visible: the ground floor is focused on practical and public functions such as the café, information services, quick book check-in, and children's facilities. The first floor focuses on study, collaboration, and creativity. On both floors, the foyer serves as the central hub of the floor. Finally, the top floor is entirely public and focused on relaxation.

The section of the building (Figure 13) also shows that the public functions are mainly concentrated on the ground floor and top floor. The semi-public zones, such as study rooms, are primarily located on the first floor. The more private functions, such as staff rooms, are mainly located at the edges of the building on the ground floor and first floor.



legend
 public
 semi-public
 private

Figure 12 | Function diagram of the Oodi Library, own diagram



legend
 public
 semi-public
 private

Figure 13 | Public vs. private zones in the Oodi Library, own diagram

4. What are the challenges and opportunities in the library design to fulfil the researcher and public needs?

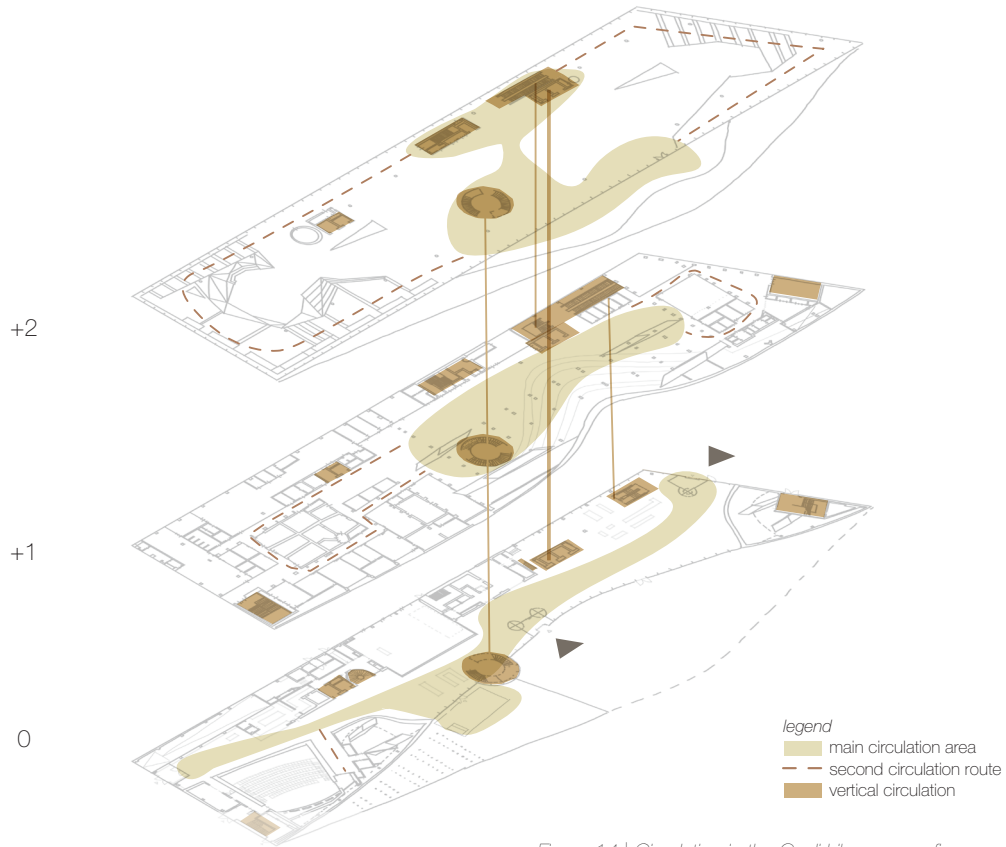


Figure 14 | Circulation in the Oodi Library, own figure

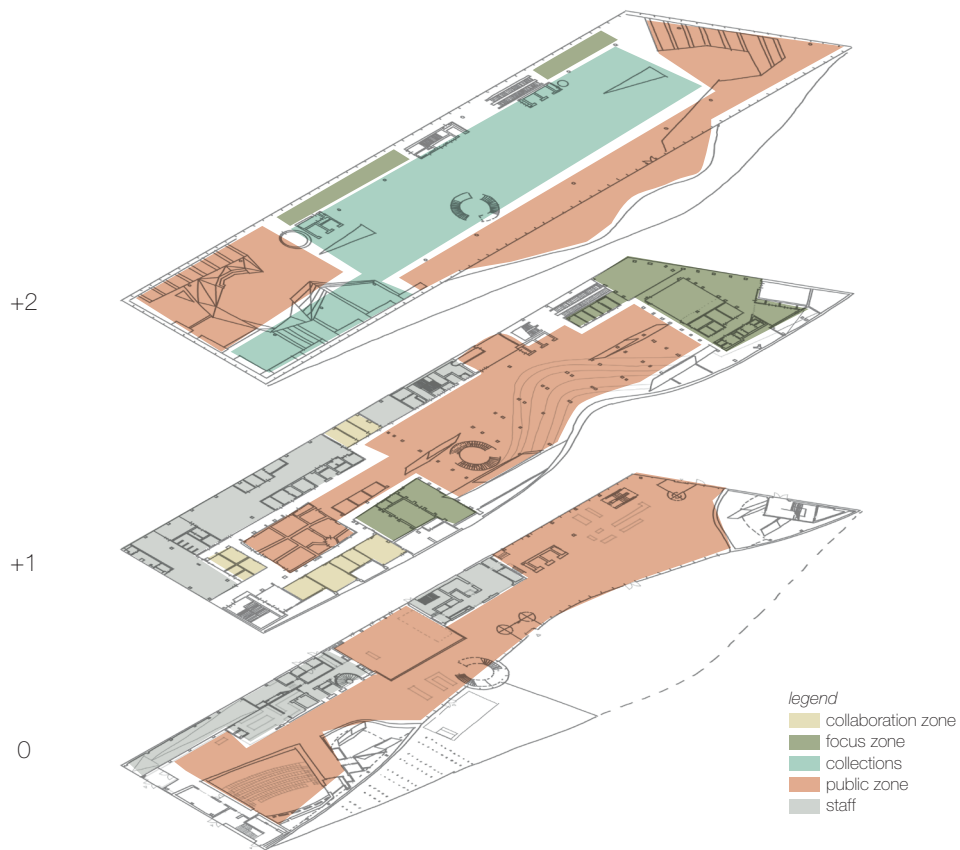


Figure 15 | Functional zones in the Oodi Library, own figure

4.1.2. Accessibility & Circulation

As shown in Figure 14, the internal circulation is organised via open central zones and clear vertical circulation routes. The escalators serve as the main vertical connections between the floors. Additionally, a central main staircase with digital art was designed by Otto Karvonen. This staircase is functional but also serves as an eye-catcher within the library (Soila, 2021).

The staff have their own vertical circulation zones, separate from the public circulation ones. This allows them to move efficiently and independently through the building without crossing the paths of the public users' circulation. Interestingly, the quieter areas, such as the reading rooms and study spaces, can only be accessed via secondary routes. These secondary routes have been separated from the main routes so that the atmosphere in these areas remains quiet (see Figure 14 & 15).

The ground floor plays a key part in the overall circulation of the building. It functions as an open, accessible space, allowing visitors to enter the library from multiple directions. This creates a strong connection between the building and the surrounding city, particularly with the park at the front. The transparent façades contribute to this by making visual contact between the inside and outside and inviting people to enter (Oodi Helsinki Central Library / ALA Architects, 2018).

4.1.3. Acoustic Strategies

Acoustics played a central role in the design of the Oodi Library. As mentioned earlier and illustrated in Figure 15, the quiet areas, such as the reading room and study spaces, are located on the outer edges of the building, away from the busier central circulation zones. This zoning reduces noise problems between quiet and active areas. The architect also chose to enclose many of these spaces with glass walls to support this. This design decision helps contain noise while preserving the openness and visual transparency of the overall space.

Acoustic materials, such as textile wall panels and ceilings, have also been used throughout the building to reduce noise pollution, for example in the ceiling of the "Book heaven" on the second floor. The 'room-in-room' principle was used for busier areas, where spaces are locally acoustically insulated (Oodi Helsinki Central Library / ALA Architects, 2018).

Technical installations, such as the ventilation system, were modified to minimise noise pollution in quiet zones. Korhonen (2020) emphasises that, especially in the large reading room, much attention was paid to soundproofing and silent ventilation in the building. In addition, the façade construction, consisting of wooden elements suspended from a steel support structure, also posed some problems. According to the acoustic designer, noise insulation is more challenging to implement than on a conventional concrete element façade. Because of this, ventilation units placed against the façade were given extra sound insulation (Korhonen, 2020).

4. What are the challenges and opportunities in the library design to fulfil the researcher and public needs?

4.1.4 Flexibility & Multifunctionality

The Oodi Library was designed not as a traditional library, but as a dynamic public space in which different functions coexist and complement each other. Many spaces are multifunctional, and their use changes throughout the day. For instance, Majjansali and Kino Regina are located on the ground floor for lectures and conferences during the day and as cinemas or event venues in the evening, see Figure 16&17 (Annala, 2020).

The first floor also contains flexible spaces. Kuutio is a high-tech projection room for art and education, and the workshop spaces offer room for creating, learning and presenting. Even the foyers on the ground and first floor can be used flexibly for exhibitions or public gatherings. The floor plans and images show that the ground floor and second floor are largely free to arrange. This flexibility is made possible by the building's construction. Oodi is built as an "inhabited bridge" with two steel arches measuring over 100 metres, creating open, column-free ground and second-floor space (Oodi Helsinki Central Library / ALA Architects, 2018).



Figure 16 | Majjansali, ('Helsinki Central Library Oodi', n.d.)



Figure 17 | Kino Regina, ('Helsinki Central Library Oodi', n.d.)

4.2 Amsterdam Public Library, OBA

Amsterdam | Jo Coenen | 2007 | 28.500 m²

The Amsterdam Public Library (OBA) was designed by Jo Coenen and opened in 2007, marking a new type of library: an open, layered and multifunctional public building in the heart of Amsterdam (See Figure 18 &19). The design vision was to create an “experience library” with space for study, cultural events and relaxation. The design is deliberately open and transparent, with a strong focus on light, sightlines and different functions (Coenen, n.d.; ‘OBA’, 2012).



Figure 18 | Amsterdam Public Library (OBA Oosterdok, n.d.)

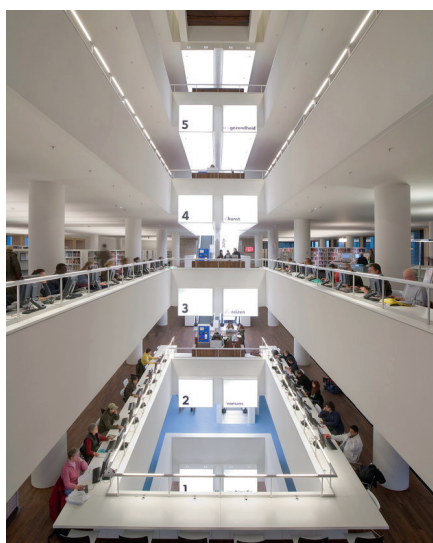


Figure 19 & 20 | Atrium with studyplaces (left), foyer with escalators (right), (Public Library Amsterdam / Jo Coenen & Co Architekten, 2014)

4. What are the challenges and opportunities in the library design to fulfil the researcher and public needs?



Figure 21 | Selected floorplans of the OBA, own figure

4.2.1 Zoning & Functional Layout

The Amsterdam Public Library (OBA) design is based on a clear functional layout, with each building floor having a specific purpose and identity. The ground floor, first floor and basement level are designed as open, transparent layers that are accessible and inviting to the public. They are focused on public interaction and rapid circulation (Coenen, n.d.). These levels accommodate the most active public functions, including the large multifunctional foyer, book drop-off point, children's library with makerspaces, café and exhibition space (see Figure 21 & 22). According to the architect, these areas function as the vibrant public heart of the library (Coenen, n.d.).

The floors above the ground floor and basement (second to fifth floors), also referred to as the "centre" of the building, are designed to promote tranquillity and concentration. These floors house the library collections, with study areas primarily located along the facades and in the zones between the bookcases. The floors are interconnected by mezzanines and voids, creating visual connections and allowing natural light to reach the building (Public Library Amsterdam, 2014).

The upper floors (sixth and seventh) focus on relaxation, meetings and cultural events. The sixth floor accommodates a forum and conference facilities, including meeting rooms and multifunctional halls. The seventh floor has a restaurant and the OBA theatre. The top floor is not public and is reserved for staff offices. Figure 22 also schematically shows this division between public and private zones.

The function diagram (Figure 22) and the section diagram (Figure 23) clearly illustrate the relationships between the various functions within the building. What becomes clear is that the public functions are concentrated on the lower and upper floors. In contrast, the middle floors are dedicated primarily to the library collections and quiet study spaces. These middle floors form a quiet connecting zone with a clear focus on books and places for concentration. This clear structure between the floors ensures a smooth transition between active and quiet areas.

4. What are the challenges and opportunities in the library design to fulfil the researcher and public needs?

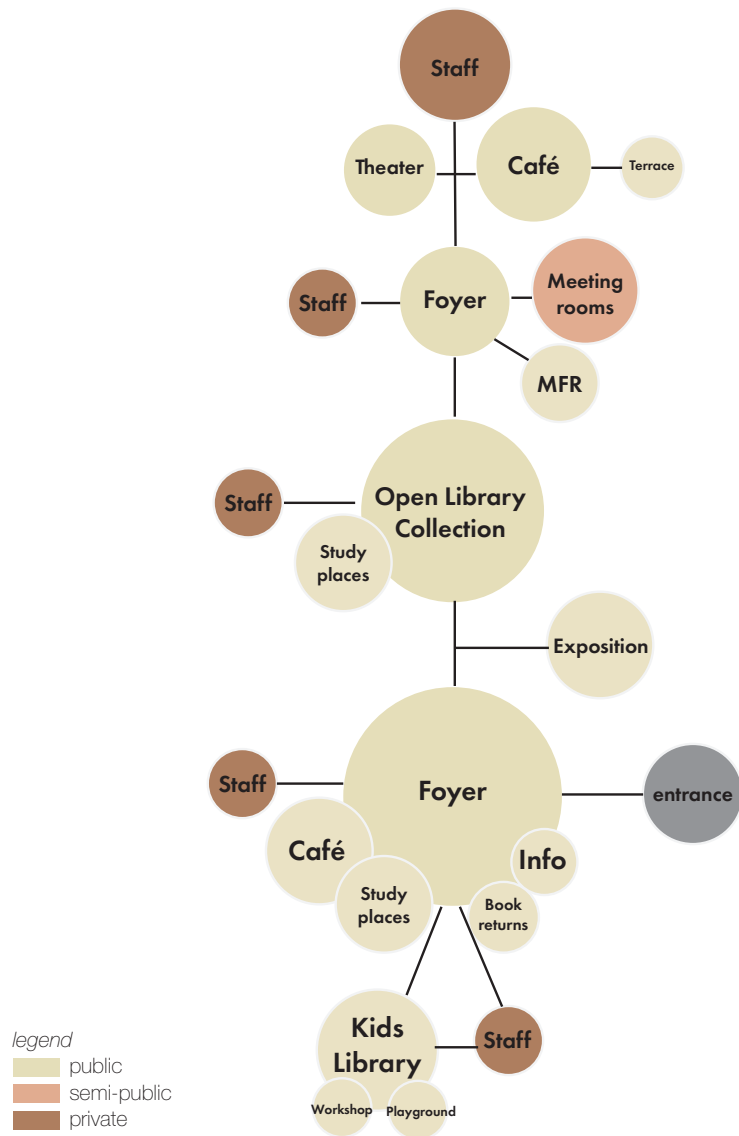


Figure 22 | Function diagram of the OBA, own diagram

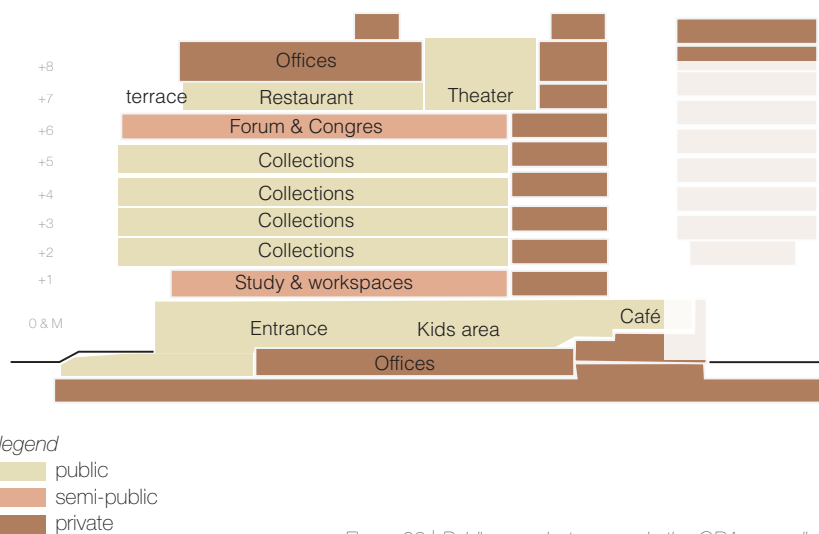
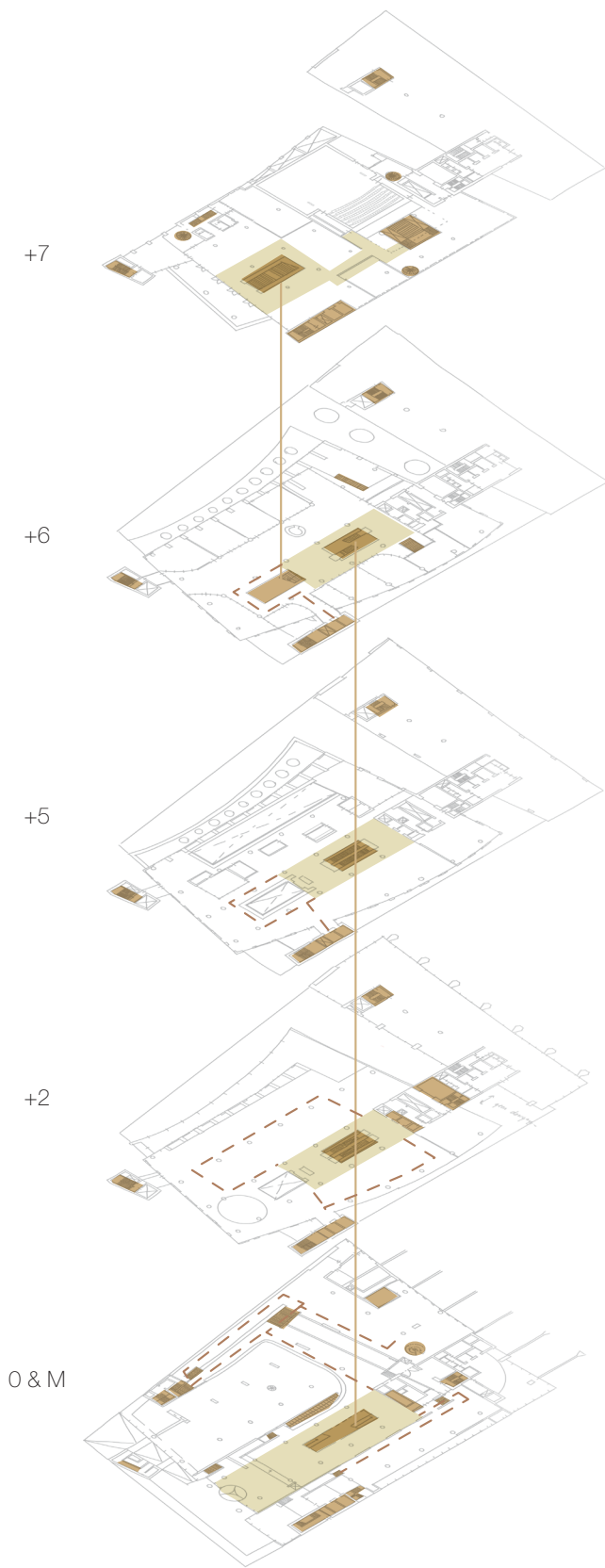
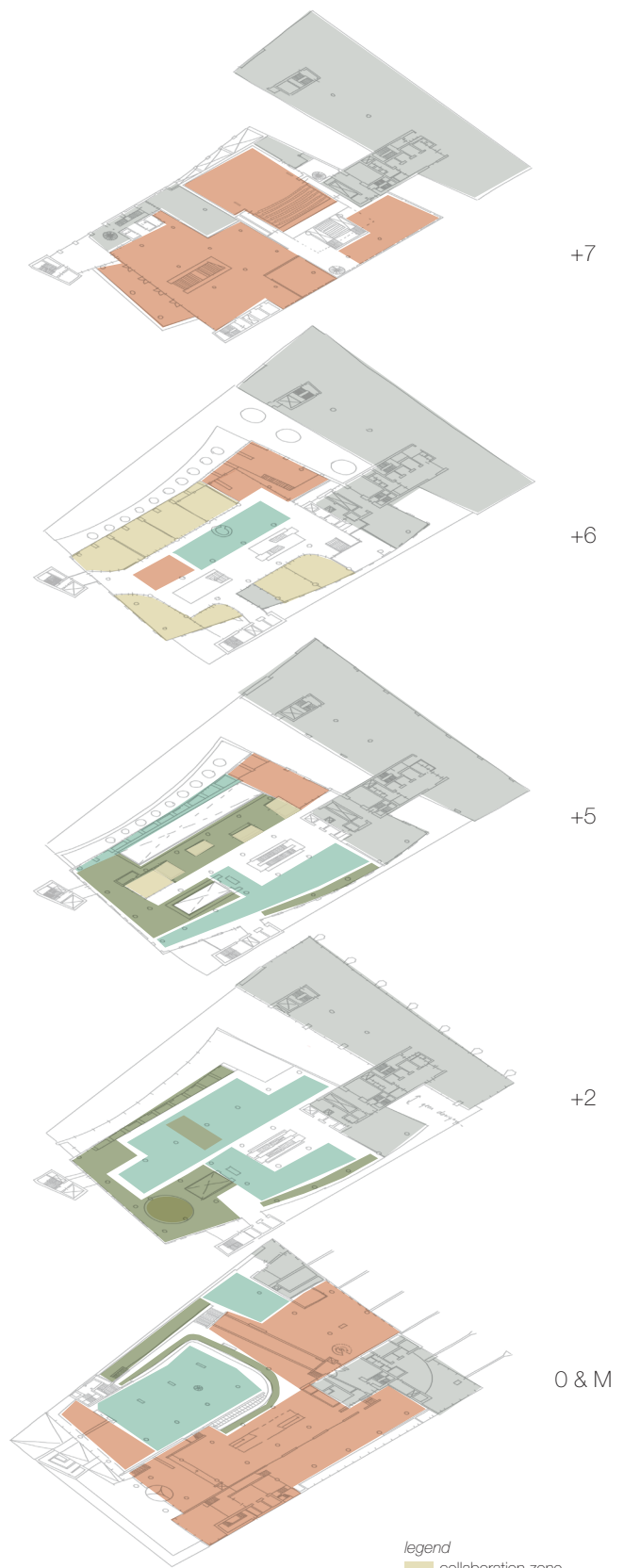


Figure 23 | Public vs. private zones in the OBA, own diagram



legend
 main circulation area
 second circulation route
 vertical circulation

Figure 24 | Circulation in the OBA, own figure



legend
 collaboration zone
 focus zone
 collections
 public zone
 staff

Figure 25 | Functional zones in the OBA, own figure

4.2.2 Accessibility & Circulation

Figure 24 shows that the OBA uses a central spine as its central circulation zone. Users are guided through a low passageway from the entrance to a high, light-filled hall, where the central circulation is immediately visible. This central circulation uses escalators, which are located centrally in the building. The architect has purposely placed lighting installations above the escalators to draw attention to the central circulation route (Coenen, n.d.).

The central circulation zone, which is visible on every floor (see Figure X), also houses the public elevators. During the visit of the library, it was observed that many visitors preferred to use the elevators to move through the building more quickly. Users commented that the escalators are too slow and therefore feel less efficient. In addition to the main circulation route, there is a secondary circulation of elevators and stairs designated explicitly for staff and logistical operations, enabling efficient and unobstructed movement throughout the building.

4.2.3 Acoustic Strategies

The OBA uses a column-based structural system, allowing a flexible floor layout. The architect deliberately chose to keep the floors as open as possible to foster visual connections between users and enhance orientation. As a result, there are very few fixed walls or partitions across the floors.

To address this, functions were clustered per floor; quieter functions such as study areas and reading zones were grouped on the same levels. The same applies to more active functions like the café, children's area, and book return and lending point. Notably, the busier functions on each floor are often located around the central circulation zone. The quieter areas are located along the facades or in small areas between the bookcases, serving as a buffer zone between silence and activity, see Figure 25.

However, once the building was completed, users criticised the acoustics. While many were positive about the library's role as a vibrant 'living room of the city', they also noted that the open layout resulted in high ambient noise levels. For some, this made it difficult to concentrate or read, which they considered a core function of a library ('OBA', 2012).

In response, the library later implemented several measures to improve quiet areas. For example, the fourth floor is now designated as a quiet floor, and the fifth floor has a silent zone during certain times of the day. Also, study cubicles for individual use and group workspaces, where discussions are permitted without disturbing other users, have been added to other floors (see Figure 21 & 25). In this way, the diverse needs of the various user groups have been more effectively addressed, resulting in a better balance between openness and concentration ('Verbouwing Centrale OBA van start', 2017).

4.2.4 Flexibility & Multifunctionality

As described in the previous paragraph, the OBA uses a column-based structural system. As a result, the floors are free of load-bearing walls, allowing for a highly flexible layout across most levels. The floors are also designed to bear heavy loads, allowing functions to be rearranged. This design makes the building adaptable to any future user needs.

In addition to these flexible spaces, the OBA has spaces that can be used for multiple purposes. The first floor has an exhibition space for temporary exhibitions and events (see Figure 26). The sixth floor contains enclosed spaces that can be used flexibly for presentations, meetings and workshops. On the seventh floor is the OBA theatre, suitable for conferences, performances, films, and lectures (see Figure 27&28) (OBA Oosterdok, n.d.).



Figure 26 | Exhibition space, own image



Figure 27 | OBA Forum & Congress, own image



Figure 28 | Exhibition space, own image

4. What are the challenges and opportunities in the library design to fulfil the researcher and public needs?

4.3 Seattle Public Library

Seattle | OMA & LMN | 2004 | 33.700 m²

The Seattle Central Library was designed by OMA in collaboration with LMN architects and opened in 2004. The design originated from the idea of reinventing the library as a multifaceted information centre, with space for physical and digital media. The building consists of various functional platforms with space for meetings in between. The building aims to be a place for knowledge transfer and the city's meeting place, see Figure 29 &30 (Central Library Architecture, n.d.; Seattle Central Library / OMA + LMN, 2009).



Figure 29 | Seattle Central Library, (Seattle Central Library, n.d.)



Figure 30 | the "Living Room" (Seattle Central Library, n.d.)

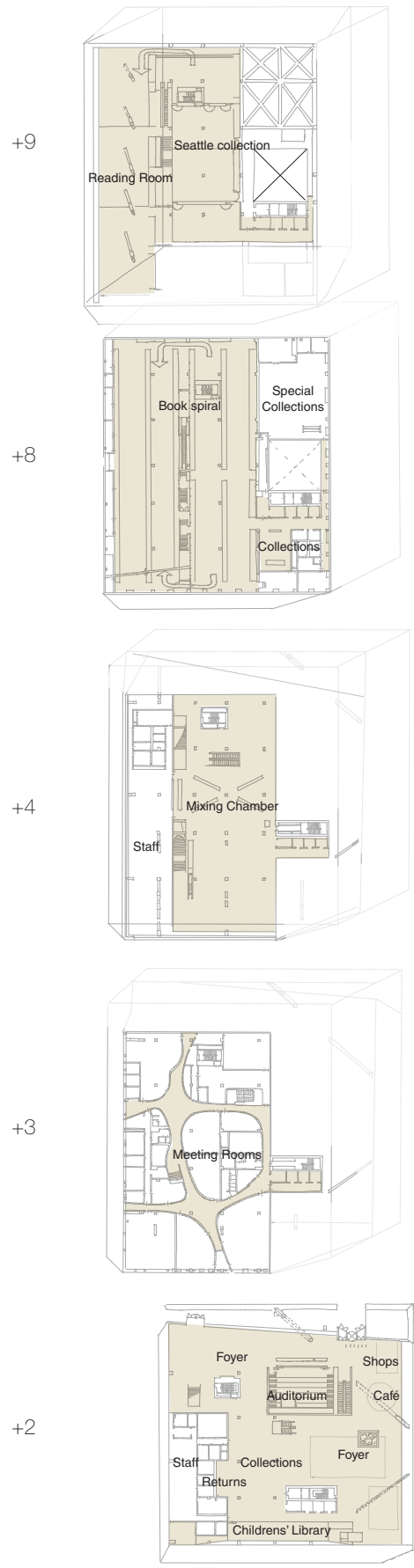


Figure 31| Selected floorplans of the Seattle Public Library, own figure

4.3.1 Zoning & Functional Layout

The building consists of various functional layers, also called “static platforms”, each with its main function and atmosphere. These platforms accommodate functions such as the book collection, meeting rooms and offices (see Figure 31). Between these platforms are dynamic intermediate levels. These levels provide space for meetings, workspaces and information points for users. This layered design creates clear zones with different atmospheres in the building.

The lower floors are designed for lively, public functions. These include the entrance area with information desks, the auditorium, café, shop, children’s centre and, on the second floor, the “Living Room”, see Figure 31 & 32. This open, lounge-like space functions as the central floor of the building where various public functions come together. Due to the difference in height in Seattle’s urban landscape, this floor is directly accessible from street level, which contributes to the openness of the building.

From the living room, escalators lead to the next intermediate level: ‘the Mixing Chamber’. Located on the fifth floor, this open information centre is where visitors can consult library staff, use digital resources and work or study. Between these two dynamic floors is a static platform with meeting rooms and project space. This level is semi-public and is used for both internal and external meetings, see Figure 32 (Seattle Central Library | OMA, n.d.).

The platform above, known as the Books Spiral (floors 6 to 9), is designed as a quiet zone with book collections and reading and study areas. What makes this zone unique is its gradually ascending floor structure. The collection floors are designed as a continuous ramp, allowing users to move through the entire collection without needing stairs or elevators. Above this, on the 10th floor, is the reading room, which offers panoramic views over the city. The upper floors accommodate the offices and support functions of the building. These are not accessible to the public (Seattle Central Library / OMA + LMN, 2009).

The function diagram (Figure 32) and section diagram (Figure 33) schematically shows how the different layers are functionally and spatially connected. Notably, the dynamic intermediate zones also serve as the main circulation areas. The diagram illustrates that active, public-facing functions are primarily situated in the lower levels, gradually transitioning to quieter, more focused functions as one moves upward through the building. The higher you go in the building, the quieter and more concentrated the user function becomes.

4.3.2 Accessibility & Circulation

Figure 34 illustrates the circulation on the main floors. The second floor, “The Living Room”, is the central circulation zone. Several entrances from street level converge here. It is also the starting point for the main vertical access routes. This floor functions as a key circulation hub within the building.

The main route for visitors consists of a diagonal series of escalators connecting the public floors (see Figure 34). This vertical spine runs through several atrium layers, intuitively guiding users and visually connecting them to

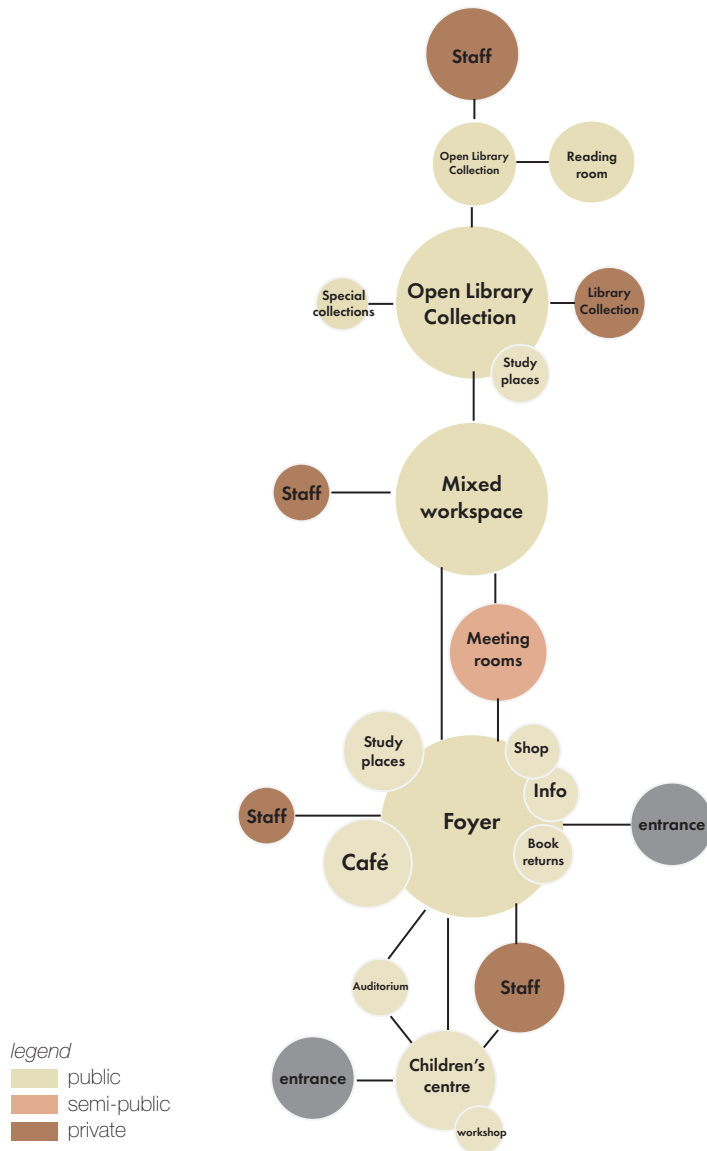


Figure 32 | Function Diagram of the Seattle Public Library, own diagram

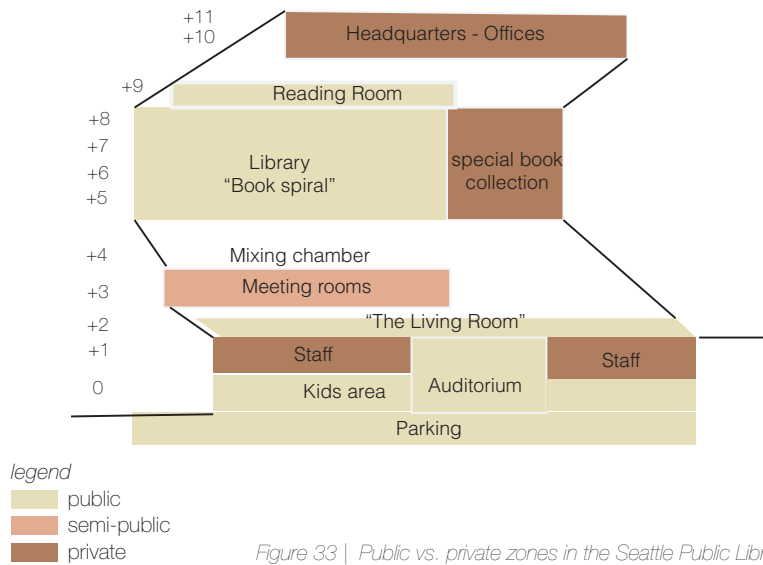
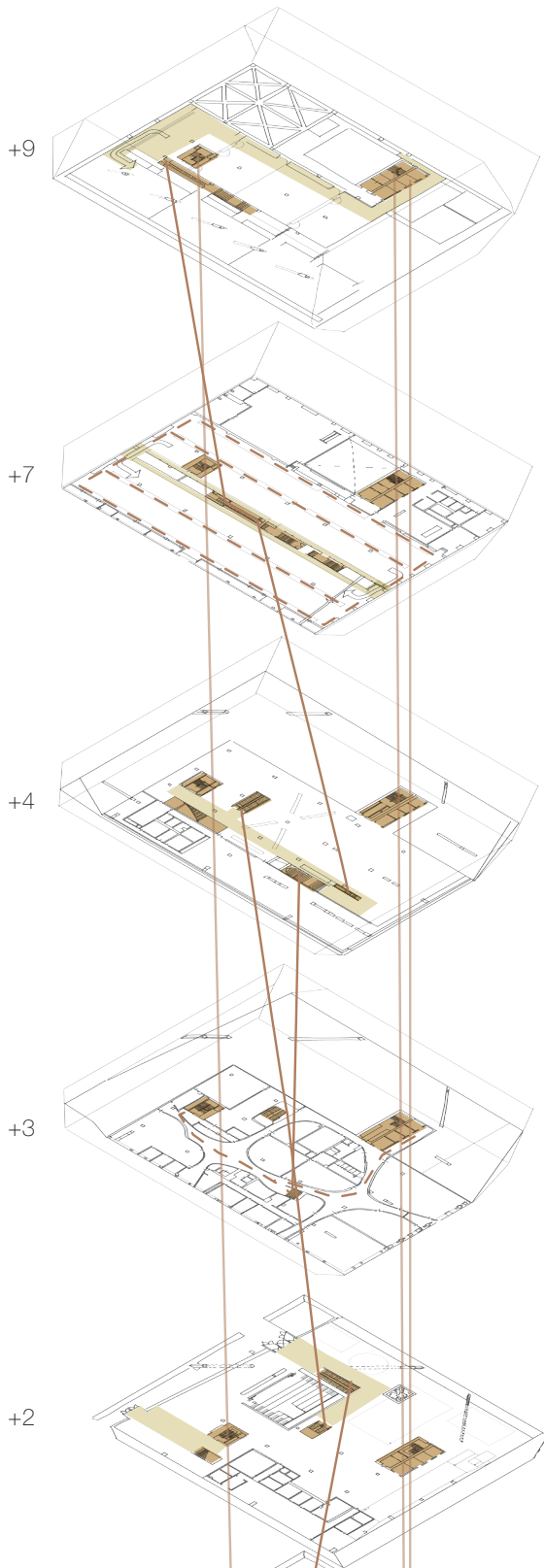


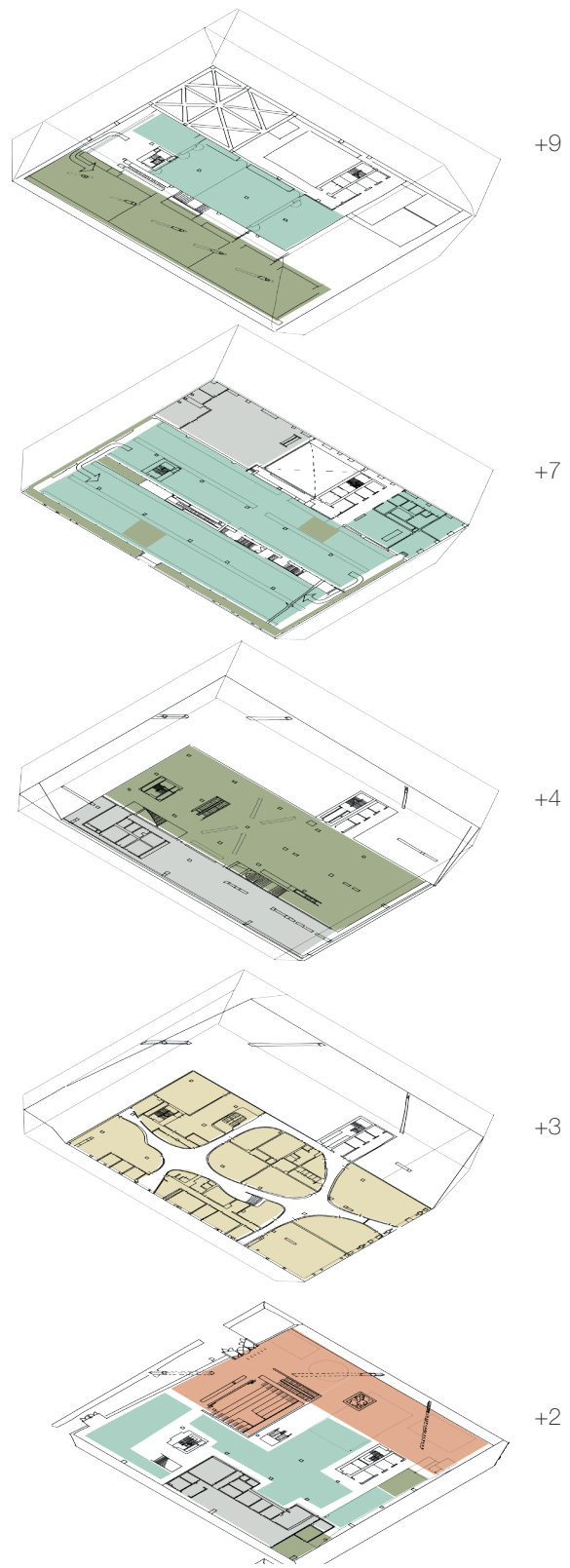
Figure 33 | Public vs. private zones in the Seattle Public Library, own diagram

4. What are the challenges and opportunities in the library design to fulfil the researcher and public needs?



legend
 ■ main circulation area
 - - - second circulation route
 ■ vertical circulation

Figure 34 | Circulation in the Seattle Public Library, own figure



legend
 ■ collaboration zone
 ■ focus zone
 ■ collections
 ■ public zone
 ■ staff

Figure 35 | Functional zones in the Seattle Public Library, own figure

the various functions within the building. The escalators are supplemented by elevators and stairs, which provide faster or more direct access. Each floor is recognisable by its own visual appearance, including the use of colour, materials and graphic signage. These elements contribute to wayfinding for users. The open voids and atriums also provide sightlines between the floors, enhancing partial orientation and visual connectivity throughout the building (Seattle Central Library / OMA + LMN, 2009).

Separate circulation areas are provided for staff and logistics. Employees can move quickly and easily through the building by separating them from the public circulation zone. In addition, extra attention has been paid to accessibility in the “Books Spiral”. As the collections are spread over four floors connected by a sloping walkway, these floors can also be used by wheelchair users or people with limited mobility without encountering any obstacles.

4.3.3 Acoustic Strategies

As was explained in the section “Zoning & Functional Layout”, the functions within the building are separated vertically: from lively, public programmes on the lower floors to quiet study and reading areas higher up in the building. This spatial arrangement is not only functional but also forms the basis of the architect’s acoustic strategy, see Figure 35 (Seattle Central Library, n.d.).

In addition to spatial separation, considerable attention has been paid to acoustic control at the material level. For example, the façade is made of laminated glass with integrated acoustic insulation to minimise external noise from entering the building. Inside, sound-absorbing wall and ceiling elements have been installed in areas with high noise levels, such as the children’s area, the living room and meeting rooms. Thick concrete floors and closed stairs also limit sound transmission to the quieter areas (Seattle Central Library / OMA + LMN, 2009).

4.3.4 Flexibility & Multifunctionality

The library was designed with the idea that a modern library should be more than just a place for books. Flexibility played a central role in the architect’s design. Instead of a design with generic floors open to any use, OMA designed a layout with clearly defined functional clusters, also known as platforms. Each platform is designed for a specific function, but allows for adaptability within that use.

The dynamic intermediate floors are designed for varying uses and are multifunctional. Due to the open structural layout, loose furniture, and flexible layout, these floors can easily be adapted to users’ needs. In the building, there are also a few multifunctional spaces. For example, the auditorium on the ground floor is used for lectures, films, and conferences. The meeting rooms on the third floor are also suitable for workshops, presentations, and gatherings (Seattle Central Library | OMA,, n.d.; Seattle Central Library / OMA + LMN, 2009).

4.4 Conclusion

The analysis of the Oodi (Helsinki), OBA Amsterdam and Seattle Public Library shows that modern libraries all fulfil a dual role. They must meet the need for a quiet, concentrated environment for reading and studying and the demand for lively public meeting places and activities. These contrasting demands present design challenges for modern libraries, but also offer opportunities to reimagine the library as a multifunctional public space.

To answer the research question ‘What are the challenges and opportunities in library design to fulfil the needs of researchers and the public?’, the three libraries were analysed based on four main themes: *Zoning & Functional Layout, Accessibility & Circulation, Acoustic Strategies, Flexibility & Multifunctionality*. The following conclusion discusses the insights gained by analysing these case studies.

Zoning & Functional Layout

All three libraries show a clear spatial stratification. Figure 36 schematically illustrates this general finding. As can be seen in the diagram, the ground floor is the most public zone of the building in all cases. This is where the most active functions are located, such as cafés, workshops, event spaces, children’s areas and exhibitions.

The quiet functions, such as reading rooms and study areas, are usually on the middle floors. These zones are less accessible to the public than the lower floors and are often disconnected from the main circulation routes to ensure the required quiet and concentration. The most private functions, such as offices, technical rooms and other support facilities, are usually located on the upper floors or at the edges of the building. This minimises their interaction with the public areas.

This layered structure creates a clear transition between the active and quiet functions. An essential difference between the three libraries is that the Seattle Public Library works with functional clusters or “platforms”, while Oodi and OBA divide the functions more by floor. Nevertheless, the underlying principle is the same for all three. There is a clear transition from open, active zones to quiet, concentrated zones.

Accessibility & Circulation

Circulation within the building is organised in all three libraries around a central vertical spine consisting of escalators or stairwells connecting the floors. This is visible in the analysis diagram in Figure 37. In all cases, the ground floor functions as a large circulation zone, where users can access various vertical access points from multiple directions. In addition to the central vertical access, secondary access points, such as lifts and stairs, are often designed for staff or specific visitors. These provide faster and sometimes direct access to functions within the building.

Notably, all three buildings use open floor plans and strategically placed sightlines to enhance the orientation of users within the building. At Oodi in particular, careful consideration has been given to the accessibility of the building for the public. The ground floor is designed to be visually and physically connected to the surrounding environment, creating an accessible and inviting entrance to the building.

Acoustic Strategies

As can be seen in the designs of the libraries, combining active and quiet functions within a single building requires effective acoustic solutions. Figure 38 shows how the libraries have solved this problem. In all cases, a clear vertical separation is made. It can be seen that the active zones are located on the lower floors (and sometimes on the top floor), while quiet functions, such as reading rooms and study areas, are placed on the middle floors.

In addition, functional zones are used at the floor plan level, as shown in Figure 38. Active functions are often located around the central circulation cores, while concentration areas are located along the façade or in the corners of the building. Buffer zones are regularly placed between the zones, using bookcases or acoustic partitioning elements. The libraries also make use of enclosed rooms to regulate noise levels further. These range from small study cells for 1 to 4 people to larger meeting rooms. This allows users to isolate themselves for concentrated work or consultation without disturbing other visitors.

Flexibility & Multifunctionality

A clear trend within libraries is that they want to be more than just traditional libraries. They are increasingly positioning themselves as flexible public spaces that can facilitate different types of use. All three case studies show how multifunctional spaces, such as small theatres and cinemas, accommodate various activities within the library. In the examples, we see that these spaces are often used for study or workshops during the day and for film screenings, lectures and cultural events in the evening, which attracts a larger audience to the library.

Flexibility is a key consideration in the design process, which is clearly reflected in the structural approaches of the three libraries. Oodi, for example, shows how a column-free construction allows for freely configurable floor plans, with the foyers even easily being used as event spaces. While based on fixed platforms, each assigned a primary function, Seattle's library still allows adaptability within these zones. At OBA, the column structure makes it easy to reconfigure floor layouts, making it possible to programme different functions as needs evolve. All three libraries illustrate that flexibility is essential for future-proofing, ensuring the library can adapt to changing user demands over time.

4. What are the challenges and opportunities in the library design to fulfil the researcher and public needs?

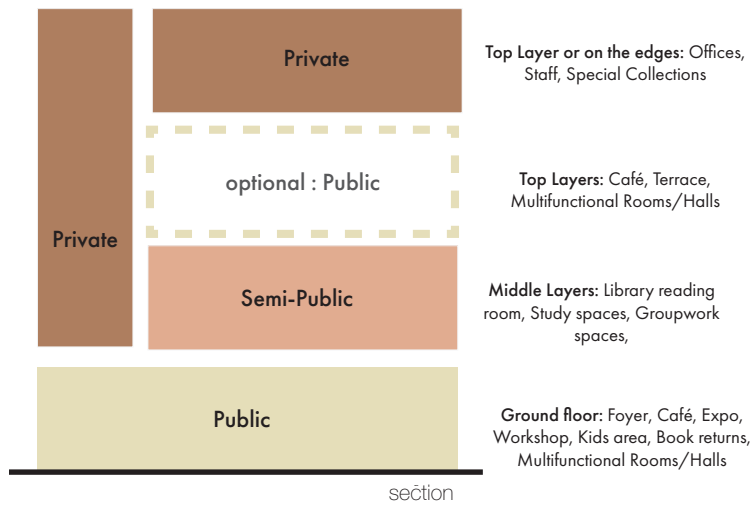


Figure 36 | General spatial strategy in case study libraries: functional zoning. own diagram

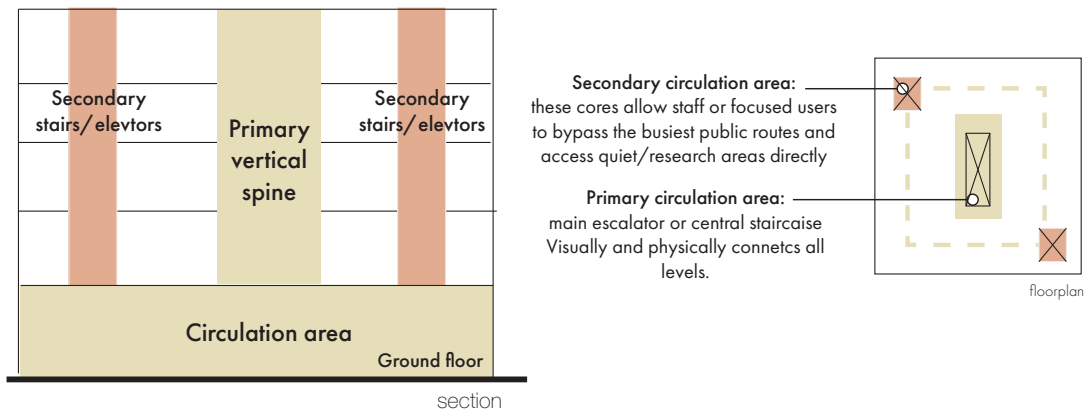


Figure 37 | General spatial strategy in case study libraries: circulation. own diagram

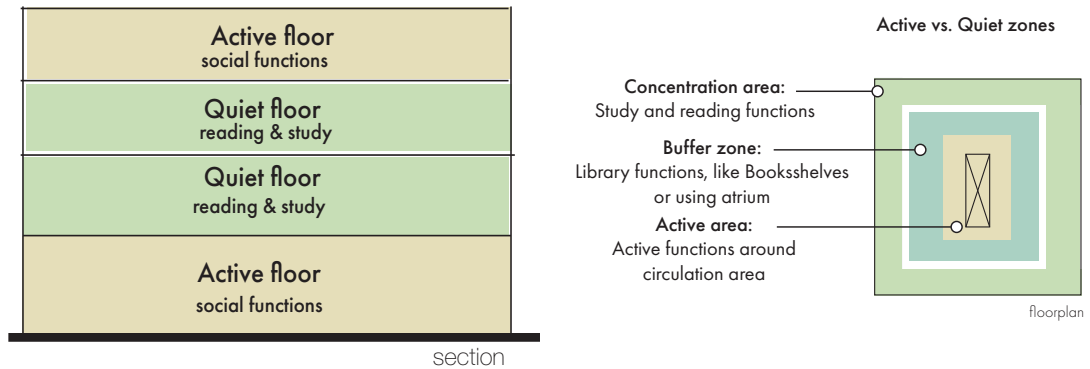


Figure 38 | General spatial strategy in case study libraries: quiet vs. active zones. own diagram

Summary

This sub-question examined the challenges and opportunities in library design to fulfil the needs of researchers and the public. The analysis of the Oodi, OBA, and the Seattle Public Library shows that the most significant challenge lies in reconciling two extremes: concentrated, silent work versus vibrant public activity and interaction. The case studies demonstrate that achieving a balance between these opposites is possible but requires careful design across multiple spatial scales.

Clear zoning proves to be essential in this regard. By grouping functions according to their intensity of use and specific needs, such as silence versus activity, and separating them spatially, both vertically within the building and across the floor plan, tranquillity is created where it is needed and liveliness where desired. This layout can be reinforced by good circulation within the building, with central and secondary routes structuring different user flows. Acoustic strategies, such as buffer zones, use of materials and closable spaces, also contribute to functional separation.

Finally, flexibility and multifunctional use are essential in the modern library. This makes it possible to respond to changing user needs and contributes to the future-proofing of the library as a public space.

In summary, the design of a new library should consider functional spatial separation, strategic circulation routes, and flexible layouts from the outset. Although this study examined three newly built libraries, the insights derived from them are equally relevant for the redesign of an existing library, where the spatial and organisational challenges can be just as demanding. Adopting these principles ensures that a single library building can accommodate diverse users and respond to changing societal needs.

5.

What spatial functions and environments do researchers and public users require?

In order to respond to the question “What spatial functions and environments do researchers and public users require?”, a combined method of quantitative and qualitative research was employed. A total of 35 surveys were conducted among the users of the Koninklijke Bibliotheek. Furthermore, 20 users of the KB were interviewed, with interviews being spread over 12, comprising both individual and group interviews.

The first subchapter 5.1 analyses the result of the survey. A distinction is made between two main groups of users: (1) researchers, who actively use the collections of the KB and conduct research, and (2) public users, who do not use the collections but use the library as a place to work or study, for example. Of the 35 survey respondents, 11 belong to the group of researchers and 24 to the group of public users. In order to compare the results in a balanced way, in most cases the average per group was used. Because this is a small-scale study, the results are based on a limited sample. Nevertheless, these results provide a general image of different needs of researchers and public users of the library.

The second subchapter 5.2 discusses the findings from the interviews that relate to the sub-question. This analysis does not distinguish between researchers and public users. The interviews were mainly used to gain more insight into general experiences, preferences and perceptions regarding the spatial environment of the KB.

5.1 Survey

This chapter presents the primary findings of the survey. The questions and answers have been categorised into four themes: accessibility, current spaces and functions, environmental factors, and the future of the KB. The complete questionnaire is included in Appendix 1.

5.1.1 Accessibility

How do you come to the KB?

The results presented in Figure 39 show that both researchers and public users equally use public transport, cycle, or walk to the KB. Only a small number of public users (8,7%) indicated that they travelled by car, suggesting that car use among visitors is relatively limited.

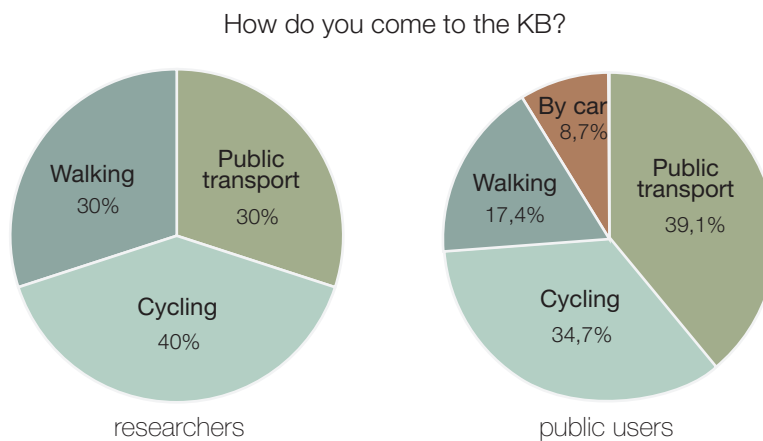


Figure 39 | Survey result: Accessibility of the KB, own diagram

How easy is it for you to reach the KB?

Figure 40 demonstrates that most researchers and public users perceive the KB to be reasonably or very easily reachable. The survey comments frequently mention the central location next to The Hague Central Station as an important factor in this regard.

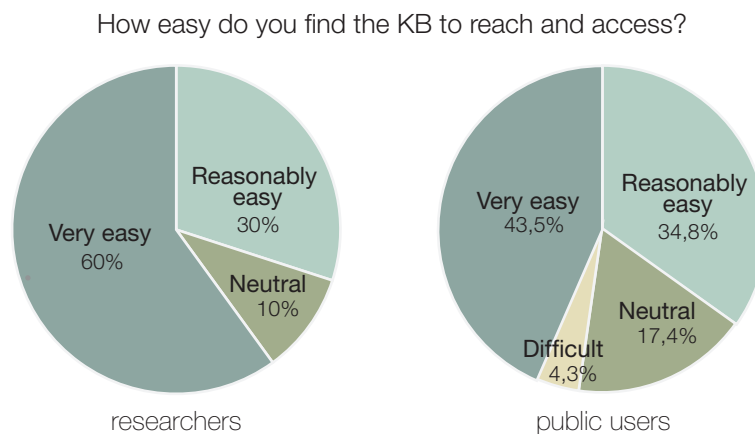


Figure 40 | Survey result: Accessibility of the KB, own diagram

How do you experience the building’s entrance, reception, and orientation?

Figure 41 shows that most researchers (60%) find the building’s entrance, reception, and orientation to be pleasant, although 20% perceive it as unpleasant. Public users responded slightly more positively, with 43,5% of respondents finding the experience very pleasant and 26,1% finding it pleasant. Approximately 14% of all respondents find it (very) unpleasant.

How do you experience the entrance, reception and orientation in the building?

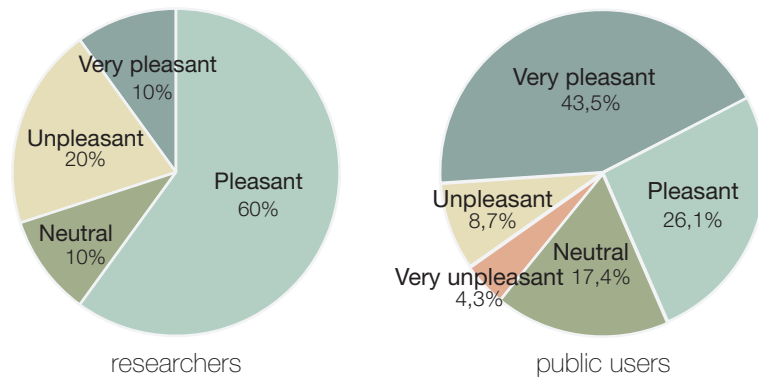


Figure 41 | Survey result: Accessibility of the KB, own diagram

5.1.2 Current rooms and functions

What spaces do you usually use in the KB?

The graph in Figure 42 shows the spaces commonly used by researchers and public users. Both groups mainly use the reading rooms, the study areas, and the café. In addition, researchers use the special collections room, the archive, and sometimes the exhibition spaces. Public users, on the other hand, do not make extensive use of additional functions in the KB except for the meeting rooms.

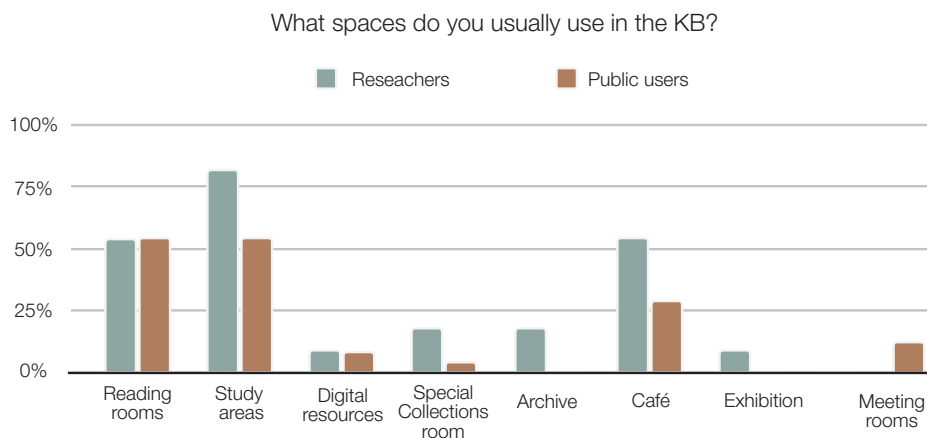


Figure 42 | Survey result: Current rooms and functions of the KB, own diagram

What features are important to you in the KB?

Table 43 presents the mean importance ratings (on a 1-5 scale) of various KB features as evaluated by researchers and public users. Both groups find a comfortable (seating, lighting, temperature), silent, and calm environment to be the most important feature. Furthermore, concentration areas are considered very important, especially by public users.

Researchers find it important to have access to facilities, such as the special collections room and the archive function, while public users attach more importance to meeting areas and group workspaces.

Informal spaces, cultural functions, and outdoor spaces were all scored as being of average importance for both groups. These findings indicate that researchers prioritize features that enhance the individual experience and access to information, whereas public users place greater emphasis on concentration and opportunities for collaboration.

What features are important to you in the KB?

	Researchers	Public users
Silent and Calm	4.2	4.6
Comfort (seating, lighting, temperature)	4.5	4.5
Concentration areas	3.5	4.2
Access to Collections	3.3	2.9
Meeting areas, Groupworkspaces	1.9	2.7
Informal meeting spaces (cafés, lounges)	3.1	3.0
Cultural activities (exhibitions, lectures)	2.7	2.5
Outdoor spaces, green areas	2.6	2.8
Digital/media zones	2.3	2.5
Archive or Heritage functions	3.5	3.0

Figure 43 | Survey result: Current rooms and functions of the KB, own diagram

What are you missing in the current spatial arrangement of the KB?

Figure 44 shows that, compared to the current situation of the KB, researchers primarily require more quiet-study areas, individual workspaces, and more green areas. Public users likewise report a shortage of individual workspaces and highlight the absence of a café or food facilities and relaxation areas. Both groups express a need for more group-work spaces, extra toilet facilities, and additional charging points.

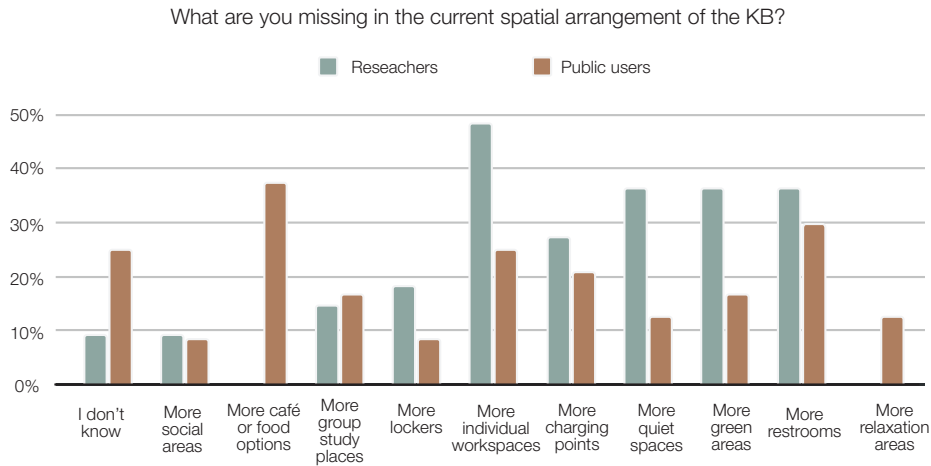


Figure 44 | Survey result: Current rooms and functions of the KB, own diagram

What do you think of the following aspects in the KB?

Table 45 presents the 1-5 rating assigned by researchers and public users to various features of the KB. Researchers are significantly more positive about the food and drink options than public users. Both groups give a low rating to the current green spaces. The remaining aspects, such as atmosphere, furniture, building orientation, staff, and lockers, are rated very positively by both groups.

What do you think of the following aspects in the KB?

	Reseachers	Public users
The number of workspaces	4.3	4.2
Orientation and signage in the building	4.3	3.9
The atmosphere in the building	4.0	3.9
Furniture arrangement	3.5	3.9
Food and drink options	4.3	2.8
Staff or help points	4.5	4.1
Lockers or storage space	4.5	4.1
Power outlets or charging points	4.8	4.0
Opportunities for recreation	3.3	3.6
Amount of greenery (indoors or outdoors)	2.9	2.5

Figure 45 | Survey result: Current rooms and functions of the KB, own diagram

5.1.3 Environmental factors

Do you feel cut off from the outside world when you are inside the KB building?

As shown in Figure 46, the majority of researchers (80%) and public users (69,5%) indicate that they feel cut off from the outside world when in the KB, but they do not experience this as a hindrance. Only around 10% of both groups experience this as a negative experience.

Do you feel cut off from the outside world when you are inside the KB building?

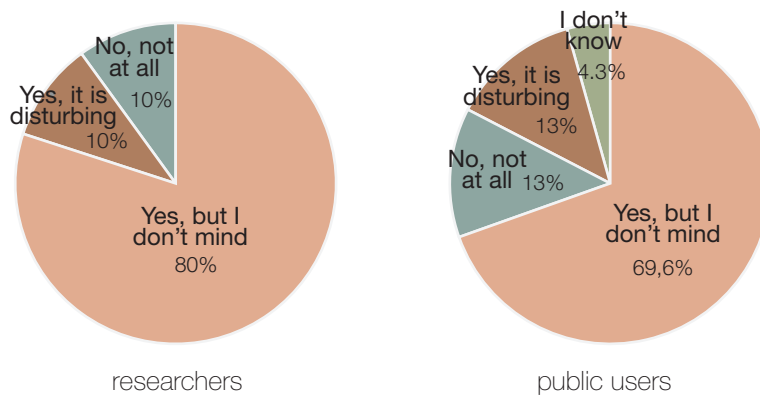


Figure 46 | Survey result: environmental factors of the KB, own diagram

How do you experience the noise level in the rooms you use?

Figure 47 shows that both groups rate the noise level in the rooms of the KB as mostly positive. Researchers experienced the noise level as (very) pleasant in 70% of cases, increasing to 87% for public users. Therefore, noise does not appear to be a hindrance in the rooms of the KB.

How do you experience the noise level in the rooms you use?

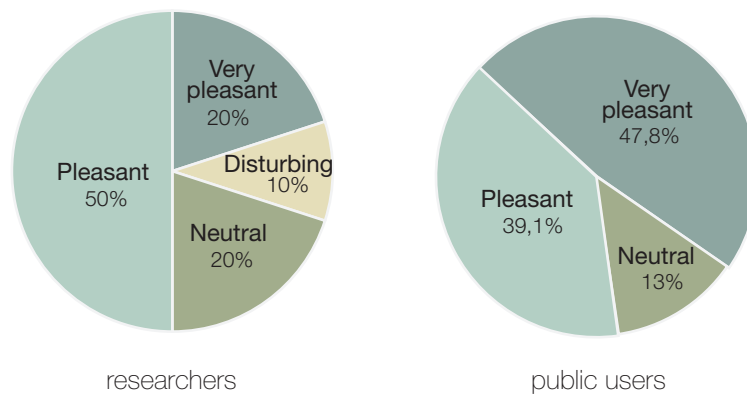


Figure 47 | Survey result: environmental factors of the KB, own diagram

How would you describe your ability to concentrate when working or studying in the KB?

As demonstrated in Figure 48, the two groups both rate the concentration capacity as good to very good. Public users tend to be slightly more positive than researchers.

How would you describe your ability to concentrate when working or studying in the KB?

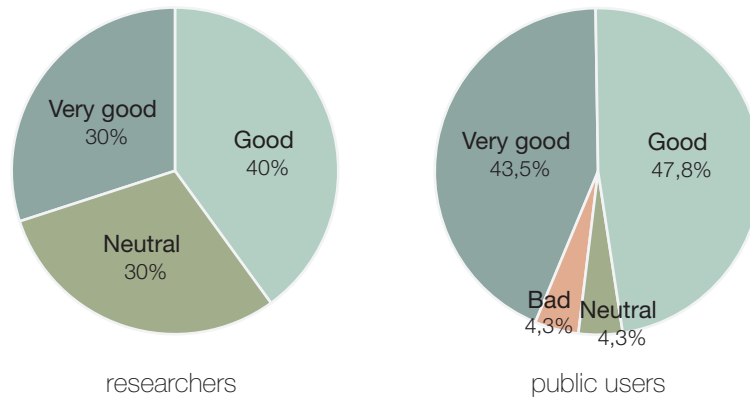


Figure 48 | Survey result: environmental factors of the KB, own diagram

To what extent are you satisfied with the lighting in the KB?

Table 49 shows how the users rate the lighting in various rooms of the KB. The results show that researchers and public users rated all rooms relatively positively, with only minor differences between the groups. The lighting in the reading and computer rooms receives the lowest scores of all rooms from both groups.

To what extent are you satisfied with the lighting in the KB?

	Reseachers	Public users
Reading rooms	3.1	3.2
Registration desk	4.0	3.6
Knowledge Quater	4.0	3.7
Offices	3.7	3.8
Cafe at main entrance	3.6	4.1
Foyer (main entrance KB)	4.0	4.1
Computer space	3.5	3.6
Micro hall	3.7	3.7

Figure 49 | Survey result: environmental factors of the KB, own diagram

5.1.4 Future of the KB

What do you think would be the ideal opening hours?

illustrates that both groups desire extended opening hours. While researchers prefer greater flexibility in weekday opening hours, public users consider both extended weekday hours and additional weekend access important.

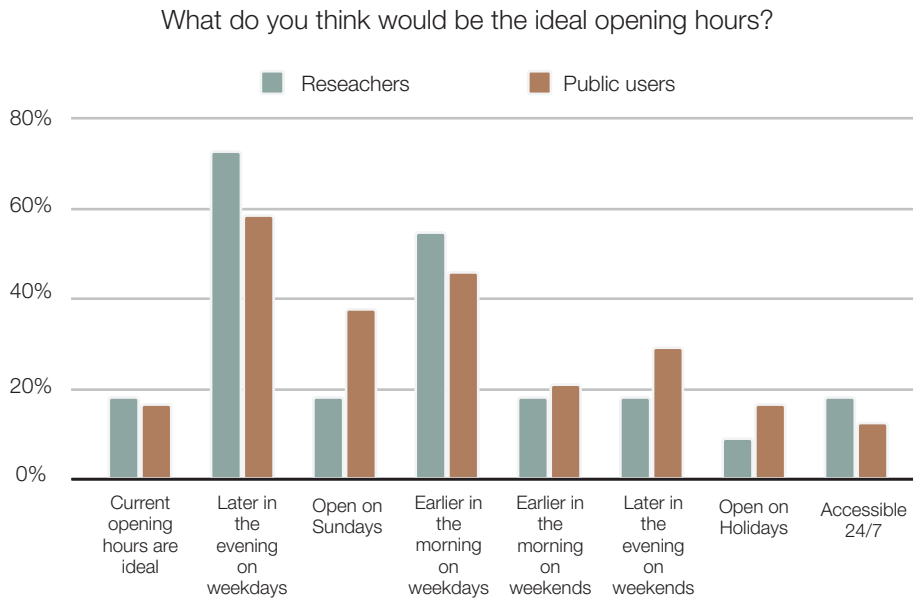


Figure 50 | Survey result: future of the KB, own diagram

To what extent do you think the KB should become accessible to everyone in the future?

Researchers prefer to make the KB partially accessible to the public, see Figure 51. Public users show a wider divide in their opinions, with more votes making it largely publicly accessible. However, the majority of both groups are content with the current level of accessibility.

To what extent do you think the KB should become accessible to everyone in the future?

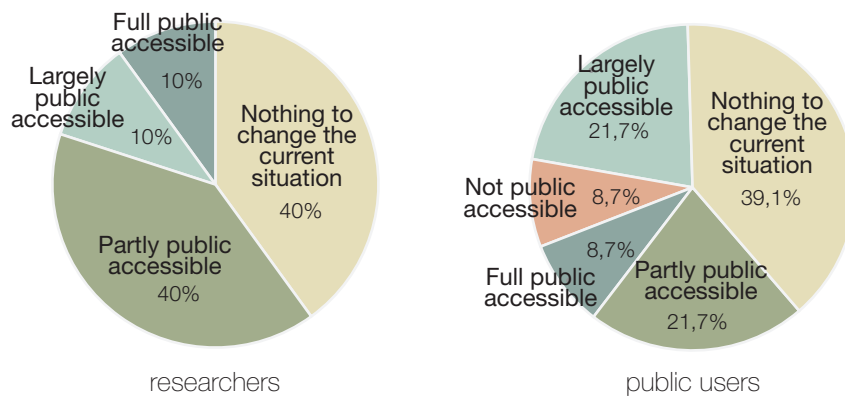


Figure 51 | Survey result: future of the KB, own diagram

How important are the following aspects for the redesign of the KB?

Table 52 outlines the importance ratings users assigned to specific KB elements, highlighting which elements must be retained and which are of lesser significance. The results show that researchers attach greater value to the historical elements and original features of the KB, such as the staircases and floors, than public users. The most widely shared value is the building's recognisable location next to the station and the city centre, and its significance as a national knowledge centre.

How important are the following aspects for the redesign of the KB?

	Researchers	Public users
The striking exterior of the building (such as the facade and shape)	3.3	2.7
Original parts inside, such as stairs, floors or fixed furniture	3.3	2.9
Artworks and historic elements in or on the building	4.2	3.3
The building's recognizable location next to station and city	4.2	4.2
The significance of the building as a national knowledge center	3.8	3.5

Figure 52 | Survey result: future of the KB, own diagram

What spaces & functions would you like to see in a redesigned KB?

Figure 53 shows that several functions are considered important by both researchers and public users. The functions that stand out the most and are widely supported by both groups are: cafés and social spaces, outdoor spaces and green areas, exhibition spaces, and language courses.

However, there are also differences between the two groups. Researchers are more interested in functional spaces, such as archival functions, creative workspaces (e.g., makerspaces), meditation areas, and IT courses. Public users prefer social and cultural functions, including sports classes, performing arts, and creative workspaces.

What spaces & functions would you like to see in a redesigned KB?

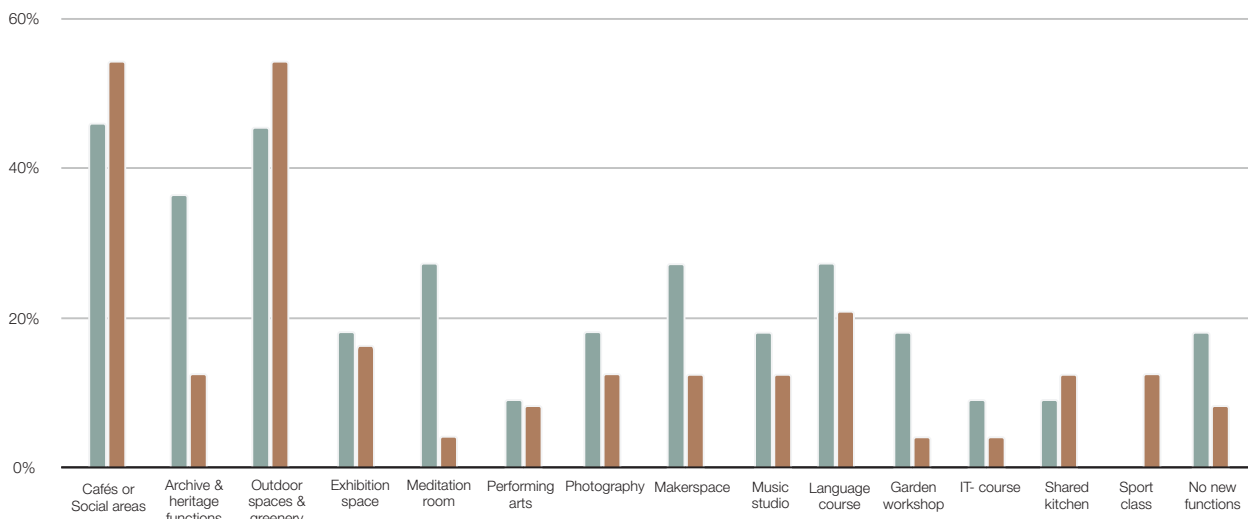


Figure 53 | Survey result: future of the KB, own diagram

5.1.5 Conclusion

The survey shows that the Koninklijke Bibliotheek successfully meets its users' reachability, comfort, and atmosphere needs while revealing several improvement opportunities. The central location of the KB next to The Hague Central Station allows the majority of users to arrive by public transport, by cycling, or on foot. Most users find the entrance, reception, and building orientation to be pleasant. Both researchers and public users indicate that a comfortable (seating, lighting, temperature), silent, and calm environment is the most important feature of the KB. The groups frequently use the reading rooms, study areas, and the café. Additionally, researchers value special collections rooms and archive access, whereas public users require meeting and group-work spaces.

Despite these strengths, researchers and public users both report a shortage of quiet-study and individual and group workspaces, green and outdoor zones, extra toilets, and charging points. Public users also lack additional cafés, food facilities, and relaxation areas.

Most users of the KB report a positive experience with its inside environment. Many users feel cut off from the outside while within the KB, which is generally not perceived negatively. Both researchers and public users indicate they are satisfied with the noise level and their ability to concentrate in the various rooms. However, recommendations have been made to enhance lighting conditions in designated reading and computer rooms.

Researchers and public users strongly support extended weekday and weekend opening hours for the future KB. Concerning public accessibility, both groups agree that the current level of access should be maintained. In the event of a redesign of the KB, researchers value maintaining the KB's historical and functional elements, whereas public users attribute less significance to these elements. Above all, users value the building's central location next to the station and its status as the national knowledge centre.

Users' preferences for the KB's future functions highlight cafés and social spaces, green and outdoor areas, exhibition zones, and language courses. Researchers are particularly interested in functional spaces, such as archival and makerspaces, while public users emphasise social and cultural facilities.

5.2 Interviews

This subchapter presents the key findings from interviews conducted with users of the Koninklijke Bibliotheek. The complete transcripts of the question-and-answer sessions can be found in Appendix 2. A summary of the main insights is provided below, and the most significant themes are also visualised in Figure 54. In total, 20 KB users were interviewed across 12 interview sessions, comprising both individual and group interviews. The interviews were conducted on 29 April, 6 May, and 10 May.

5.2.1 Conclusion interviews

The interviews reveal that people primarily visit the Koninklijke Bibliotheek (KB) for its tranquillity, study-friendly atmosphere, and access to its collections. Many users find a quiet workspace at the KB, which is often missing in other libraries, such as the Central Library of The Hague.

Nearly all respondents perceive the KB's location as highly favourable, mainly because it is next to The Hague Central Station. However, many users highlight that the entrance of the building is unclear and difficult to access, and that there is insufficient bicycle parking.

The KB's exterior is generally viewed as disappointing. Some describe its appearance as "ugly" or "hospital-like", noting that it does not align with the library's intended image. Others appreciate its sculptural form as unique and interesting, while some interviewees consider the design chaotic and incoherent.

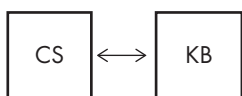
Inside the building, many users find wayfinding confusing and navigation challenging. Nevertheless, the interior is broadly valued: users value the quiet, the acoustics and the study-friendly environment. The furnishings are described as functional yet stylish. The combination of wooden furniture, carpeting and warm lighting creates a pleasant, almost homely atmosphere. According to the users, the interior is deemed instrumental to concentration. In particular, the silence, variety of seating options, and availability of secluded and individual workspaces are cited as major strengths.

Interviewees identified several facilities as essential to their visits, most notably the reading rooms. The upper-level workspaces in the reading rooms that offer privacy, daylight, and quiet are especially highly valued. However, specific seats with views or enclosed cubicles are often quickly occupied. Additionally, access to general and special collections areas is also deemed crucial.

Additionally, the area at the KB's information desk is valued as an informal workspace, and the on-site café functions as both a meeting point and a break area. Interviewees appreciate the clear separation between these formal and informal zones.

Finally, users noted the absence of outdoor spaces and greenery in and around the building. Currently, only a few benches outside offer the opportunity to take a break in the sun.

Valued Aspects



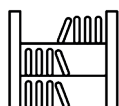
Convenient Location



Quiet, Study-Friendly Atmosphere



Access to (special) Collections



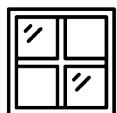
Homelike Interior
Wooden furniture, carpeting



Informal work & social spaces



Clear separation between formal
and informal spaces

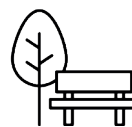


Workspaces next to windows

Improvement Opportunities



Confusing Navigation
inside building & entrance



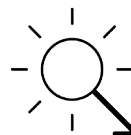
In- & Outdoor & Green spaces



More Informal spaces and functions



Variety in seating
individual, group & informal



Workspaces with
enough Daylight

Figure 54 | key themes from interview results, own figure

5.3 Conclusion

The central question in this chapter revolves around what spatial functions and environments the researchers and public users of the Koninklijke Bibliotheek need. The survey and interview results show that both groups mainly need quiet, comfortable workplaces in a quiet and study-friendly atmosphere. For researchers, access to archives, special collection rooms and functional workplaces is essential for focused research. Public users value social and cultural facilities, such as cafés, group workplaces and places for meeting and relaxation, in addition to quiet workplaces.

Although the KB's central location and quiet character are appreciated, both researchers and public users report a shortage of workplaces, greenery and outdoor spaces. Users also express the need for additional facilities such as a clearer entrance, better signage, extra toilets, and more space for bicycle parking. Figure 55 summarises the functions and environments needed.



Figure 55 | key themes from survey and interviews, own figure

6.

How can spatial strategies for the Koninklijke Bibliotheek be formulated based on user surveys and case study analysis to balance research and public functions?

This chapter addresses the third sub-question: *“How can spatial strategies for the Koninklijke Bibliotheek be formulated based on user surveys and case study analysis to balance research and public functions?”* It combines insights from previous sub-questions by translating user needs and library case studies into applicable spatial strategies for the KB.

The aim is to formulate design principles that respond to the dual character of the library as both a place of concentrated research and a dynamic public institution. Key spatial demands have been identified based on the user surveys and interviews (SQ2). These are compared and complemented with findings from the analysis of three international library case studies (SQ1), demonstrating how other institutions have addressed similar functional tensions.

6.1 Spatial Strategies

6.1.1 Matrix

This matrix in Figure 56 outlines spatial strategies for the redesign of the National Library of the Netherlands (KB), based on findings from user research presented in Chapter 5 (Sub-Question 2), including surveys and interviews, as well as a case study analysis of three international libraries discussed in Chapter 4: Oodi in Helsinki, the Public Library of Amsterdam (OBA), and the Seattle Public Library (Sub-Question 1). The matrix translates key user needs within the KB into spatial design strategies, informed by insights from these library case studies.

Theme	User Needs (SQ2)
Silence vs. Collaboration	Strong need for quiet workspaces and areas for collaboration, discussion, and meetings.
Functional Zoning	A clear separation between public, silent, and support functions is required.
Circulation & Accessibility	Users want logical, intuitive circulation and orientation.
Environmental Quality	Users value a quiet environment for concentration and workspaces with natural daylight.
Workplace Diversity	Demand for various workspaces: silent desks, group areas, informal seating, and individual booths.

6.1.2 Conclusion

The matrix addresses the sub-question: “How can spatial strategies for the National Library be formulated based on user research and case study analysis to create a balance between research and public functions?”

It provides an analysis by presenting spatial design strategies that respond to user needs and draw from best practices in other libraries. The matrix suggests that strategies can help address tensions, such as those between silence and activity, public and research functions, or flexibility and identity, based on combined insights from user research and case studies. These strategies offer a guiding framework for designing a future-proof National Library that effectively balances its academic and public roles.

Inspiration from Case studies (SQ1)	Design Strategies for KB
Case studies use spatial separation of quiet and active zones with buffer areas, sound insulation, and transparent barriers.	Create clear zoning for silence and activity using acoustic separation, closed rooms, and buffer zones while maintaining openness.
All cases use floor-by-floor zoning: active functions on lower levels, quiet zones in the middle, and staff functions on the top levels or the edge of the building.	Structure the building vertically: active public on the ground floor, quiet study above, and technical/support spaces at the top.
All case studies feature a central vertical spine as the main circulation area and visible sightlines to aid navigation.	Add a central circulation spine with open visual connections. Use material contrasts and light to clarify pathways.
Quiet functions are grouped to maintain a low-noise environment. Workspaces are located along the façades, away from noisy main circulation areas, offering a comfortable setting with natural daylight.	Position workspaces along the façades to allow natural daylight in. Use acoustic materials and group quiet functions together to ensure a low-noise environment.
All three libraries offer a mix of booths, open lounges, and informal spots with varied acoustics and lighting.	Provide a mix of workspace types, silent desks, open and closed group spaces, lounge seating, and individual booths to support various user needs and preferences.

Table continued on next page →

Figure 56 | Spatial strategy matrix based on survey, interviews (SQ1), and case study analysis (SQ2), own table

6. How can spatial strategies for the Koninklijke Bibliotheek be formulated based on user surveys and case study analysis to balance research and public functions?

Theme	User Needs (SQ2)
Access to Collections	Easy, logical access to books and digital collections.
Cultural & Informal Spaces	Users want more informal spaces, cafés, exhibitions, workshops, and places to relax or meet informally.
Outdoor & Green Areas	Need greenery and access to outdoor space.
Atmosphere & Comfort	A warm, quiet, and comfortable setting is highly appreciated.
Inclusivity & Access Hours	Demand for better signage, extended hours, and more inclusive environments.
Architectural Identity	Users desire an open, welcoming building that reflects the KB's cultural and national values.

Inspiration from Case studies (SQ1)	Design Strategies for KB
Seattle's Books Spiral integrates browsing with uninterrupted movement across multiple levels, while OBA uses thematic layouts, organising collections by theme on each floor.	Organise collections by theme or category per floor and ensure continuous, intuitive circulation between levels to support browsing and orientation.
Ground levels in all case studies are lively, multifunctional zones with informal public functions for different types of users. Some also activate higher floors as public spaces connected to terraces, offering outdoor access. Many spaces are multifunctional and used by different users for various purposes.	Design active and welcoming ground-floor zones with informal functions such as cafés, exhibitions, and workshops to attract diverse users. Use higher levels to extend public space by connecting to terraces. Design spaces to be flexible, supporting various user activities throughout the building.
Oodi and OBA have rooftop terraces; Oodi features a strong ground-level connection to the surrounding park. All case studies create strong visual connections with the outdoors and the urban context.	Integrate accessible outdoor spaces such as rooftop terraces and ground-level green areas. Strengthen visual connections to the outside environment to enhance the sense of openness and, where possible, a connection with nature.
Oodi uses wood, daylight, and soft spatial transitions to create comfort. OBA provides warm interior accents in some zones. Seattle contrasts with bold, structured interiors.	Use natural materials, warm lighting, and soft spatial transitions to create a calm and inviting atmosphere. Integrate daylight and acoustic design to support comfort and a sense of quiet.
The libraries stay open into the evening, supported by cafés and event spaces with public programs. Signage is intuitive and includes multilingual or symbolic elements.	Extend opening hours and support evening use with cafés and public programming. Use clear, intuitive signage with multilingual and symbolic elements to create an inclusive and accessible environment for all users.
All three libraries have iconic, accessible exteriors that express their public character: Oodi opens to the park with glass and wood; OBA combines transparency with cultural programming; Seattle's geometric form enhances public visibility.	Design an iconic, accessible exterior that reflects the library's public role. Use openness, transparency, and connection to surrounding spaces to express public and national identity.

Figure 56 | Spatial strategy matrix based on survey, interviews (SQ1), and case study analysis (SQ2), own table

7. Conclusion

This research answers the question: *How can spatial strategies in the building of the Koninklijke Bibliotheek contribute to creating an effective balance between research and public needs?* The answer is that a carefully designed spatial structure, based on zoning, acoustic separation, multifunctionality and inviting public spaces, is the key to harmoniously bringing these research and public functions together.

The case studies of Oodi, OBA and the Seattle Public Library demonstrate that combining public and quiet functions within a single building is possible, provided clear physical separations and buffer zones are applied. The libraries use vertical construction in which active functions are concentrated on the ground floor, while research functions, such as quiet workstations, are located on higher or more private floors. Acoustic strategies such as closed study cells, sound-absorbing materials and separate circulation routes prove crucial. In addition, flexible, multifunctional spaces allow the library to meet the diverse needs of its users. For example, these spaces are used as workspaces during the day and for active public programming in the evening, without interfering with each other.

For the Koninklijke Bibliotheek (KB), which now serves primarily as a research library, it is possible and desirable to retain its traditional research function while strengthening its public role. The user research, in the form of surveys and interviews, shows that both target groups, researchers and public users, appreciate a quiet atmosphere and comfortable workplaces. At the same time, there is a clear need among visitors for additional functions such as a café, group spaces, informal meeting places and green outdoor space. The current physical layout of the KB, which is strongly internally oriented and closed, hinders this public broadening. There are therefore gains to be made by transforming the first floor into an open, inviting zone with lively public functions, while the higher floors continue to guarantee quiet and concentration for research.

The results confirm that balancing both functions does not need to be compromised. Still, they can be a reinforcement: a public-oriented library attracts new audiences. It increases its social relevance, while researchers benefit from better-equipped, quiet workplaces in a future-proof building. Spatial strategies become not just a design choice, but a powerful tool for balancing institutional identity, user experience and social value.

This research provides a concrete and applicable framework for the spatial redesign of the KB and possibly other national libraries. By considering spatial diversity, clear zoning and user-oriented design, the KB can grow into a national library that preserves heritage and connects the public.

8. Discussion

This research has shown that balancing research and public functions in the KB is primarily a spatial challenge, but also a social one. Combining literature, case studies, and user data provides a clear picture of what visitors need and identifies the current bottlenecks. At the same time, there are limitations in the methods and data that influence the outcomes, which are essential to note.

A first limitation is that the case studies are mainly examples of public, newly designed libraries. Their design and approach offer many valuable insights, but do not fully correspond to the situation at the KB. This is not only because the KB is an existing building with a fixed structure and limitations, but also because the KB has a strongly research-oriented function that distinguishes national libraries from open, public libraries. As a result, the strategies from the case studies must be carefully translated to the context of the KB. A broader comparison with other national libraries could further strengthen the research.

Additionally, the user study only provides insight into the experiences of individuals who already visit the KB. This means that an important group is missing: people who avoid the KB for reasons such as the atmosphere, the closed character, the functions, or other aspects of the building. This creates a one-sided picture of user experiences. Follow-up research should involve these non-users to obtain a more comprehensive picture of the accessibility and public appeal of the KB.

In a broader social context, this research aligns with the current trend in which libraries are increasingly serving as multifunctional spaces in society. The KB finds itself at a crossroads in this regard: it must support public functions, but also continue to offer the quiet working and research environment that is essential for researchers. This makes spatial design choices not only practical but also culturally and institutionally important.

The results of this study provide guidance for design decisions. The proposed strategies are therefore not fixed solutions, but form a basis that must be further developed and tested in the design phase in the context of the KB and its environment.

In conclusion, this research provides a valuable framework for redesigning the KB, but also requires further refinement and elaboration. The KB's social position, as both a national library and a public space, means that spatial choices influence how knowledge is made accessible and who feels welcome in the building.

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20. (Public Library Amsterdam / Jo Coenen & Co Architecten, 2014)
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30. (Seattle Central Library, n.d.)





Research

6

Design

68

Appendix

260

Design

In this chapter, I have collected the products of the design process. It presents both the intermediate steps and the final outcomes, showing how the design was developed. Together, they provide insight into my approach and the decisions made throughout the design process.

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Bibliothèque

A photograph of a modern library building. The building features a prominent, large, golden-colored sign that reads "Bibliothèque" in a stylized, serif font. The building's facade is composed of light-colored, rectangular panels arranged in a grid pattern. To the right of the main building, there is a taller, more vertical structure with a curved, ribbed facade. The sky is blue with some light clouds. In the foreground, there is a concrete walkway and a small, young tree. The overall image has a slightly desaturated, teal-tinted appearance.

1. Analysis



HAAGS

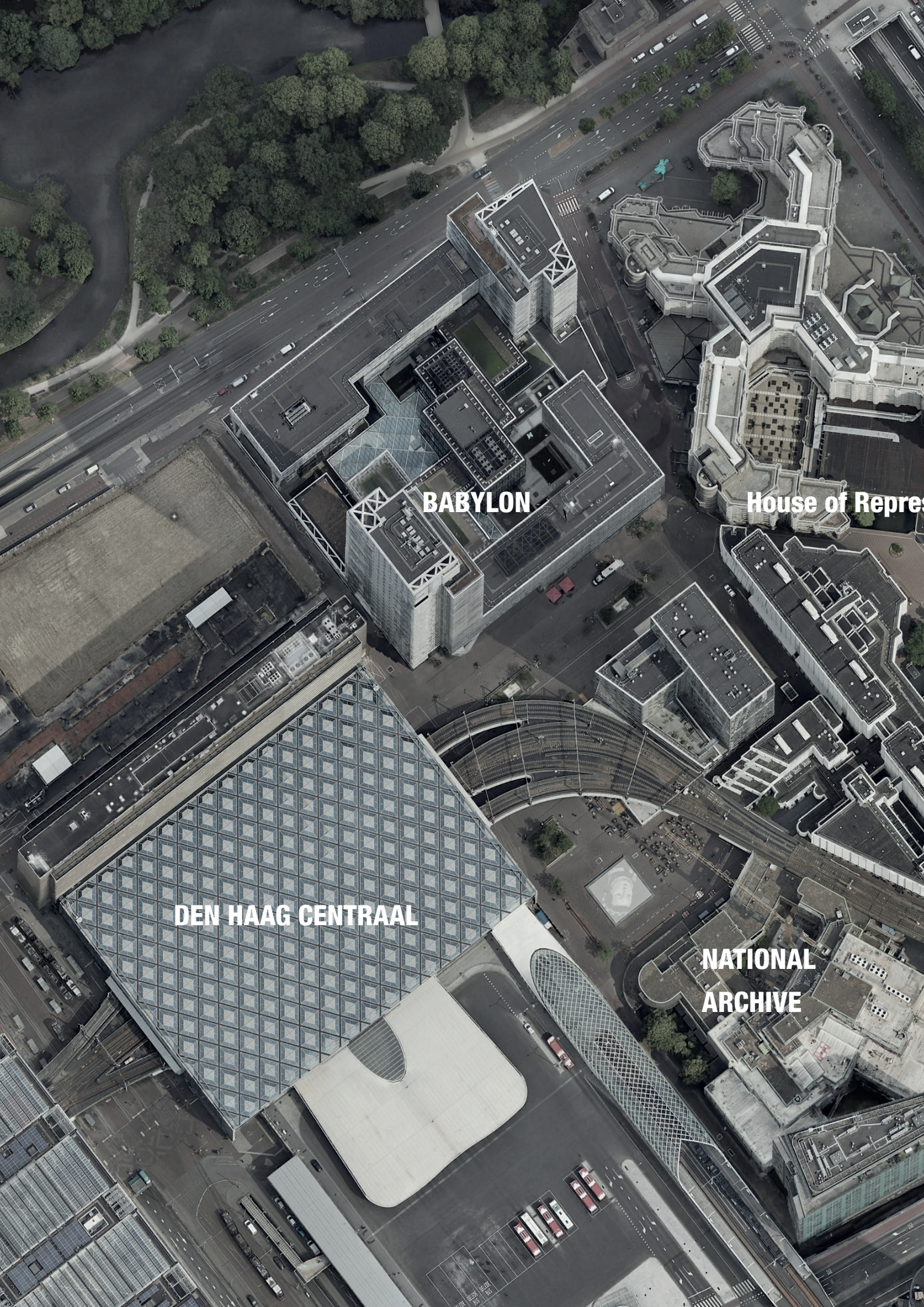
KOEKAMP

DEN HAAG
CENTRAAL

CITY CENTRE

E BOS





BABYLON

House of Repre

DEN HAAG CENTRAAL

**NATIONAL
ARCHIVE**

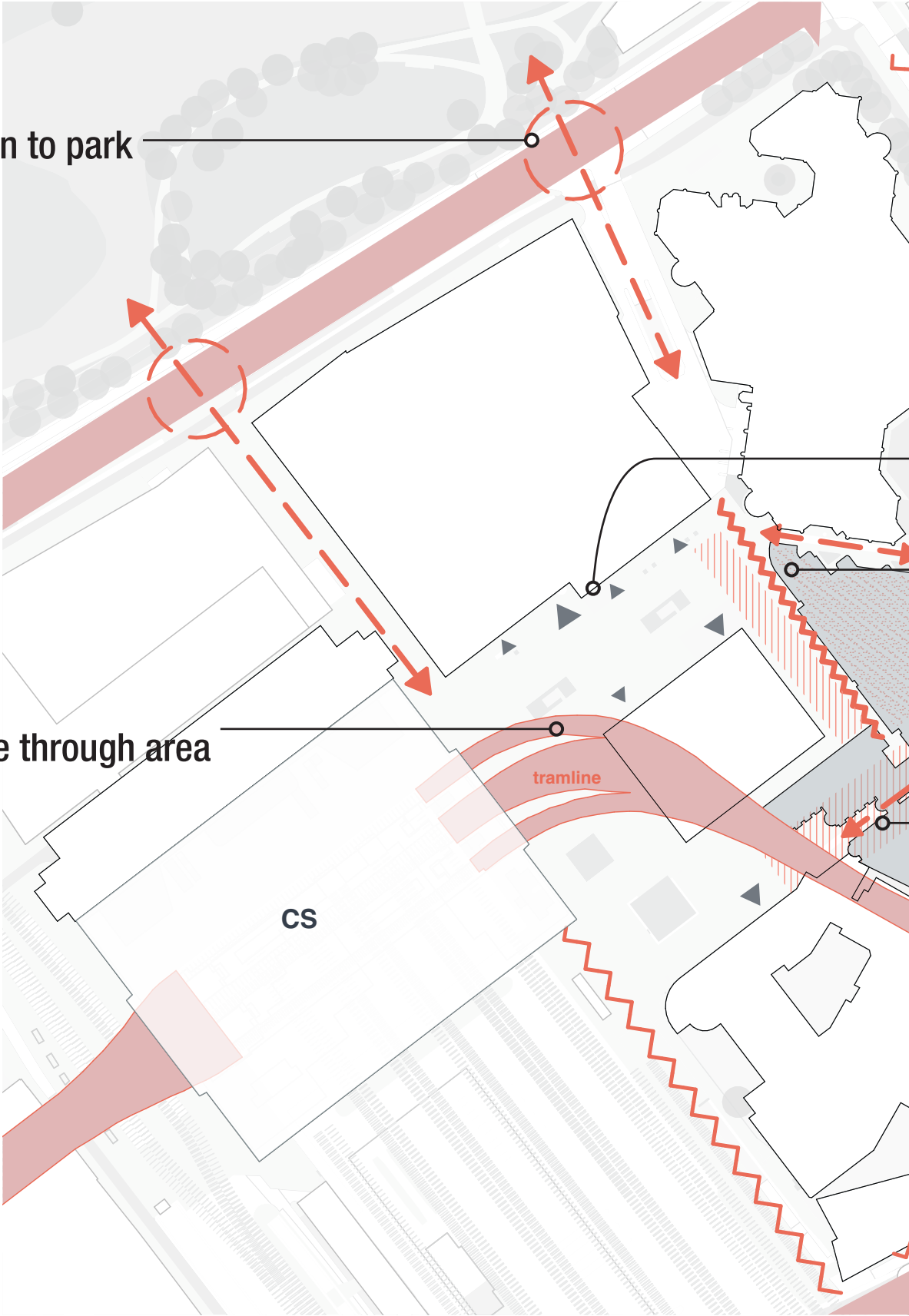
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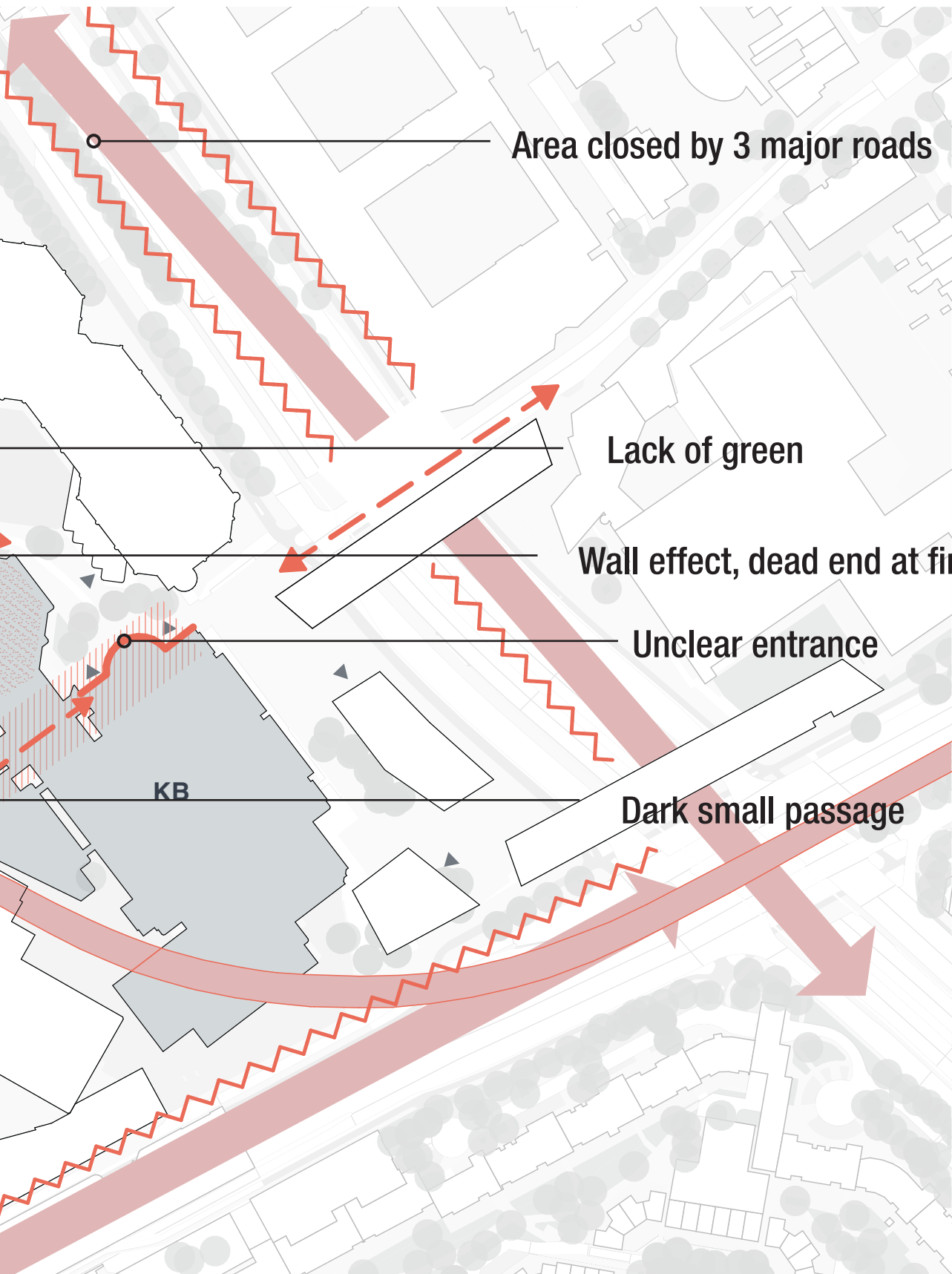


Site Analysis

Transition to park

Tramline through area





Area closed by 3 major roads

Lack of green

Wall effect, dead end at first glance

Unclear entrance

KB

Dark small passage



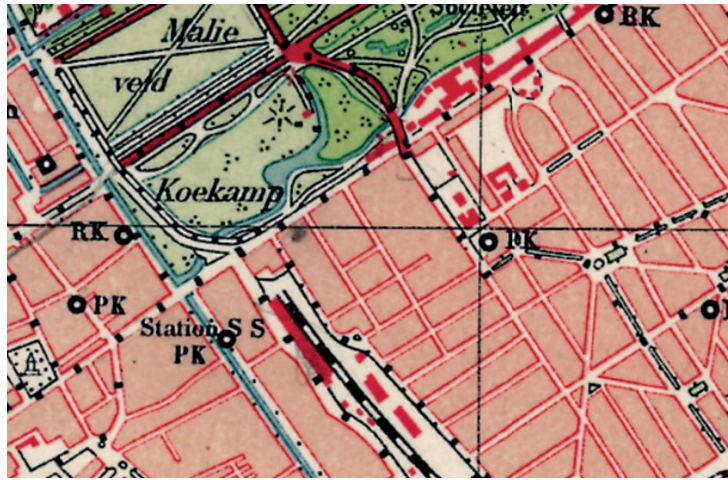
1850



1899



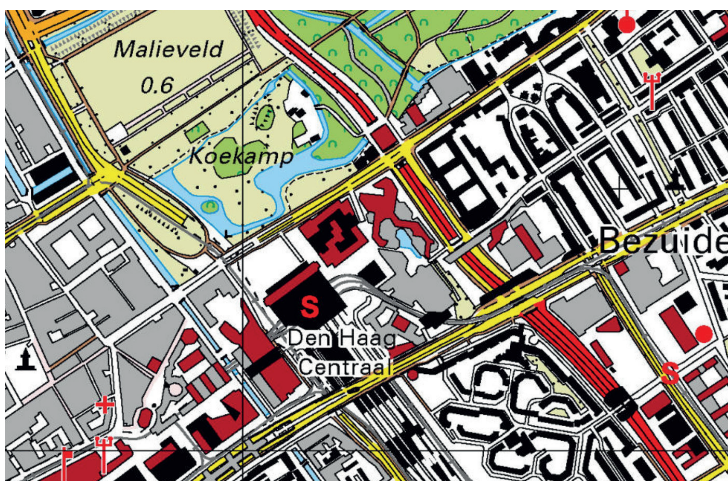
1931



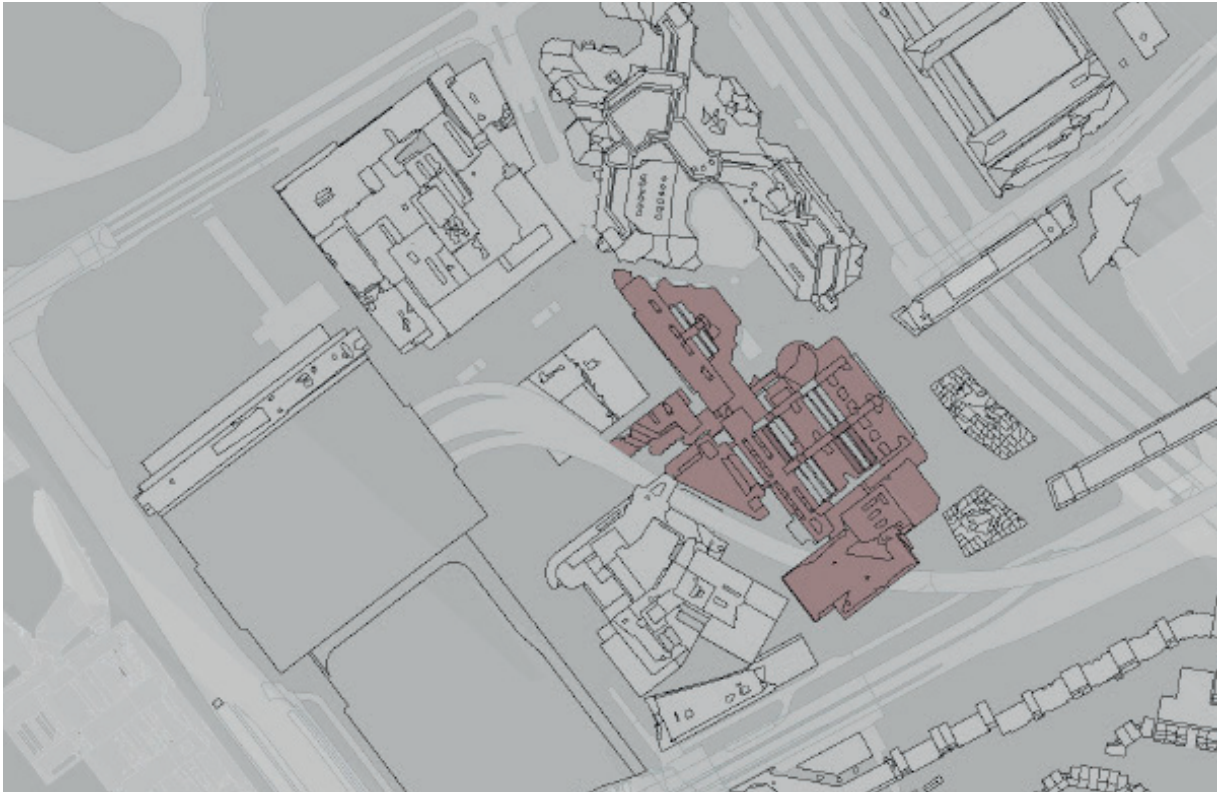
1951



1973



2011



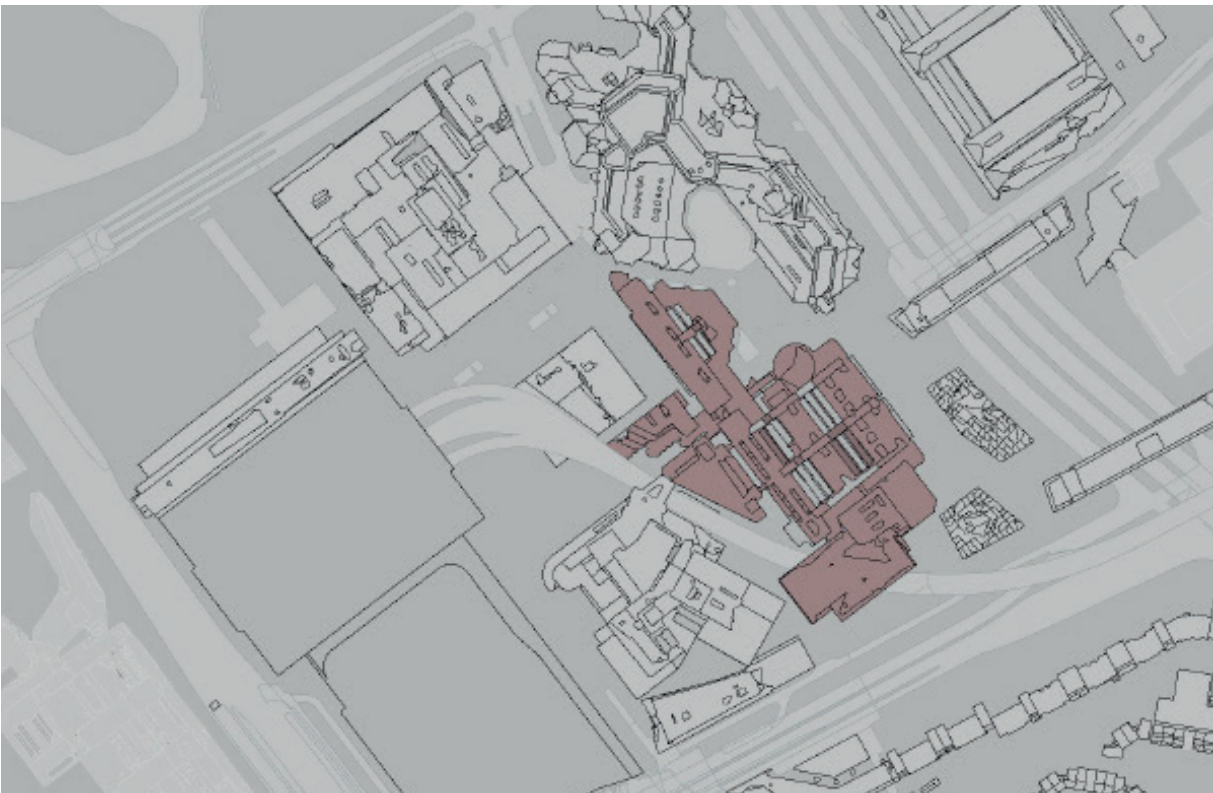
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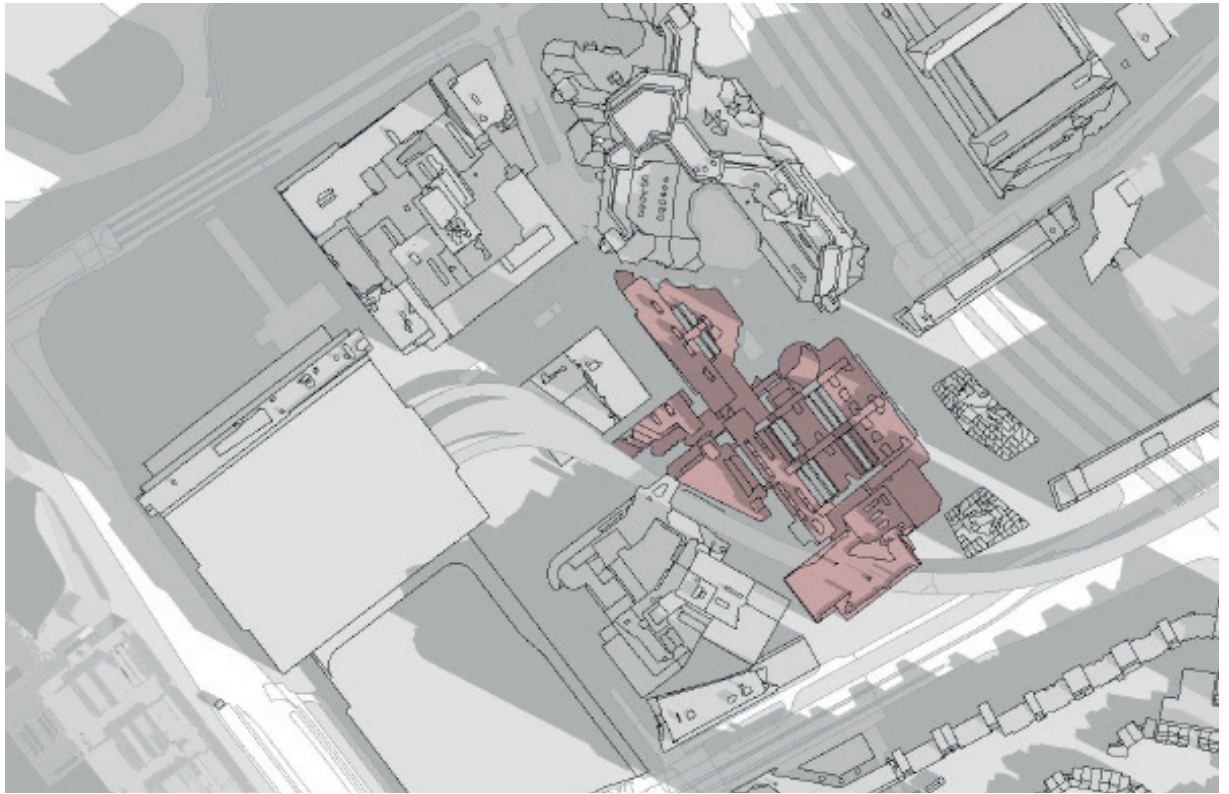
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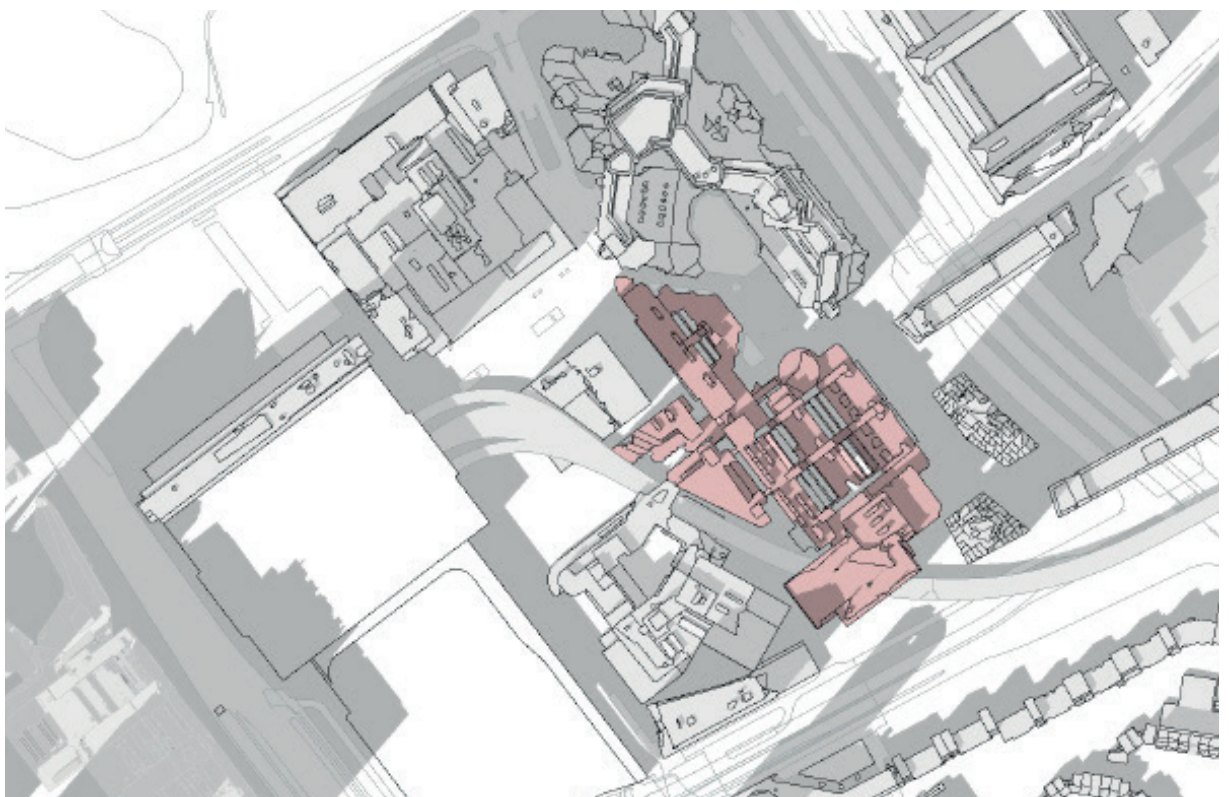
12:00



18:00



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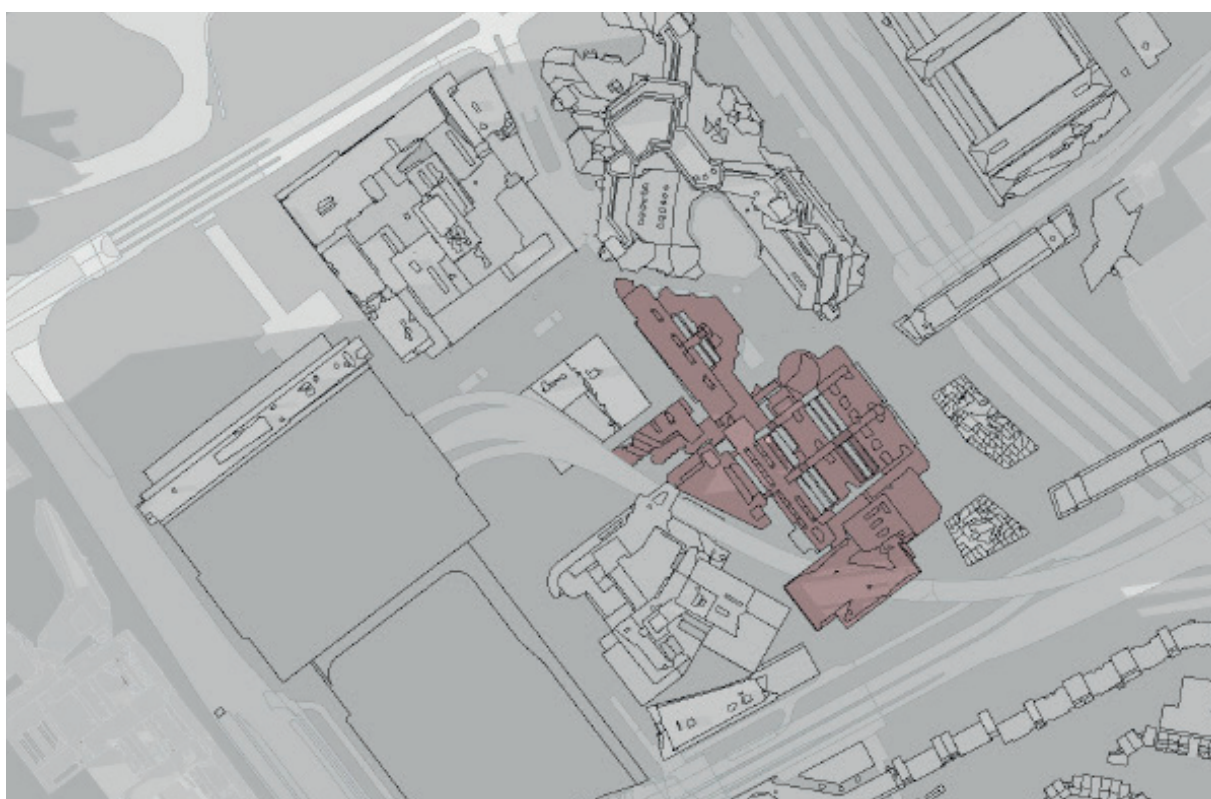


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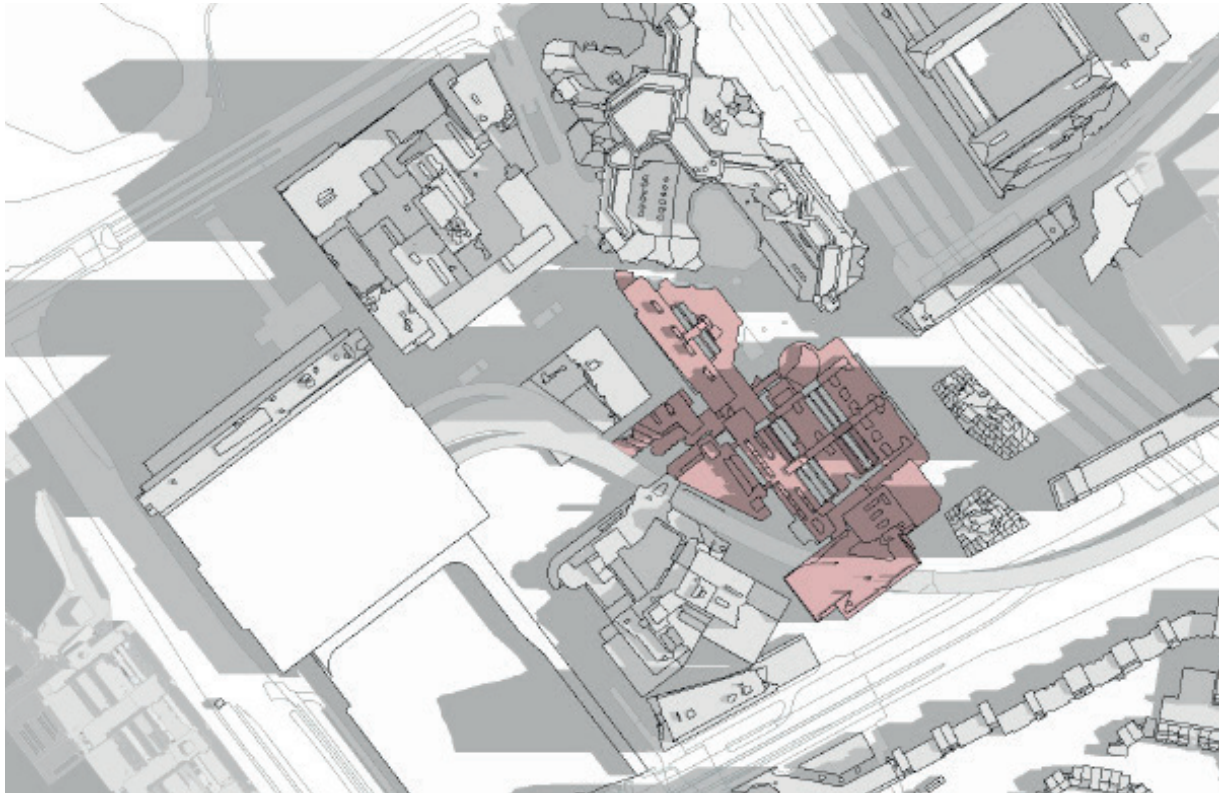
Sun Study | 21 March



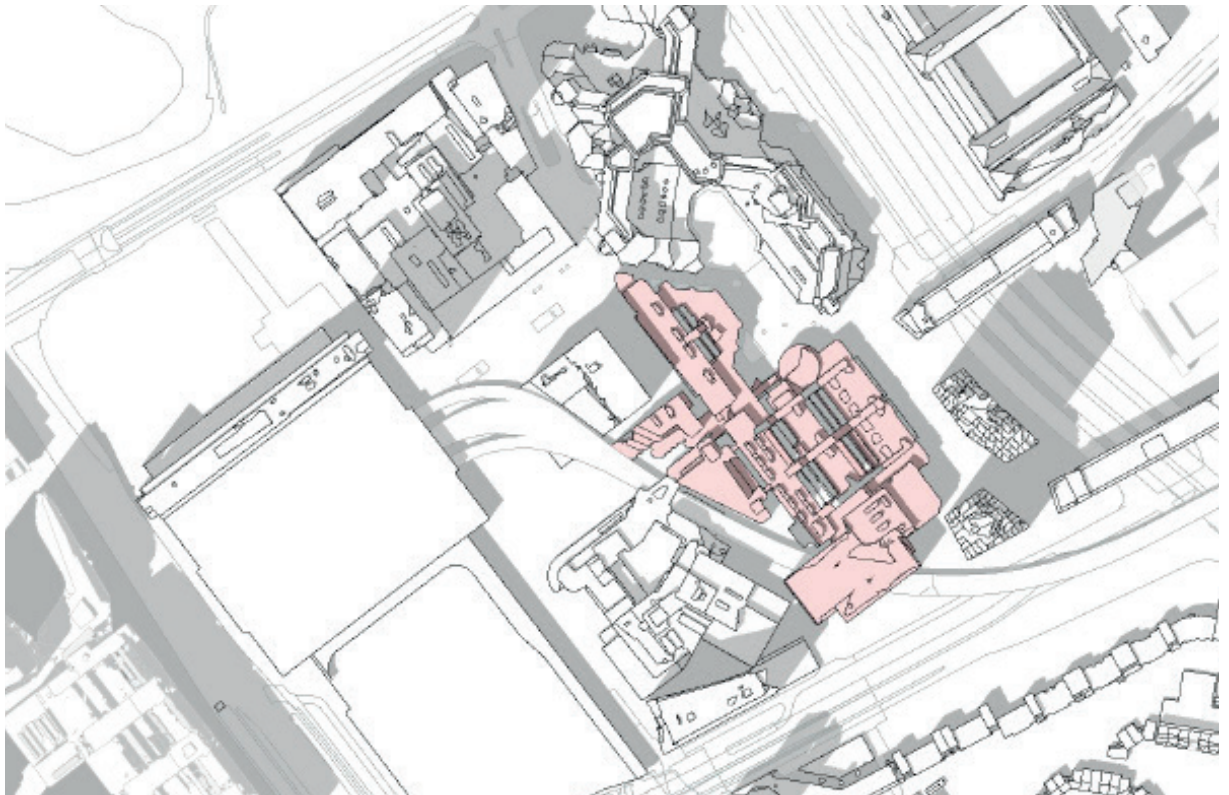
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18:00



09:00



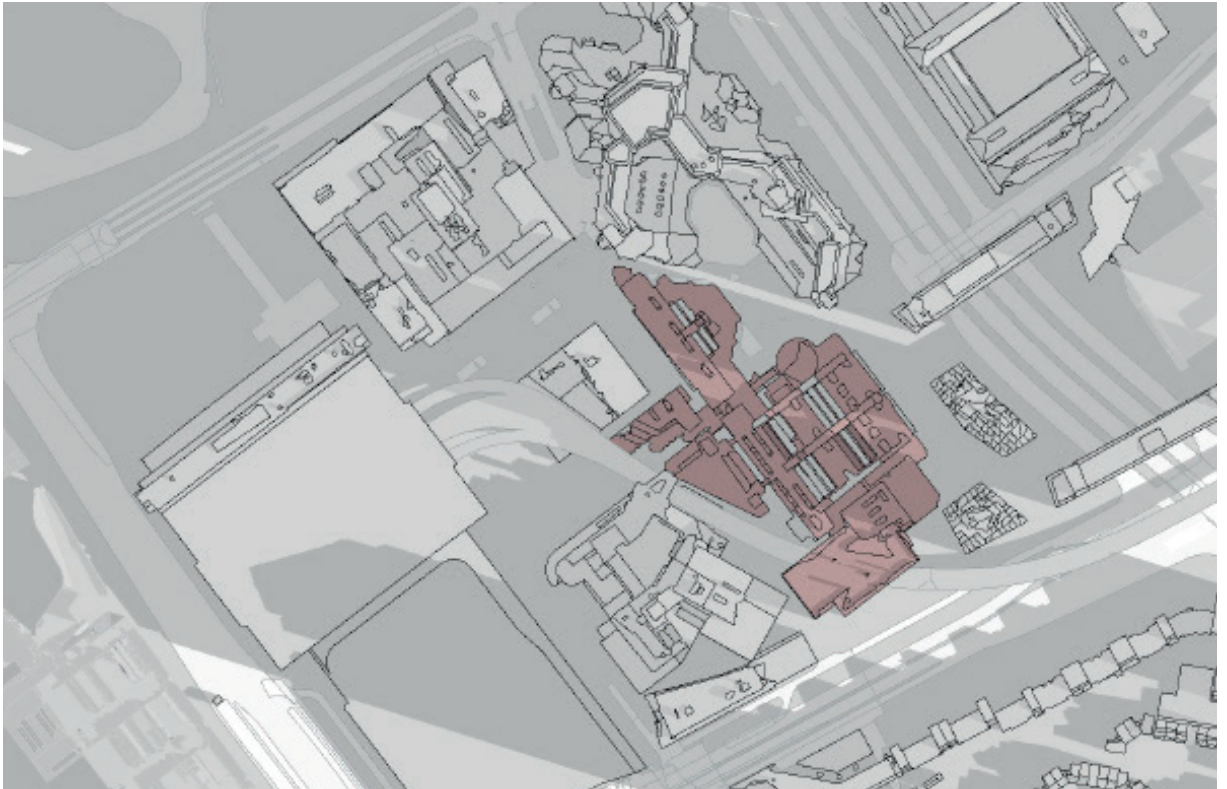
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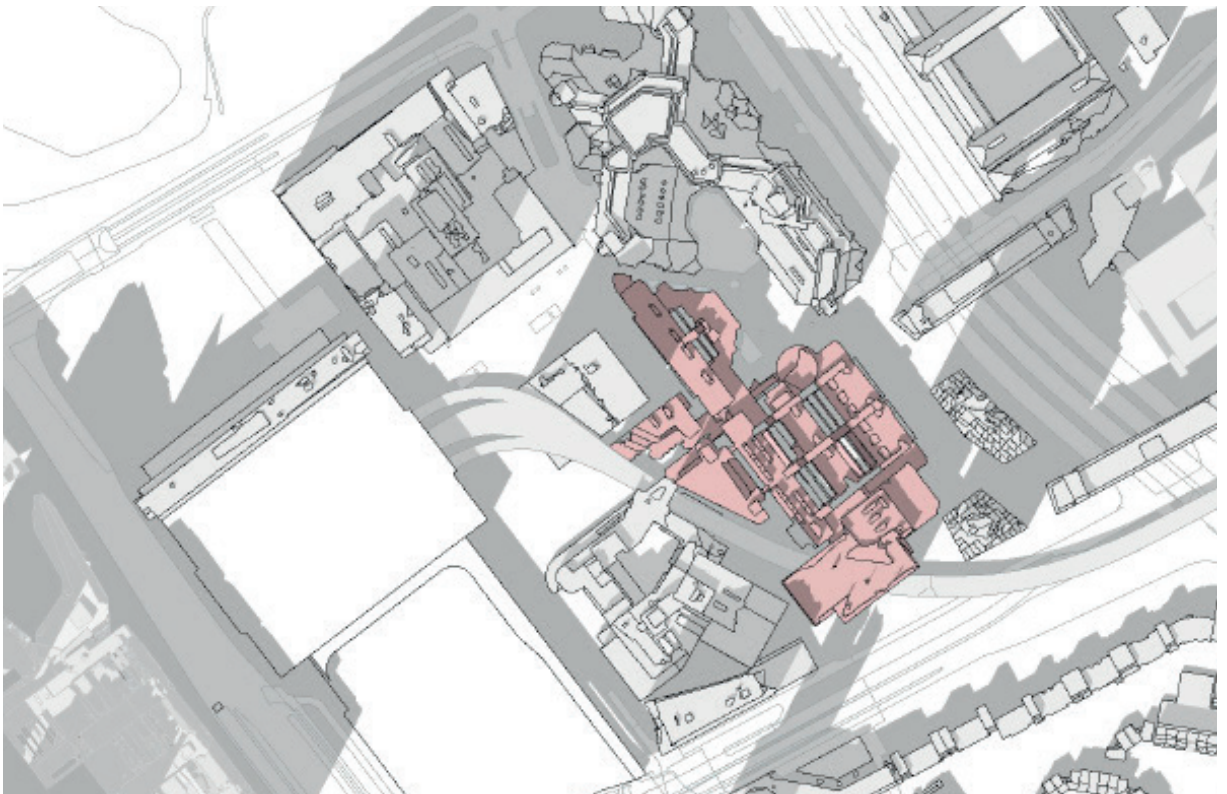
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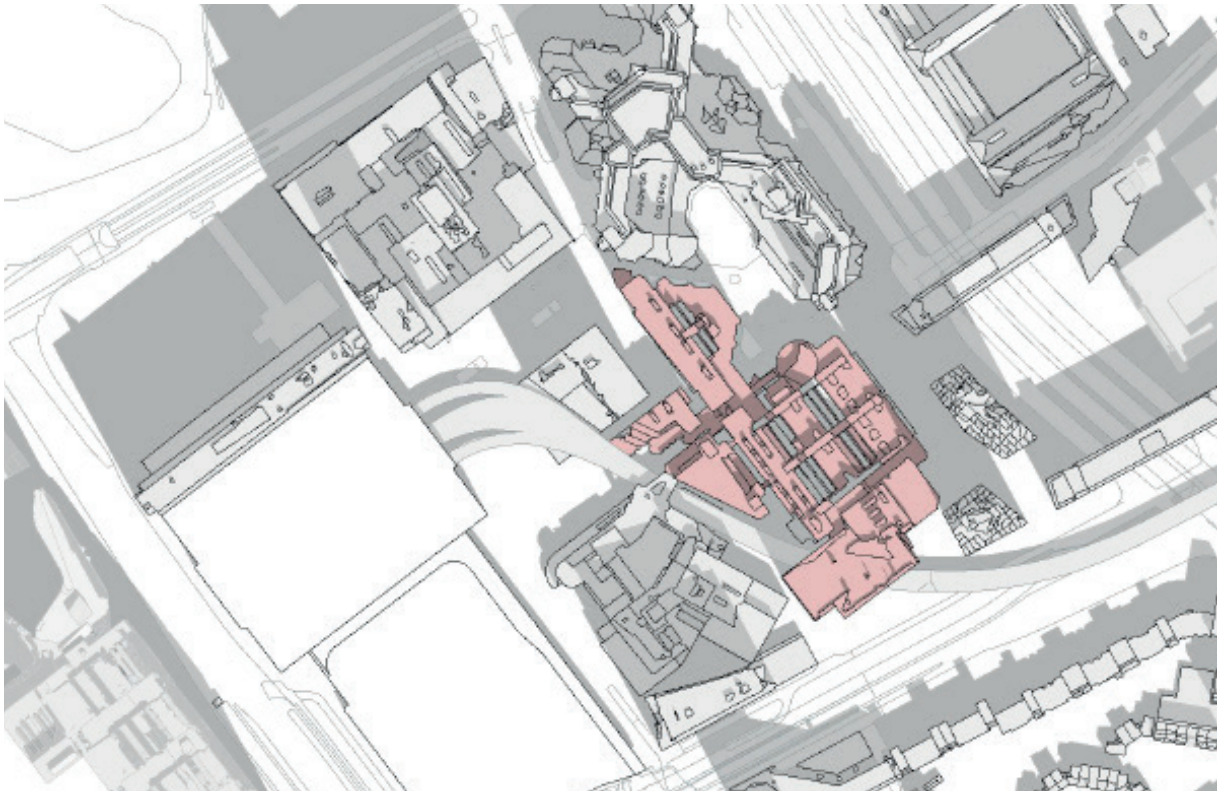
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15:00



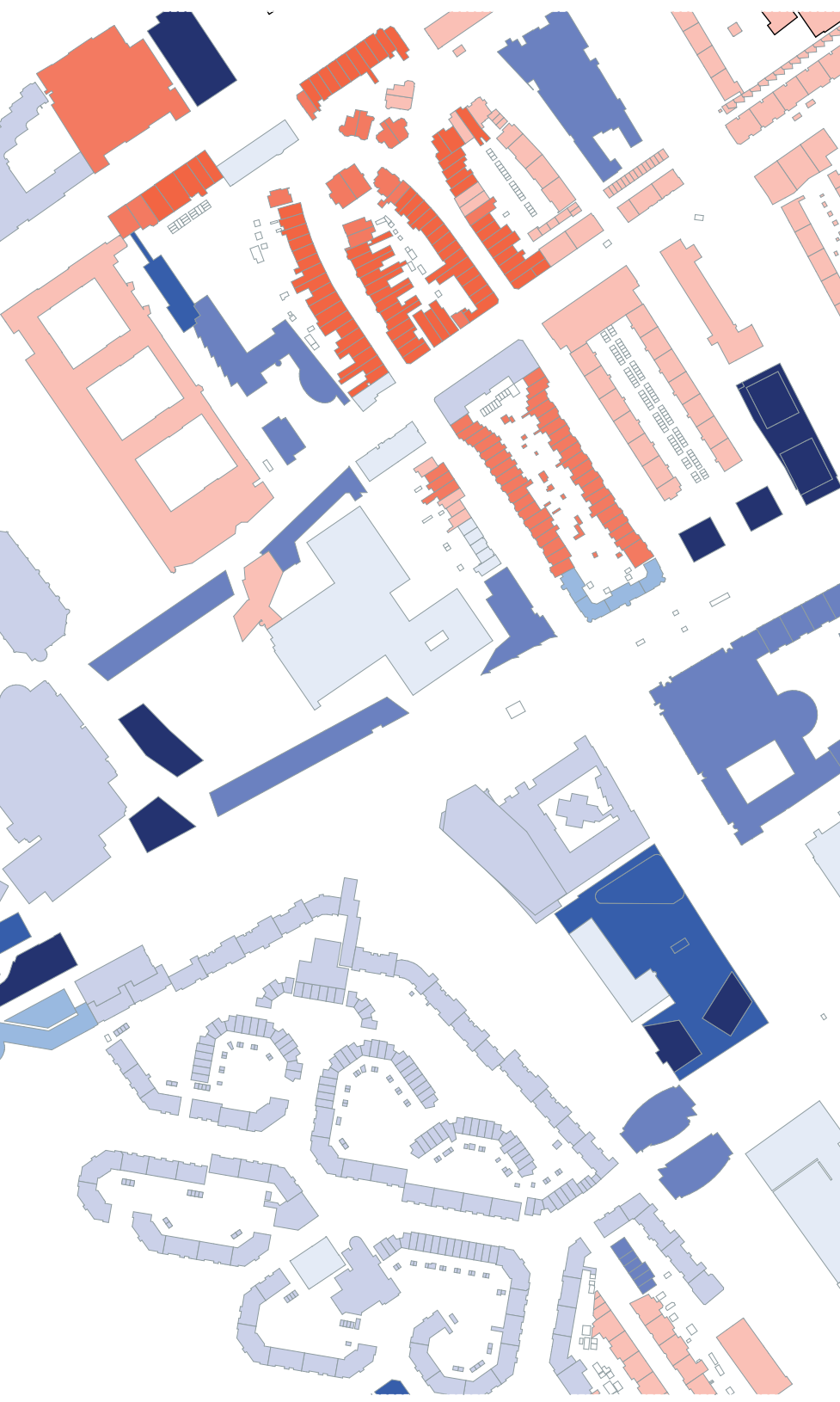
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18:00



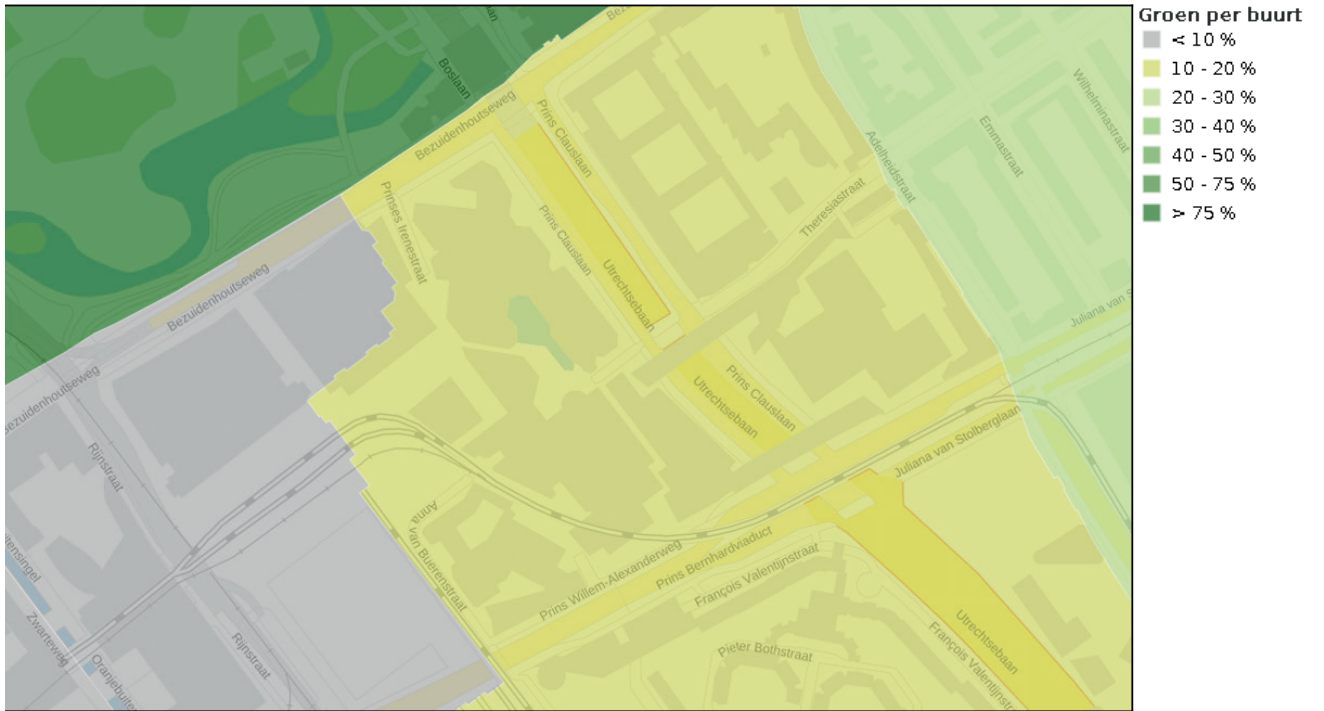
City | Building Construction year



Building year:

-  <1800
-  1800-1850
-  1850-1900
-  1900-1930
-  1930-1945
-  1945-1960
-  1960-1975
-  1975-1985
-  1985-1995
-  1995-2005
-  2005-2015
-  2015 - present

N
1:4000



Analysis | Green per neighborhood

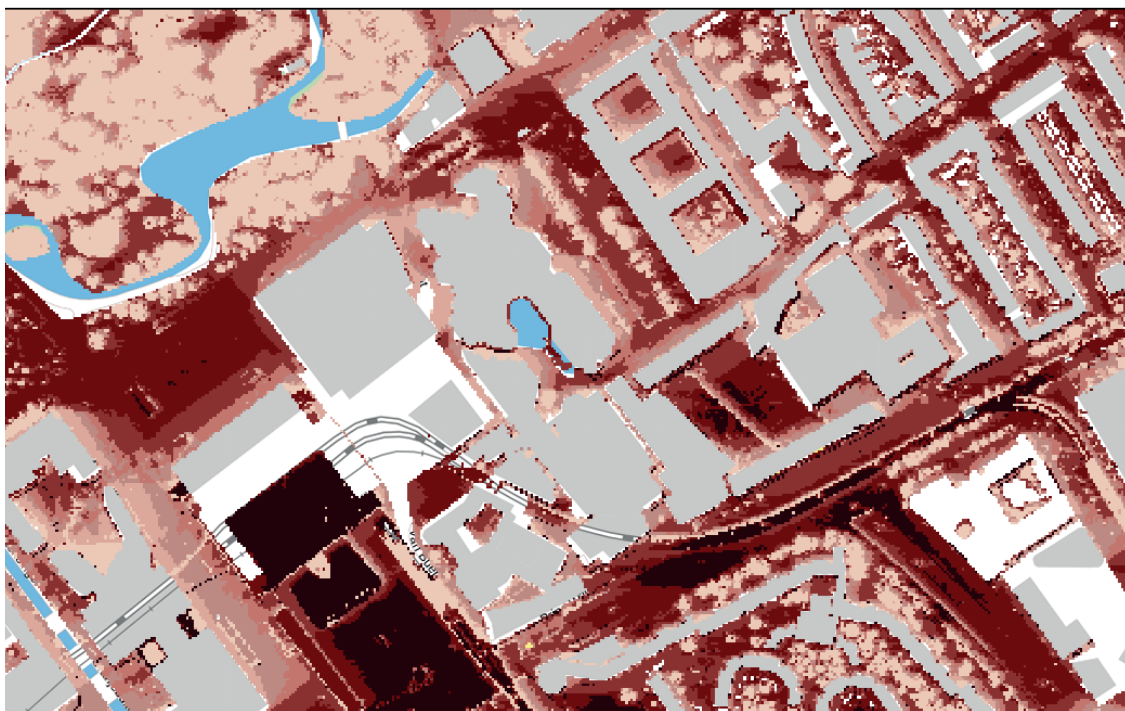


Analysis | Shadows on pedestrian and bicycle paths



- Afstand tot koelte (zoom)**
- 0 - 200 meter
 - 200 - 300 meter
 - 300 - 400 meter
 - 400 - 500 meter
 - 500+ meter
 - Koele plek

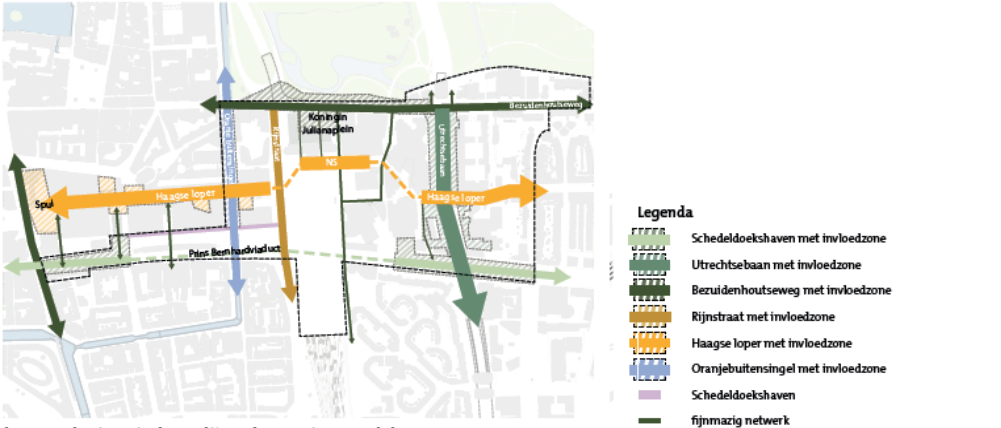
Analysis | Distance to cool place



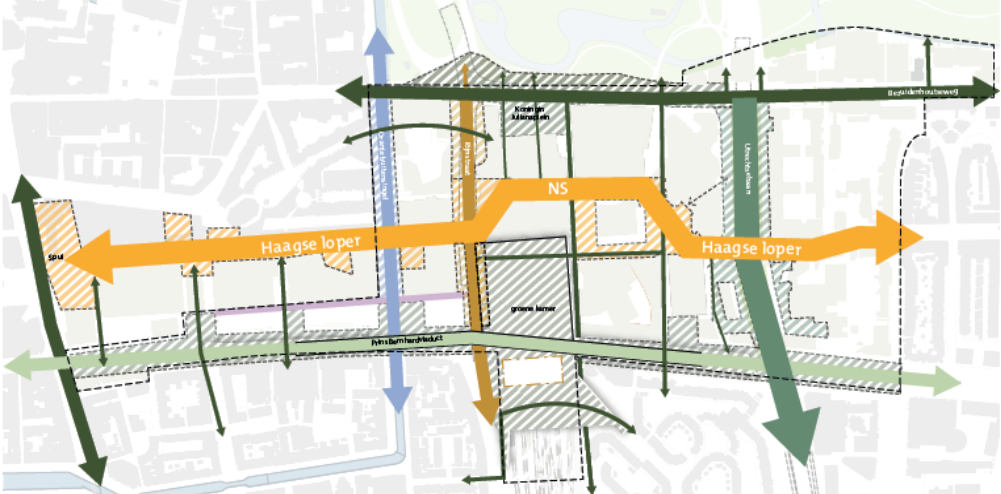
- Gevoelstemperatuur 2021:**
- Gematigde Hittestress: ·
 - Gematigde Hittestress: :
 - Sterke Hittestress: 35°C
 - Sterke Hittestress: 38°C
 - Extreme Hittestress (niv
 - Extreme Hittestress (niv
 - Extreme Hittestress (niv
 - Extreme Hittestress (niv
 - Extreme Hittestress (niv

Analysis | Perceived temperature

Design Vision | Central Innovation District



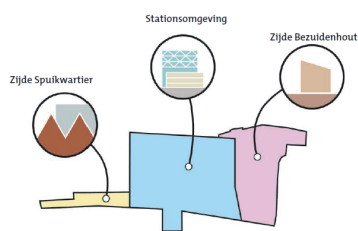
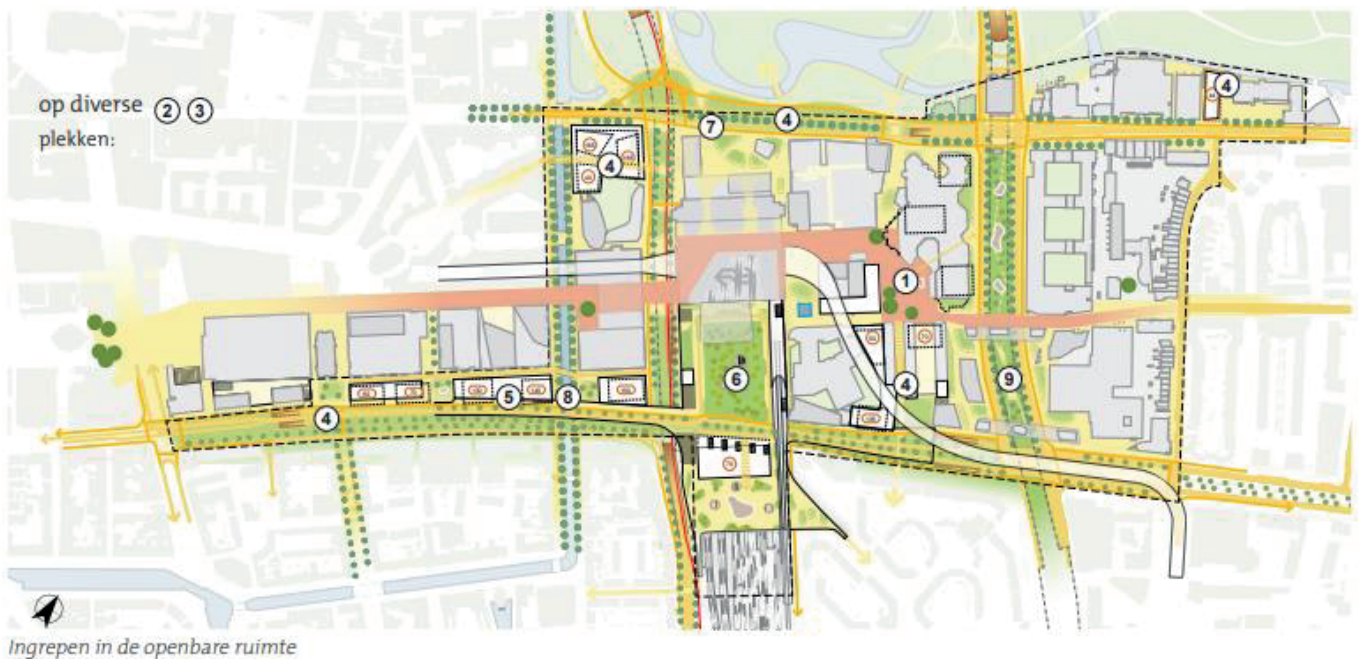
bestaande situatie: lange lijnen lopen niet overal door



toekomstige situatie: lange looplijnen en het fijnmazig netwerk van voetgangersverbindingen
In de invloedssfeer van de lange lijnen bevinden zich groene verblijfsplekken

Vision Gemeente Den Haag:

The Central Innovation District (CID), particularly the area around The Hague Central Station, is already the city's economic core. The combination of (national) government, businesses, and educational and research institutions forms **the foundation of a successful innovation district.**



Drie sfeergebieden

Den Haag Centraal zijde Spuikwartier: centrum, hoge dichtheid, karakter aansluitend bij Jubigebouw, (gevels met veel ritme en relief), traditioneel materiaalpalet: uitstraling van baksteen of natuursteen.
Den Haag Centraal Stationsomgeving: 'post165' en moderne gebouwen, materiaalgebruik is eigentijds, architectuur straalt rust uit, is de achtergrond voor een dynamische en levendige stationsomgeving.
Den Haag Centraal zijde Beuzenhout: historische context, kleinere korrel, traditionele kleuren en materialen, behalve Paleis van Justitie geen hoogbouw.



Ruimte voor ontmoeting

De omgeving van Den Haag Centraal wordt verder uitgebouwd als een interactiemilieu van de Policy campus. Het is van belang dat het ontwerp van de ruimte ontmoeting tussen mensen stimuleert. Ontmoetingsruimte krijgt vorm in de openbare plint, stedelijke interieurs (lobby's, gemeenschappelijke ruimtes, atriums, dakterraces, etc.) en in publiek toegankelijke doorgangen in gebouwen in het gebied (Koninklijke Bibliotheek, Babylon, Beuzenhoutseweg 67, Bellevue).

Themes:

1. **Enhancing Vibrancy:** Proposals focus on revitalizing the area by improving public spaces and activating the ground floors of buildings.
2. **Densification and Strengthening:** The aim is to further develop the station area as an innovation hub where various stakeholders collaborate. By 2040, an estimated 2,250–2,500 homes and 130,000 m² of office space will be added, along with 17,000 m² of educational facilities. The plan also considers the need for approximately 11,000 m² of social facilities.
3. **Connecting:** The goal is to better integrate the area with surrounding neighborhoods by removing barriers and implementing traffic measures to improve accessibility for pedestrians and cyclists.
4. **Greening and Sustainability:** As the city grows, green spaces and public areas require special attention. The plan incorporates climate adaptation and nature-inclusive design while considering future urban developments.

Analysis | Context KB

Disrupted connection with the Haagse Loper:

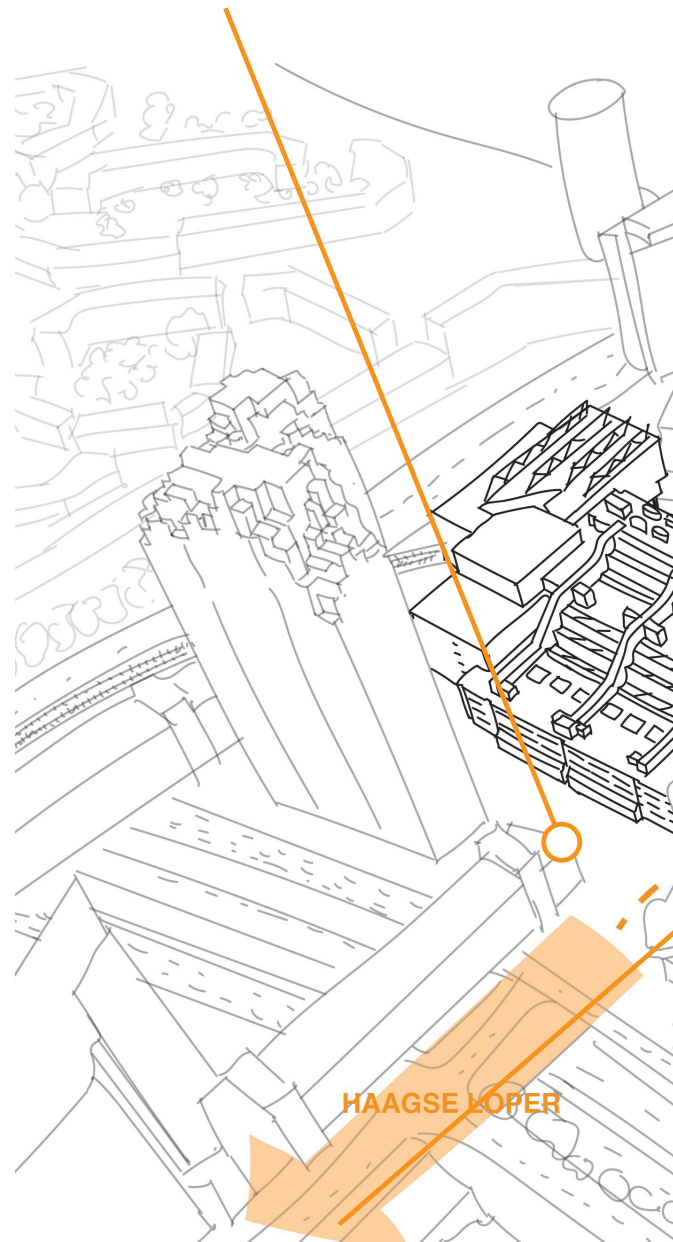
The route ends abruptly at the KB, preventing a natural flow towards the entrance.

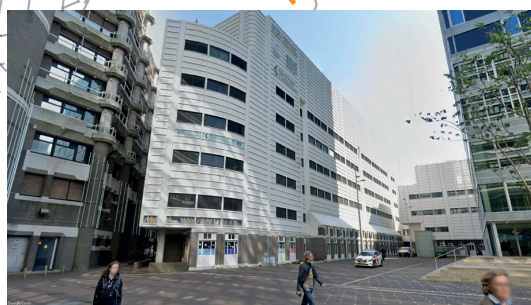
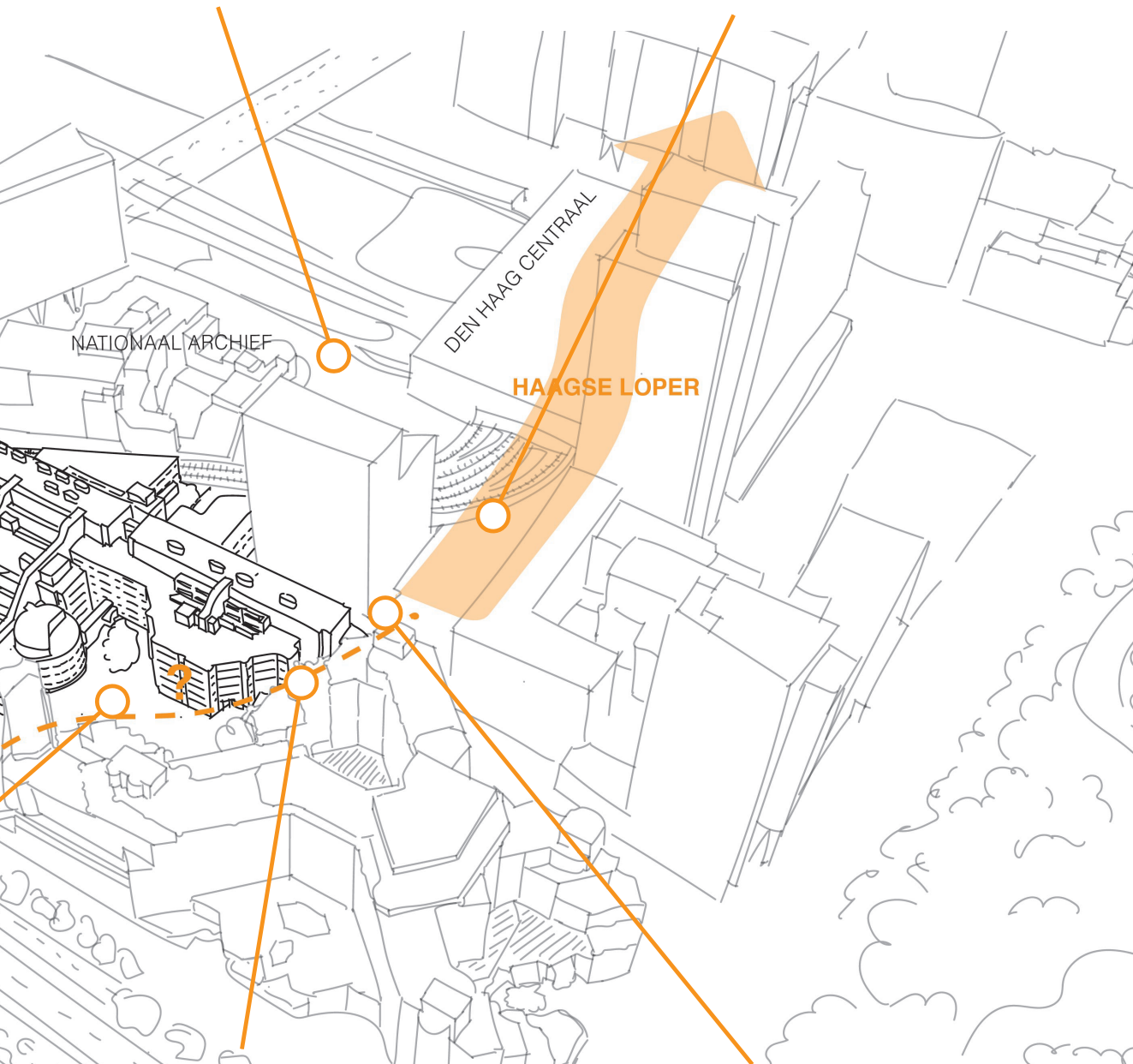
Lack of orientation and sightlines: Visitors experience the space as disorienting and closed off.

Secluded character of the KB: Originally designed without public accessibility in mind, making the entrance and outdoor spaces uninviting.

Historical context: The construction of a railway line beneath the site influenced the spatial layout, reducing design flexibility.

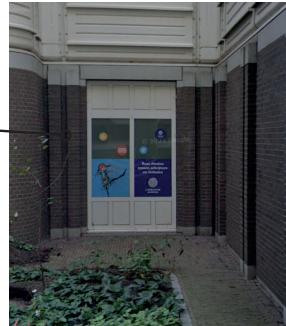
Limited public and social functions along the Haagse Loper: The area lacks active ground-floor functions that could foster engagement and a welcoming atmosphere.





Building Analysis I Facade





Analysis I Nature Roofs

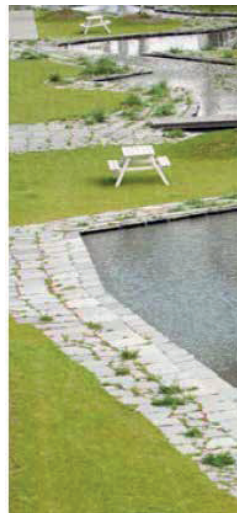
Type of Roofs	Substrate thickness / weight	Ecological value
Traditional (grey)	None (hard surface)	None
Extensive Green Roof	≤ 15 cm (~60–150 kg/m ²)	Low–Medium
Intensive Green Roof	≥ 15 cm (500–1000 kg/m ²)	High
Water Roof (blue)	Varies; water storage system	Medium–High
Energy Roof (yellow)	Usually extensive with PV panels	Medium
Use Roof (red)	Usually intensive (> 15 cm)	Medium (with disturbance)
Brown Roof	Thin–medium layer (local soil, rubble, gravel)	High (pioneer species, insects, birds)



Green Roof (extensive)



Green Roof (intensive)



Blue Roof

Maintenance	Human use	examples
None	None	Bitumen, tiles, metal – no biodiversity
Low (1–2x/year)	Rarely walkable	Sedum roofs, water retention, cooling
High (like a garden)	Walkable, usable as garden	Supports shrubs, trees, insects, birds
Medium	Not for regular use	Helps reduce flooding, cooling
Low–Medium	No direct use	Panels more efficient on green roofs
High	High: terraces, playgrounds	Combines greenery with recreation
Low–Medium	None	Reuses soil, supports rare species



Yellow Roof

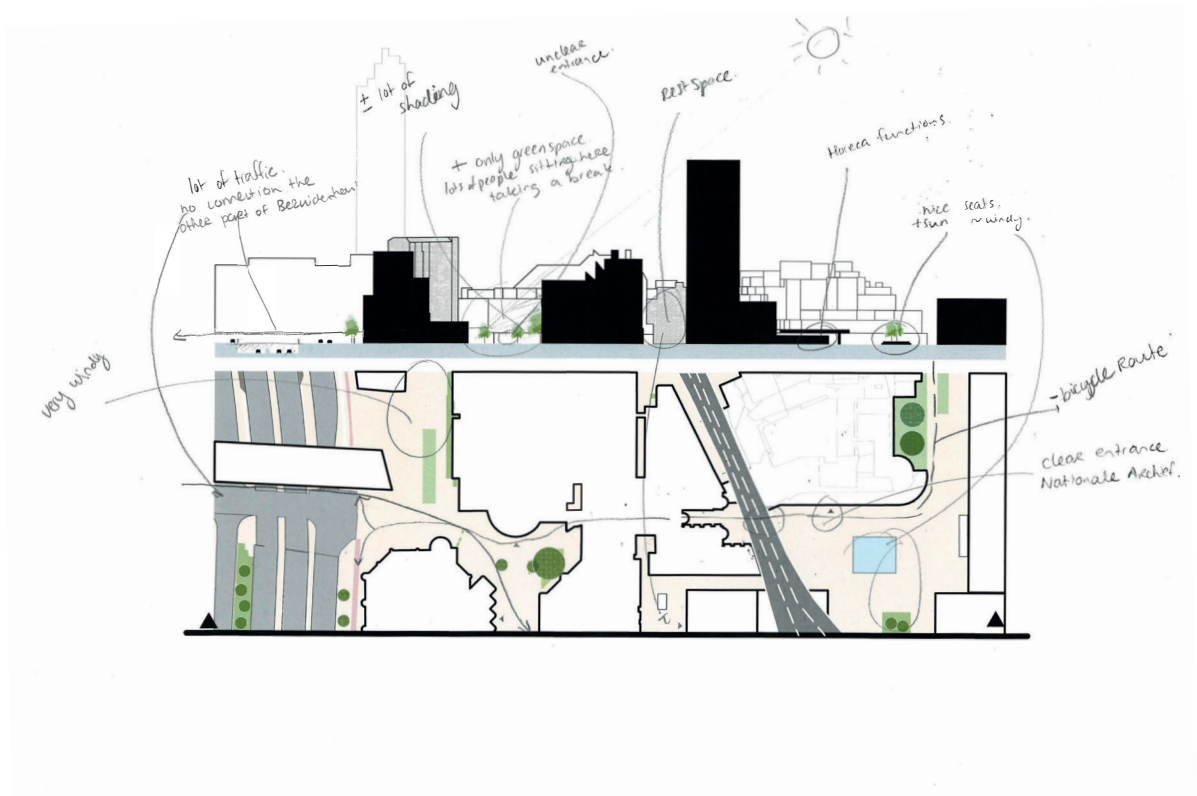
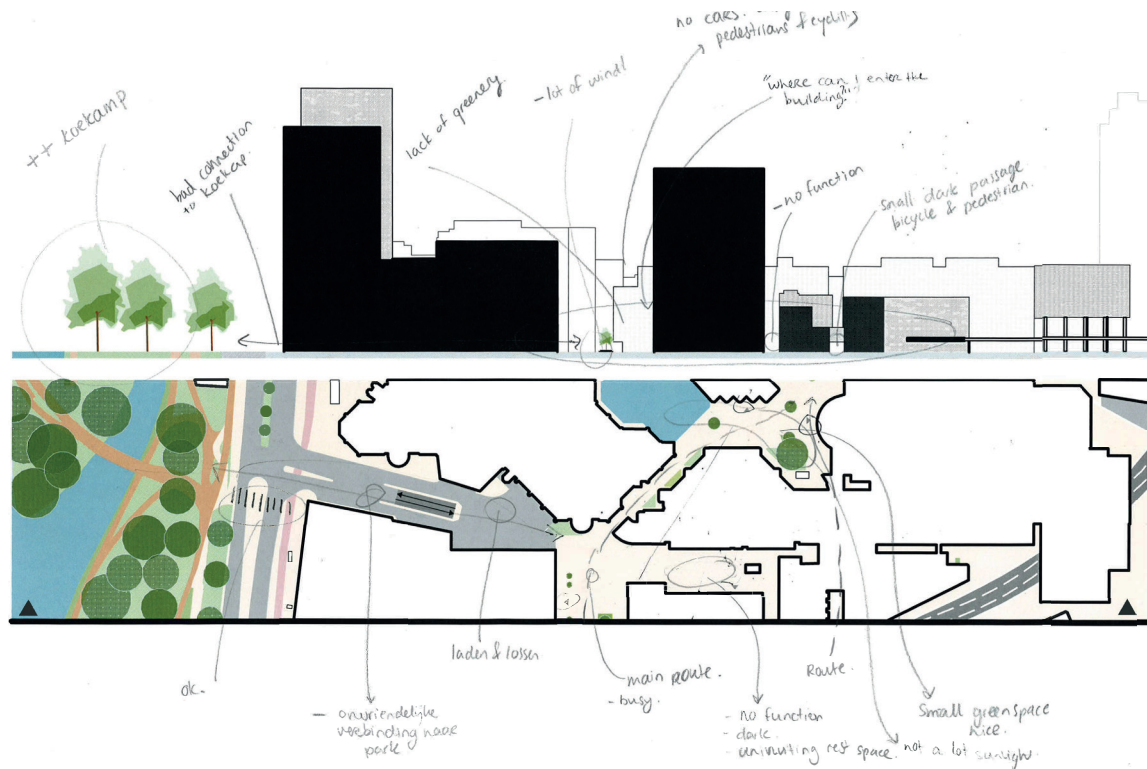


Red Roof

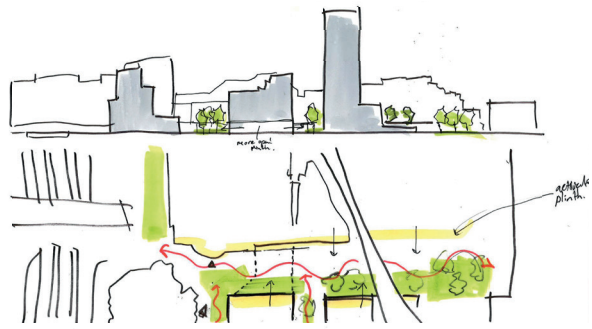
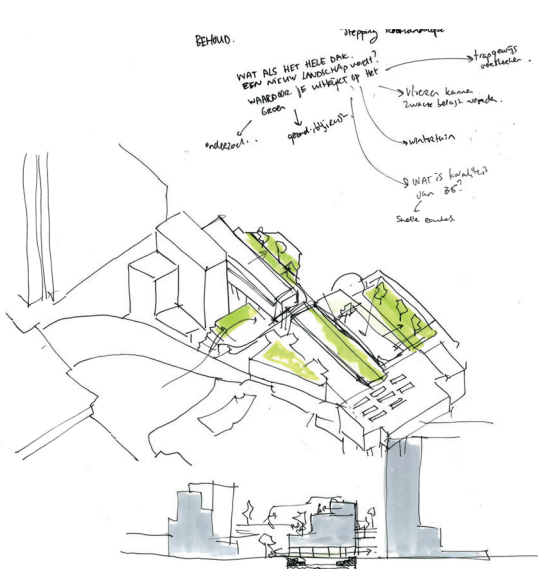


Brown Roof

Analysing & Testing Urban Situation



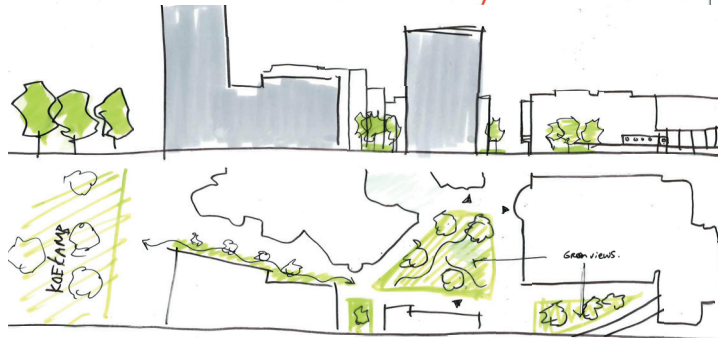
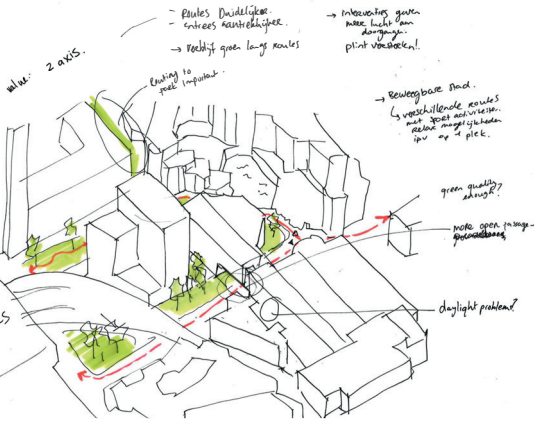
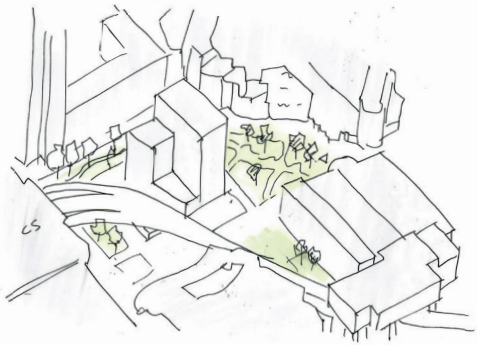
Existing Situation | 1:1000



BEHOUD "ALGEMENE FUNCTIES"

→ clear movement
→ clear structure
→ open space
→ als op afstand

→ more daylight (open space)



Sketches of Urban Situation



2. Building of the KB

Value Matrix of the KB

	Social	Economic	Political	Historic	
Tangible	Fixtures & Fittings	Calm interiors, Erasmus statue, and additional lighting added.	x	x	Original stairs, lighting, and lampposts.
	Materials	x	x	x	Use of aluminum indicates new construction techniques
	Structure	x	Flexible design, because the structural column grid and uniform floor load capacity.	x	x
	Surface	Human-scale design expressed through relief in façade.	x	x	Development of 'raincoat' façade – a good example of construction technology.
	Style	x	x	x	Human-scale design as a reaction to modernism, following typical scientific library design principles.
	Form	x	x	x	Stepped structure as a reaction to the construction of large anonymous office volumes of that time.
	Location	Next to Central Station	Two required public passages in the KB area.	Two required public passages in the KB area.	Important part of the reconstruction of Bezuidenhout.
	Setting	Residual outdoor spaces	Housing multiple cultural institutes	x	Angled building placement; outdoor space design by OD205.
		nickname "Ice Palace"	Part of Bezuidenhout post-war reconstruction together with the National Archives and Ministry of Foreign Affairs.	Part of Bezuidenhout post-war reconstruction together with the National Archives and Ministry of Foreign Affairs.	x
Intangible	Process	x	x	x	x
	Management	x	x	An important area for housing ministries and government institutions.	x
	Craftmanship	x	x	x	x
	Design	From a scientific institute to an open social institution.	Interior depends on functional layout.	x	One of the most important works in Hagoort's oeuvre.
	Use & Function	Redesign increases accessibility.	Flexible programmatic design symbolising role in the knowledge economy.	x	KB houses the most important cultural and historical collections of the Netherlands.

Aesthetic	Scientific	Age	Ecological
Tables with fixed lighting, light wooden furniture.	Measurement system based on the size of bookcases.	x	Extra light fittings added due to poor daylight.
Light-coloured façade, neutral interior elements.	White aluminium cladding designed specifically for the KB.	x	White panels play a crucial role in reducing heat and require minimal maintenance.
Flexible floorplans, skylights, and voids.	Structural system of measurements in plans, façades, and interior. Uniform floor loads for flexible design.	x	Three high voids with skylights.
Walls and ceilings of public spaces are white; artworks are integrated into the KB.	Façade panels correspond to the building layout.	x	Sun protection is fully integrated into façade design.
Monumental, imposing design to express national identity.	x	x	x
Building's sculptural stepped form	Degree of unity and clear structure & All levels have the same height.	x	Unevenly sized plots cause internal routes.
Views into the Ministry of Foreign Affairs' inner garden.	x	x	Not real public spaces but residual areas between buildings; busy roads prevent openable windows.
x	x	x	White façade colour chosen to match surrounding buildings.
x	Similarity between Ministry of Foreign Affairs and KB and colour connection with National Archive.	x	White cladding provides coherence among buildings in area.
x	Part of the Bezuidenhout reconstruction & implementation of the structural measurement system.	x	x
x	KB followed the typological development of scientific libraries.	Original entrances and connections between building parts have been changed.	x
Artwork in the KB, gold lettering on the depot.	Prefabricated aluminium panels assembled on site	1950s aluminium use and new construction techniques; 1970s custom panels.	x
Varying shapes of voids per floor.	New and old depots are connected on the same levels.	The original palette of neutral wall and ceiling colours has been retained.	Visual axis idea towards Koekamp; limited daylight access; non-openable windows.
x	Flexible layout.	x	x

High valued
 Medium valued
 Low valued

Value Matrix based on Group research of the KB

Existing Floorplans

Legend

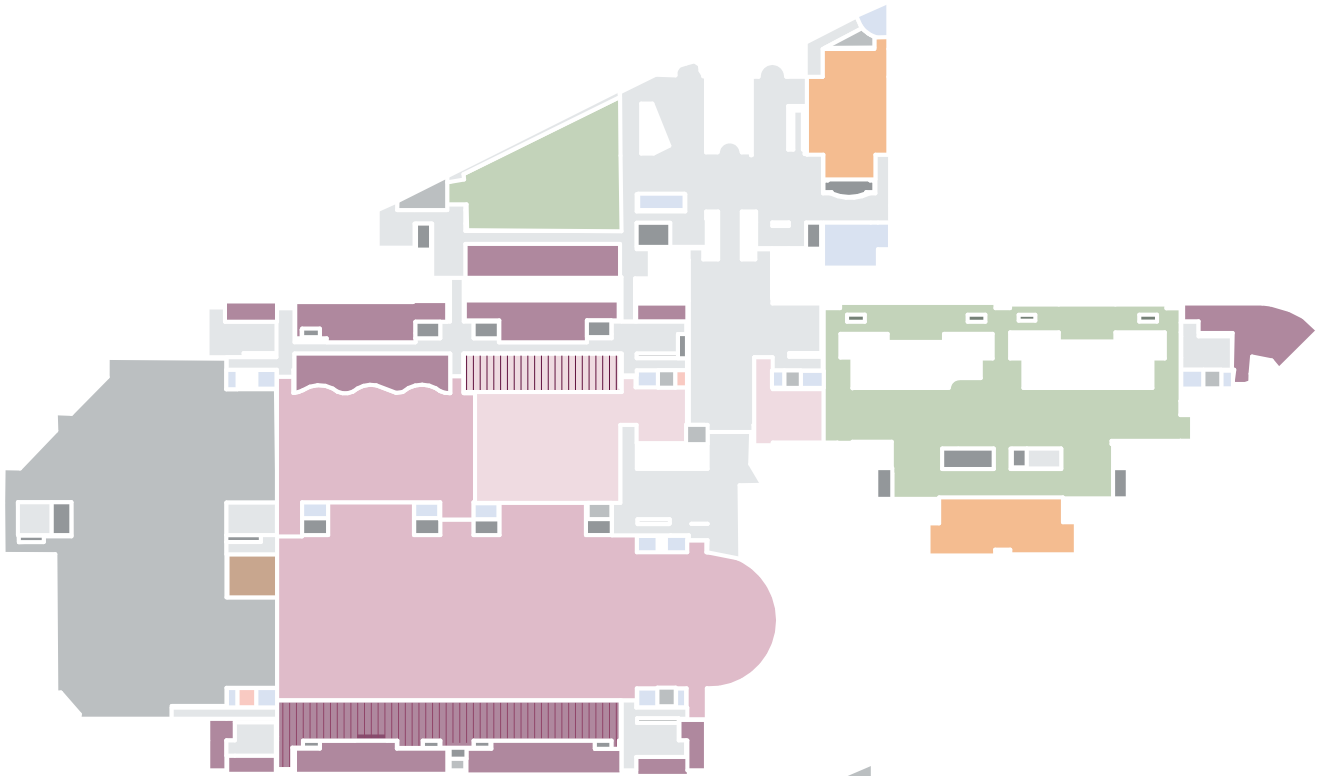
	Kantoren
	Leeszaal
	Centrale hal
	Verkeerruimte
	Opslag
	installaties
	sanitair
	kantine
	overig
	exporuimte
	Restaurant/ cafe
	keuken
	Vergaderruimtes
	repro
	Infobalie/ kb cafe
	auditorium/zalen
	WERKPLAATS
	garderobe



Floorplan Level -1 | 1:1000



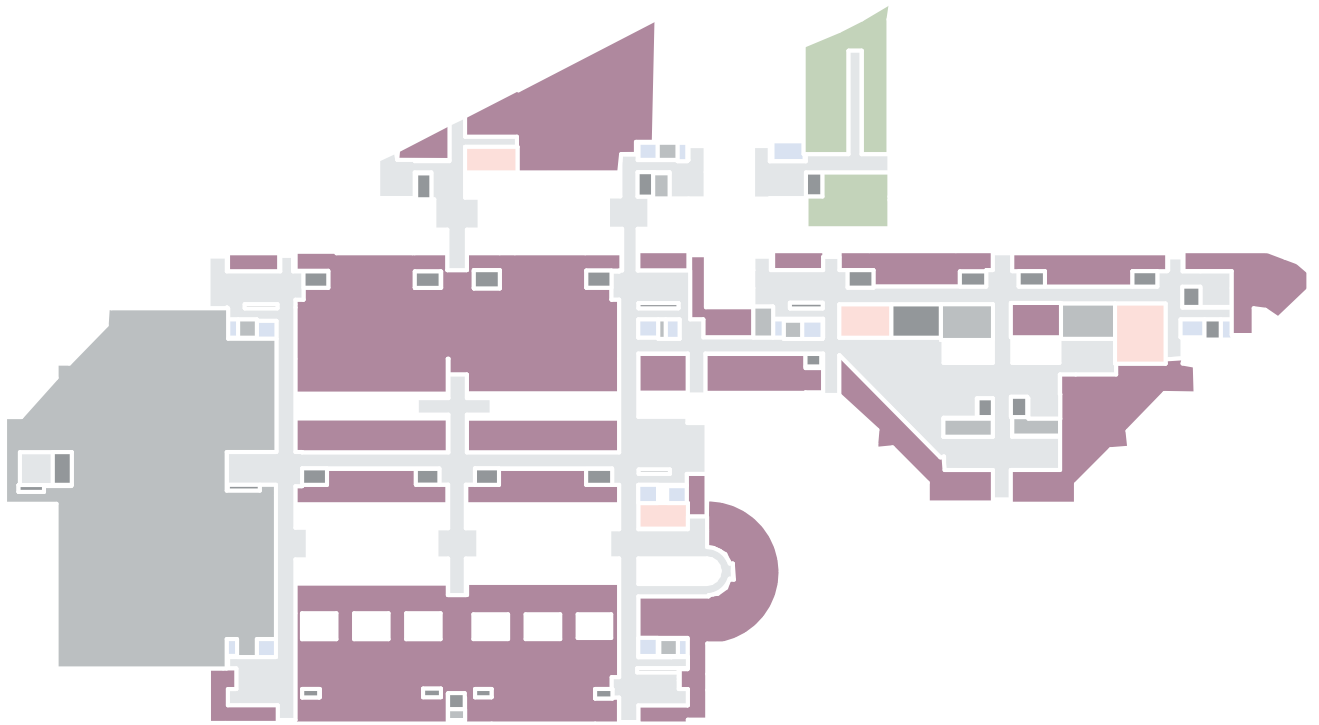
Floorplan Level -2 | 1:1000



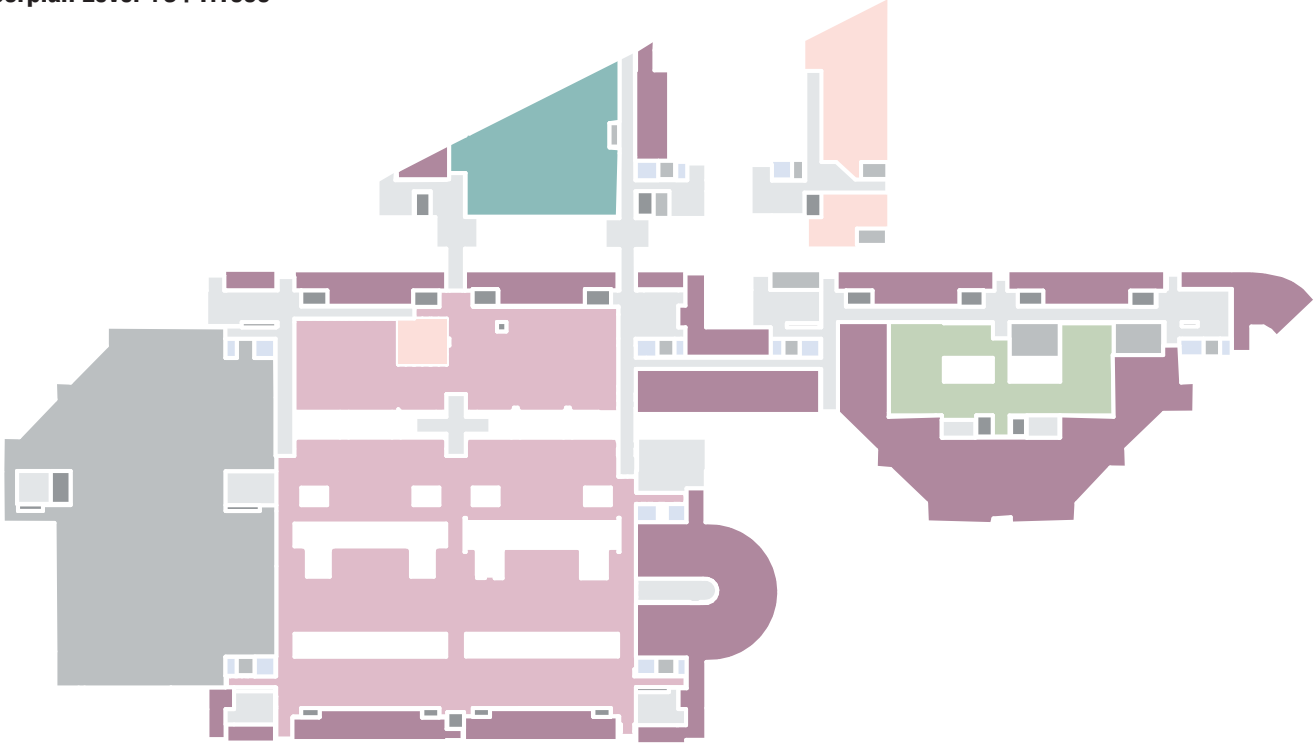
Floorplan Level +1 | 1:1000



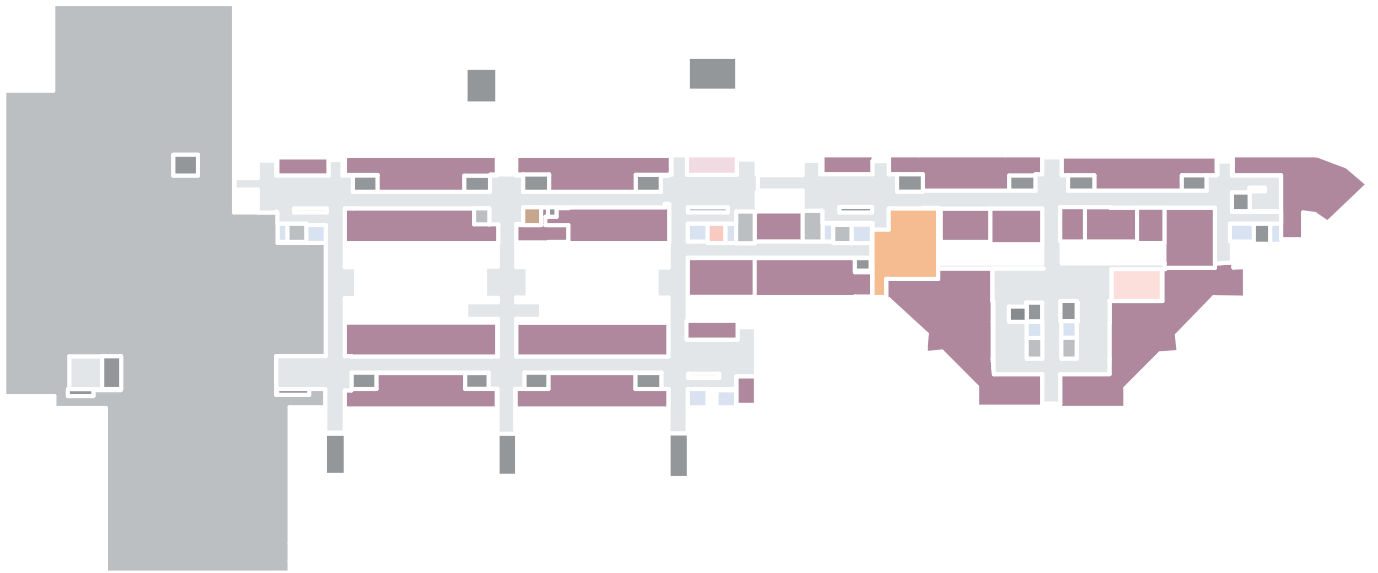
Floorplan Level 0 | 1:1000



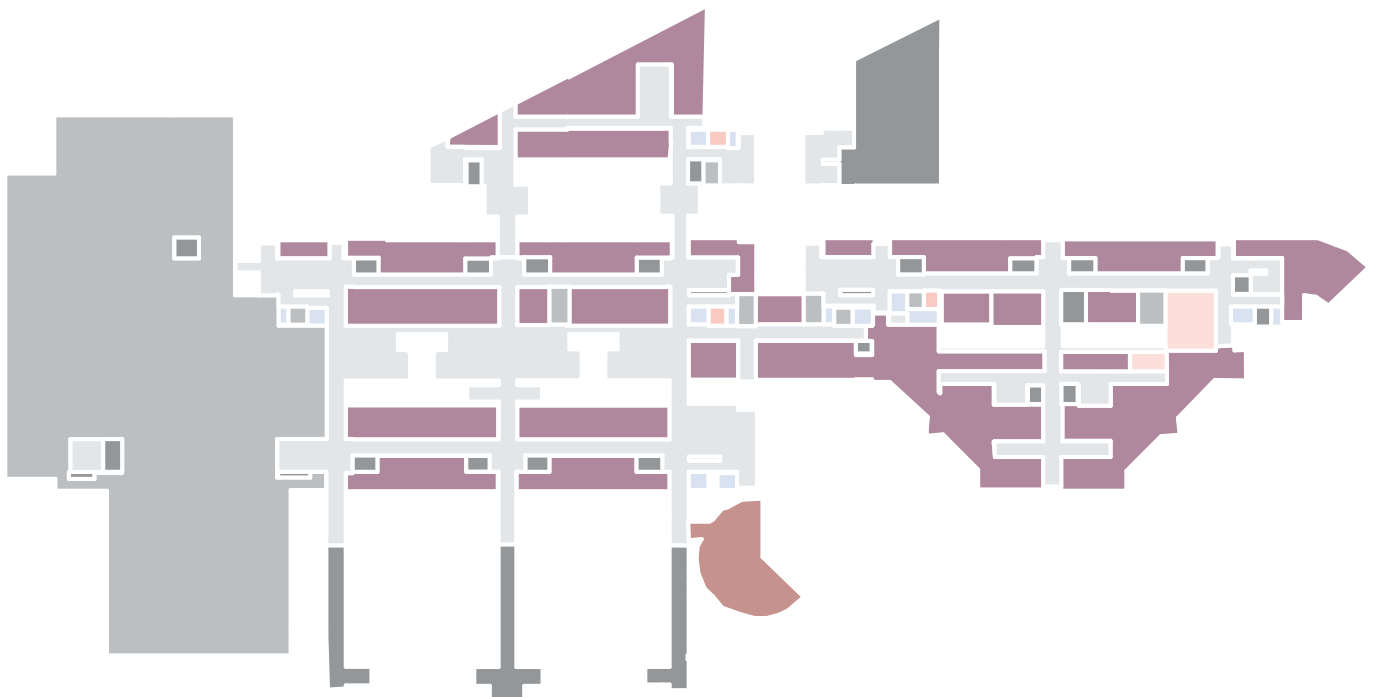
Floorplan Level +3 | 1:1000



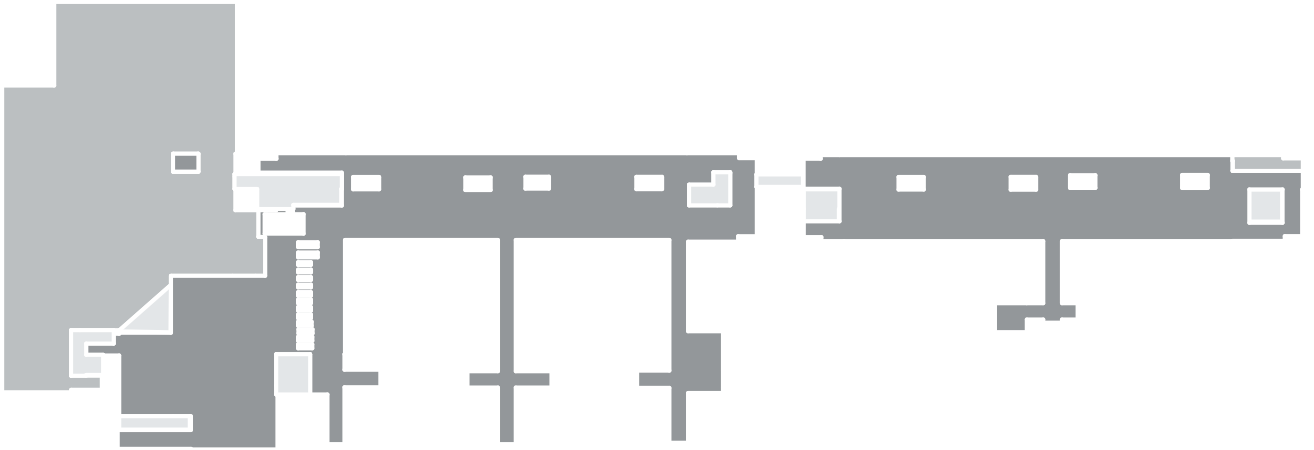
Floorplan Level +2 | 1:1000



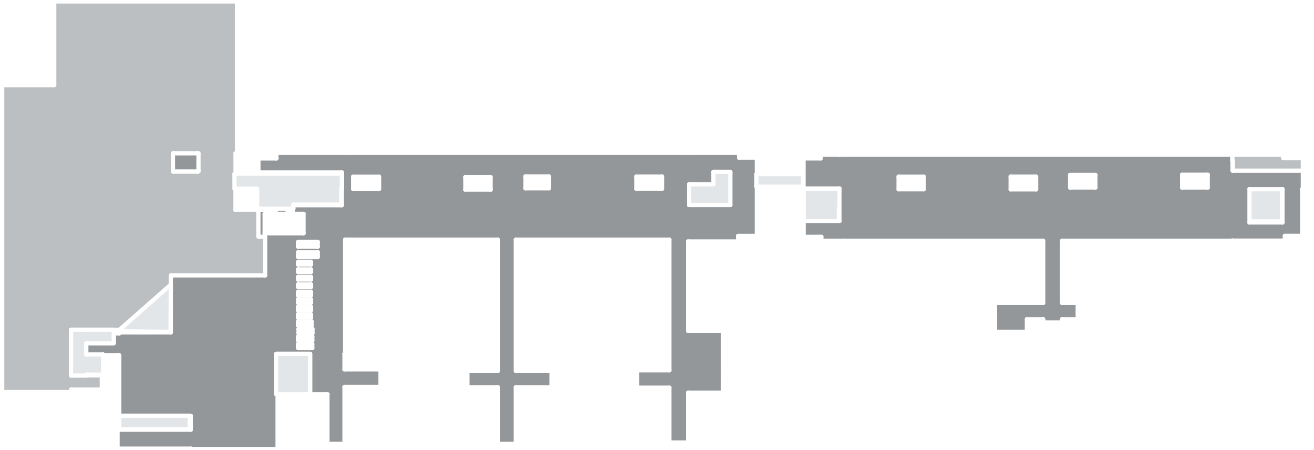
Floorplan Level +5 | 1:1000



Floorplan Level +4 | 1:1000



Floorplan Level +7 | 1:1000



Floorplan Level +6 | 1:1000



3. Redesign of the KB



The New Program

“The House of Culture”

Knowledge & Heritage

libraries, archives, museums

- KB - Study/working zone (1.225 m²)
- KB - Collection zone (1.175 m²)
- KB - Offices & supporting (2.550 m²)
- KB - Centrally supporting (910 m²)
- KB - Specific spaces (1.225 m²)
- RKD (2.700 m²)
- Literature Museum (7.500 m²)
- Exposition-rooms (1.200 m²)

Community & Education

public spaces, café, kids, study rooms

- KB - Informal public functions (2.600 m²)
- Kids area (200 m²)
- Mixed study rooms (800 m²)
- Restaurant & Café (300 m²)
- Community green/roof garden activities

Arts & Creativity

studios, workshops, performances

- MF hall 'blackbox' (2x 300 m²)
- Club Erasmus (175 m²)
- Large rehearsal studios (6x 480 m²)
- Medium rehearsal studios (2x 80 m²)
- Small rehearsal studios (8x 200 m²)
- Foyer (250 m²)
- Dressing rooms (175 m²)
- 5x Workshop rooms (5x80 m²)
- Flexible art workspaces (400 m²)

Innovation & Social

sustainability, ecology

- Green spaces / Roof garden / vegetable garden
- Ecology Museum / garden-to-table education

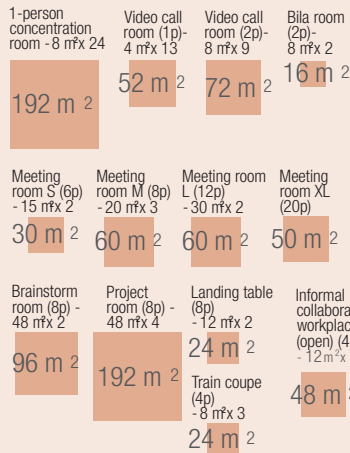
Support & Secondary Functions

- Bicycle parking
- Storage / service areas
- Toilets etc.
- Technical rooms

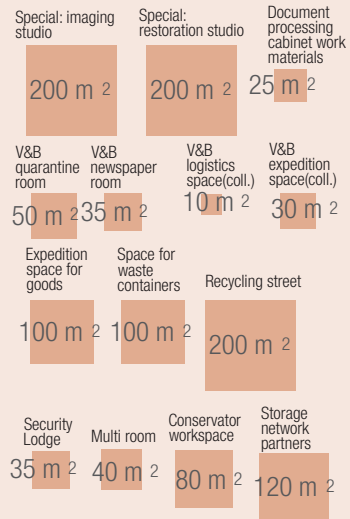
New Program of the KB House of Culture

KB Offices - 3200 m²

Regular ergonomic workplace - 6 m² x 273

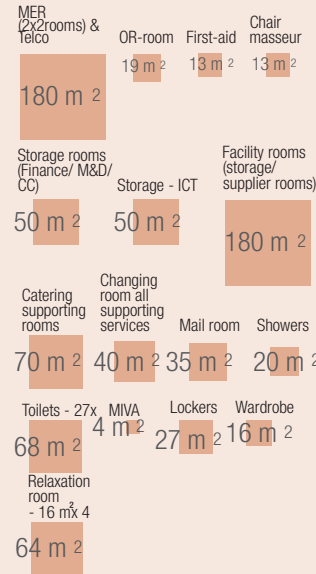


KB Specific functions - 1550 m²

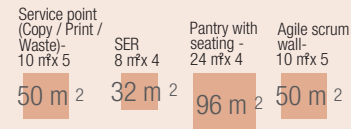


KB supporting Functions

Centralized supporting spaces 1151 m²

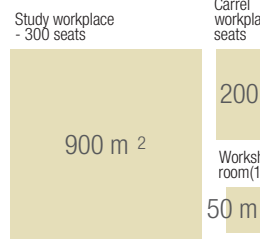


Decentralized supporting spaces 228 m²



Public spaces

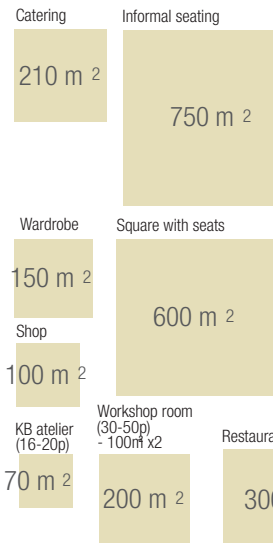
KB Reading rooms

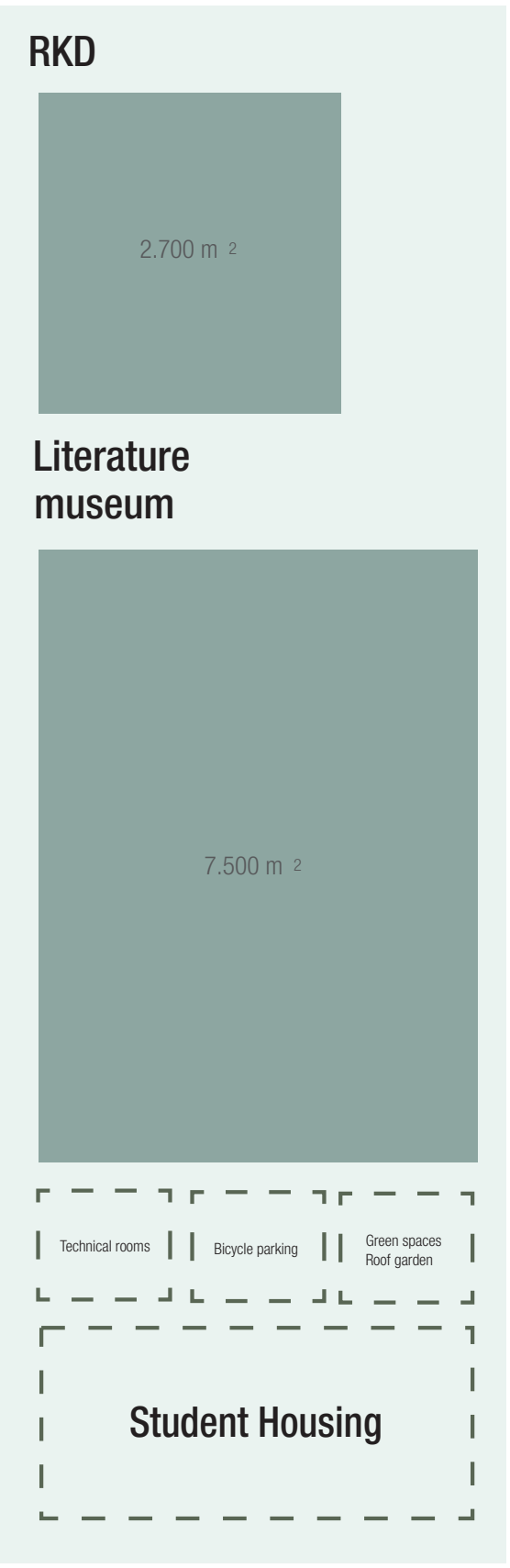
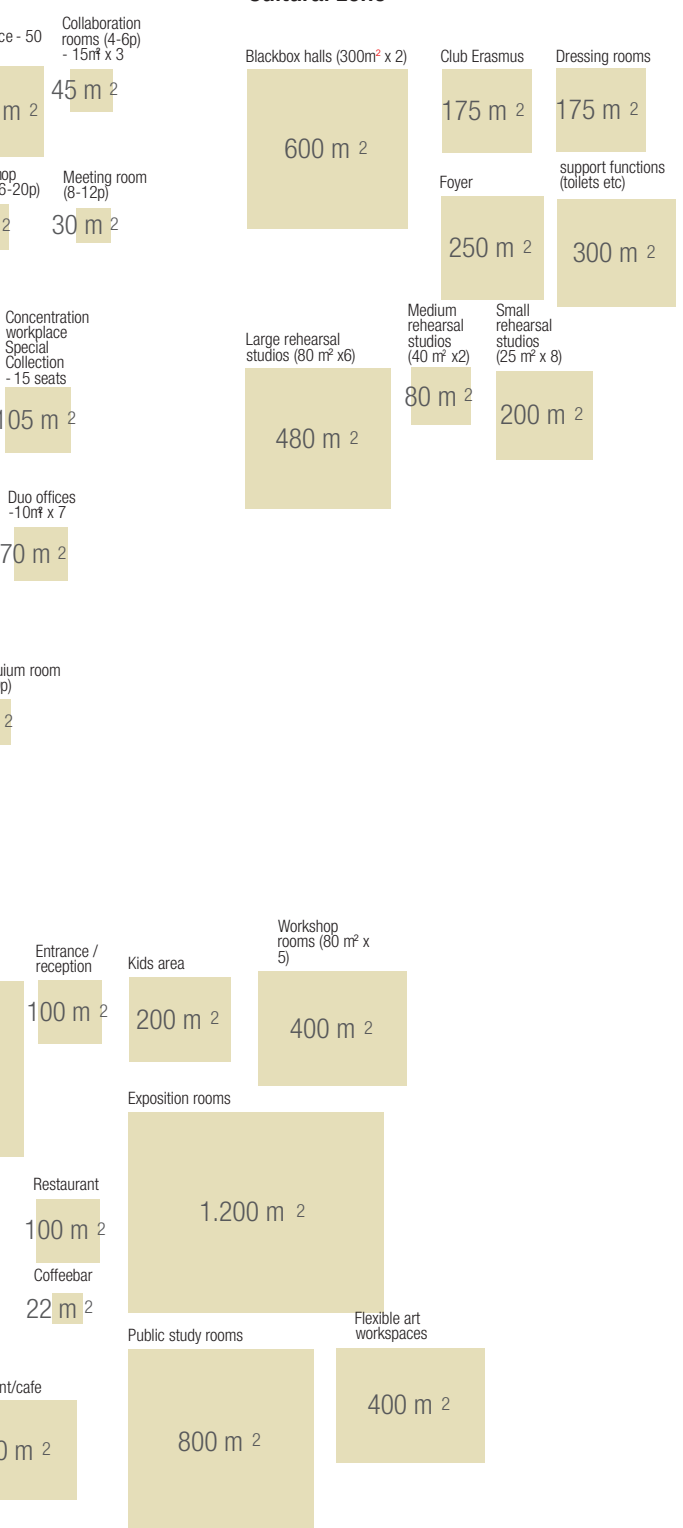


KB Collection Zone



Informal functions





Climate Requirements

Workplaces

Offices, Meeting, focus, project rooms

Temperature: 20–22 °C winter; 23–25 °C summer
Ventilation: 30–40 m³/h per person (CO₂ ≤ 800 ppm)
Lighting: Daylight required at fixed workplaces; 500 lux on work surface; 4000–5000K neutral white; UGR < 19
Relative humidity: 40–55 % RH
Acoustics: Background ≤ 45 dB(A); focus rooms ≤ 40 dB(A)

KB-specific spaces

Restoration studios / imaging:

Temperature: 18–22 °C stable
Ventilation: 30–40 m³/h per person
Lighting: ≤500 lux, diffuse; daylight desirable but controllable
Relative humidity: 45–55 % RH

Collection storage / quarantine / expedition:

Temperature: 16–20 °C stable
Ventilation: low, stable; 30 m³/h per person when occupied
Lighting: ≤200 lux; daylight to be avoided
Relative humidity: 45–55 % RH constant

Central support spaces

MER/ICT rooms:

Temperature: 18–24 °C stable
Ventilation: based on equipment load (~10–15 W/m²)
Lighting: 300 lux, daylight not required
Relative humidity: 40–60 % RH

Storage / archive (non-collection):

Temperature: 18–22 °C
Ventilation: 30 m³/h per person (when occupied)
Lighting: 200 lux, daylight not required

OR / first aid / company doctor:

Temperature: 20–22 °C
Ventilation: 30–40 m³/h per person
Lighting: 300–500 lux, daylight desirable

Sanitary / showers / changing:

Toilets: 19–21 °C, exhaust 50 m³/h per toilet
Showers: 24–26 °C, exhaust ≥70 m³/h
Lighting: 200–300 lux, daylight not required

Public Zones

Library/Study zone

Study halls / carrels / group workspaces:

Temperature: 20–22 °C winter; 23–25 °C summer
Ventilation: 30–40 m³/h per person
Lighting: 500 lux on desks; daylight required at fixed seats
Relative humidity: 45–55 % RH
Acoustics: ≤40–45 dB(A); very low reverberation (T ≤ 0.8 sec), quiet study atmosphere.

Special collection reading rooms: (perhaps too strict)

Temperature: 18–22 °C stable
Ventilation: 30 m³/h per person when occupied
Lighting: ≤200 lux; daylight to be avoided
Relative humidity: 45–55 % RH
Acoustics: ≤35–40 dB(A); maximum silence for concentration

Special collection reading rooms: (perhaps too strict)

Temperature: 18–22 °C stable
Ventilation: 30 m³/h per person when occupied
Lighting: ≤200 lux; daylight to be avoided
Relative humidity: 45–55 % RH
Acoustics: ≤35–40 dB(A); maximum silence for concentration

Informal zone

Entrance / reception / wardrobe / public square/ shop:

Temperature: 20–24 °C
Ventilation: 30–40 m³/h per person
Lighting: 200–300 lux; daylight highly desirable
Acoustics: ≤50 dB(A)

Restaurant / coffee corners / espresso bar:

Temperature: 20–24 °C
Ventilation: ≥50 m³/h per person (dining, cooking areas require more)
Lighting: 200–300 lux, warm white; daylight desirable
Acoustics: ≤50 dB(A); strong absorption to limit background noise

Exhibition:

Temperature: 20–22 °C stable
Ventilation: 30–40 m³/h per person
Lighting: ≤200 lux for collections, avoid or heavily filtered and controlled.
Relative humidity: 45–55 % RH
Acoustics: ≤45 dB(A); exhibition halls often require sound zoning

Kids area (200m²):

Temperature: 20–24 °C
Ventilation: 30–40 m³/h per person (~40 children + staff = 1.200–1.600 m³/h)
Lighting: 300 lux, daylight desirable, warm white (2700–3000K).
Relative humidity: 45–55 % RH
Acoustics: ≤ 40–45 dB(A); sound-absorbing materials to reduce noise.

Workshop rooms (80 m²):

Temperature: 20–24 °C

Ventilation: 30–40 m³/h per person (~20 persons each - 600–800 m³/h)

Lighting: 300–500 lux, daylight desirable.

Relative humidity: 45–55 % RH

Acoustics: Reverberation 0,6–0,8 s; isolation between rooms.

Flexible art workspaces (400 m²):

Temperature: 20–24 °C

Ventilation: 30–40 m³/h per person

Lighting: 500 lux for creative work, daylight highly desirable.

Relative humidity: 45–55 % RH

Acoustics: ≤ 45 dB(A); sound-absorbing ceiling/walls recommended.

Cultural spaces

Blackbox halls (300 m²):

Temperature: 20–24 °C, flexible (due to lighting & audience loads)

Ventilation: 40-50 m³/h per person (~200 persons - 8.000–10.000 m³/h per hall)

Lighting: 100–500 lux, fully dimmable, no daylight required

Relative humidity: 45–55 % RH

Acoustics: Reverberation variable acoustics 0,8–1,5 s; isolation DnT,A ≥ 45–50 dB

Large rehearsal studios (80 m²):

Temperature: 20–24 °C

Ventilation: 40-50 m³/h per person (~20 persons each - 800-1.000 m³/h)

Lighting: 300–500 lux, daylight desirable but controllable

Relative humidity: 40–55 % RH

Acoustics: Reverberation 0,8–1,0 s; isolation between studios

Medium rehearsal studios (40 m²):

Temperature: 20–24 °C

Ventilation: 40-50 m³/h per person (~10 persons each - 400-500 m³/h)

Lighting: 300–500 lux, daylight desirable but controllable

Relative humidity: 40–55 % RH

Acoustics: Reverberation 0,6–0,8 s; high isolation

Small rehearsal studios (40 m²):

Temperature: 20–24 °C

Ventilation: 40-50 m³/h per person (~6 persons each - 240-300 m³/h)

Lighting: 300–500 lux, daylight desirable but controllable

Relative humidity: 40–55 % RH

Acoustics: Reverberation 0,6–0,8 s; high isolation

Club Erasmus (175 m²):

Temperature: 20–24 °C

Ventilation: 30-40 m³/h per person (~115 persons - 3.500-4.600 m³/h)

Lighting: 300–500 lux, dimmable for presentations; daylight desirable but blackout needed for projection

Relative humidity: 40–55 % RH

Acoustics: Reverberation 0,6–0,8 s (optimized for speech intelligibility); high isolation to prevent sound leakage

Foyer (250 m²):

Temperature: 20–24 °C

Ventilation: 30-40 m³/h per person (~125 persons - 3.700-5.000 m³/h)

Lighting: 200–300 lux, daylight desirable

Relative humidity: 40–55 % RH

Acoustics: ≤ 50 dB(A), reduce echo with absorption

Dressing rooms:

Temperature: 22–24 °C (higher comfort)

Ventilation: 30-40 m³/h per person

Lighting: 300 lux, warm white (2700–3000K), daylight desirable

Relative humidity: 40–55 % RH

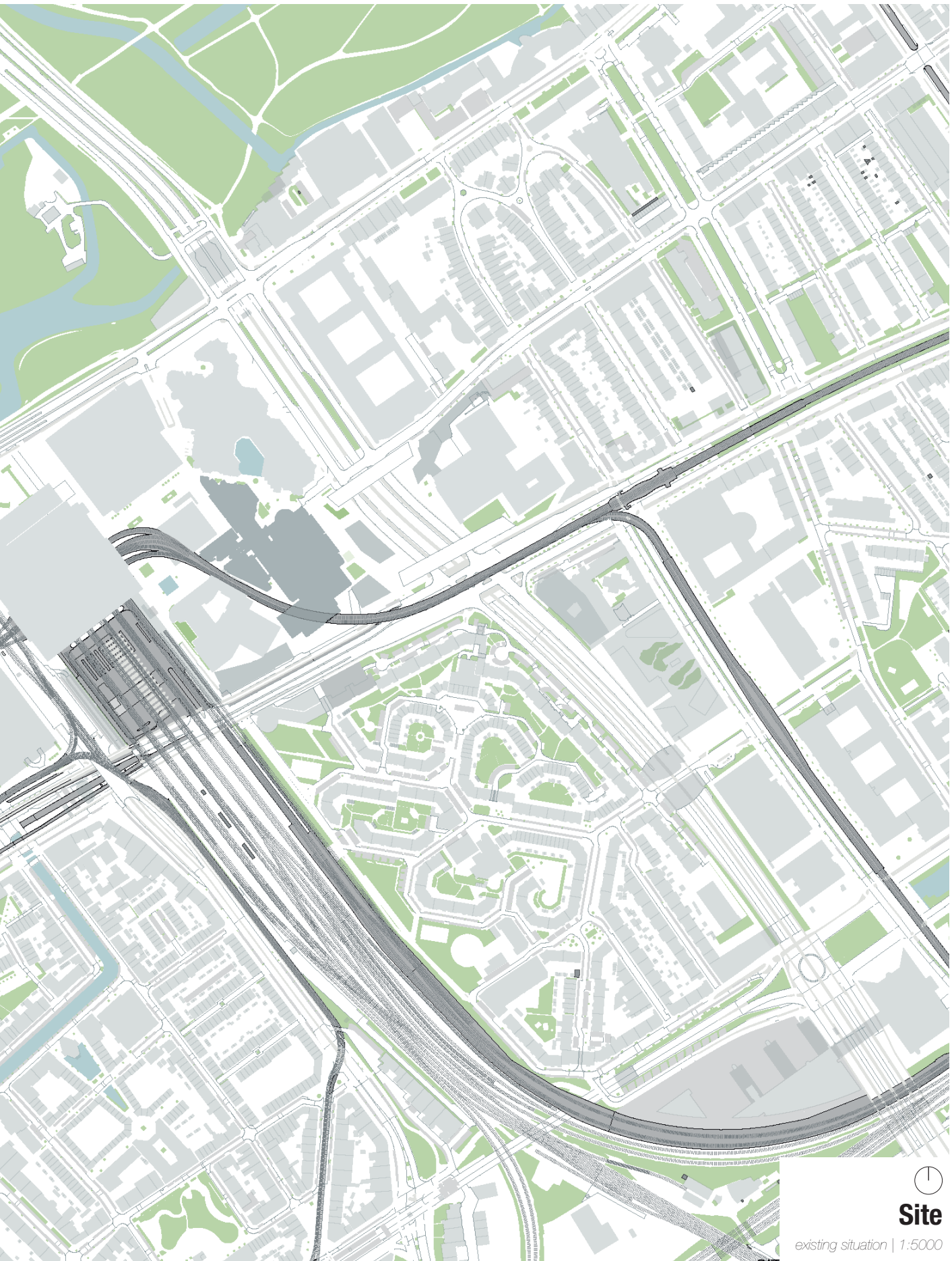
Acoustics: ≤ 45 dB(A), absorption to limit crowd noise

3.1 Design of the Urban Context







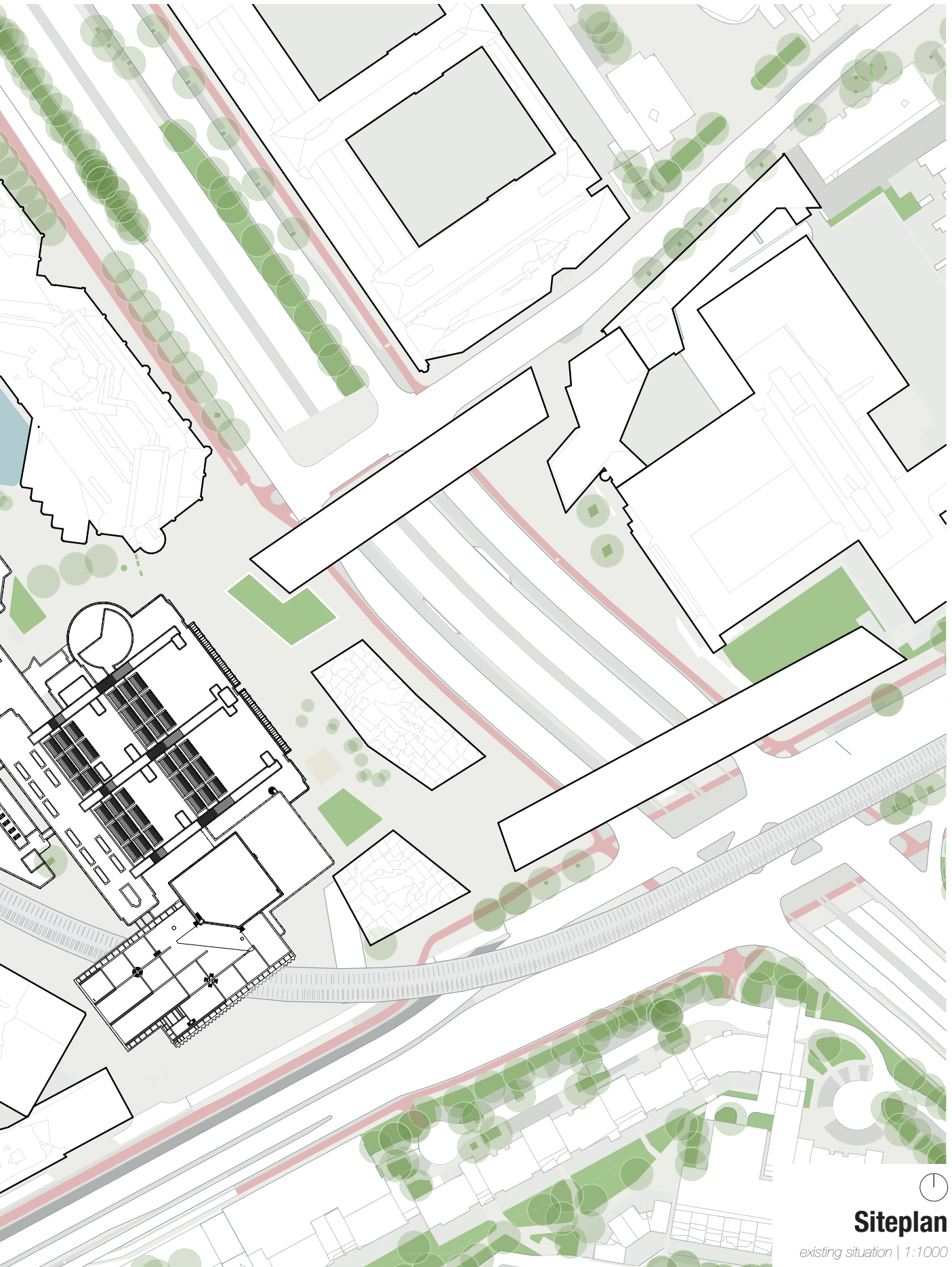


Site

existing situation | 1:5000



Central Station



Siteplan

existing situation | 1:1000



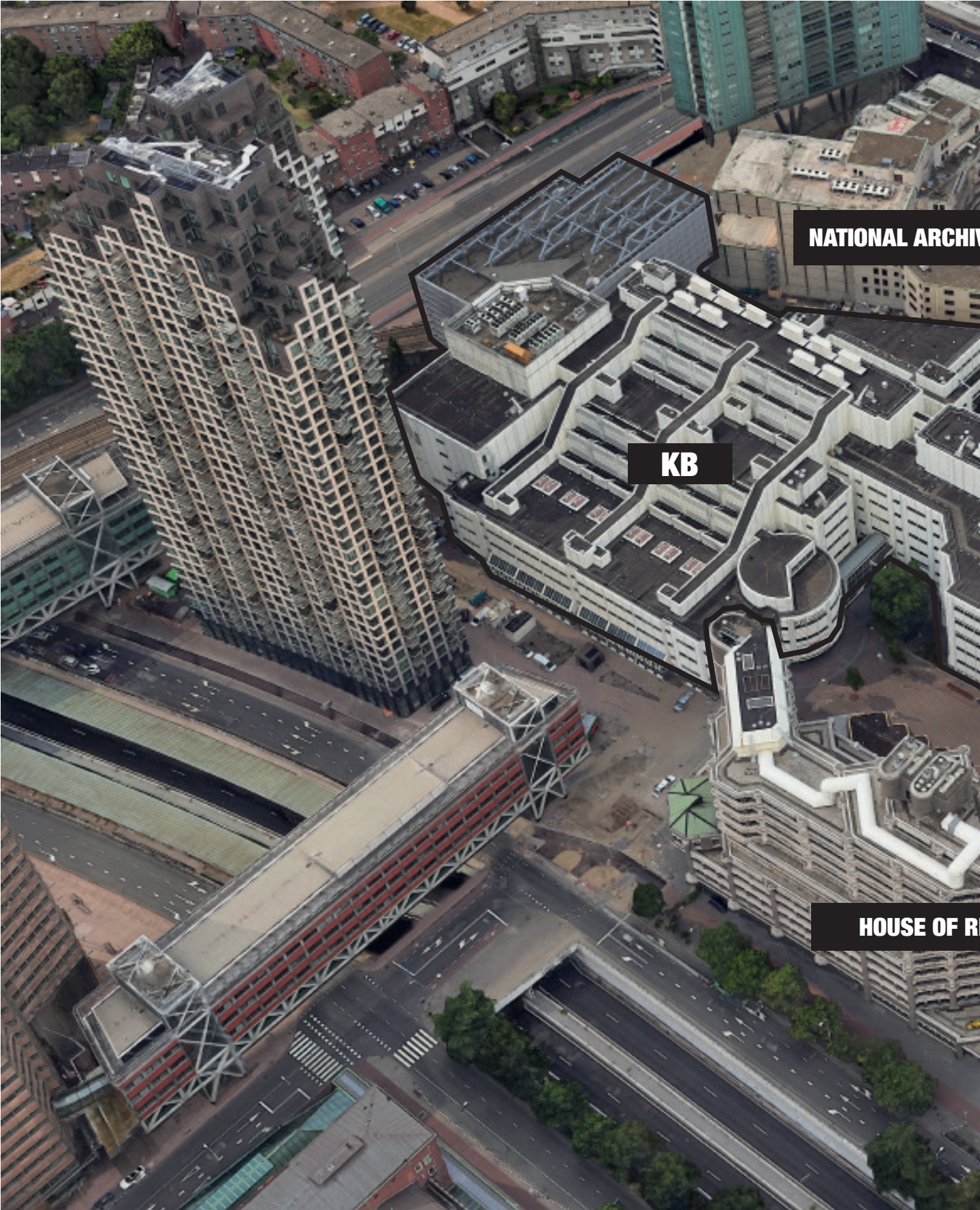
Central Station



Siteplan

new situation | 1:1000

Urban Situation KB





DEN HAAG CENTRAAL

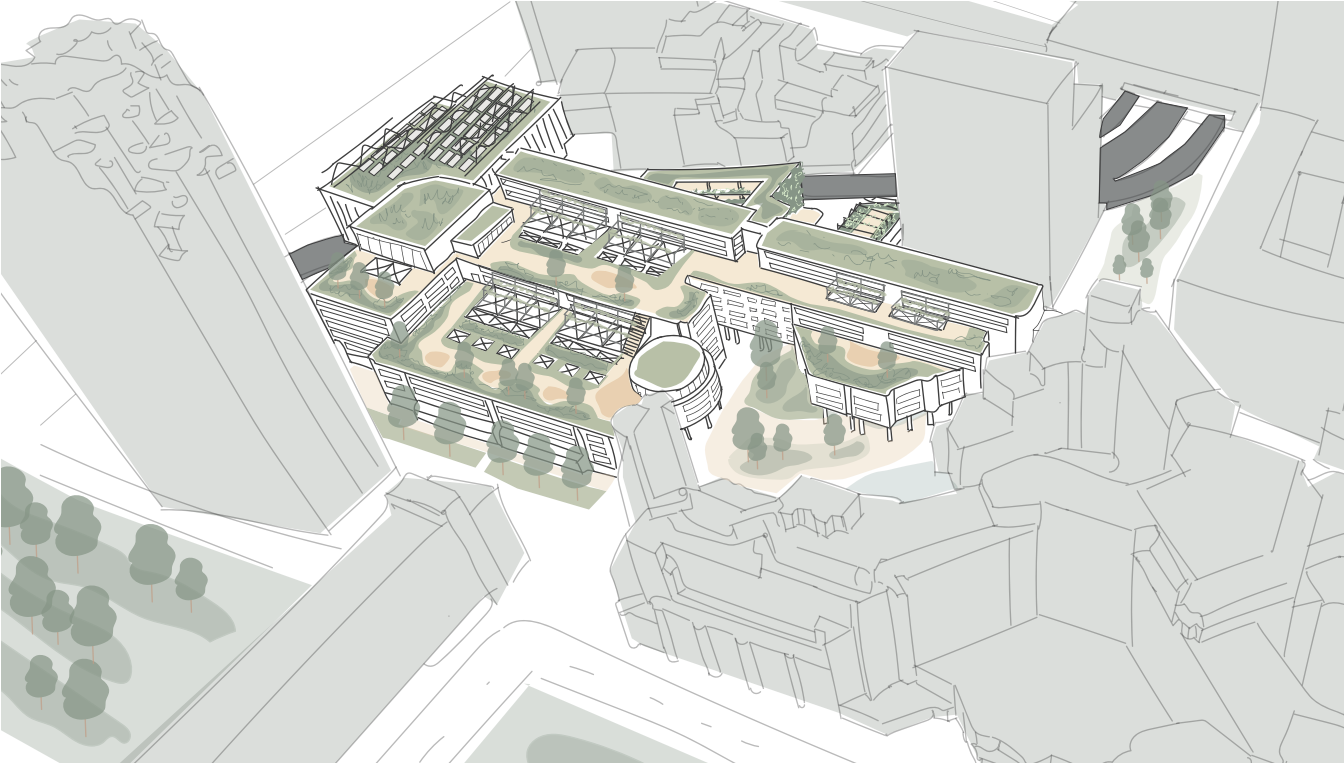
BABYLON

VE

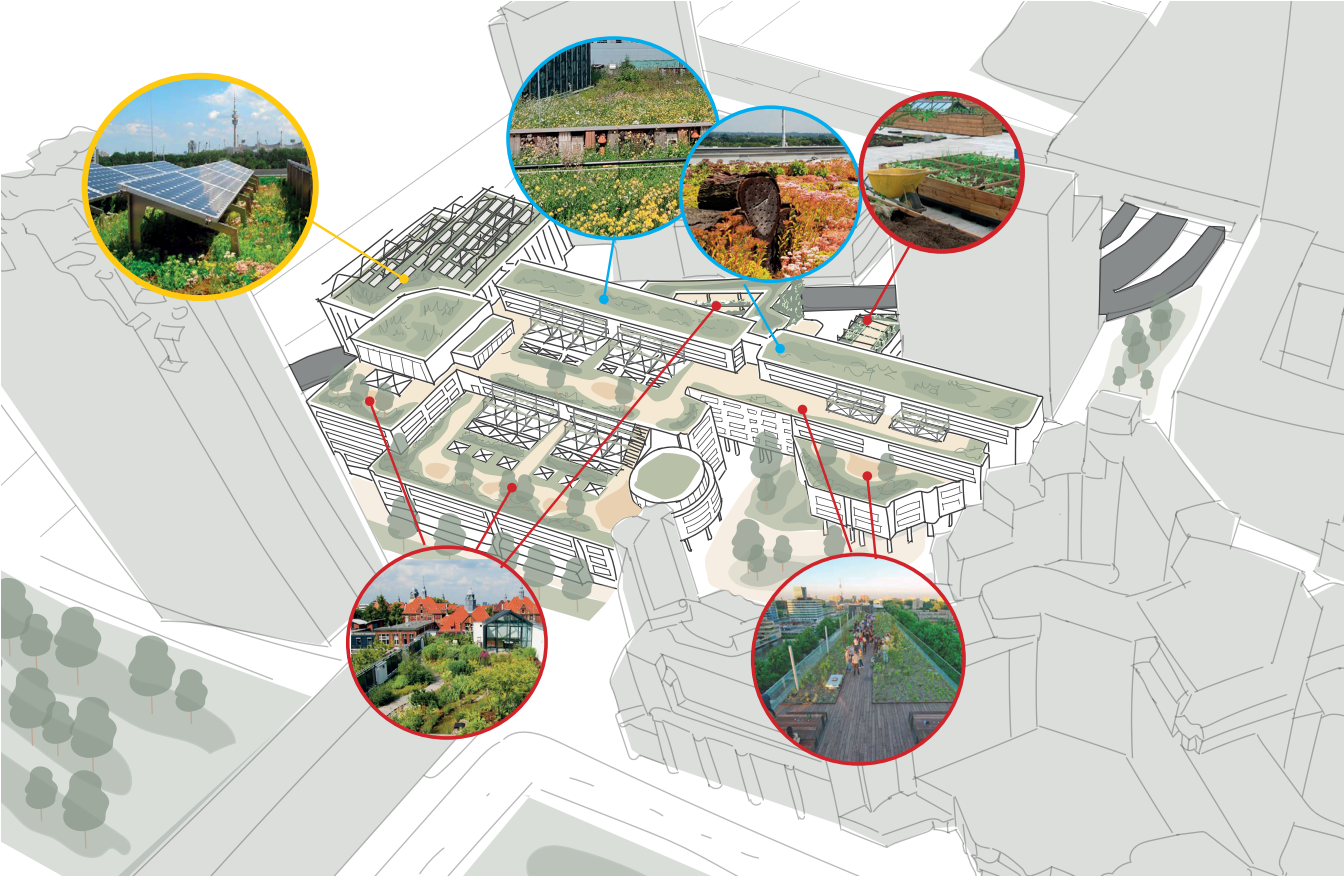
REPRESENTATIVES

Koekamp

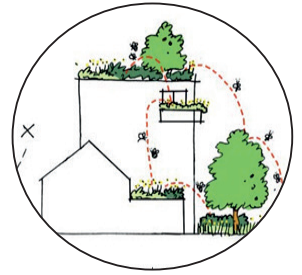
New Green Landscape on the KB



New Design of KB



Nature Roofs



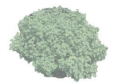
Field Elm



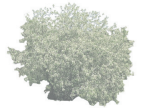
European ash



Black alder

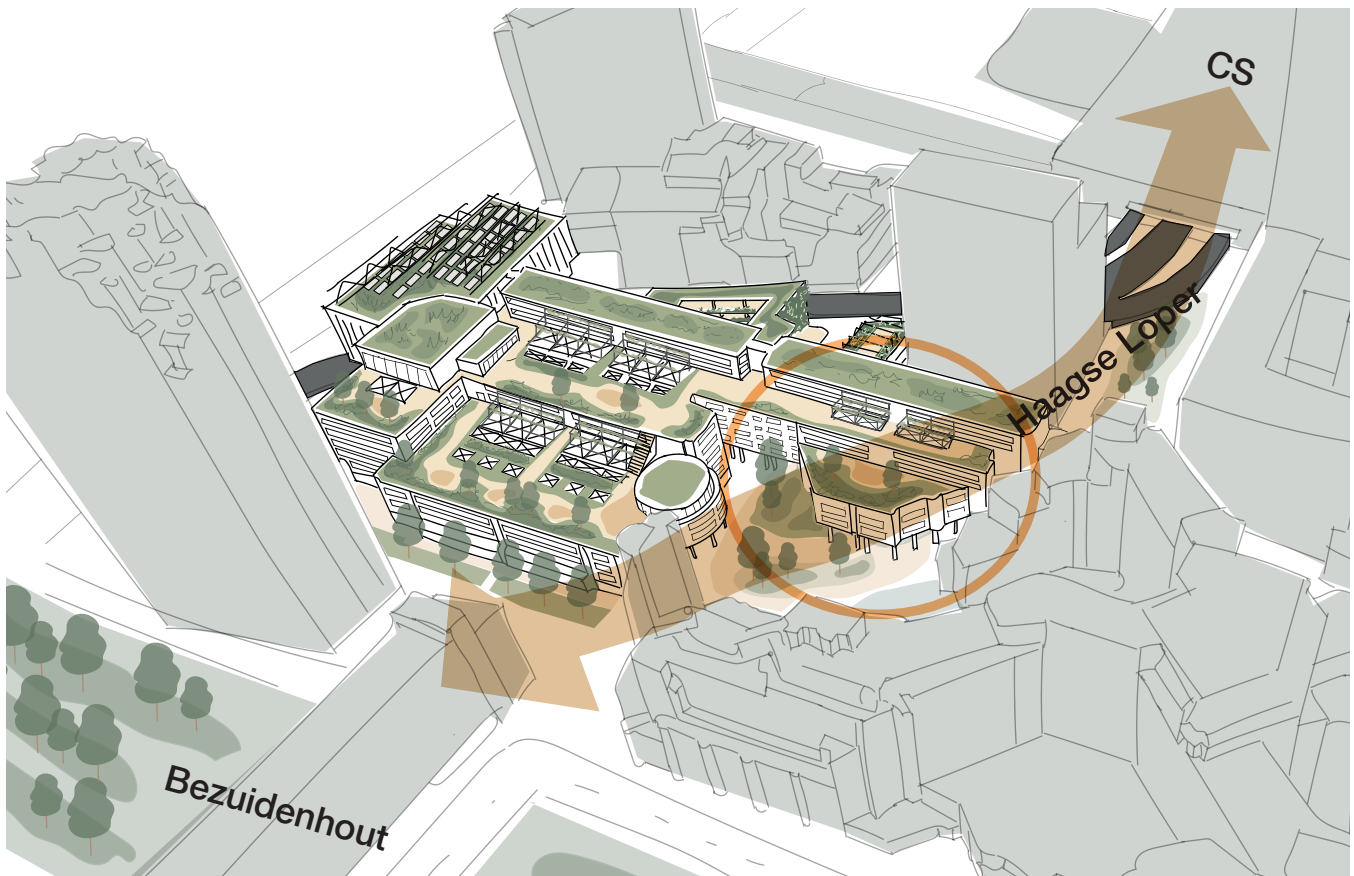


Blackcurrent

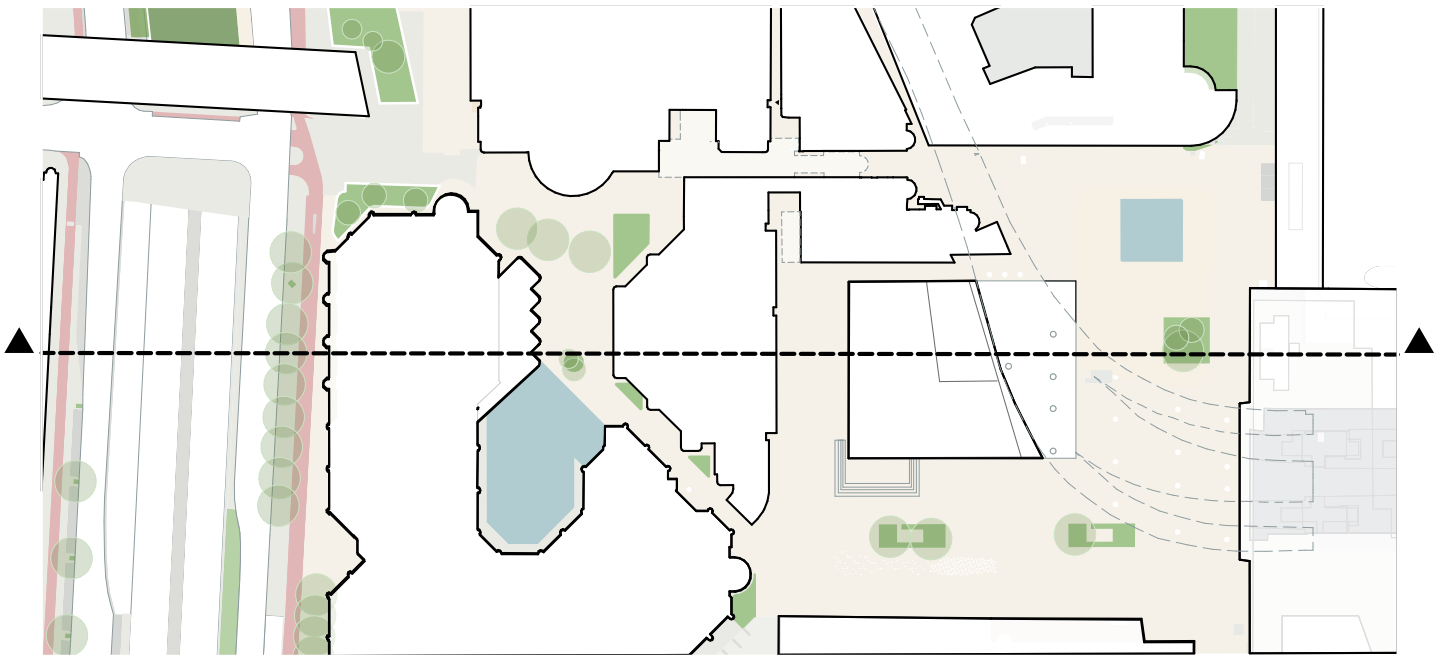
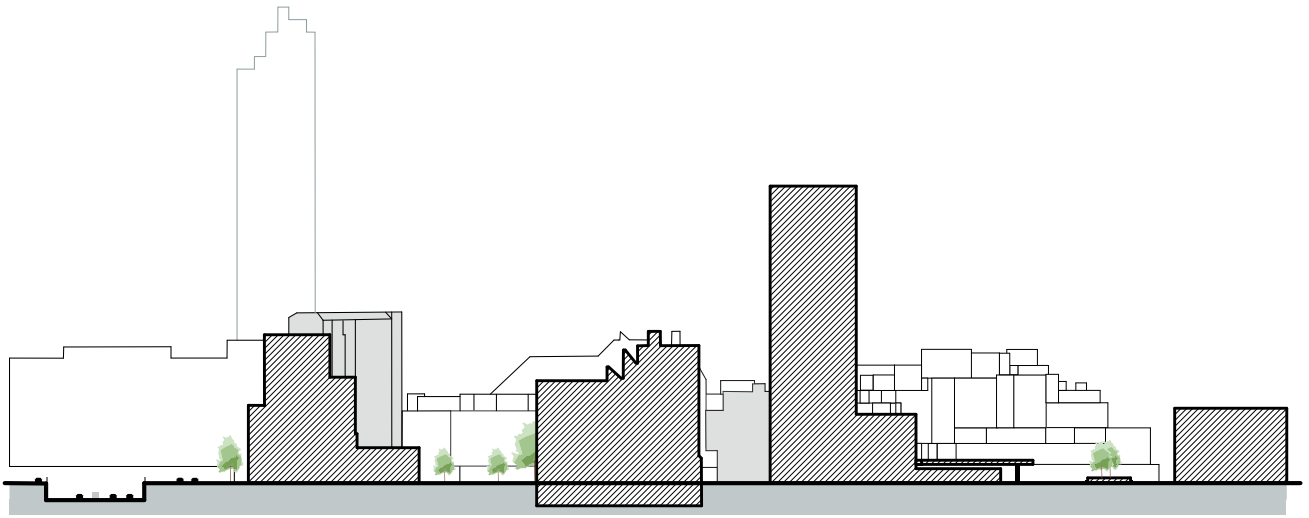


Birdcherry

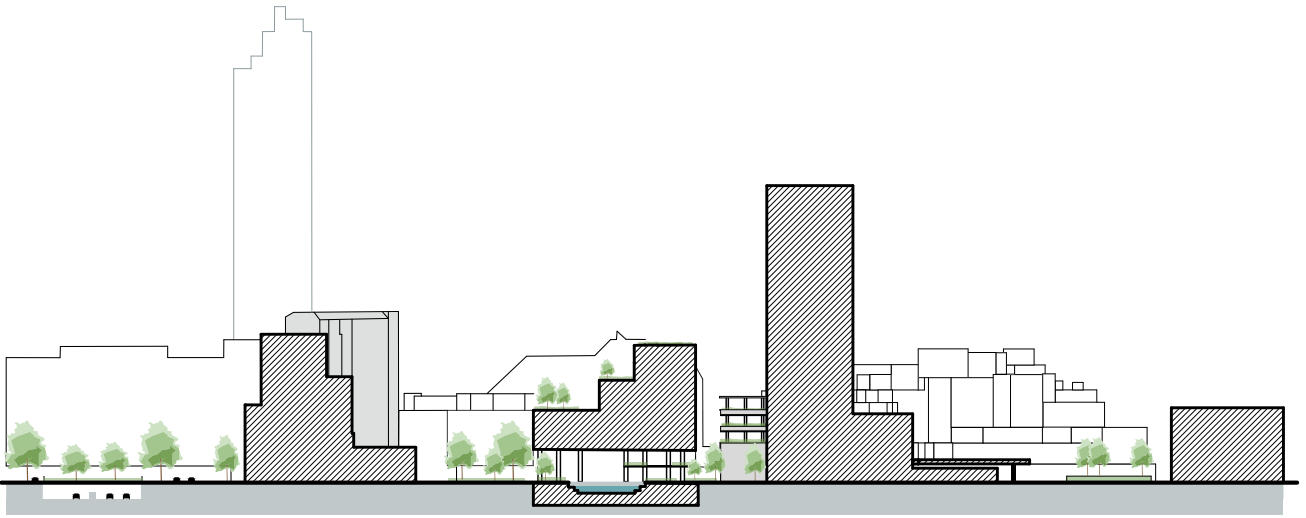
Ecological Connection



Connection with the City



 **Site Section**
existing situation | 1:1000



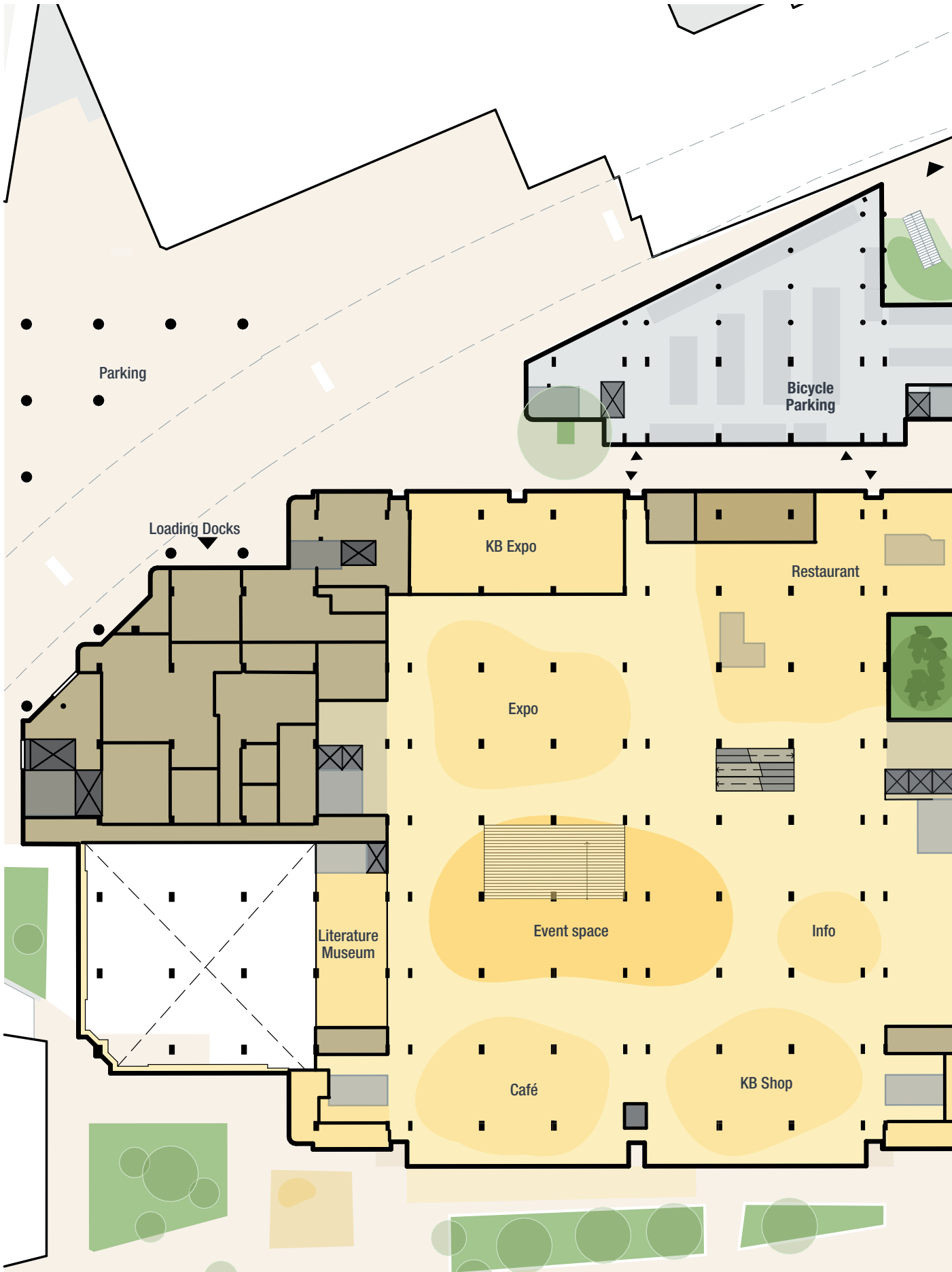
 **Site Section**
new situation | 1:1000



Urban | Existing Situation



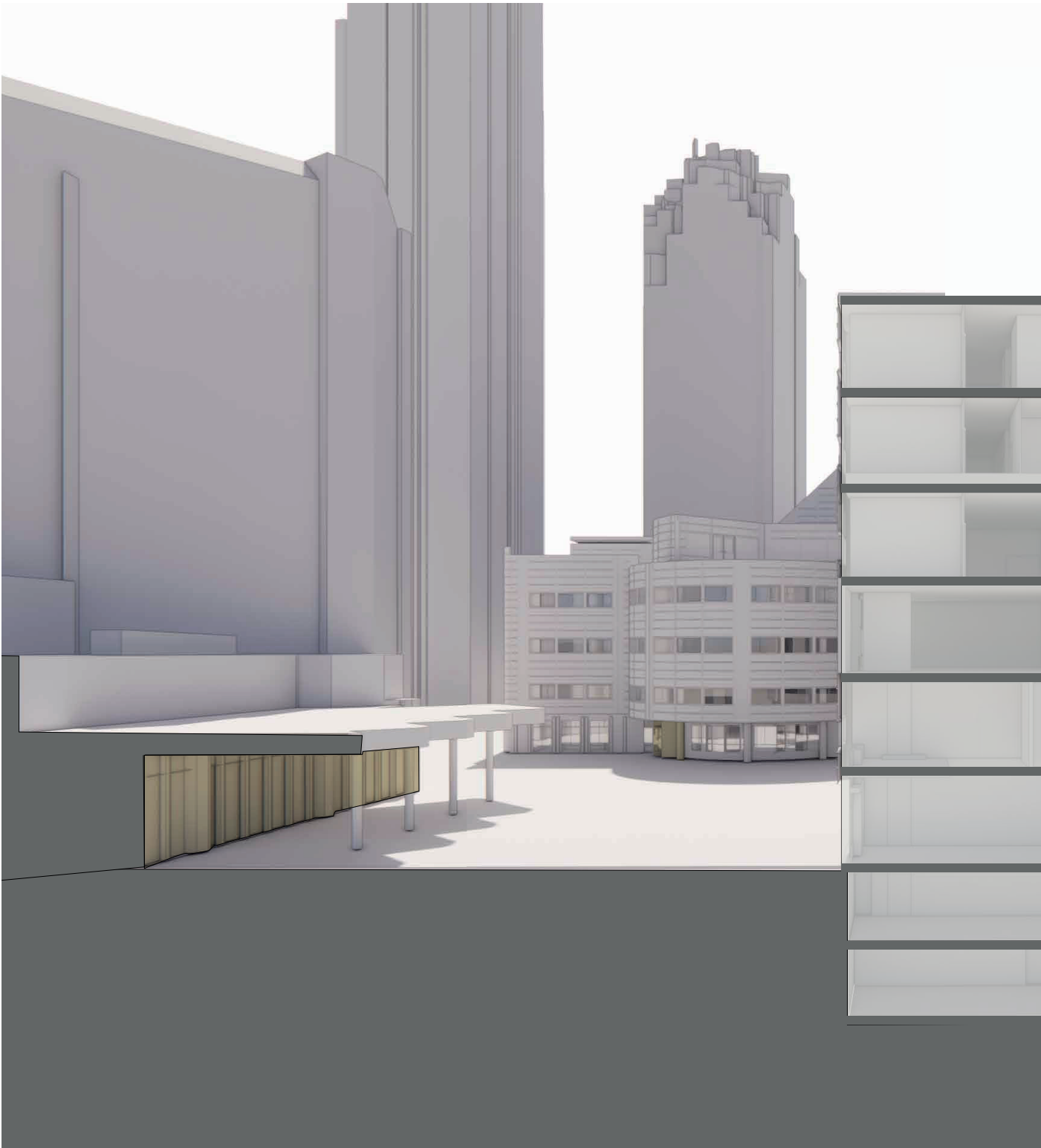
Urban | New Situation

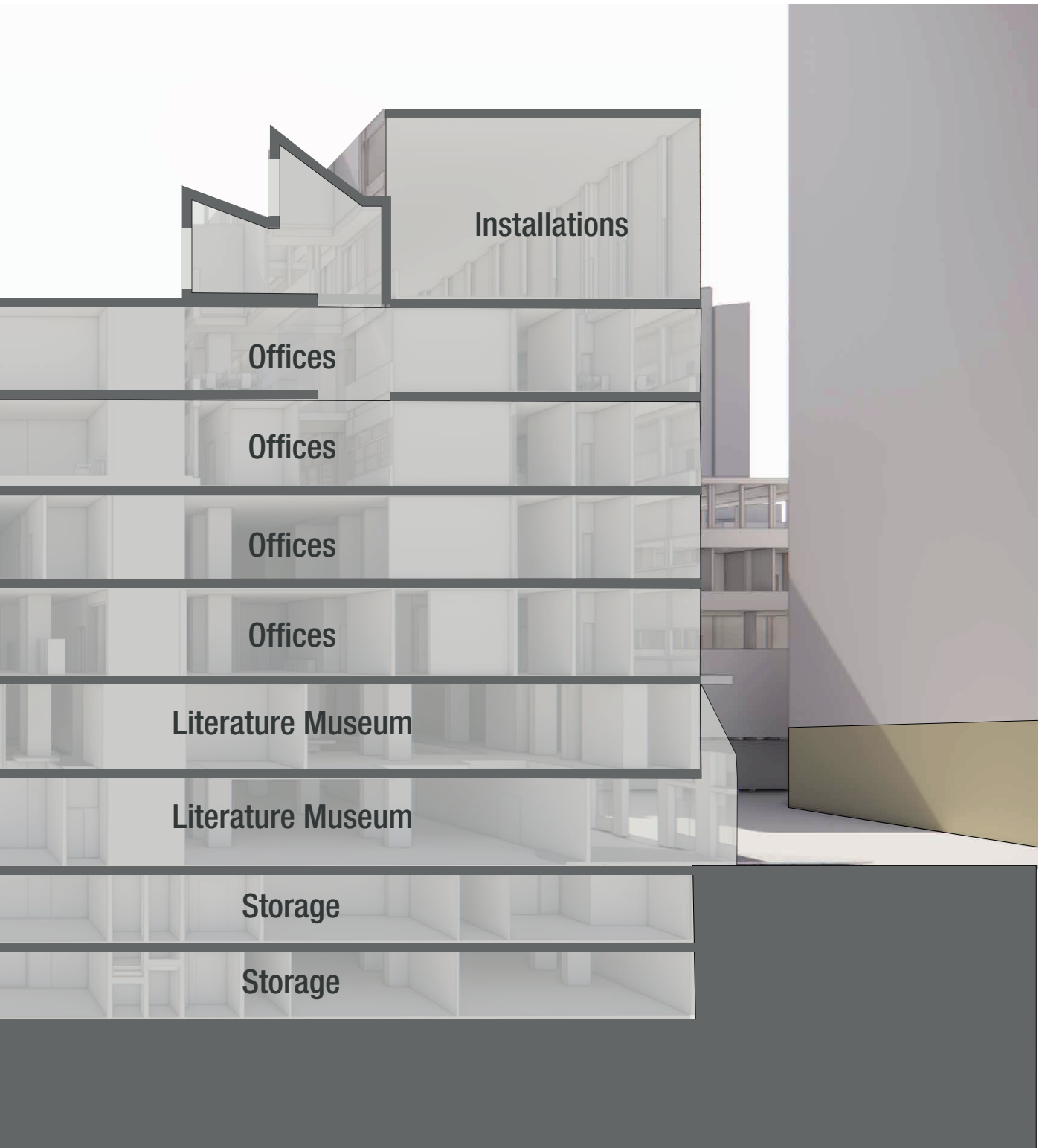
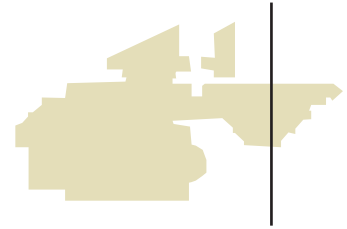




Siteplan | Ground floor

new situation | 1:500



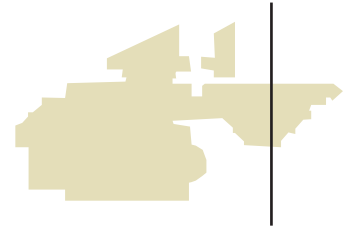


Section I Public Square

Existing situation | 1:200



Water storage

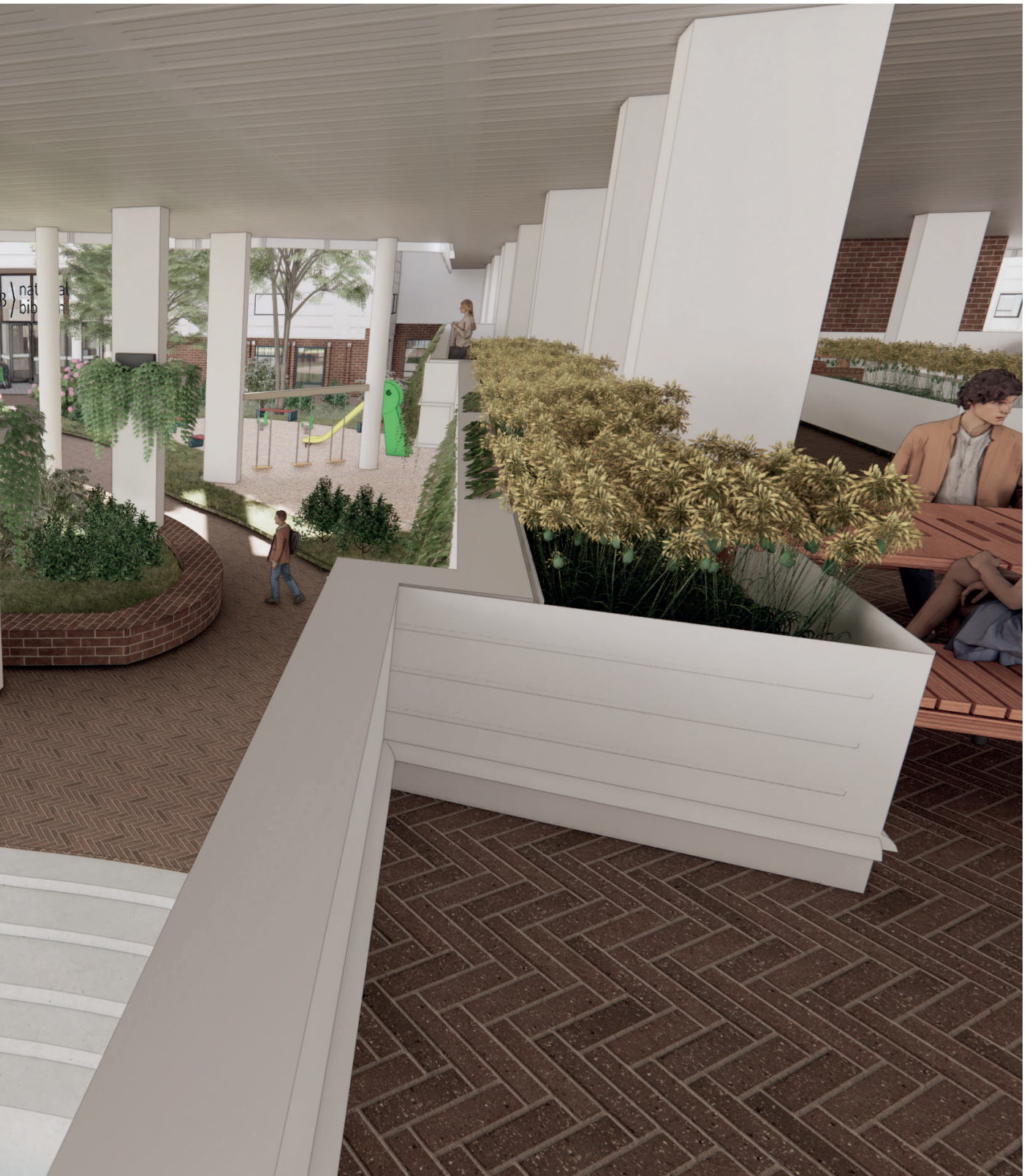


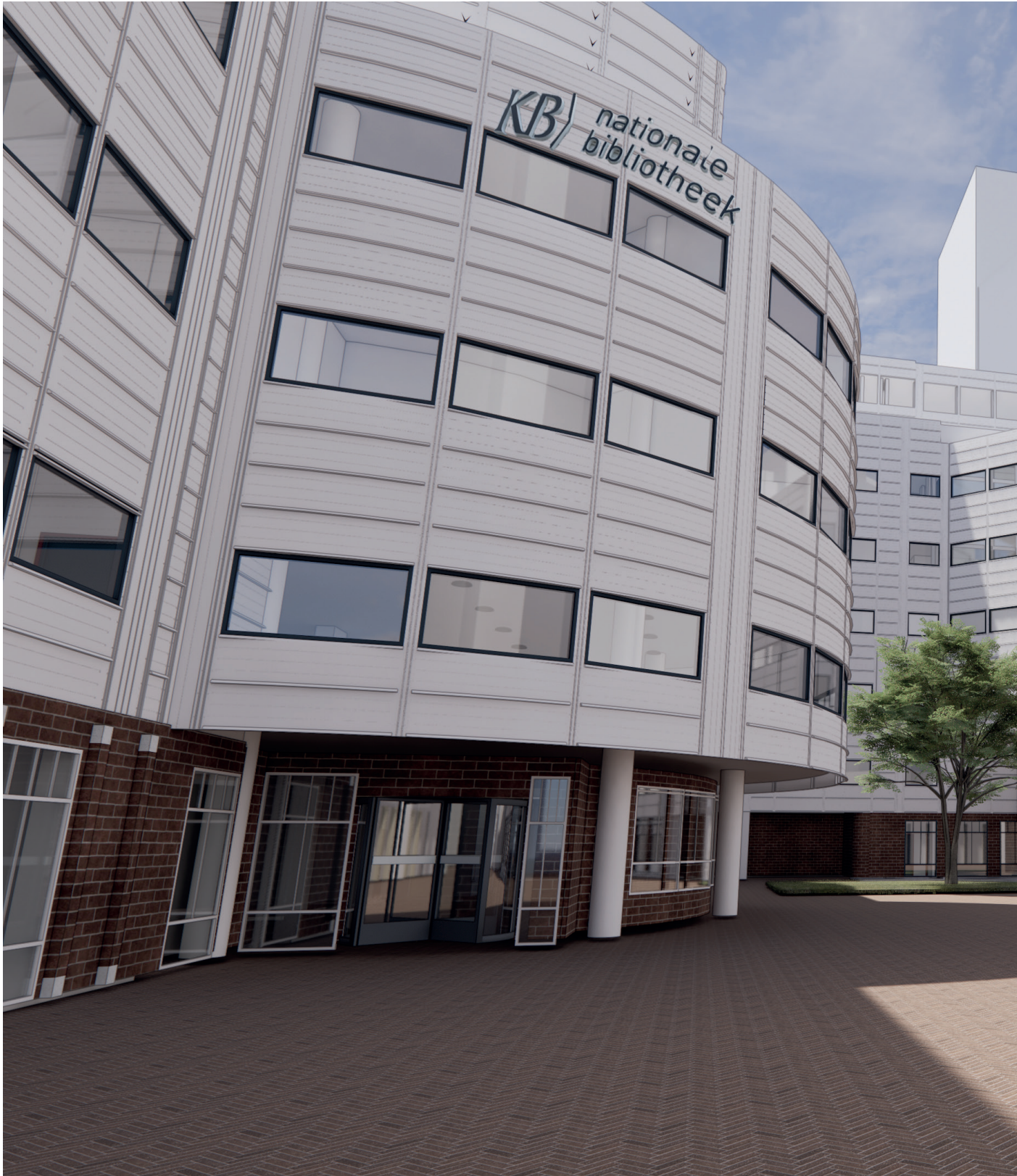
Section I Public Square

New situation | 1:200



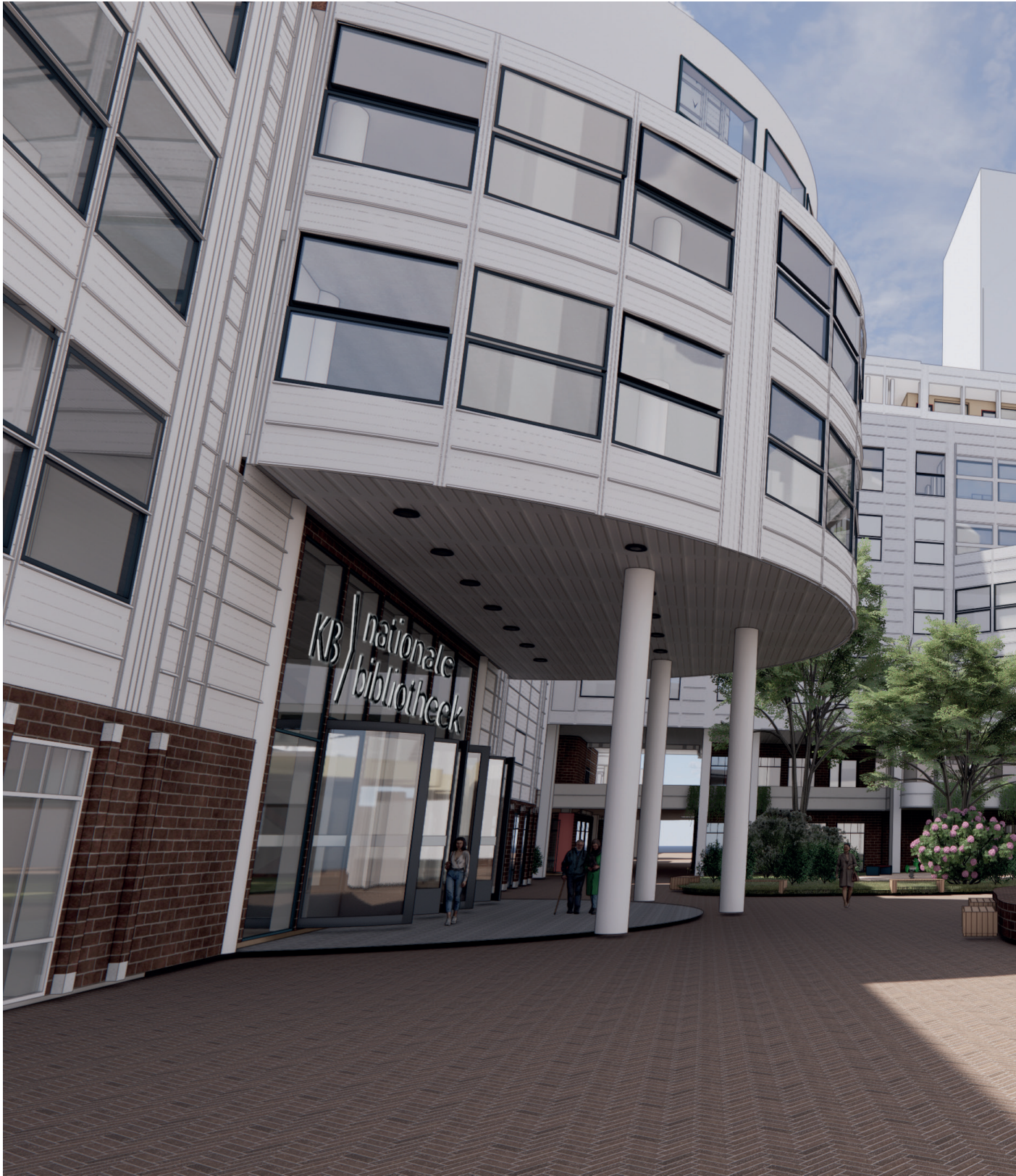
Urban | New Public Square



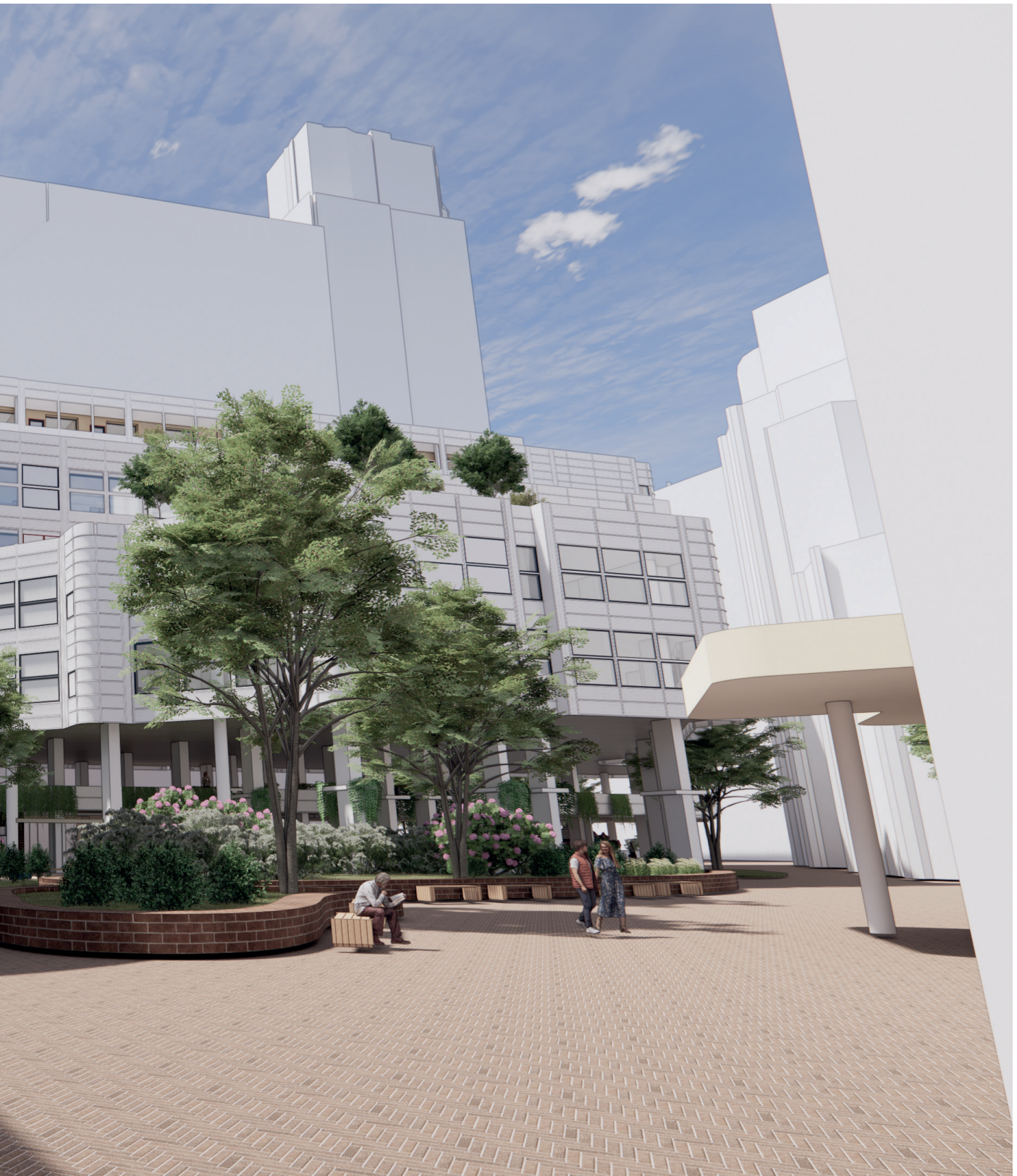


Urban | Existing Entrance





Urban I New Entrance





Urban | New Entrance

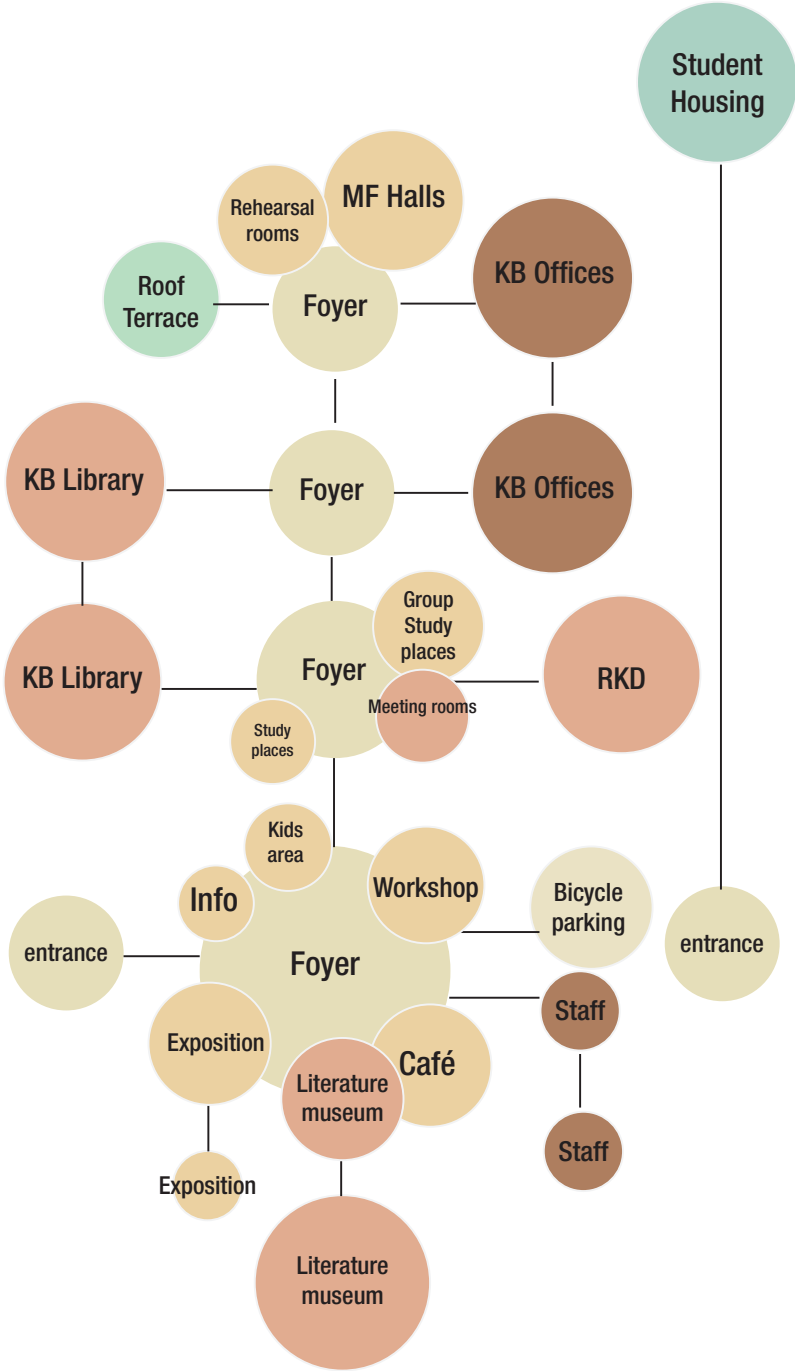


3.2 Redesign of the KB Building

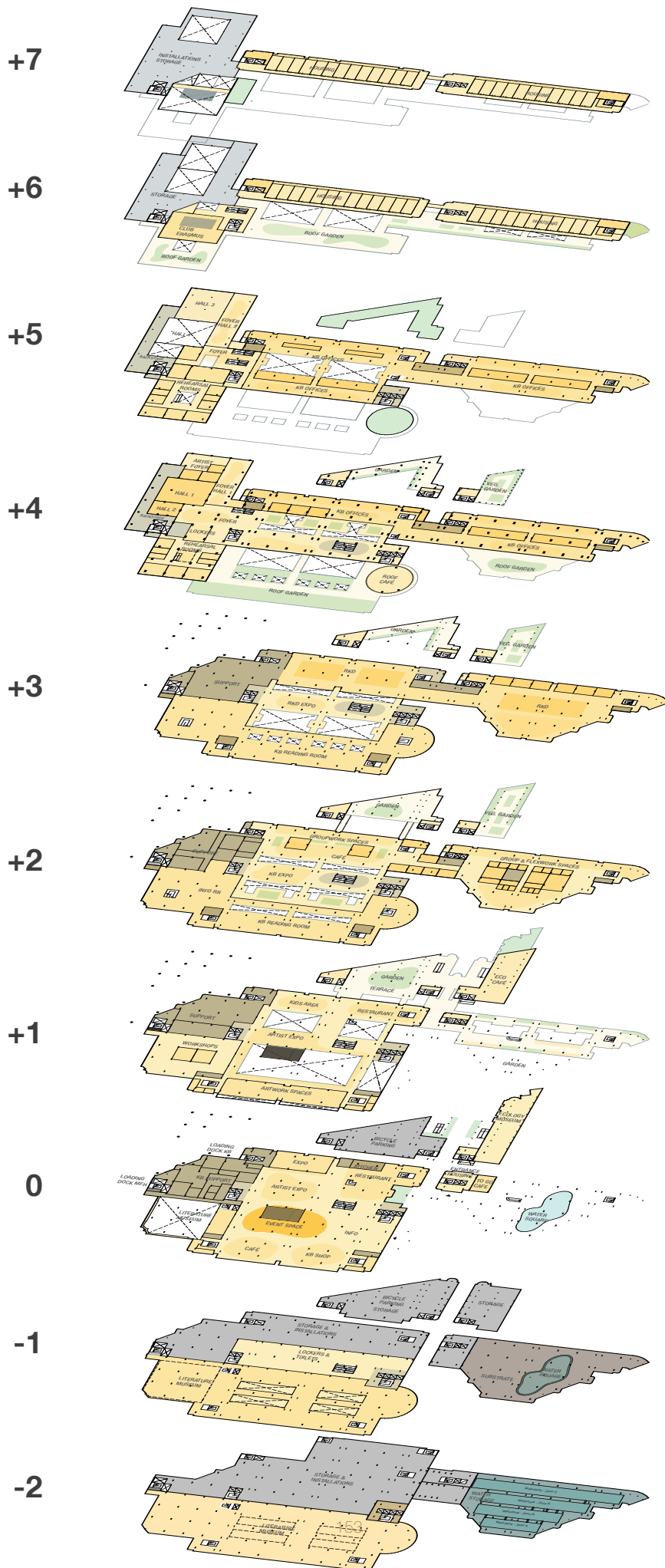




Floorplans I New Situation

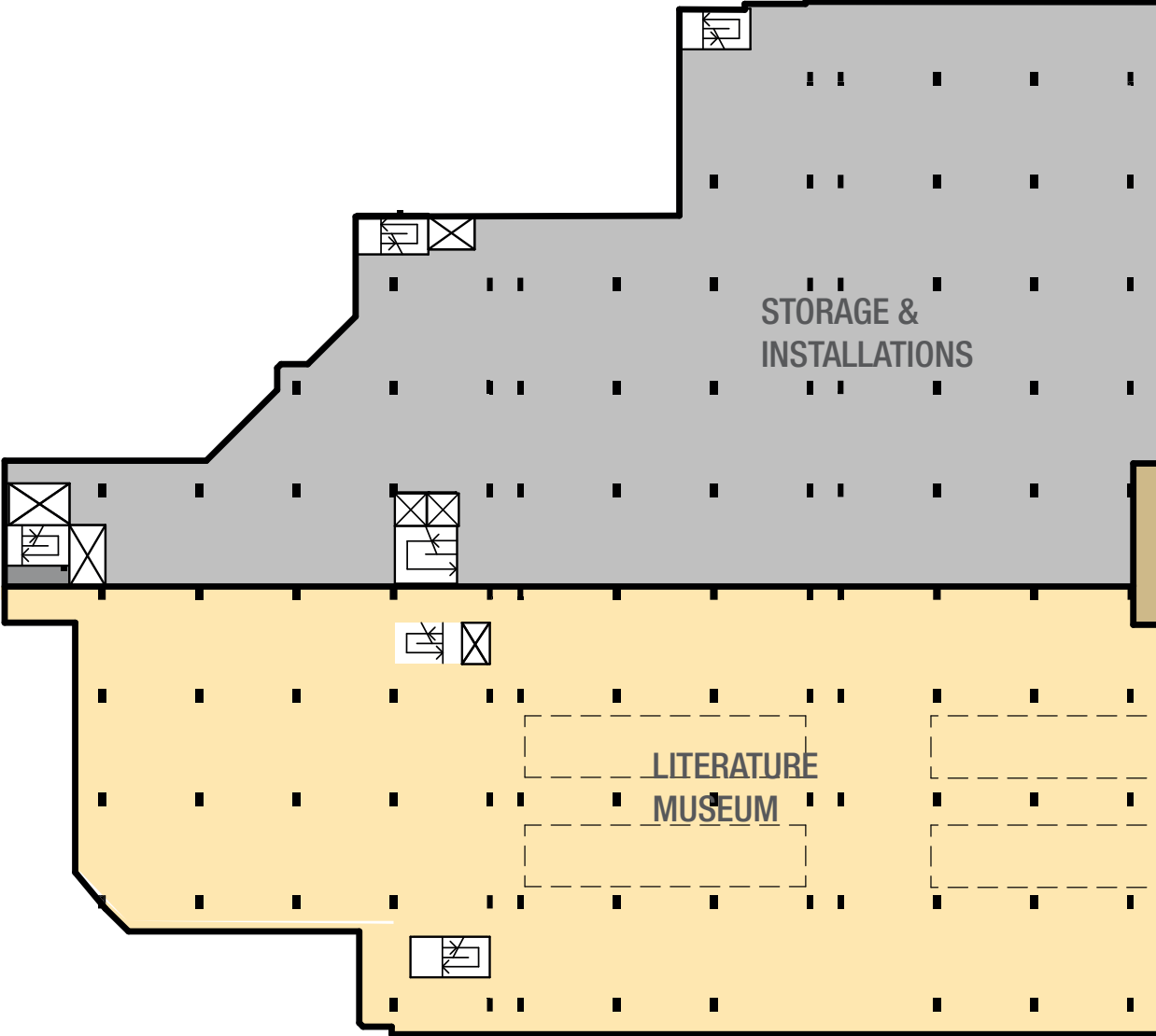


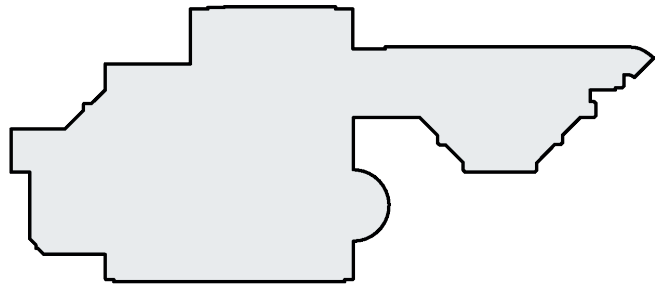
Function Diagram of the KB, new situation



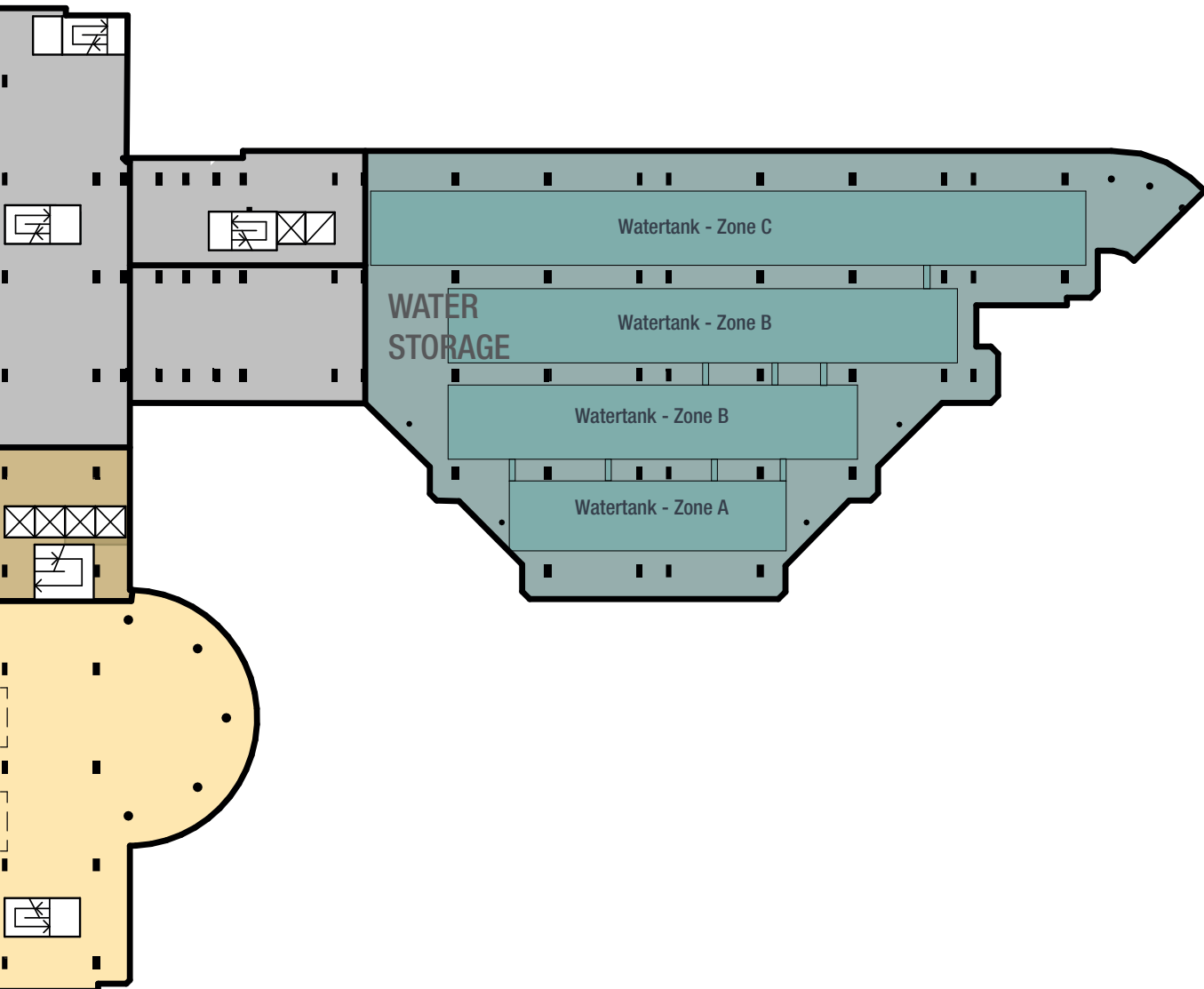
Overview of floorplans KB, new situation

Floorplans | New Situation

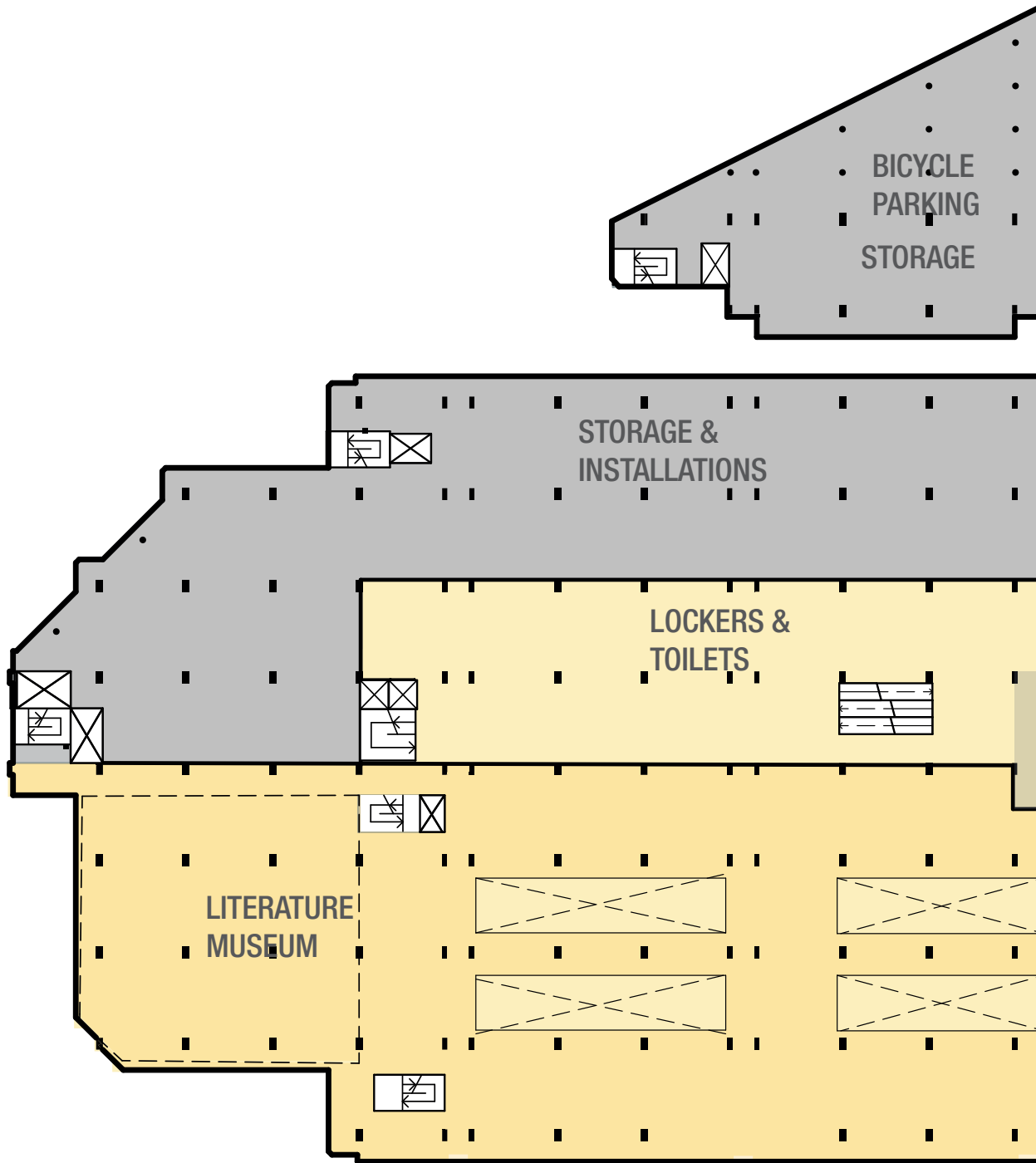


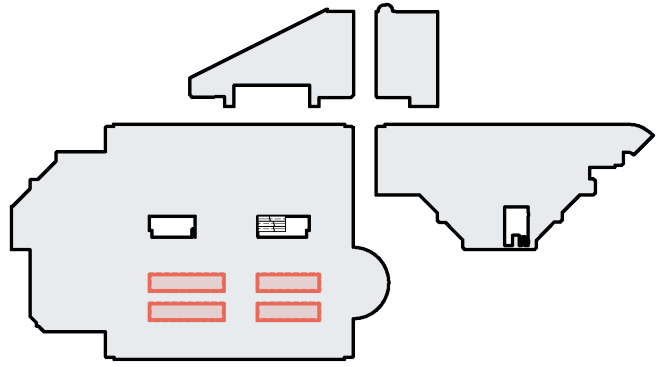


Existing Floorplan with Demolition Indicated

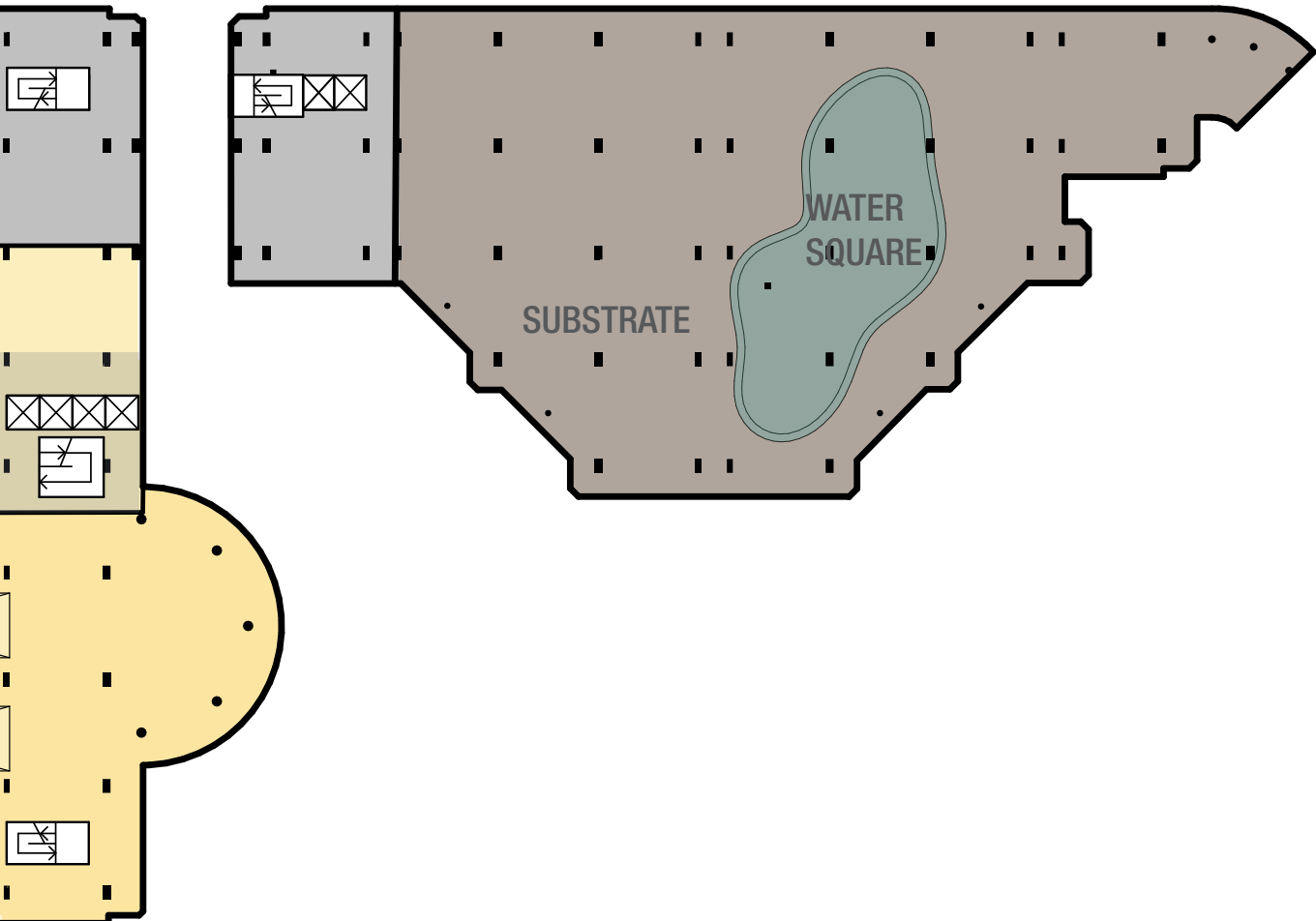
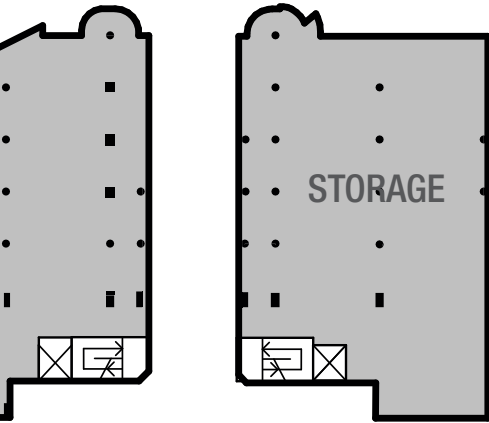



Floorplan | Level -2
new situation | 1:500





Existing Floorplan with Demolition Indicated




Floorplan | Level -1
new situation | 1:500



LOADING DOCK KB

LOADING DOCK MFH

KB SUPPORT

LITERATURE MUSEUM

EXPO

ARTIST EXPO

EVENT SPACE

CAFÉ

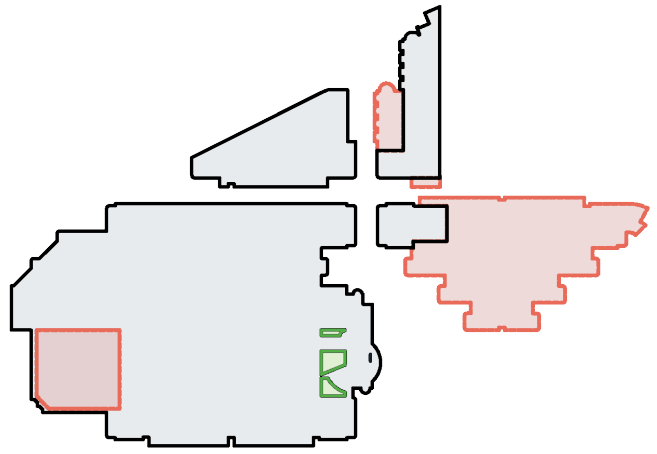
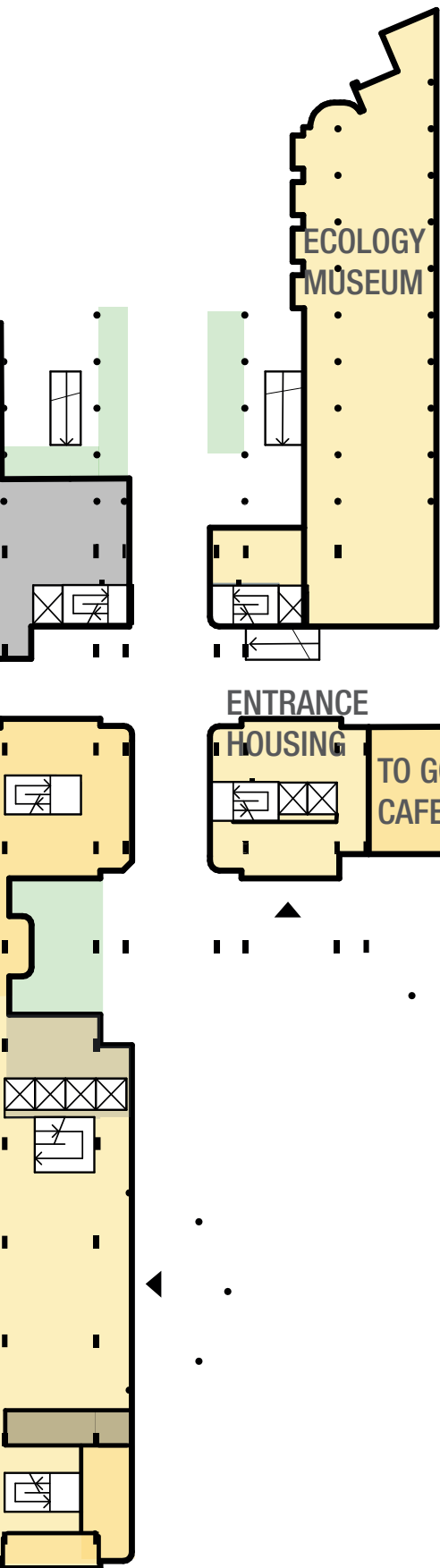
KITCHEN

RESTAURANT

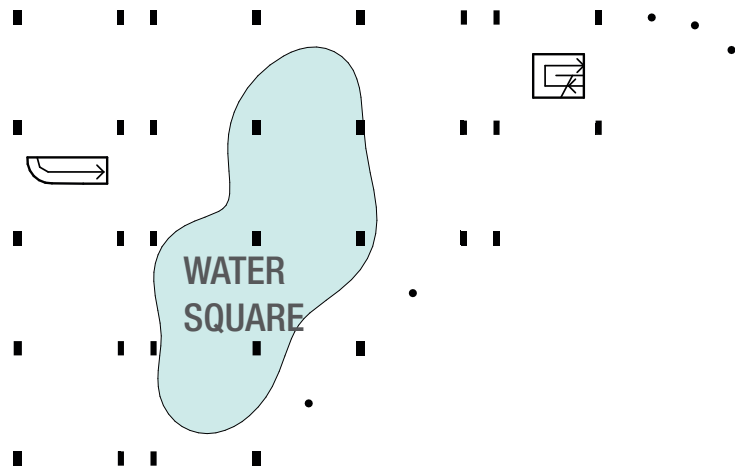
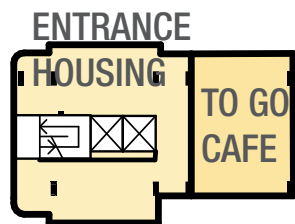
INFO

KB SHOP

BICYCLE PARKING



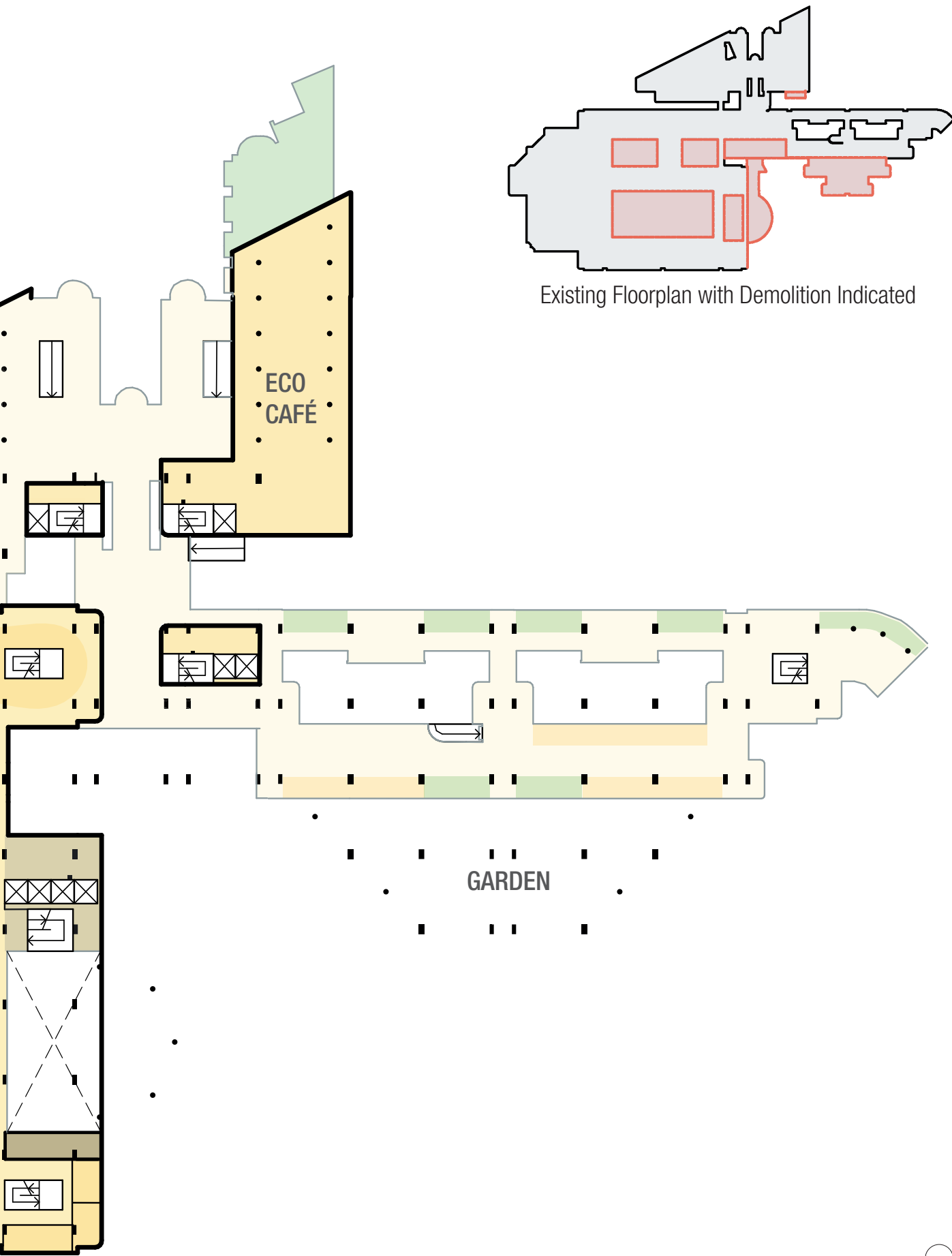
Existing Floorplan with Demolition Indicated



Floorplan | Level 0

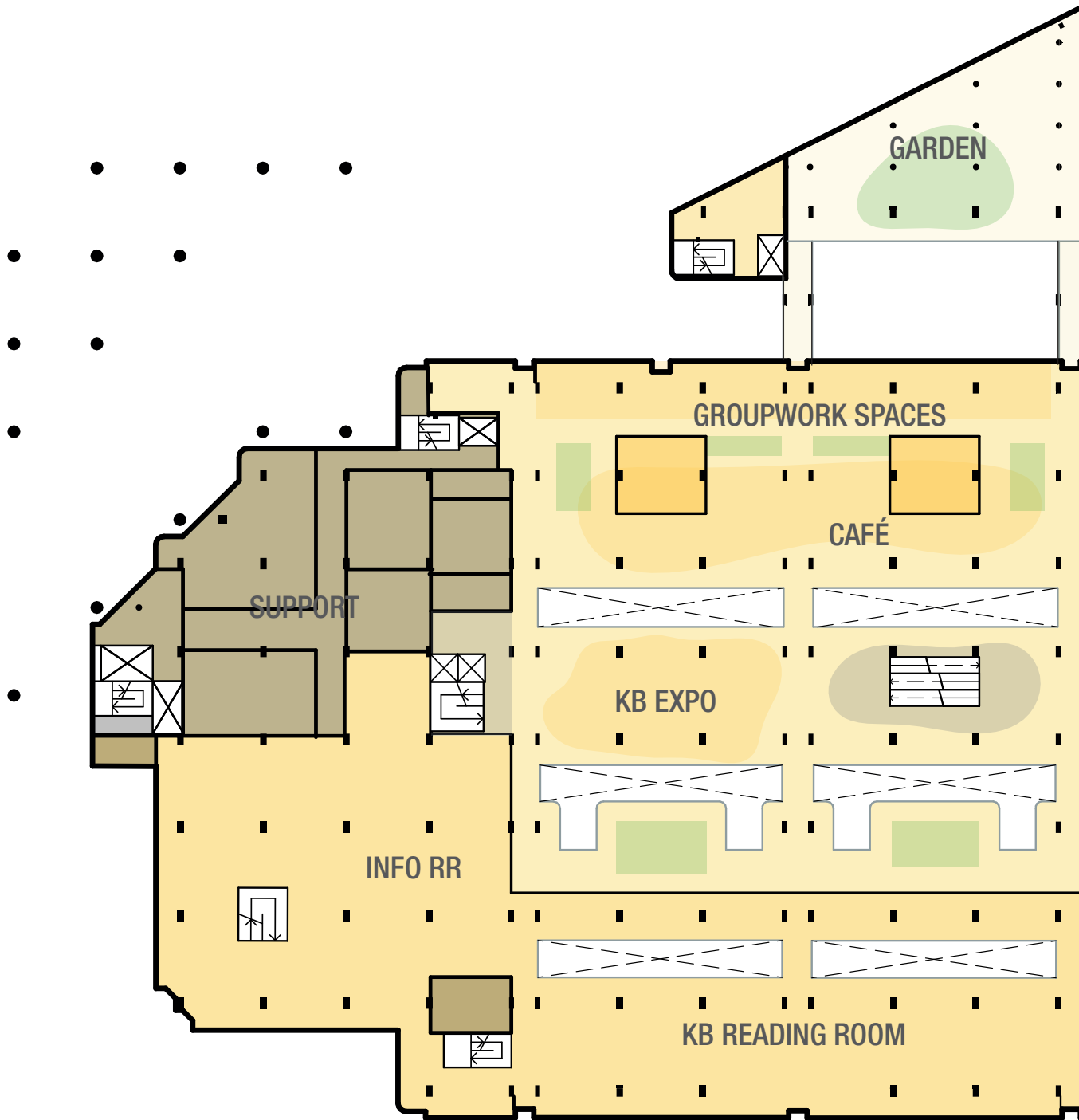
new situation | 1:500

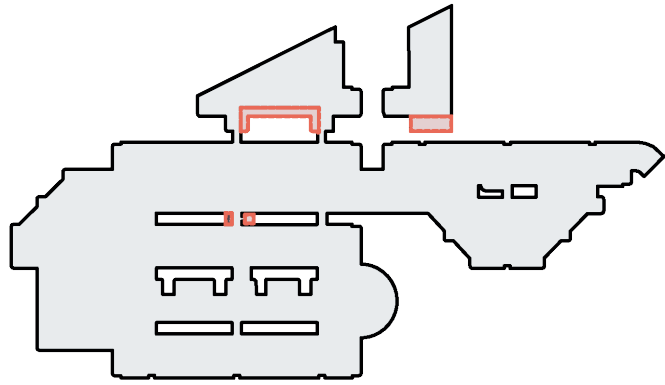




Existing Floorplan with Demolition Indicated

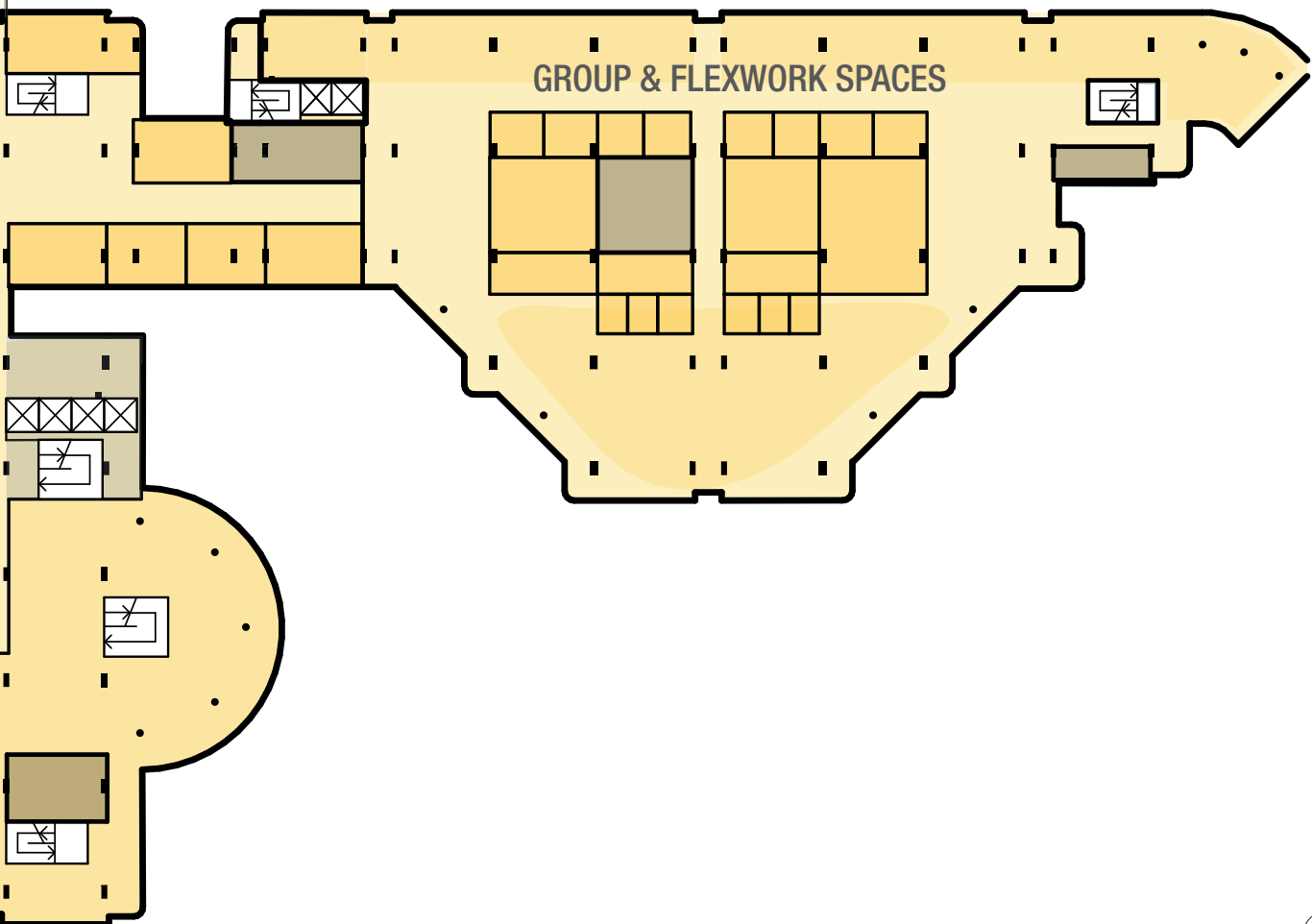
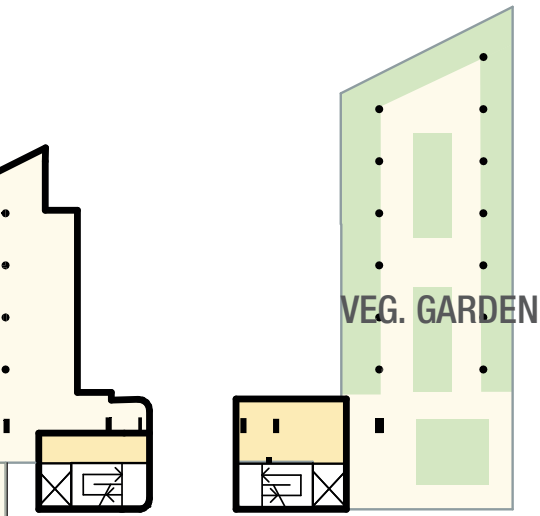

Floorplan | Level +1
new situation | 1:500





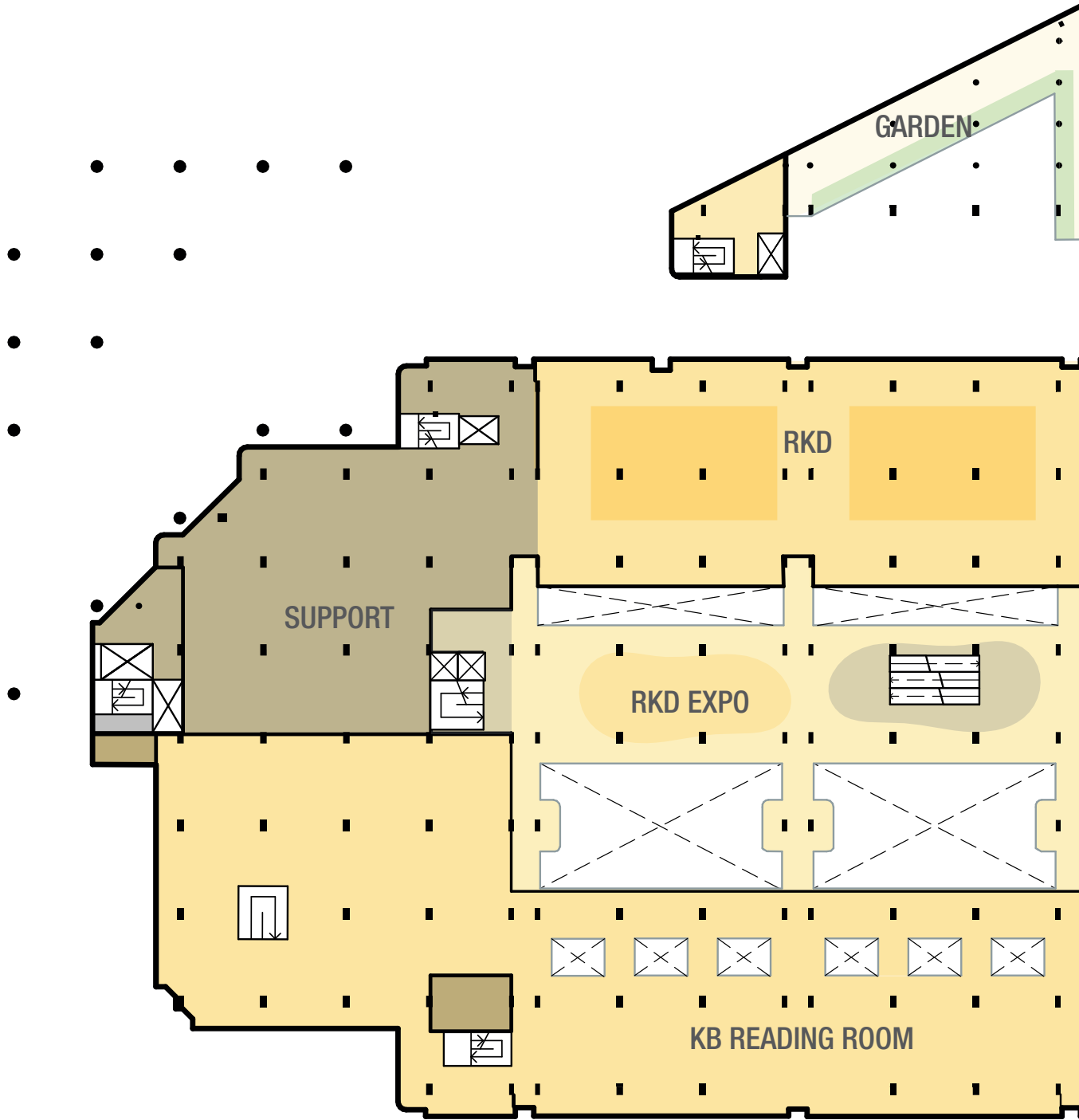
Existing Floorplan with Demolition Indicated

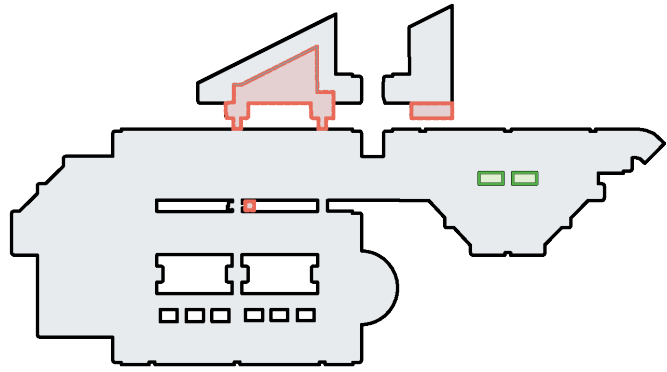
VEG. GARDEN



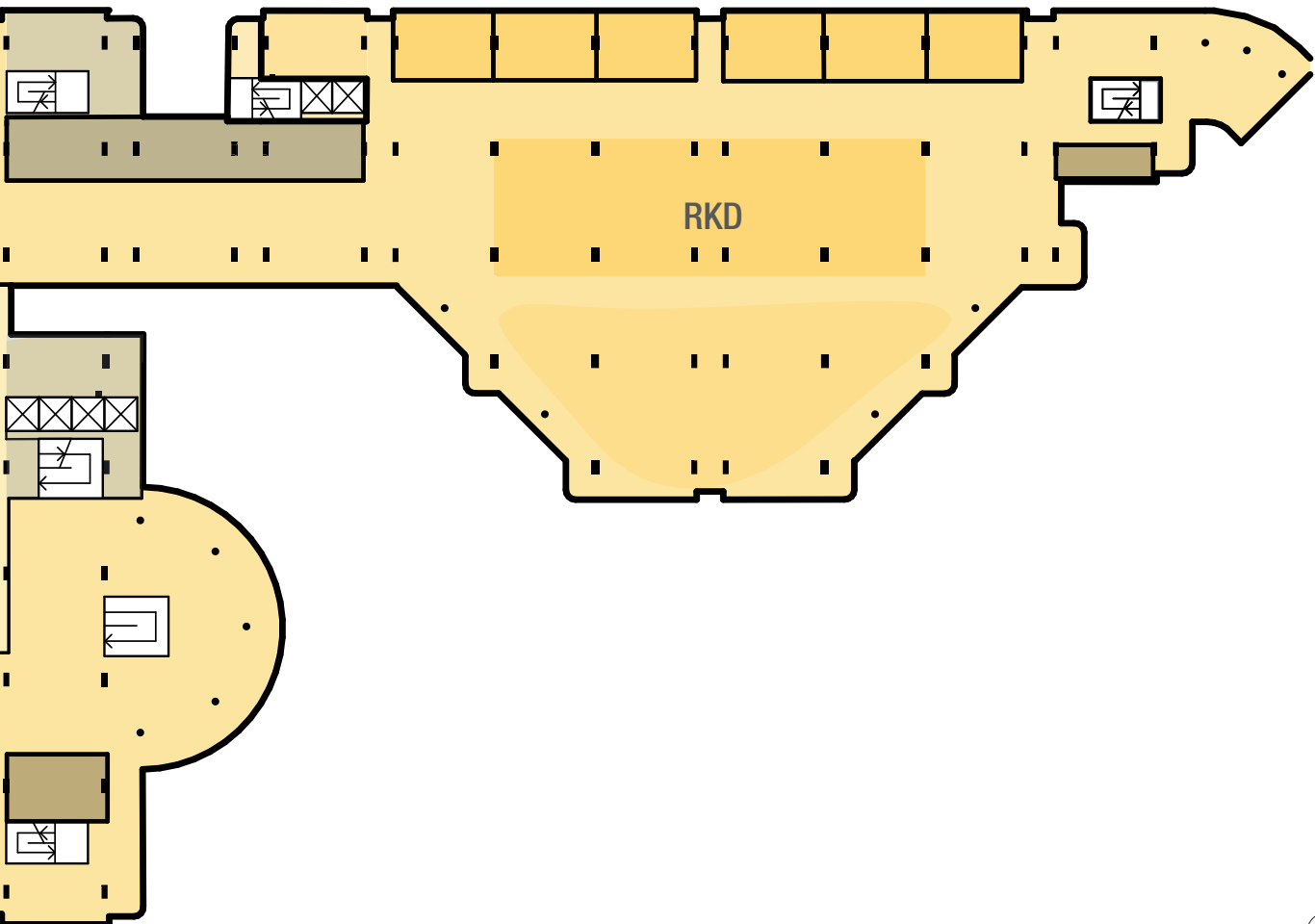
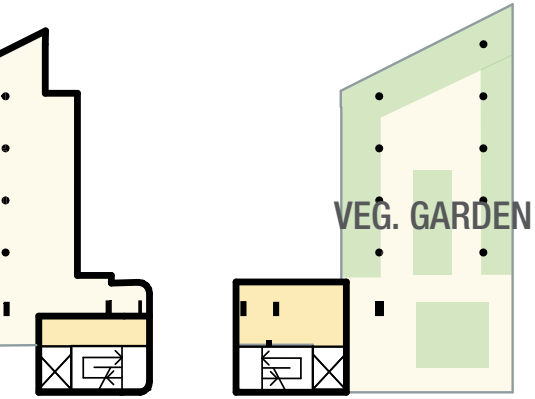

Floorplan | Level +2

new situation | 1:500



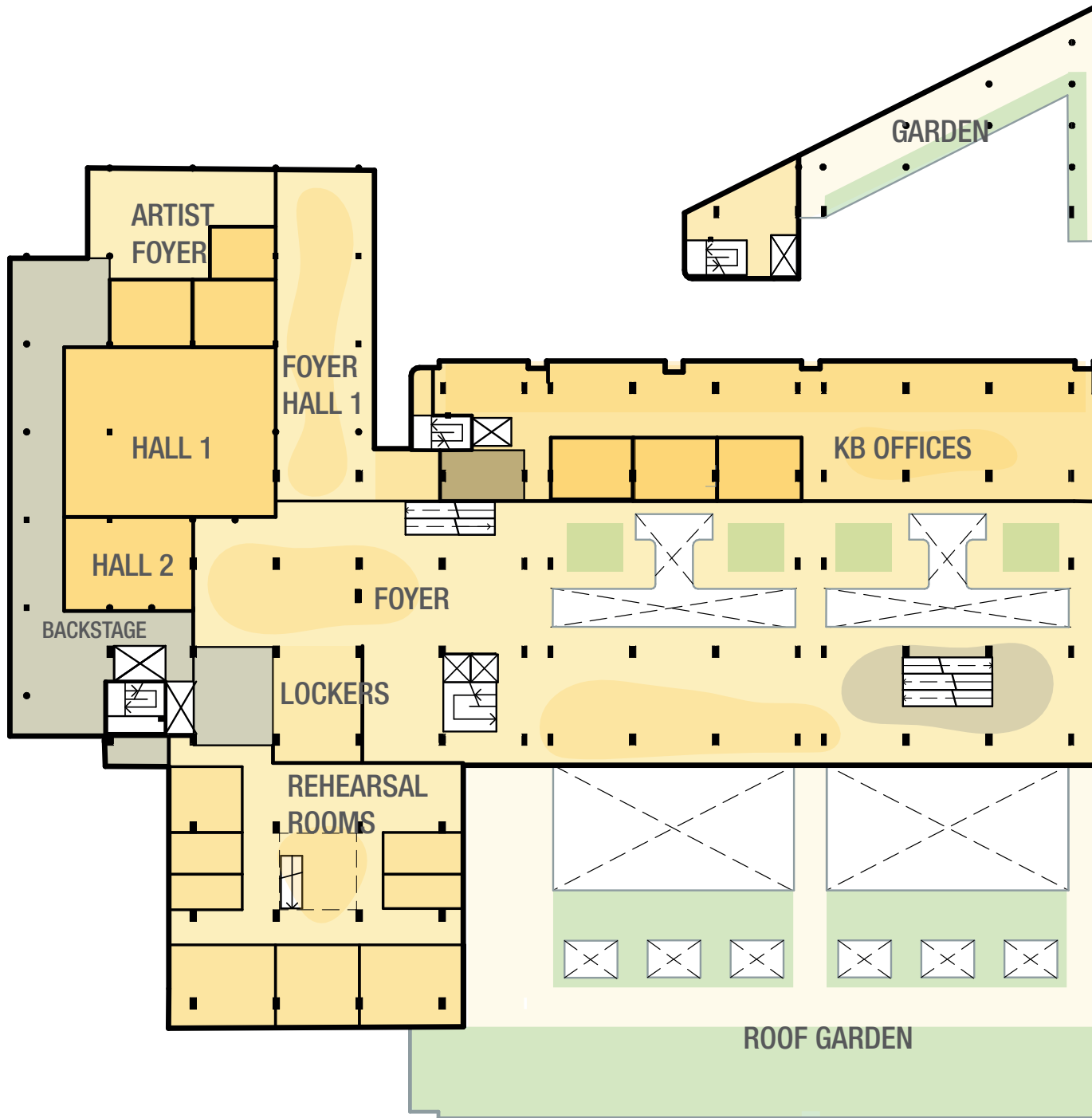


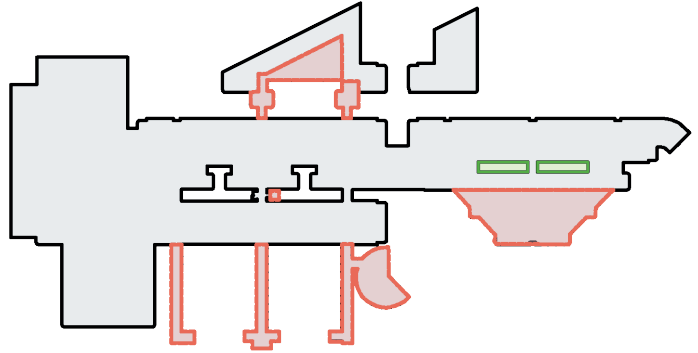
Existing Floorplan with Demolition Indicated



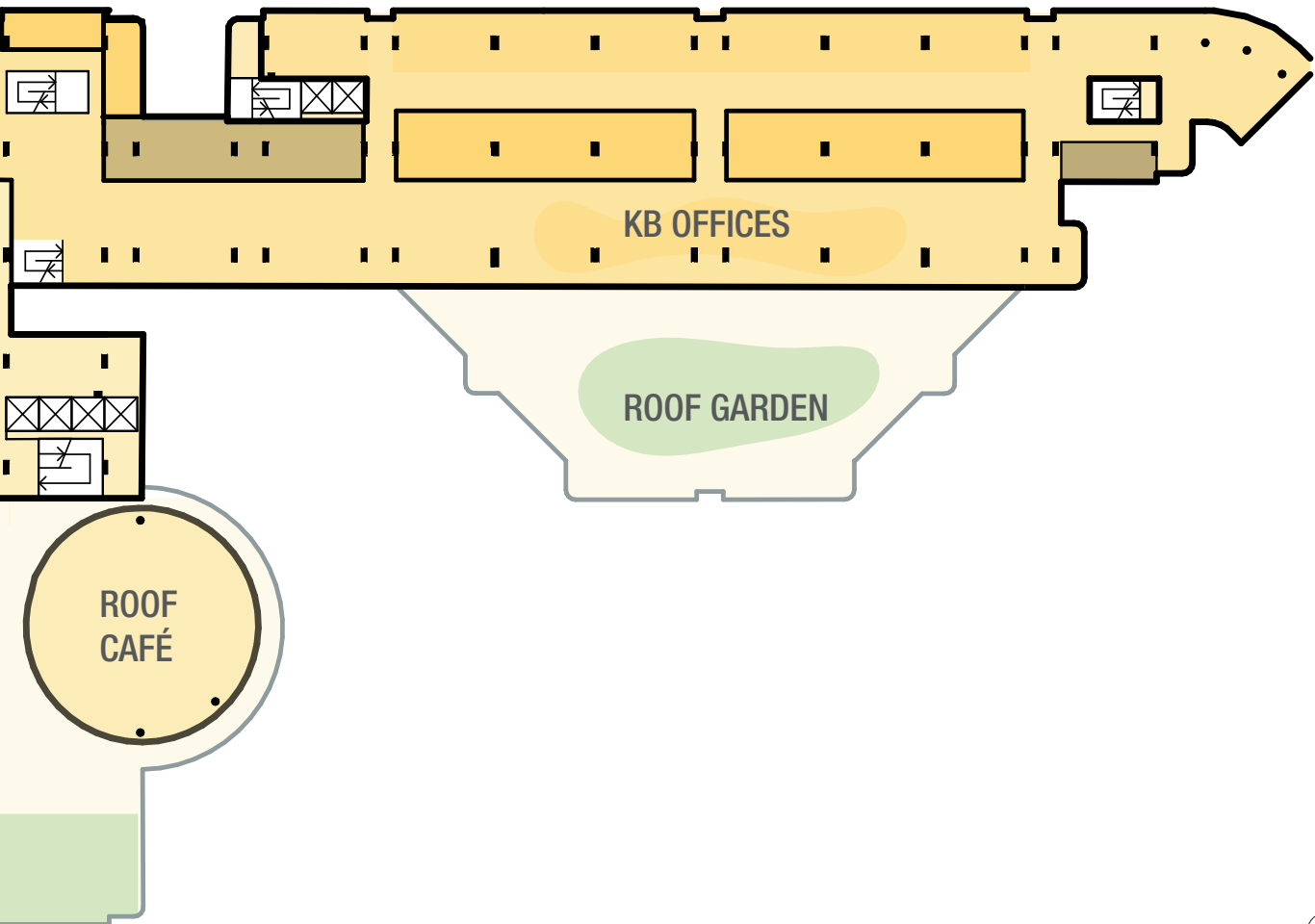
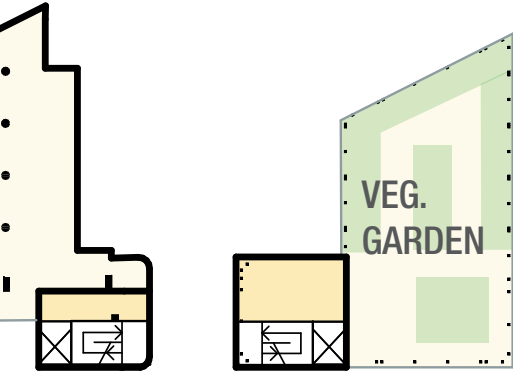

Floorplan I Level +3

new situation | 1:500



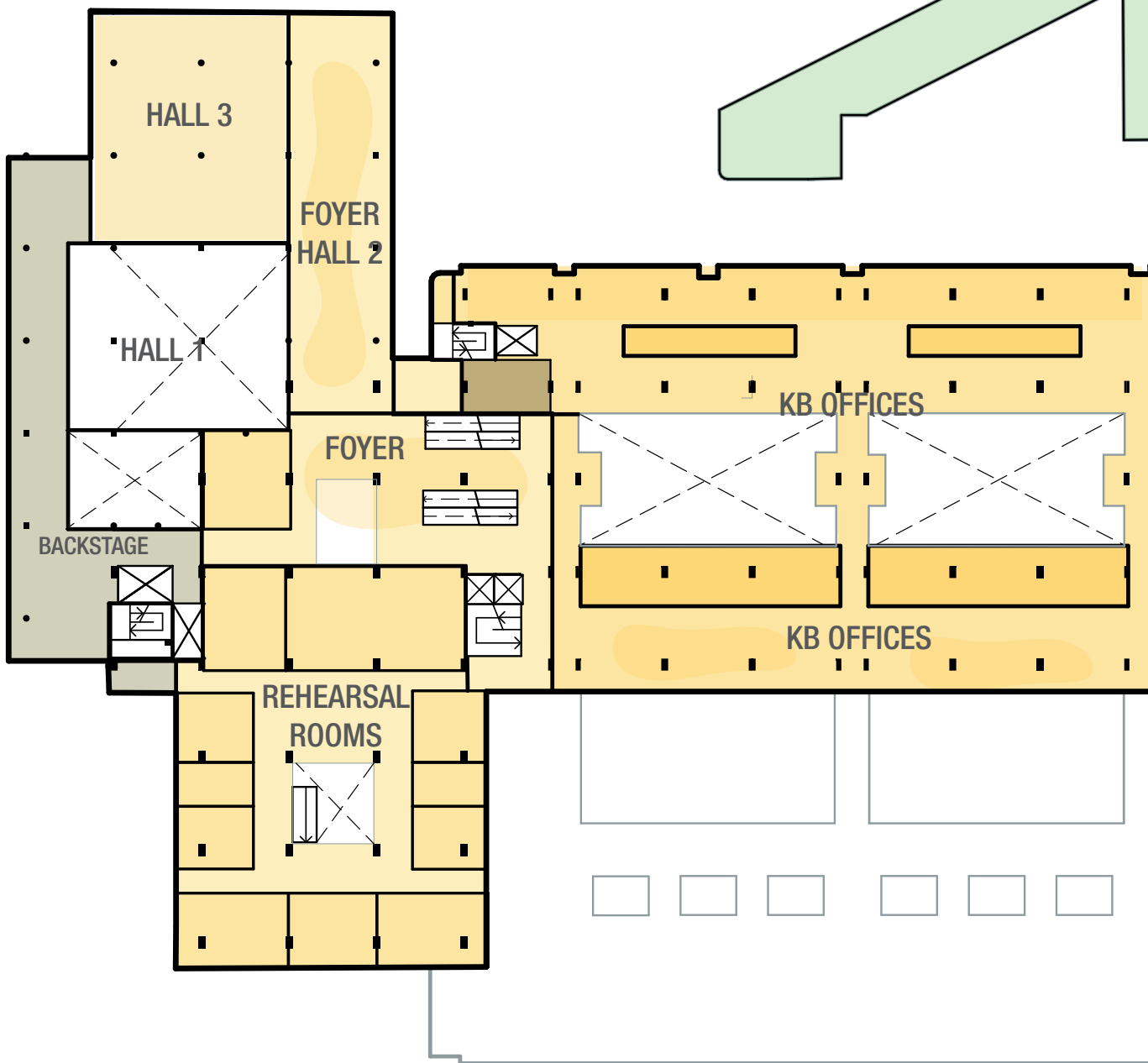


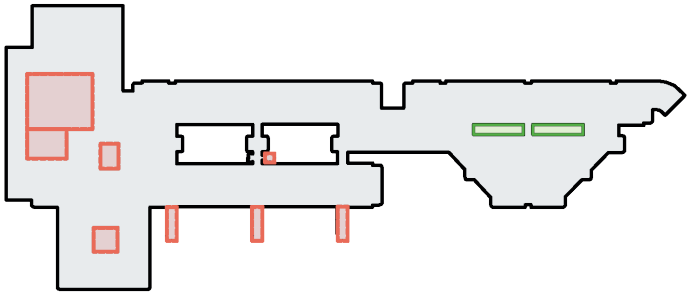
Existing Floorplan with Demolition Indicated



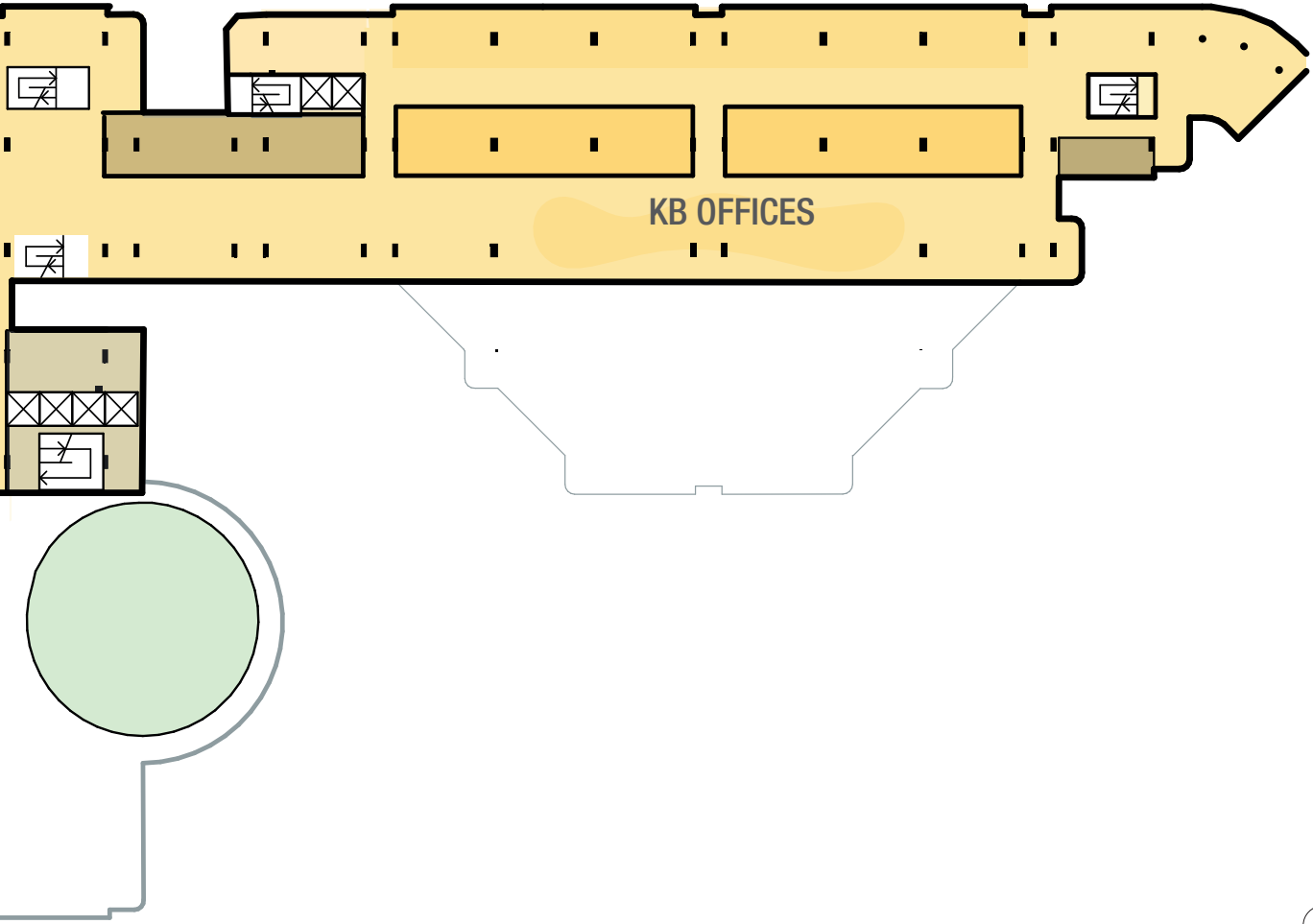
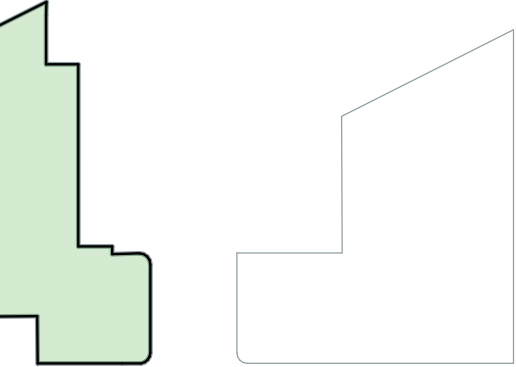

Floorplan | Level +4

new situation | 1:500



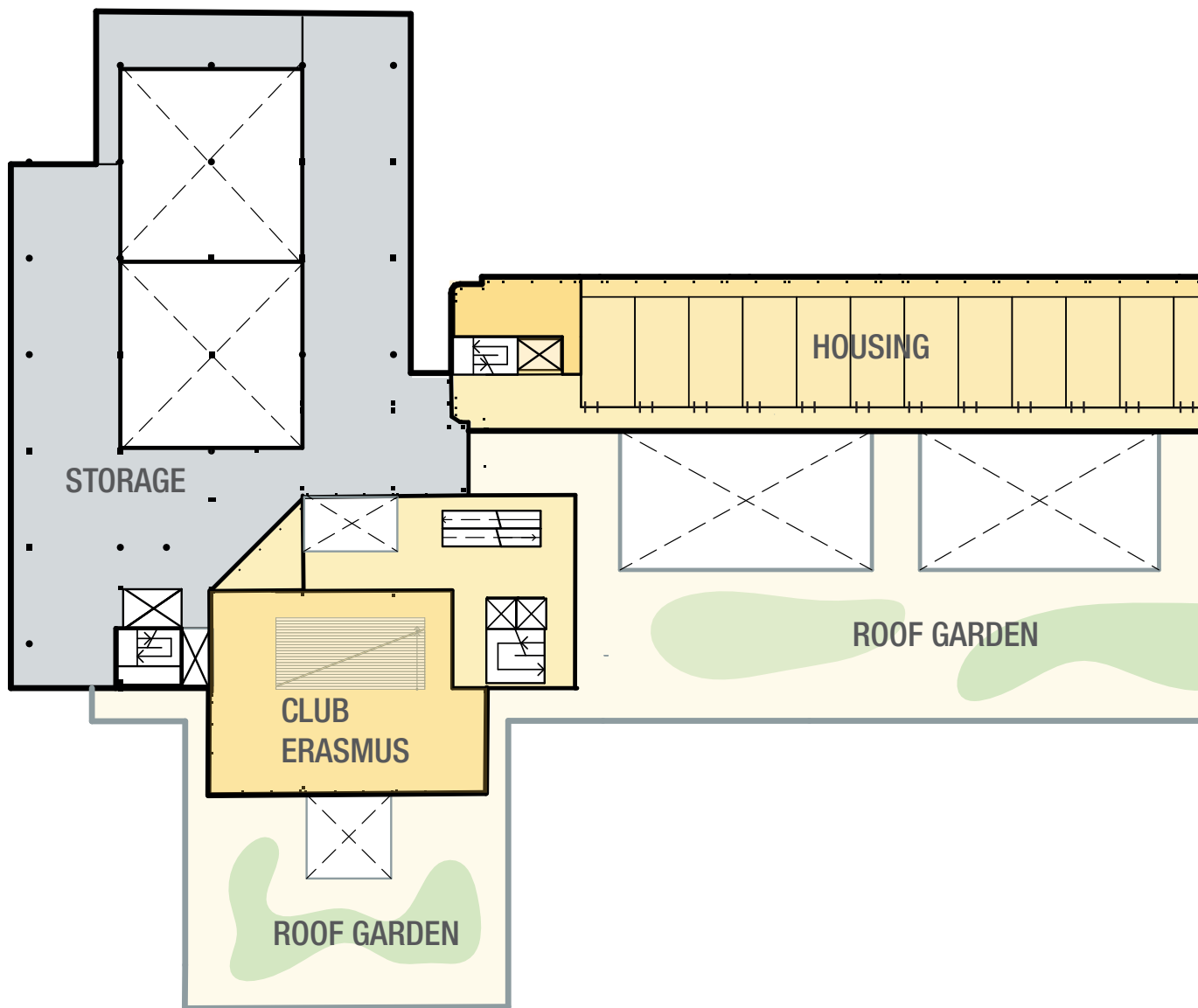


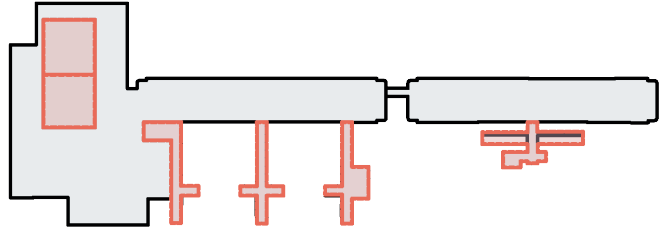
Existing Floorplan with Demolition Indicated



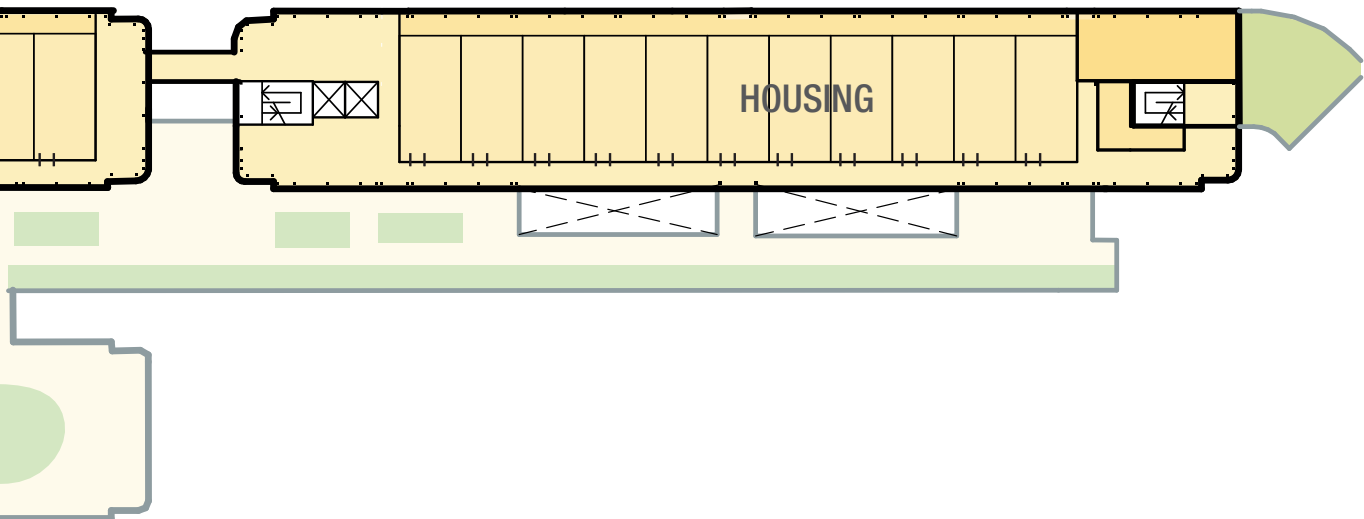
Floorplan | Level +5

new situation | 1:500

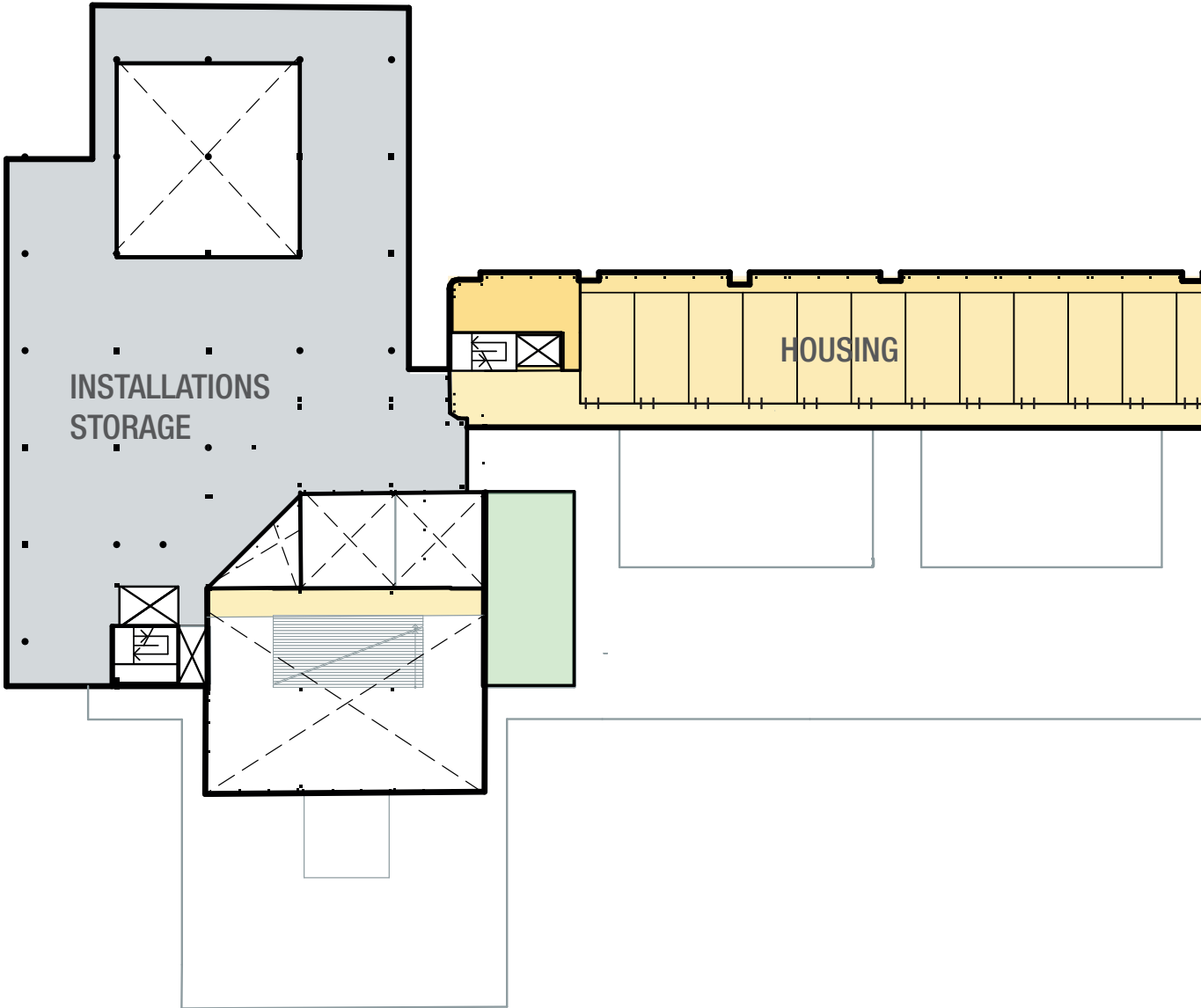


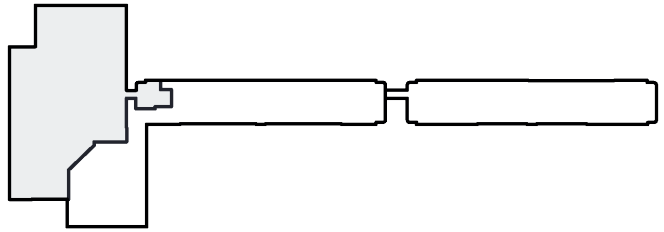


Existing Floorplan with Demolition Indicated

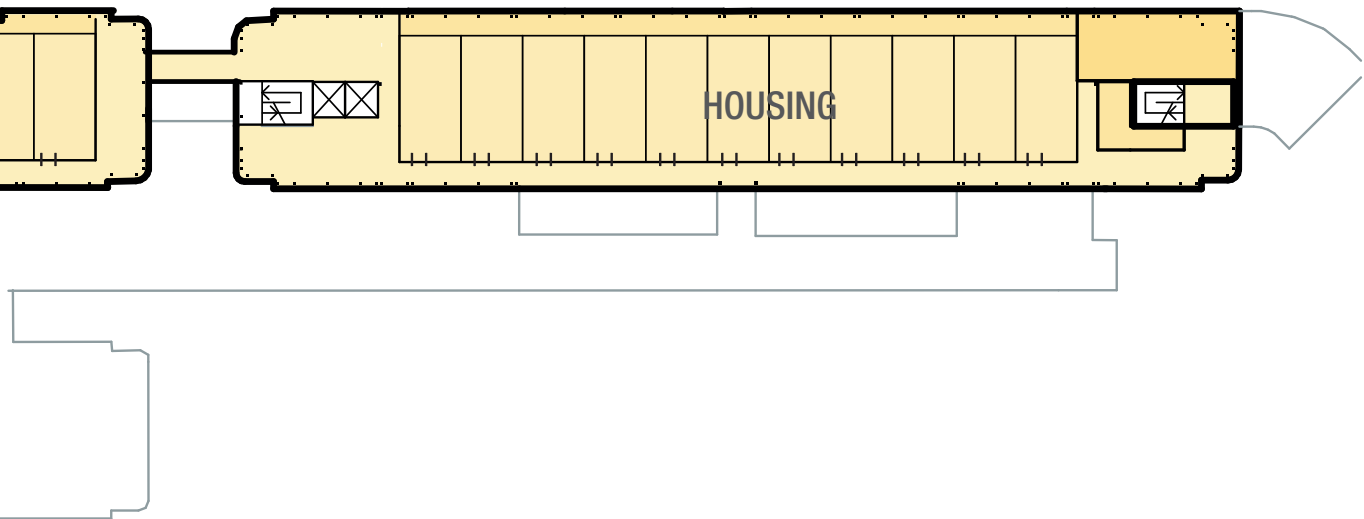


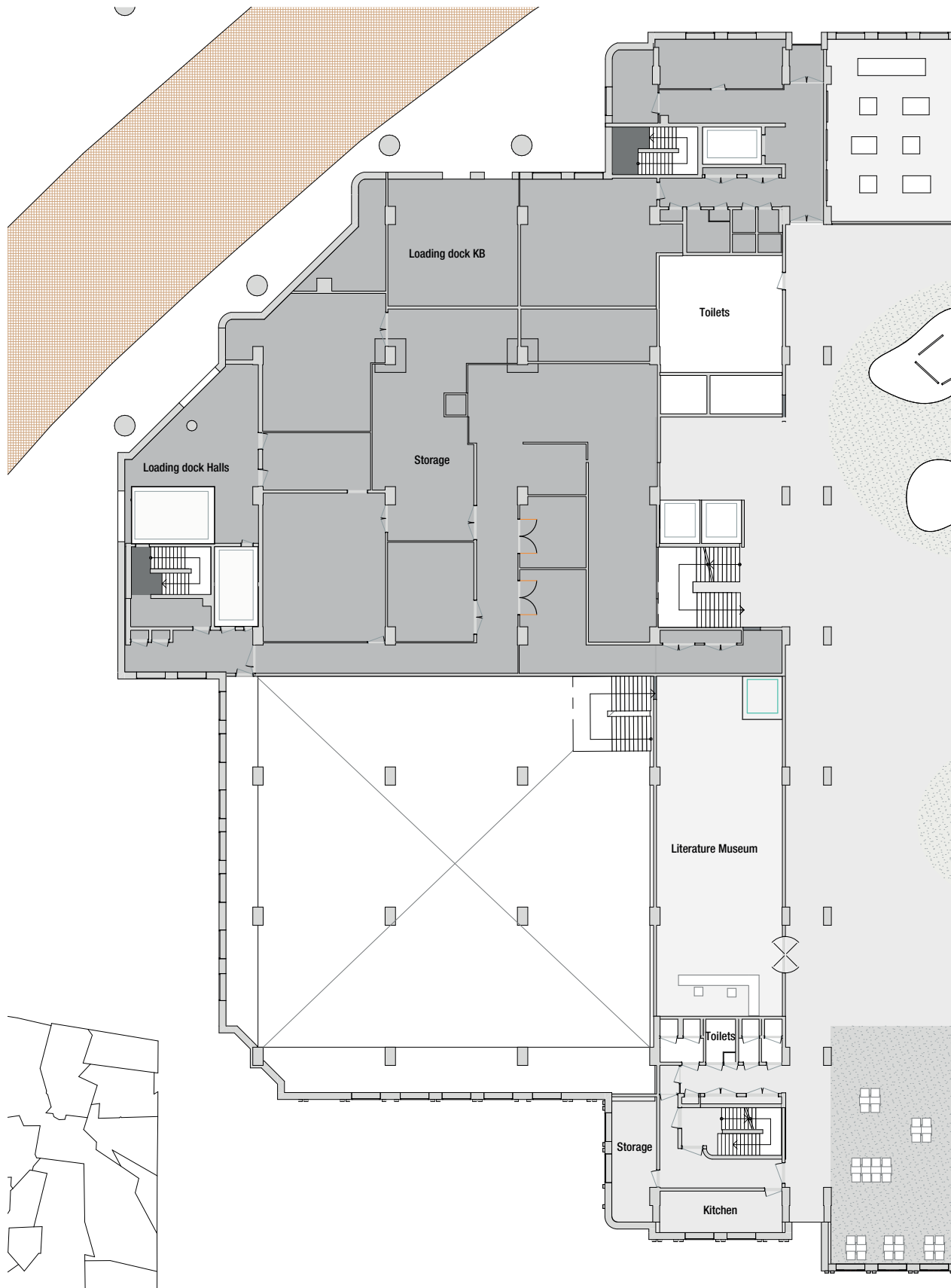

Floorplan | Level +6
new situation | 1:500



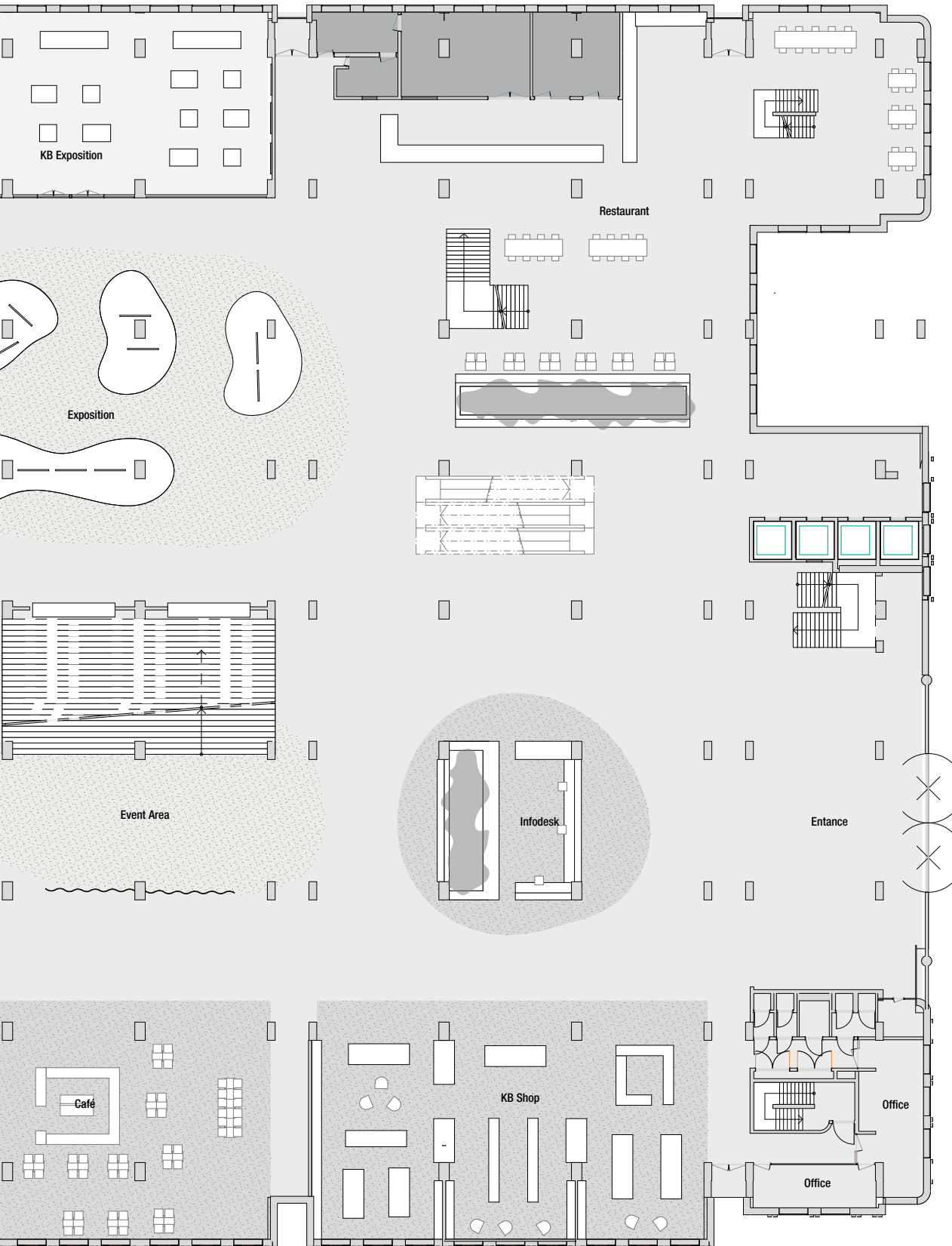


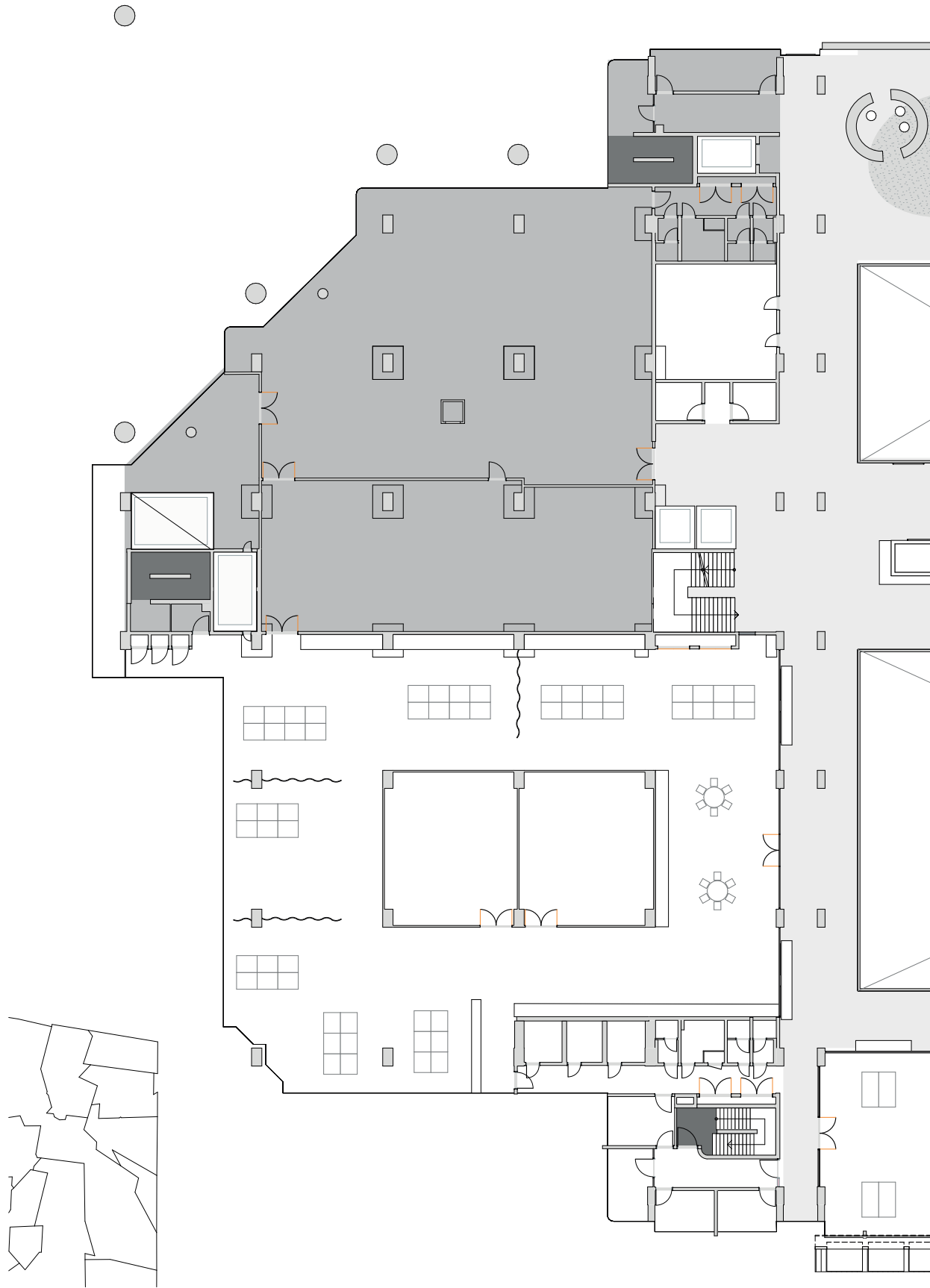
Existing Floorplan with Demolition Indicated



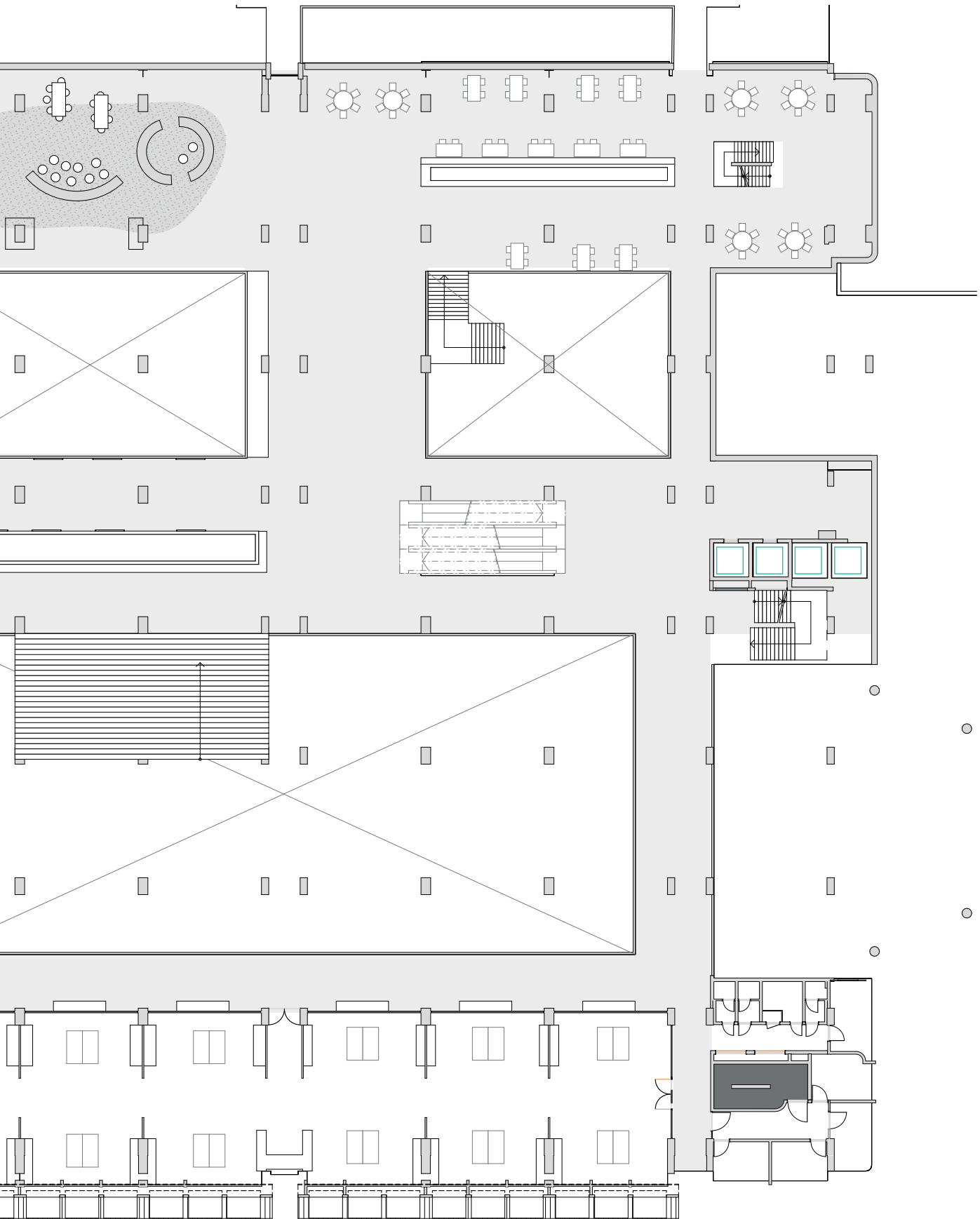


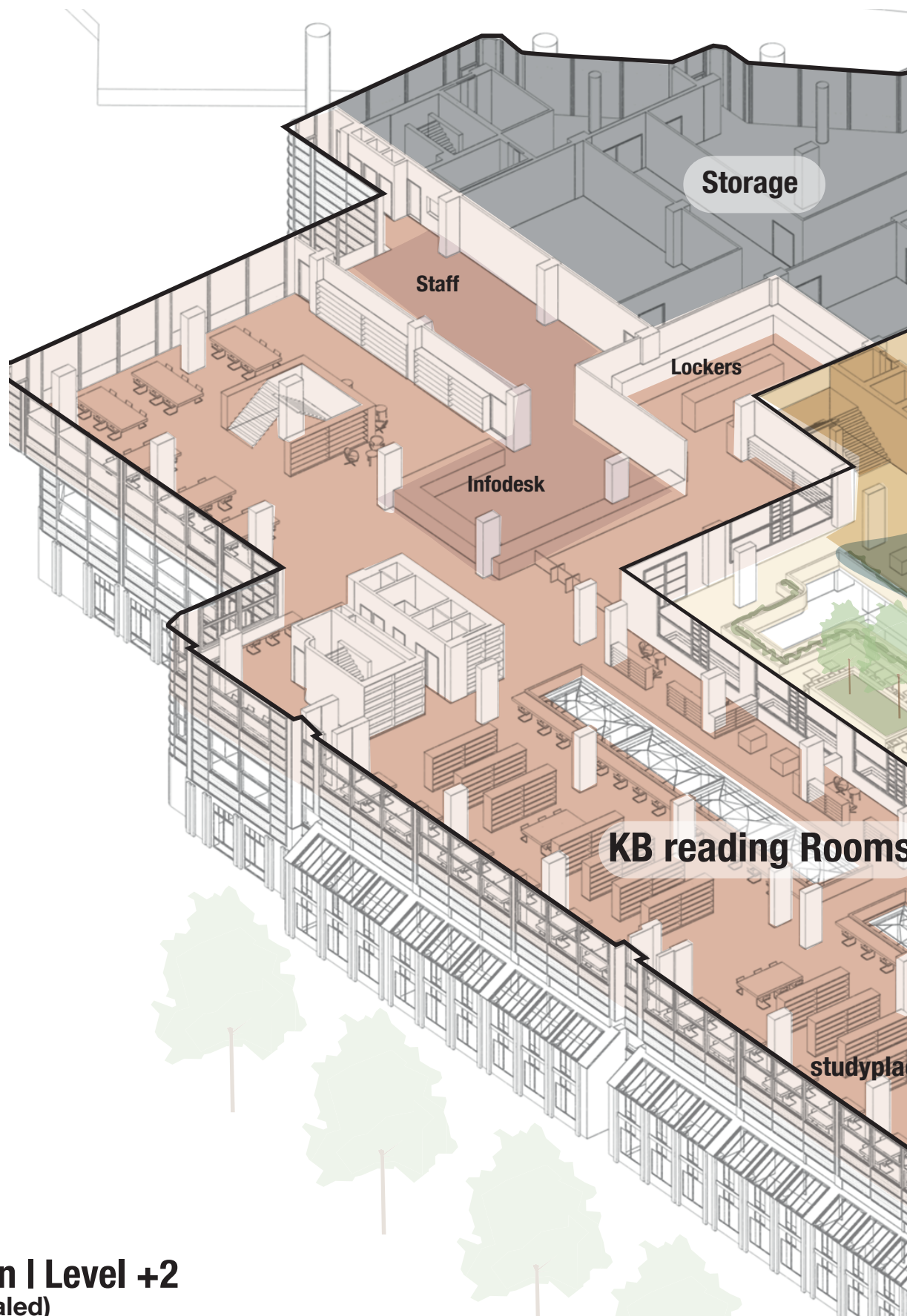
Floorplan | Level 0
1:100 (scaled)



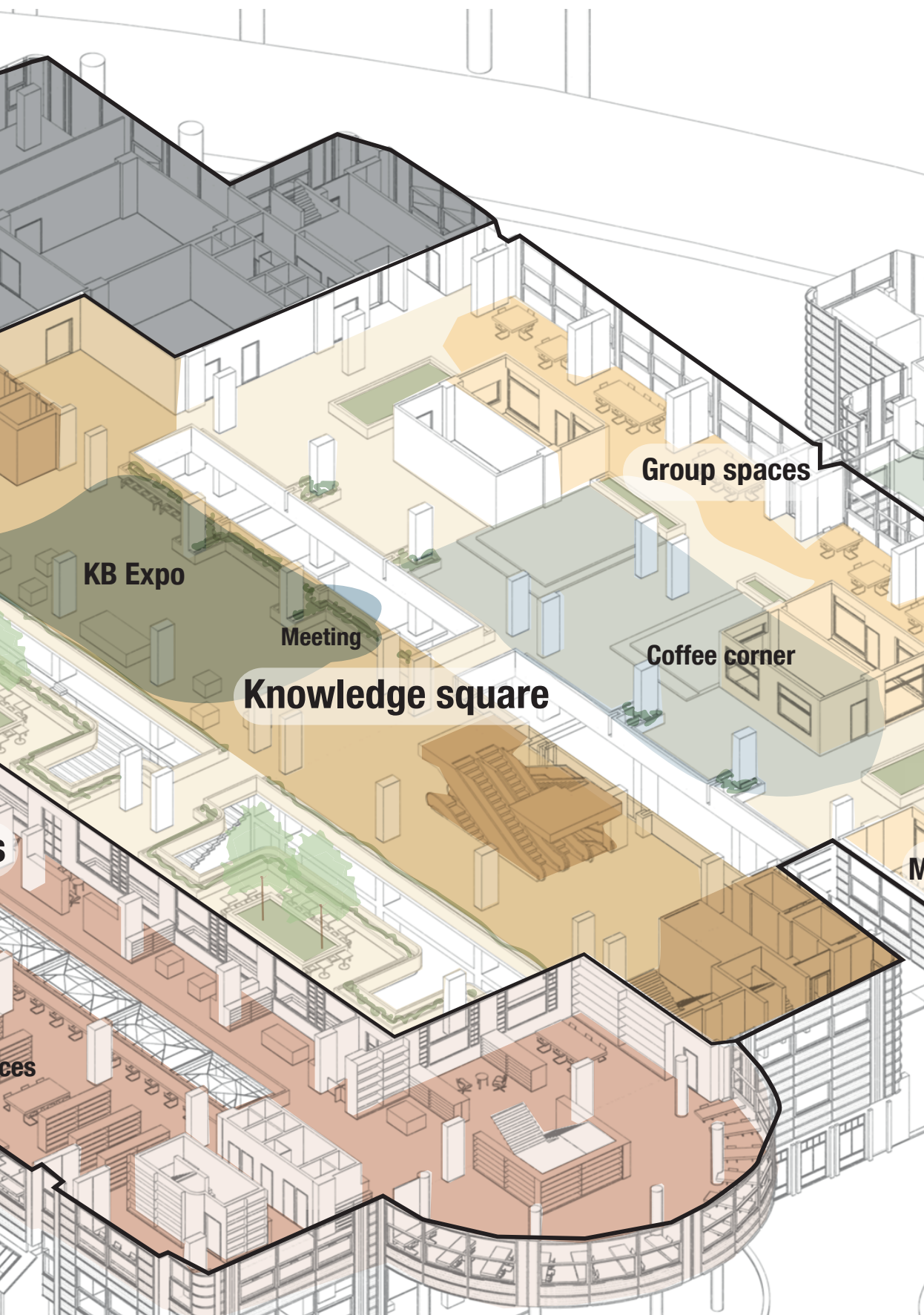


Floorplan | Level +1
1:100 (scaled)





Floorplan | Level +2
1:100 (scaled)



KB Expo

Meeting

Knowledge square

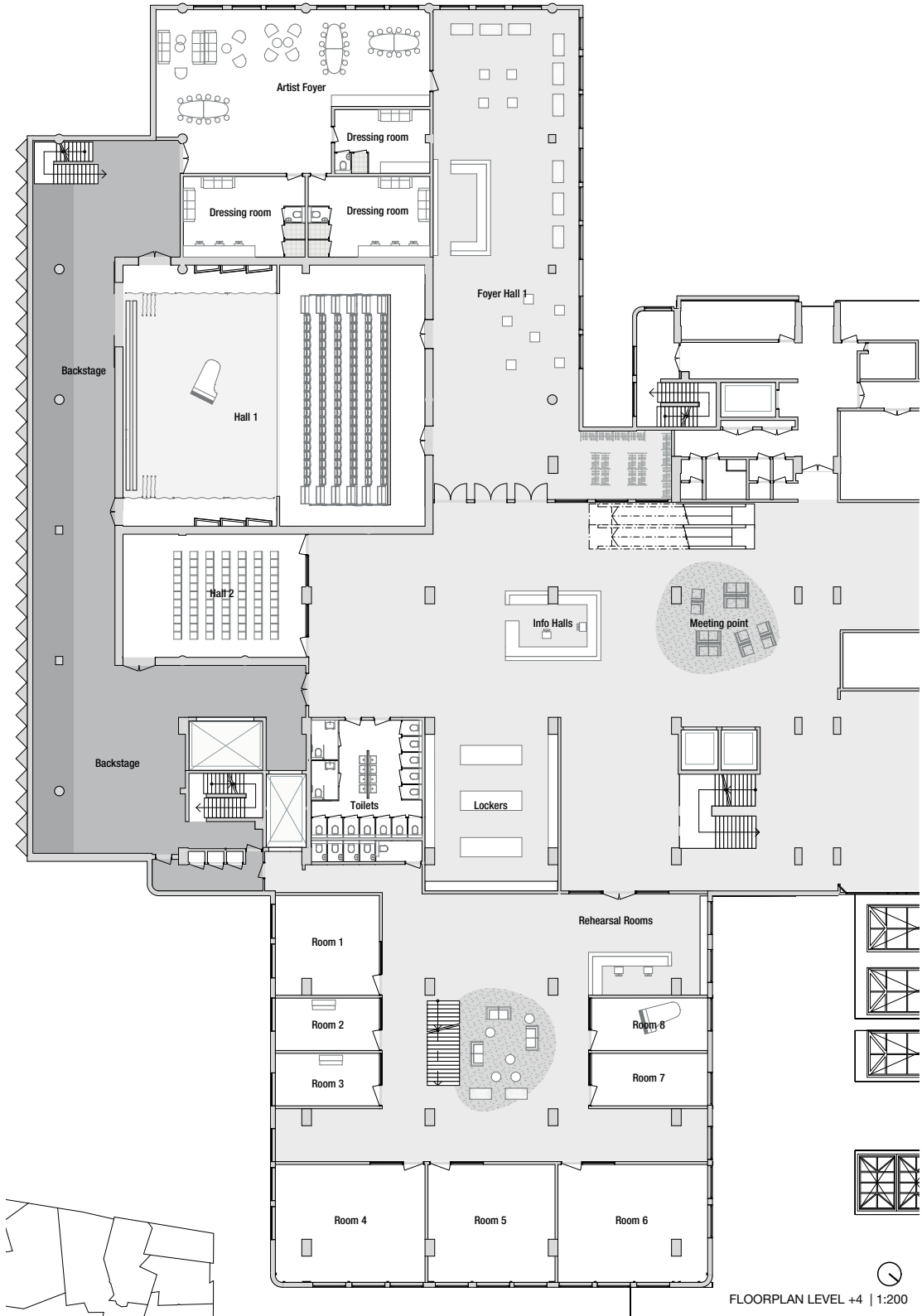
Group spaces

Coffee corner

ces

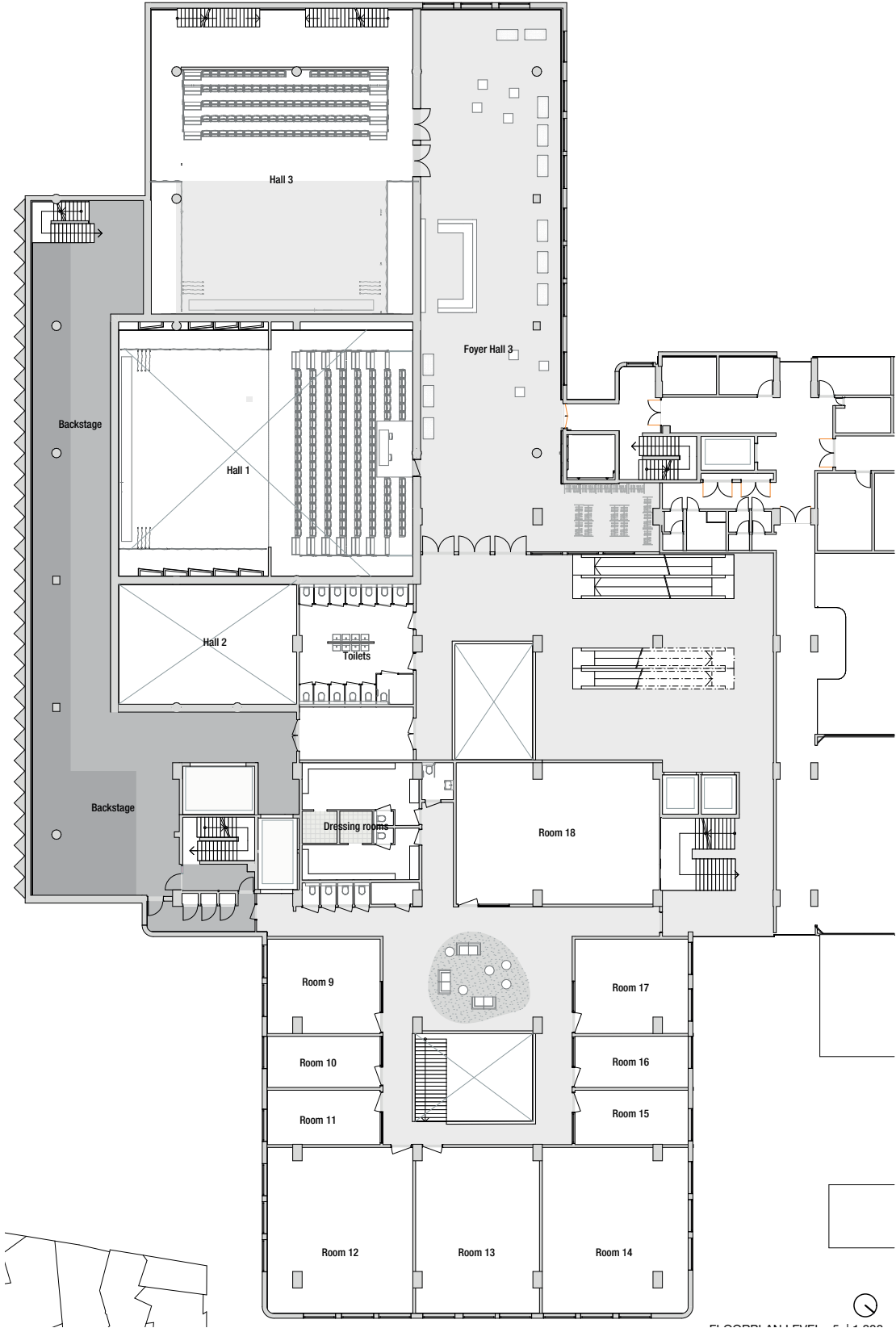
M

Floorplan | Level +4



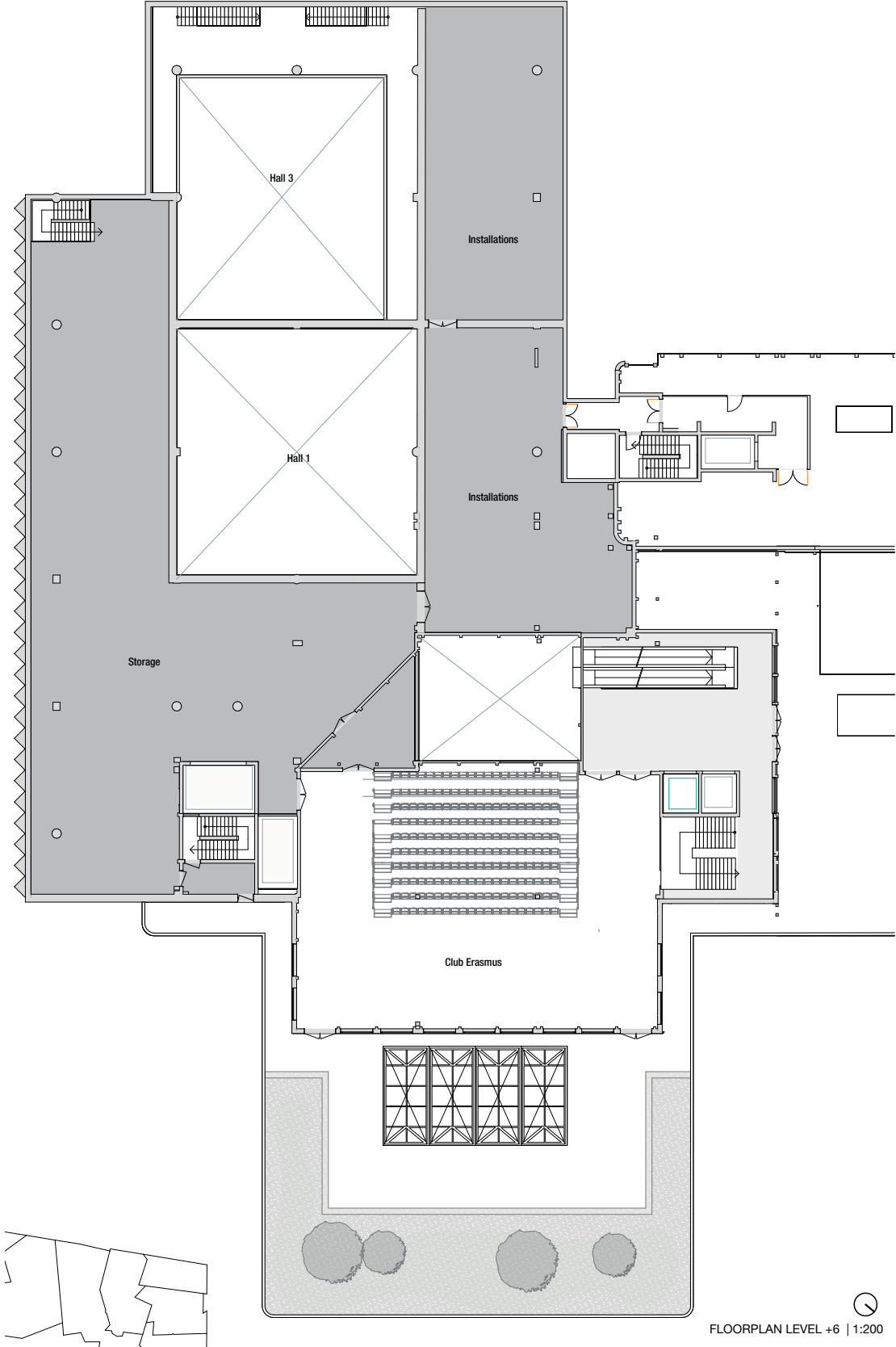
1:100 (scaled)

Floorplan | Level +5



1:100 (scaled)

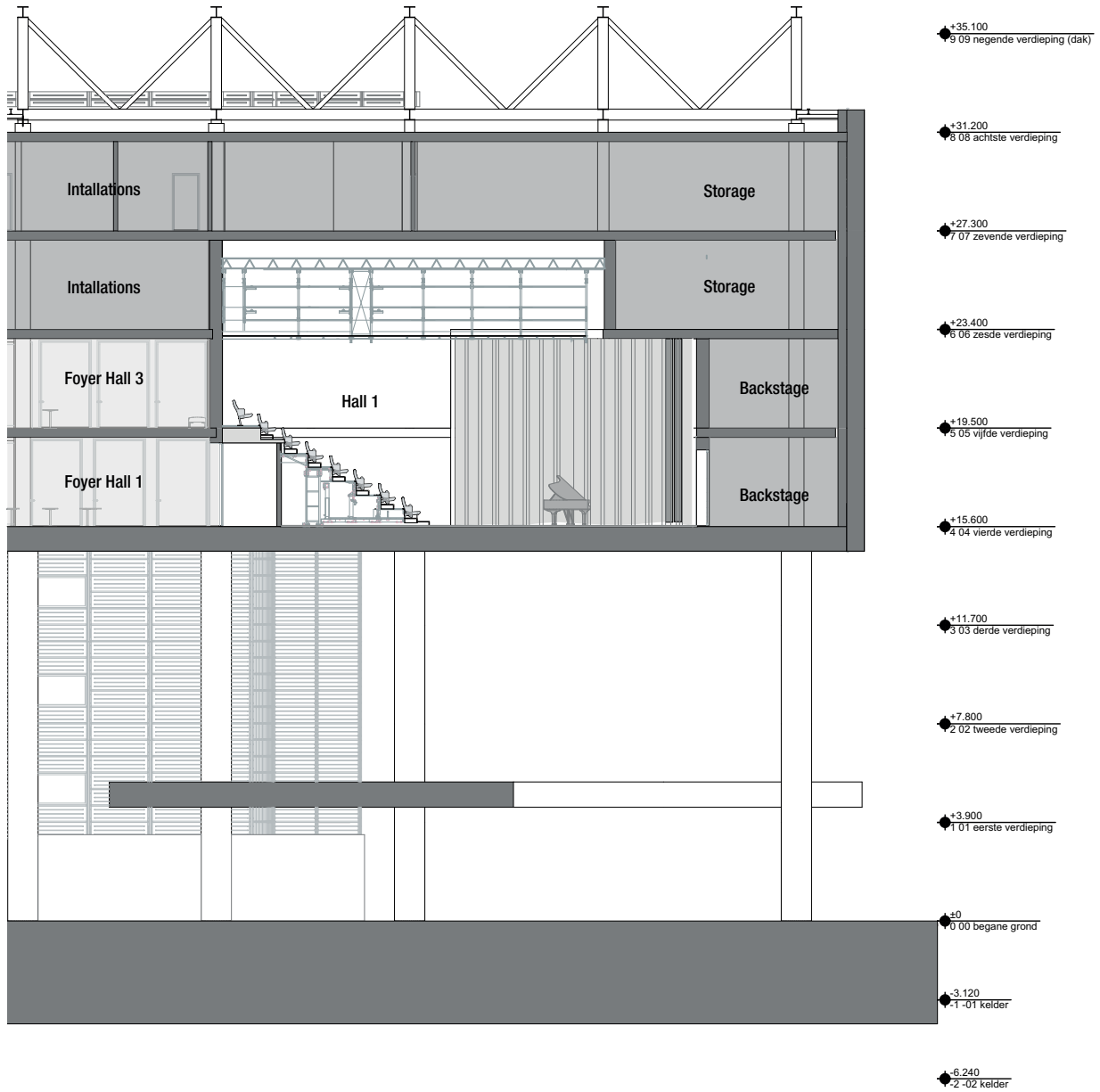
Floorplan | Level +6



FLOORPLAN LEVEL +6 | 1:200

1:100 (scaled)

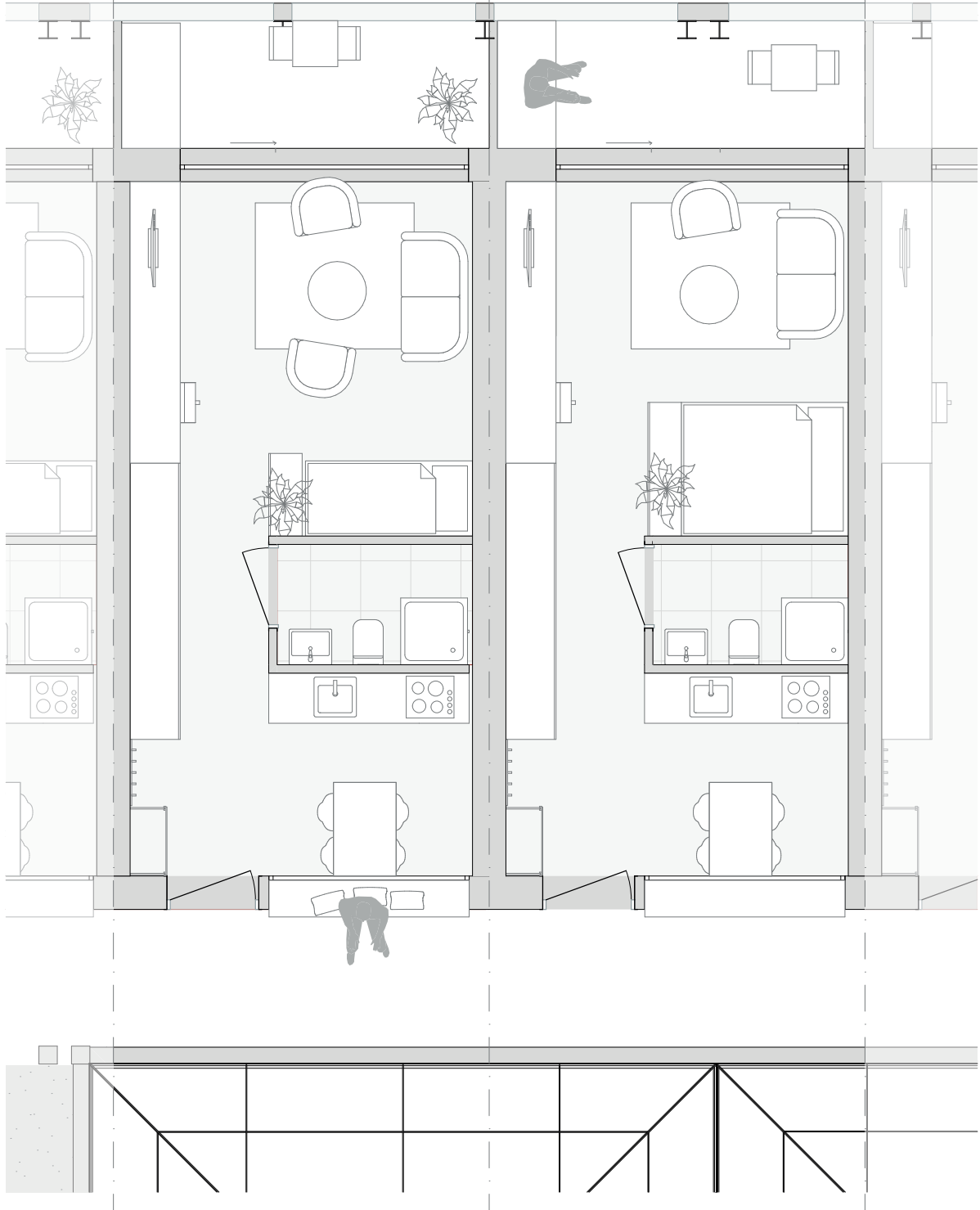
Section I Multifunctional Hall



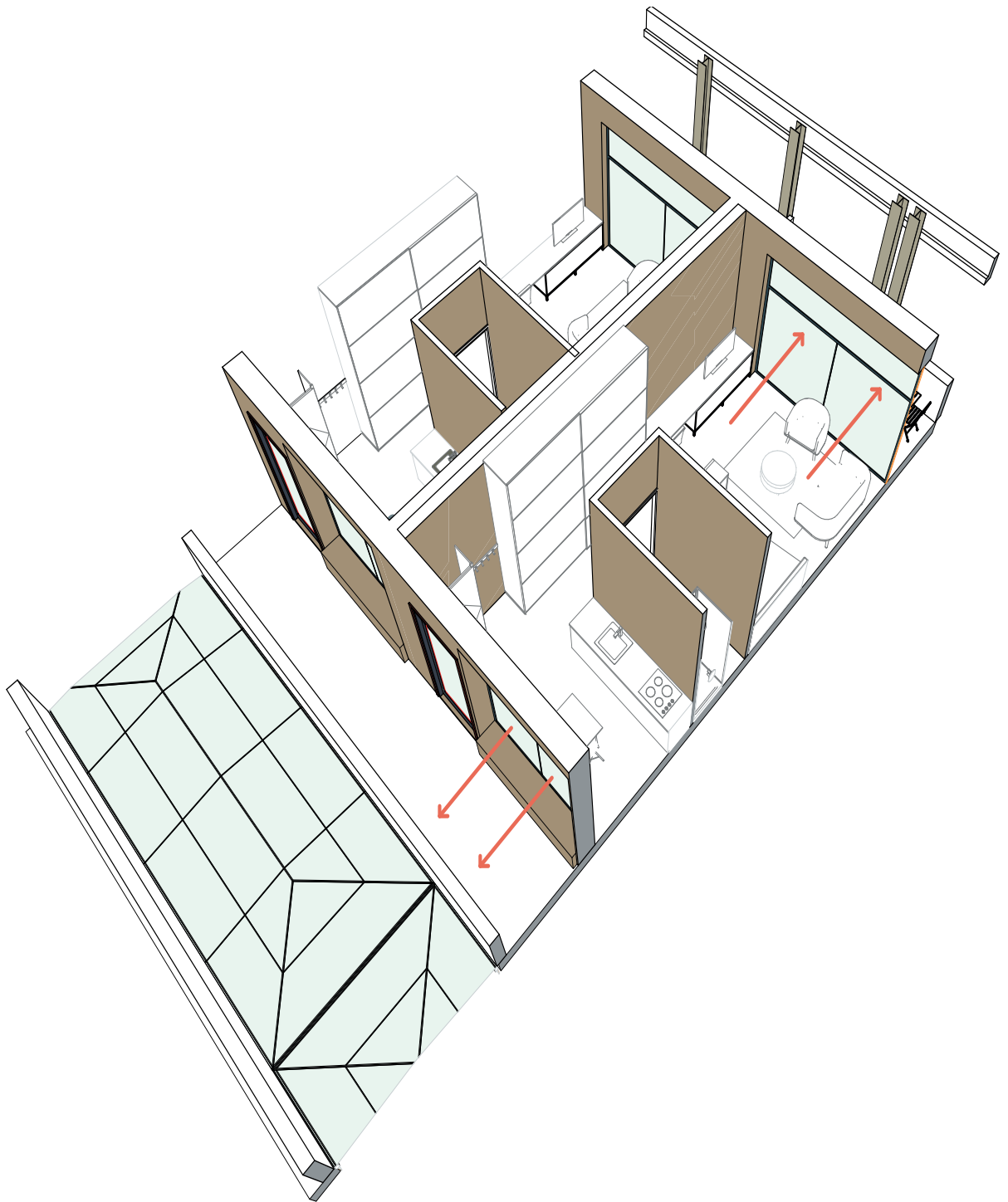
1:200 (scaled)

Floorplan option
Single bed

Floorplan option
Double bed

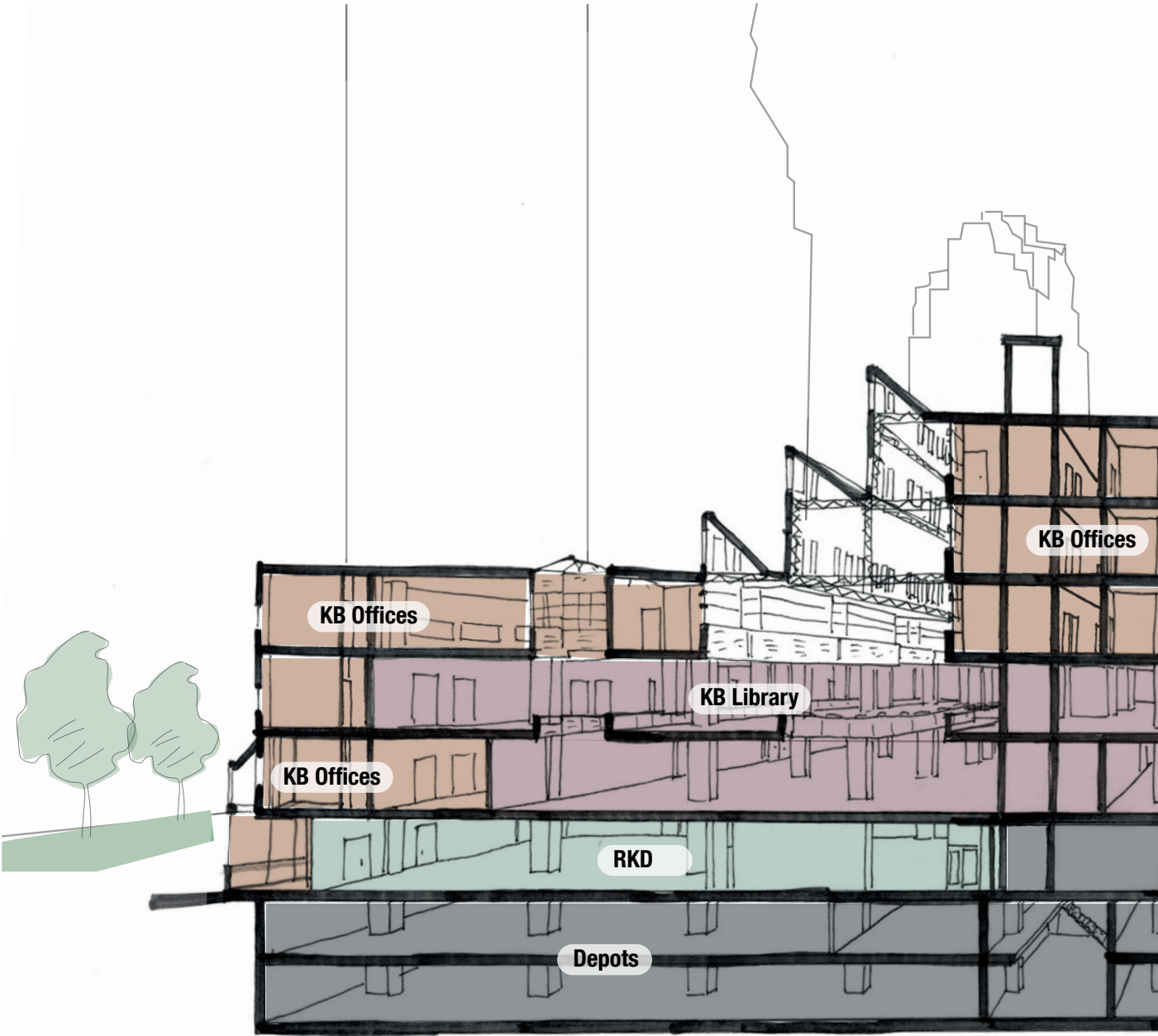


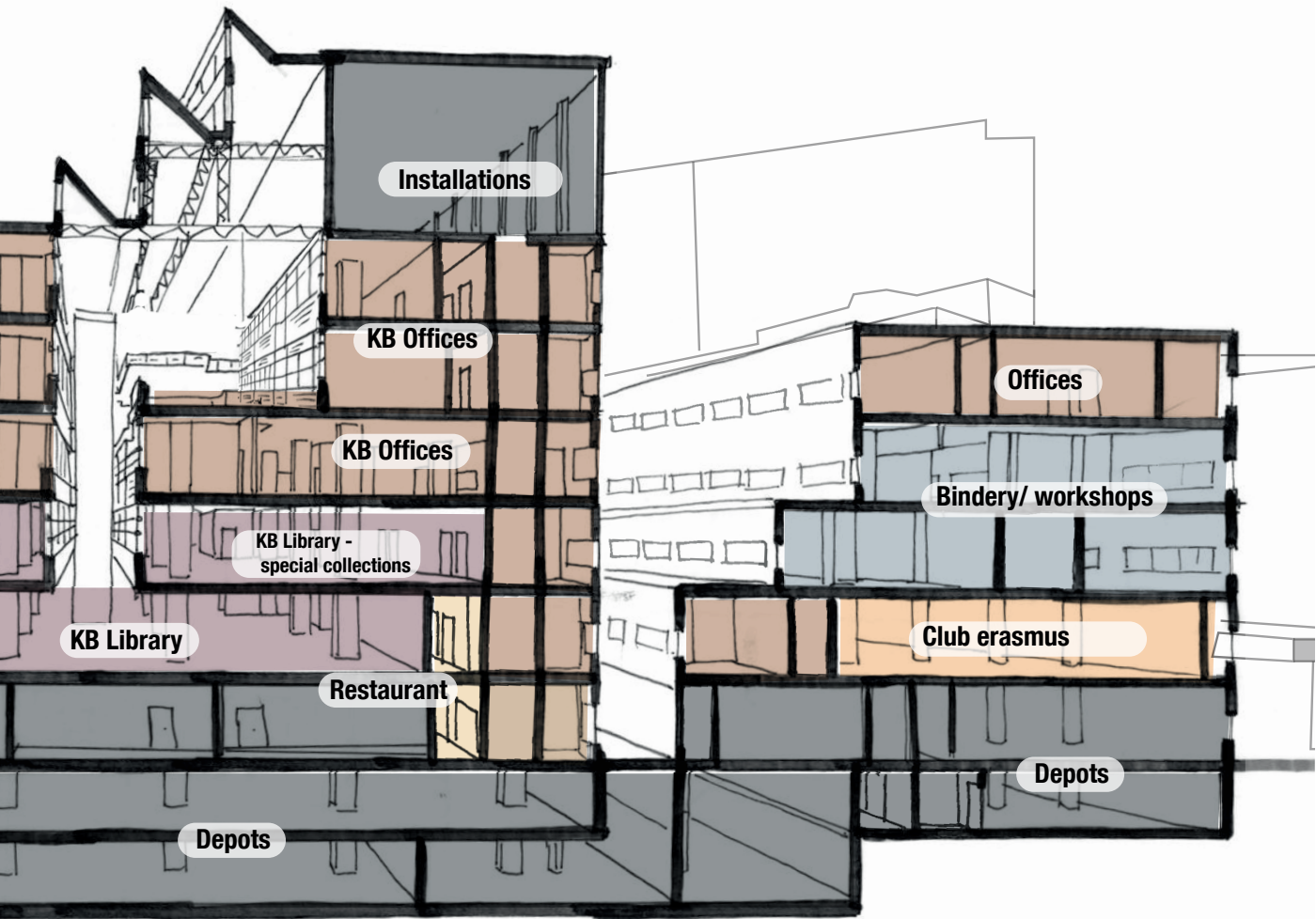
Floorplan I Housing
1:50 (scaled)



3d Axo | Housing
1:50 (scaled)

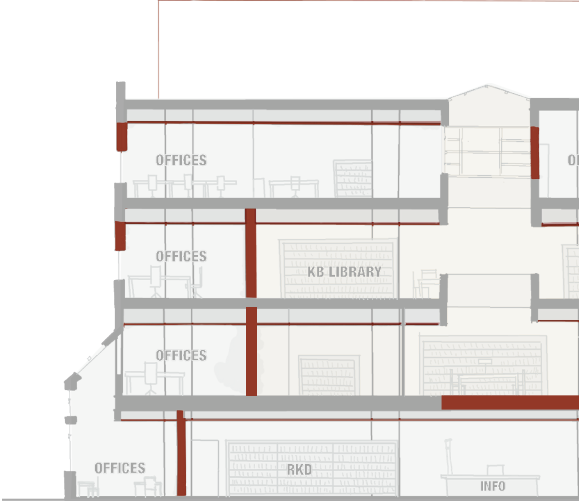
Section I Existing Situation



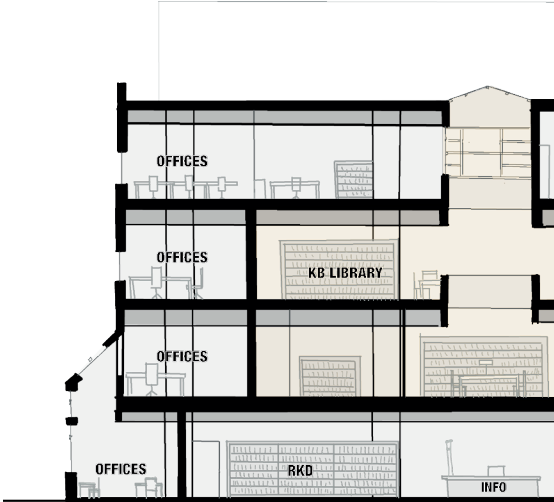


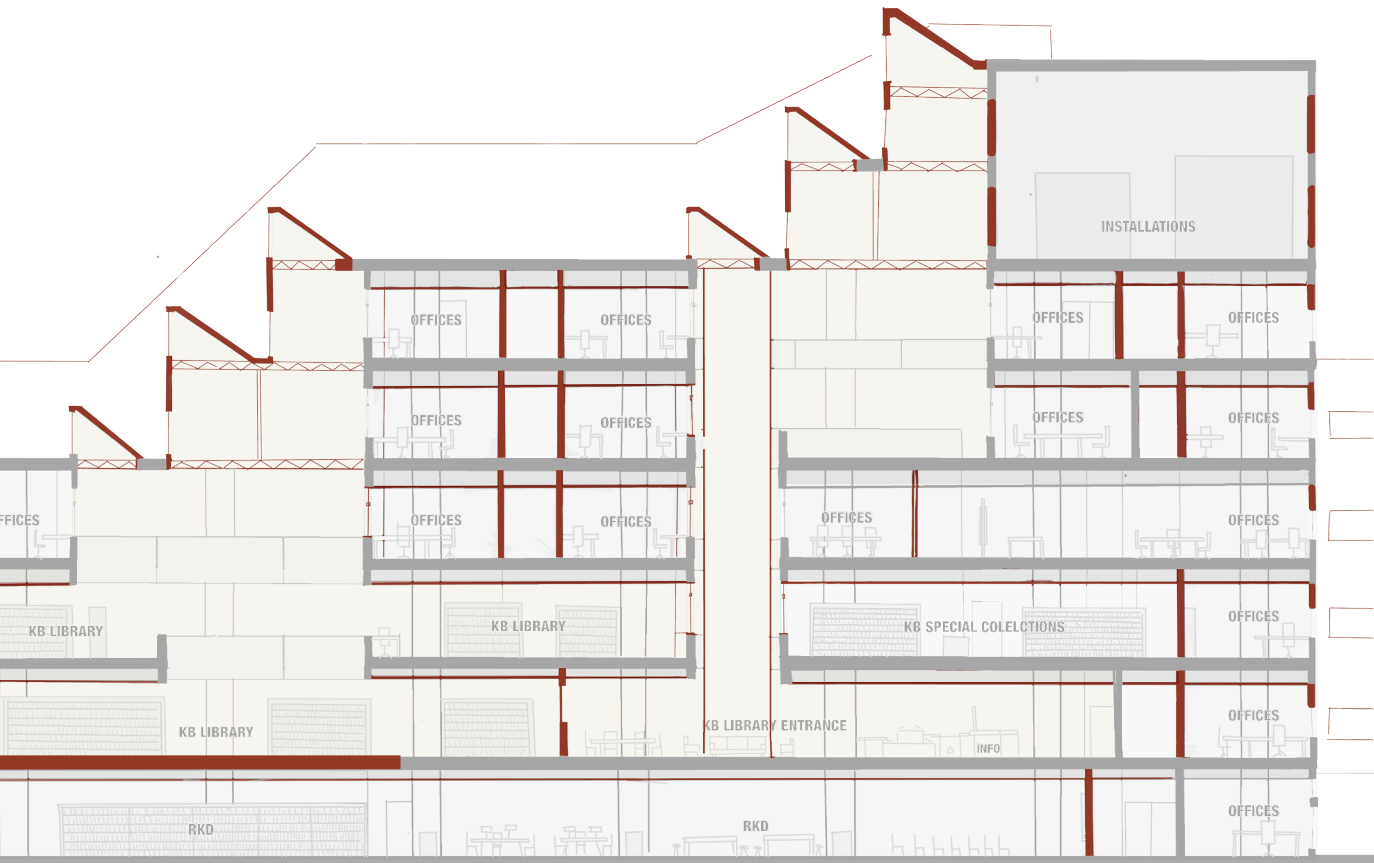
Section I KB Building

Section I Removed parts

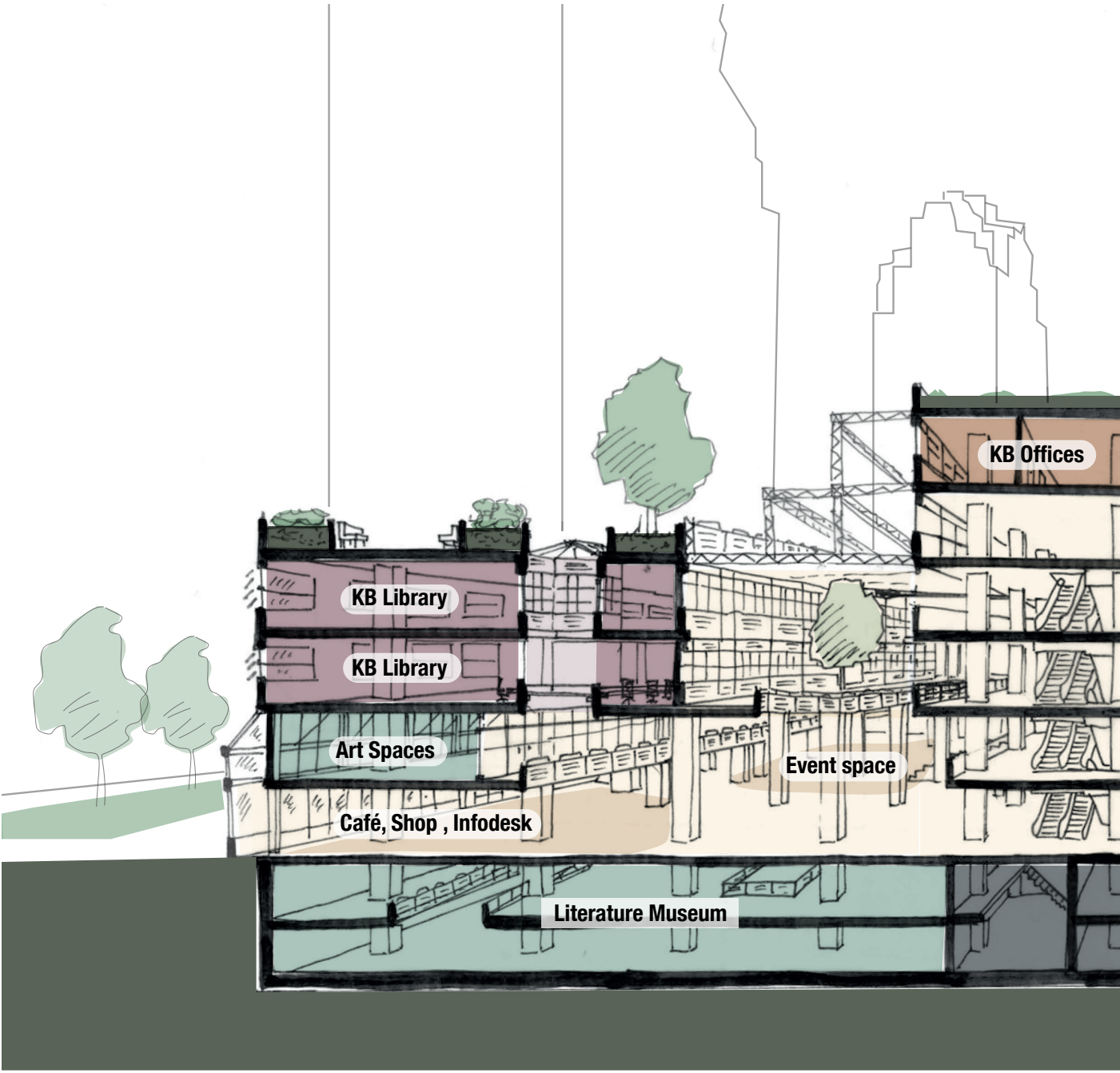


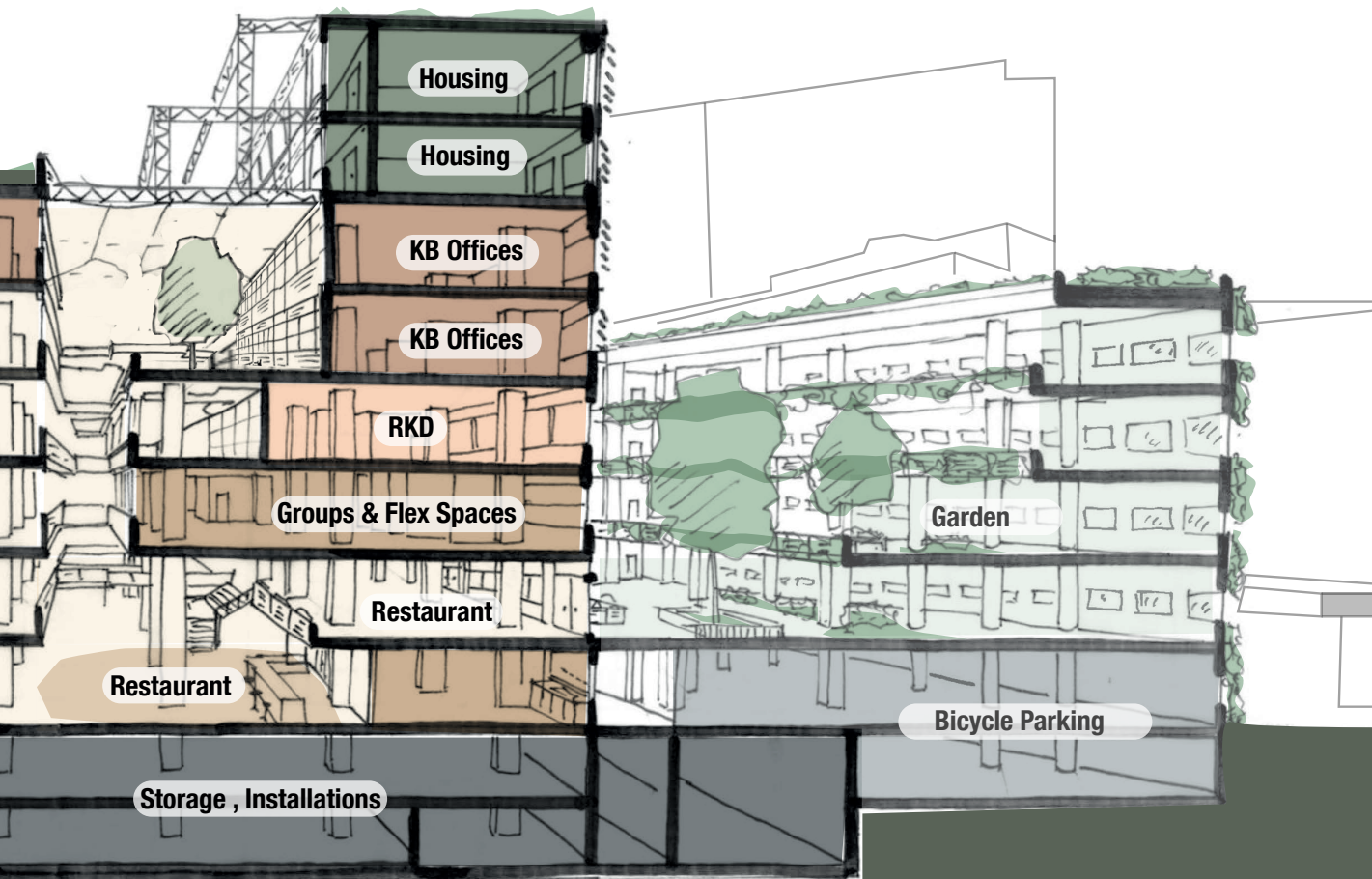
Section I Existing Situation

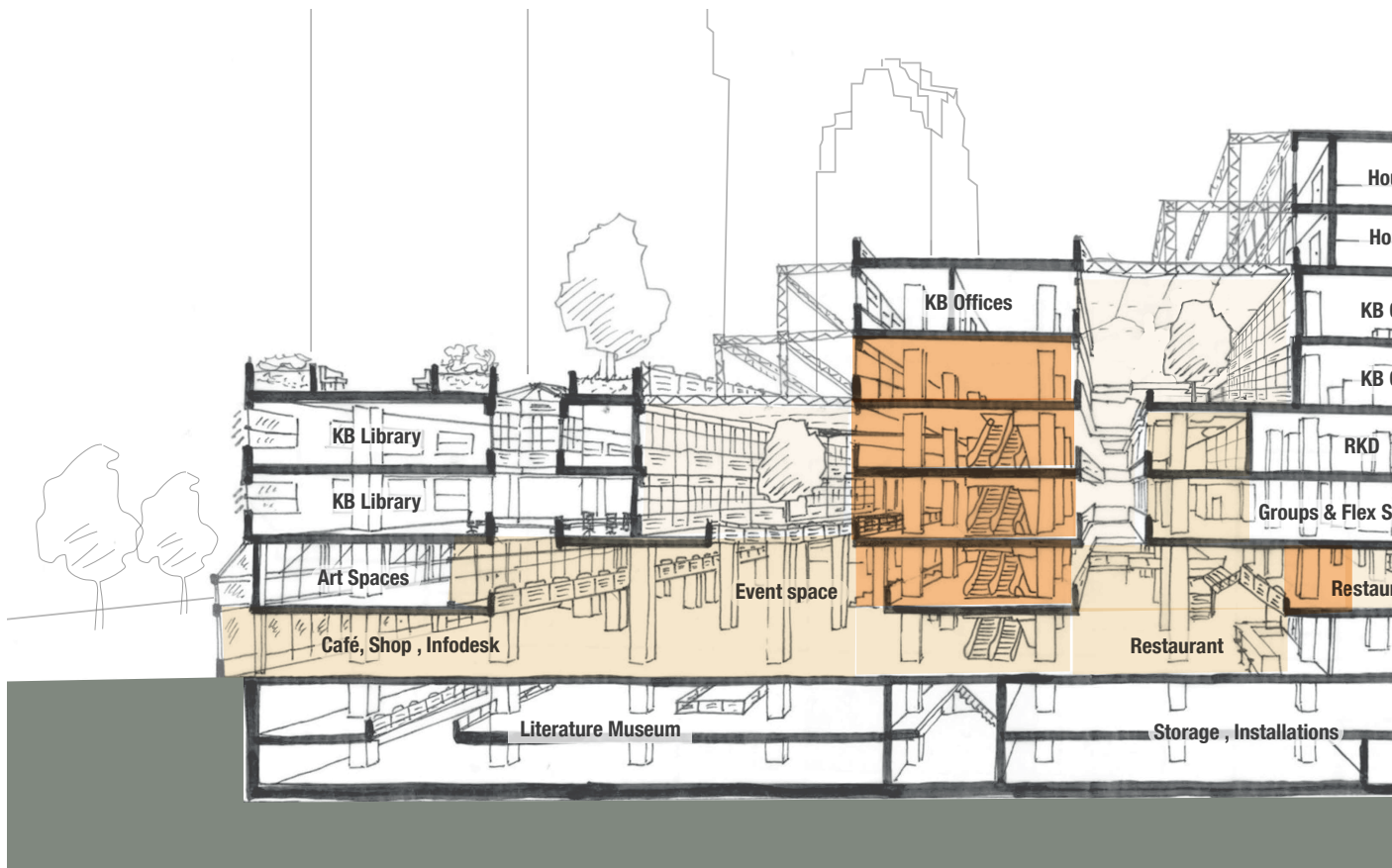
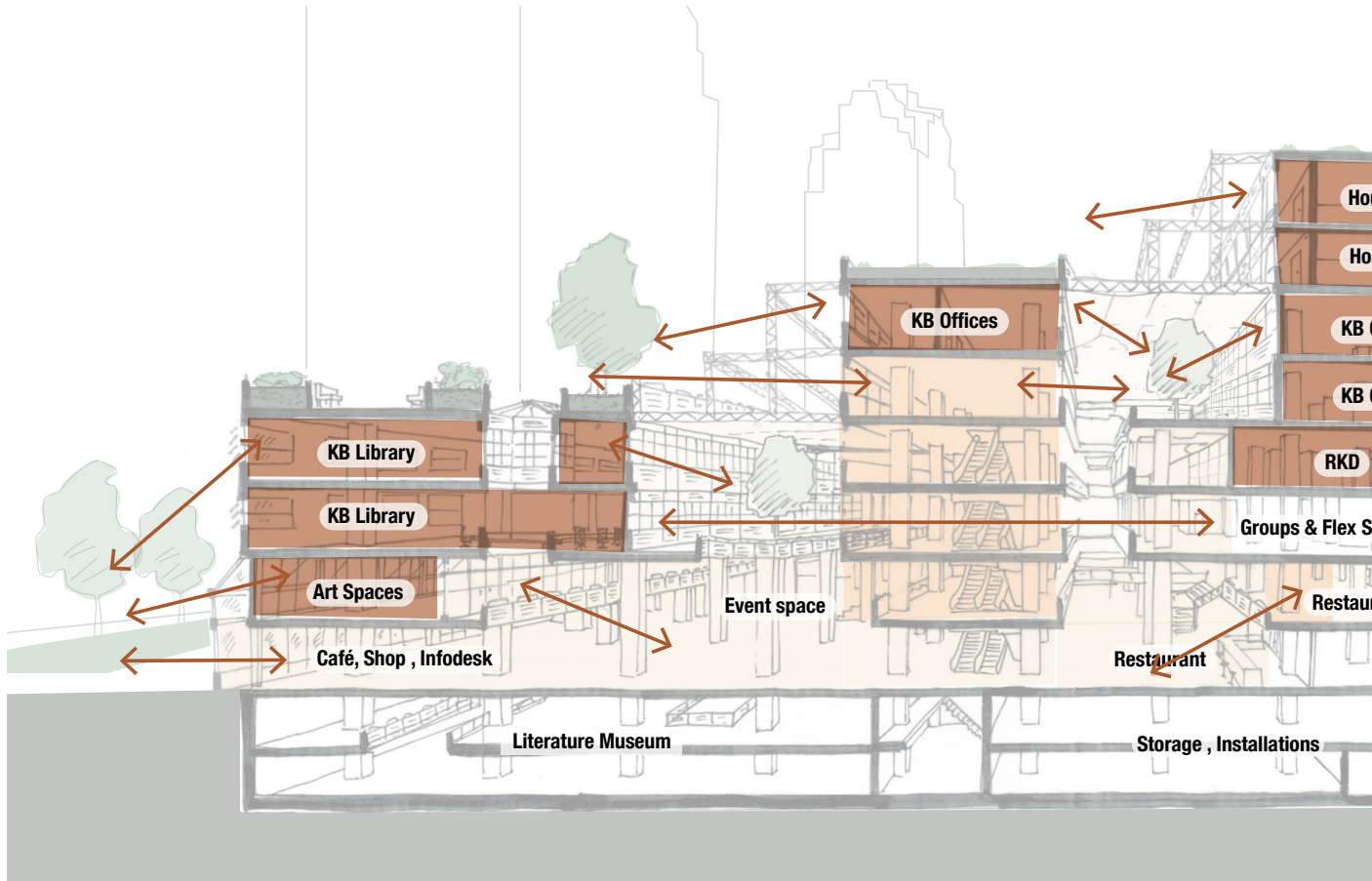


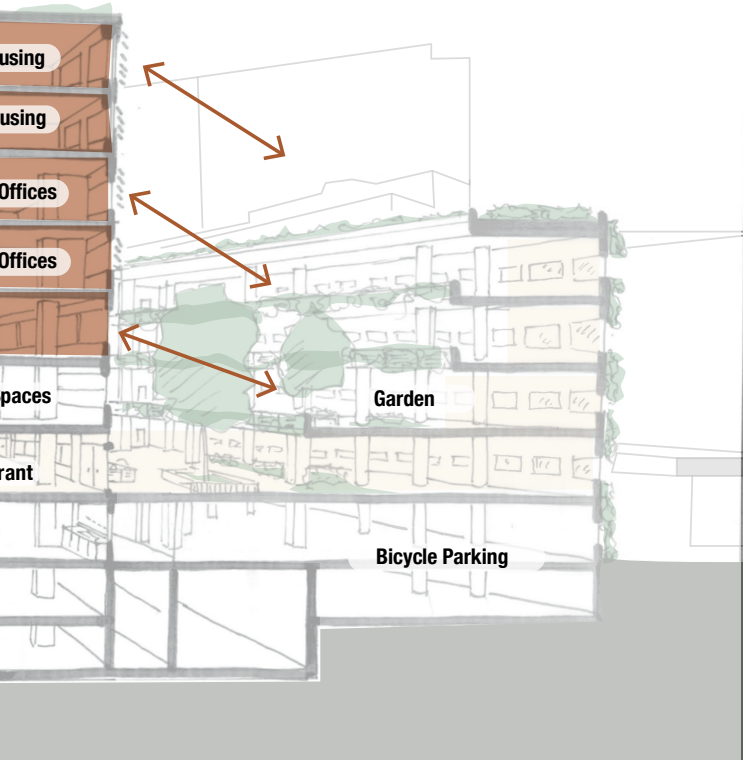


Section I New Situation





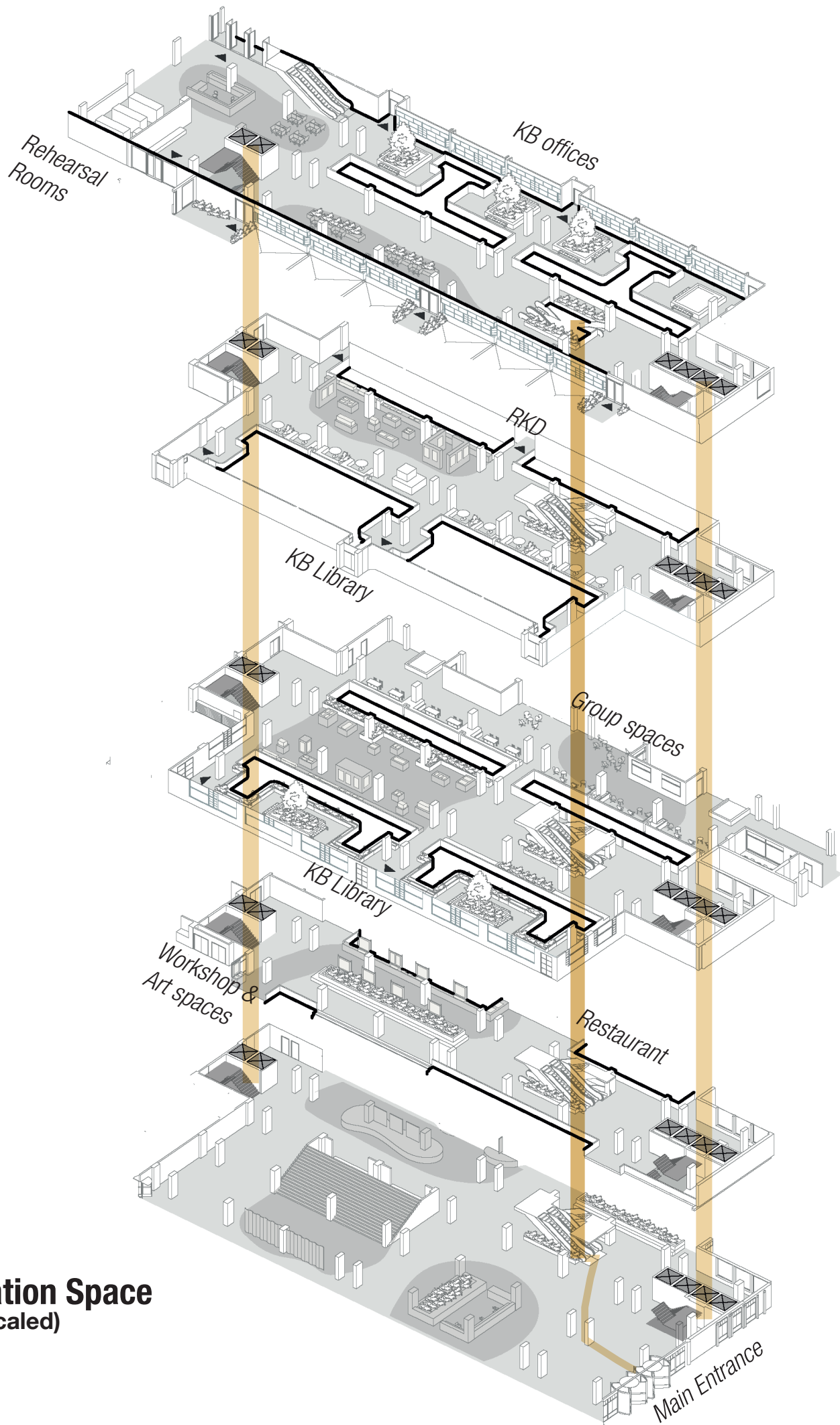




Section | Visual connections



Section | Circulation area



Circulation Space
1:100 (scaled)

Green Event Square

RKD Square

Knowledge Square

Art Square

Public Square



Building | Public Square



Building | Art Square



Building | Art Square



Building | Entrance KB Library



Building | KB Library



Building | KB Library



Building | Knowledge Square KB expo



Building | Rehearsal rooms



Building | Multifunctional Halls

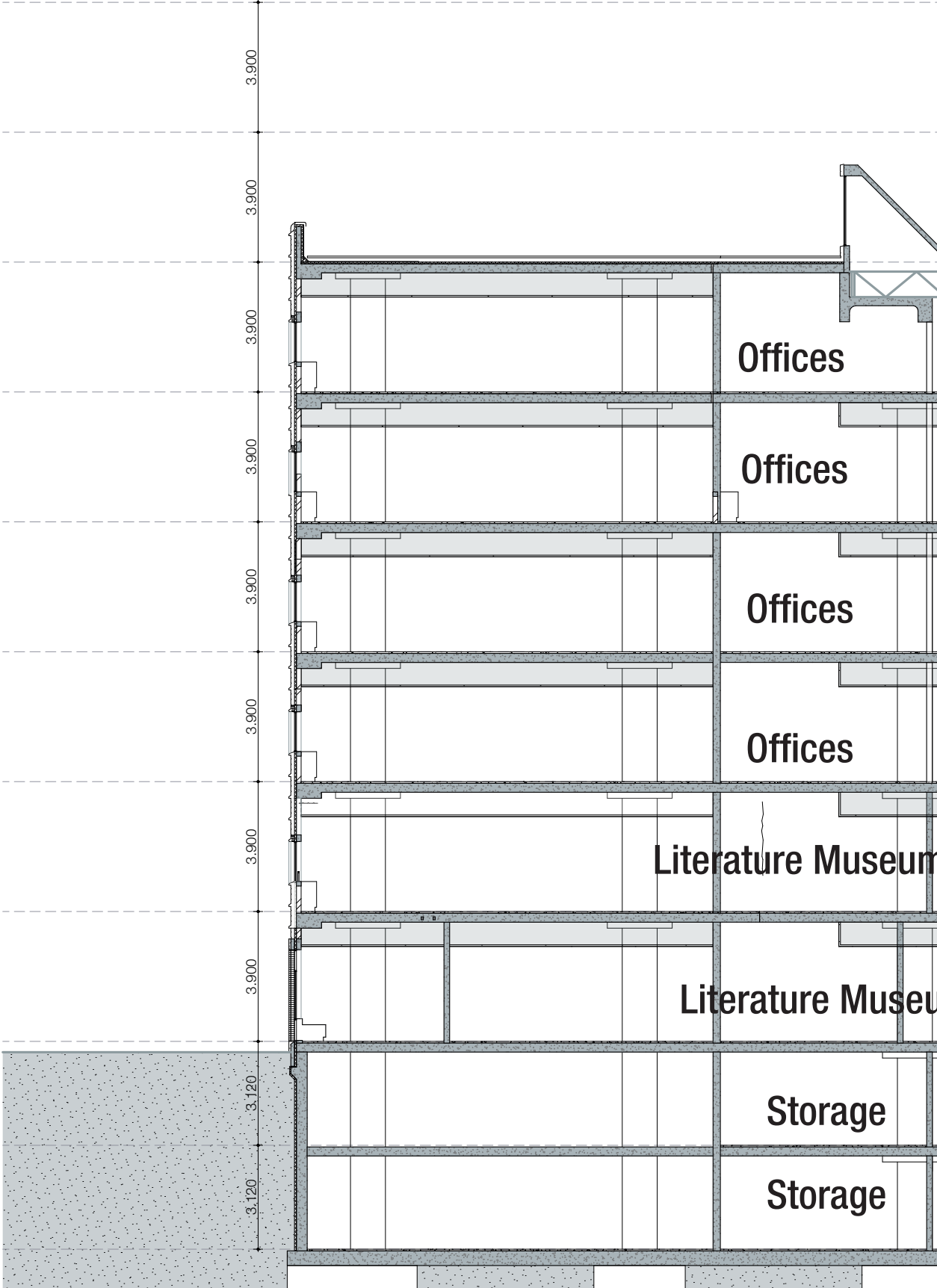


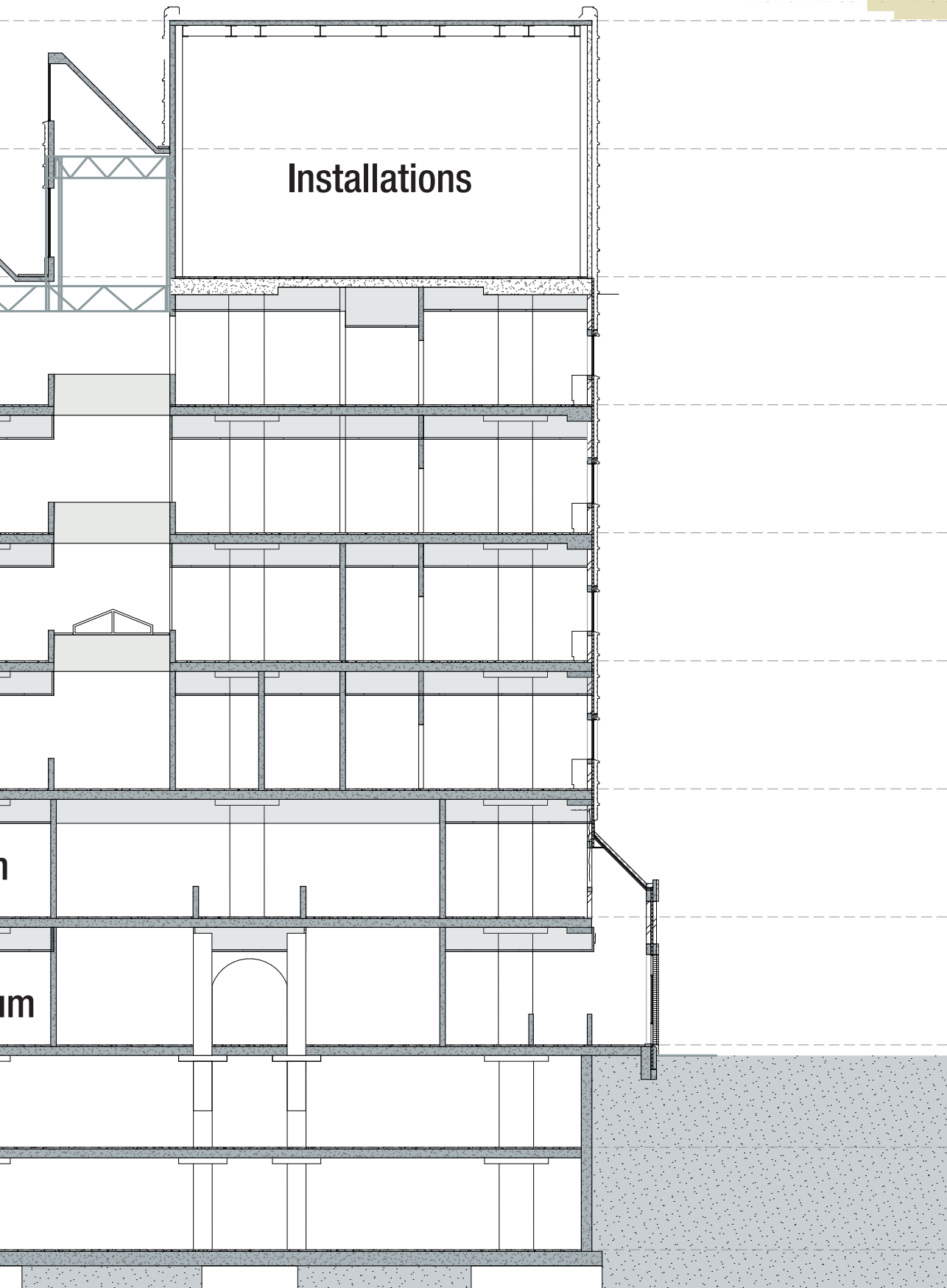
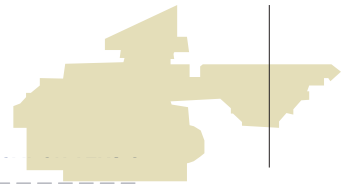
Building | Multifunctional Halls



Building | Multifunctional Halls

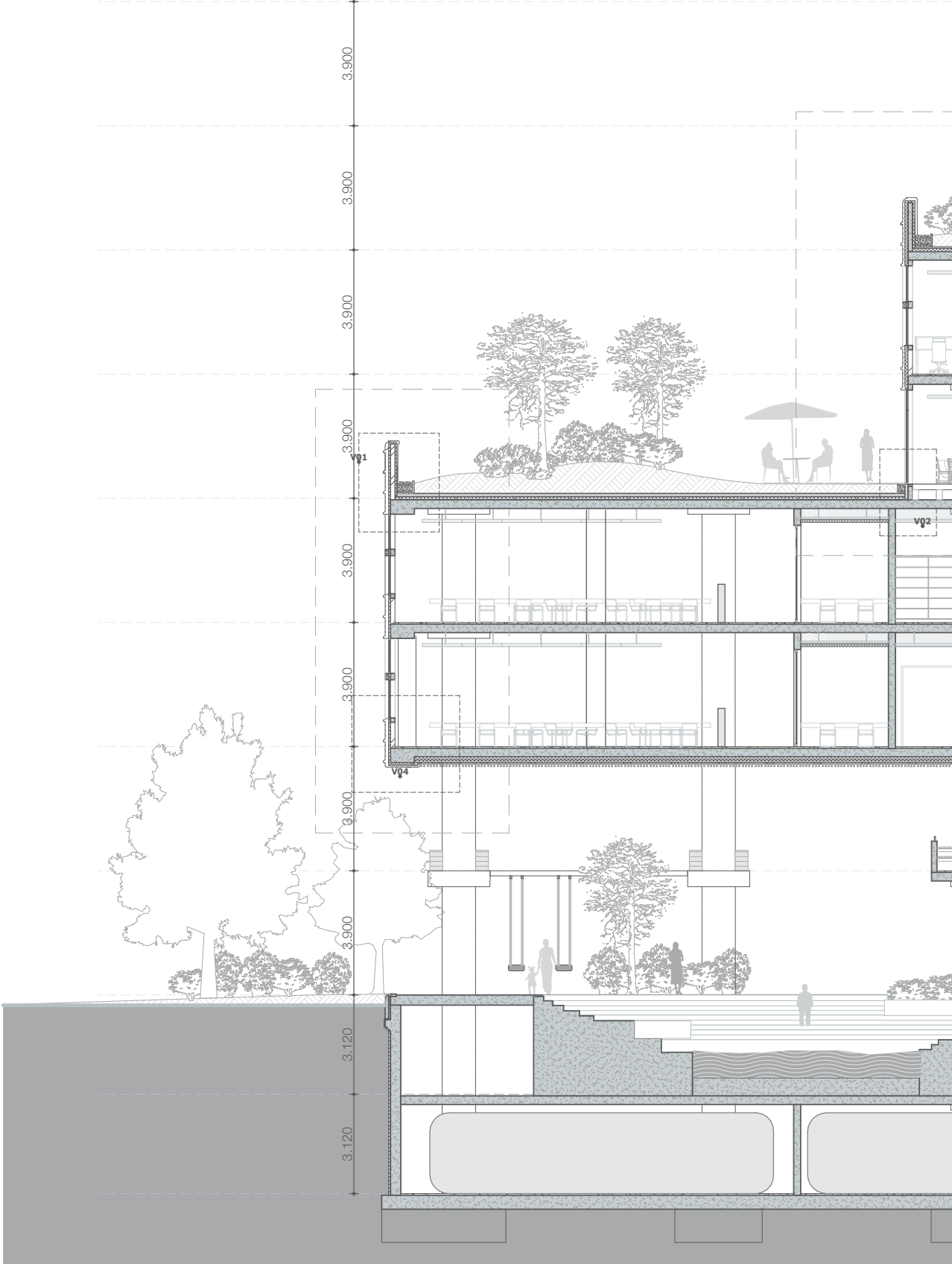
Section I Existing Situation

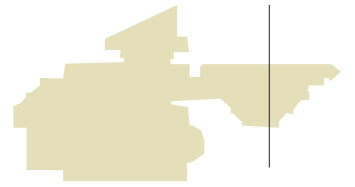




Section | 1:50 (scaled)

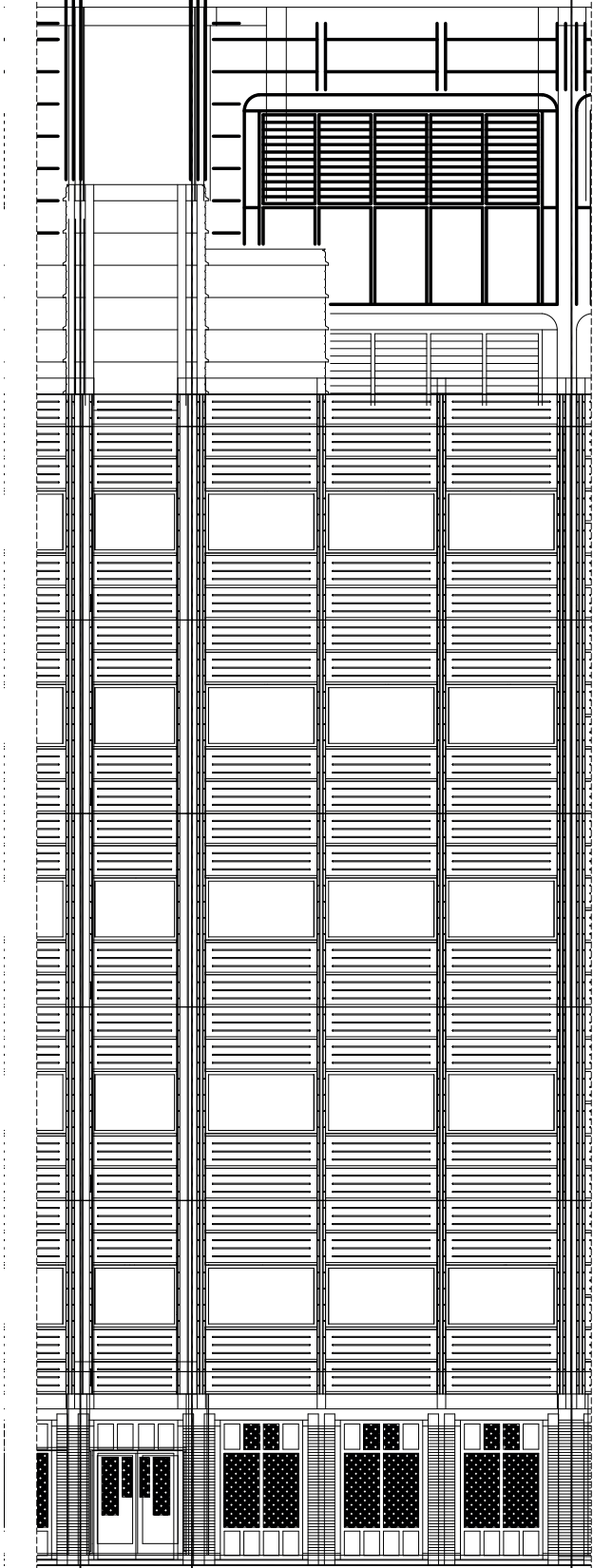
Section I New Situation



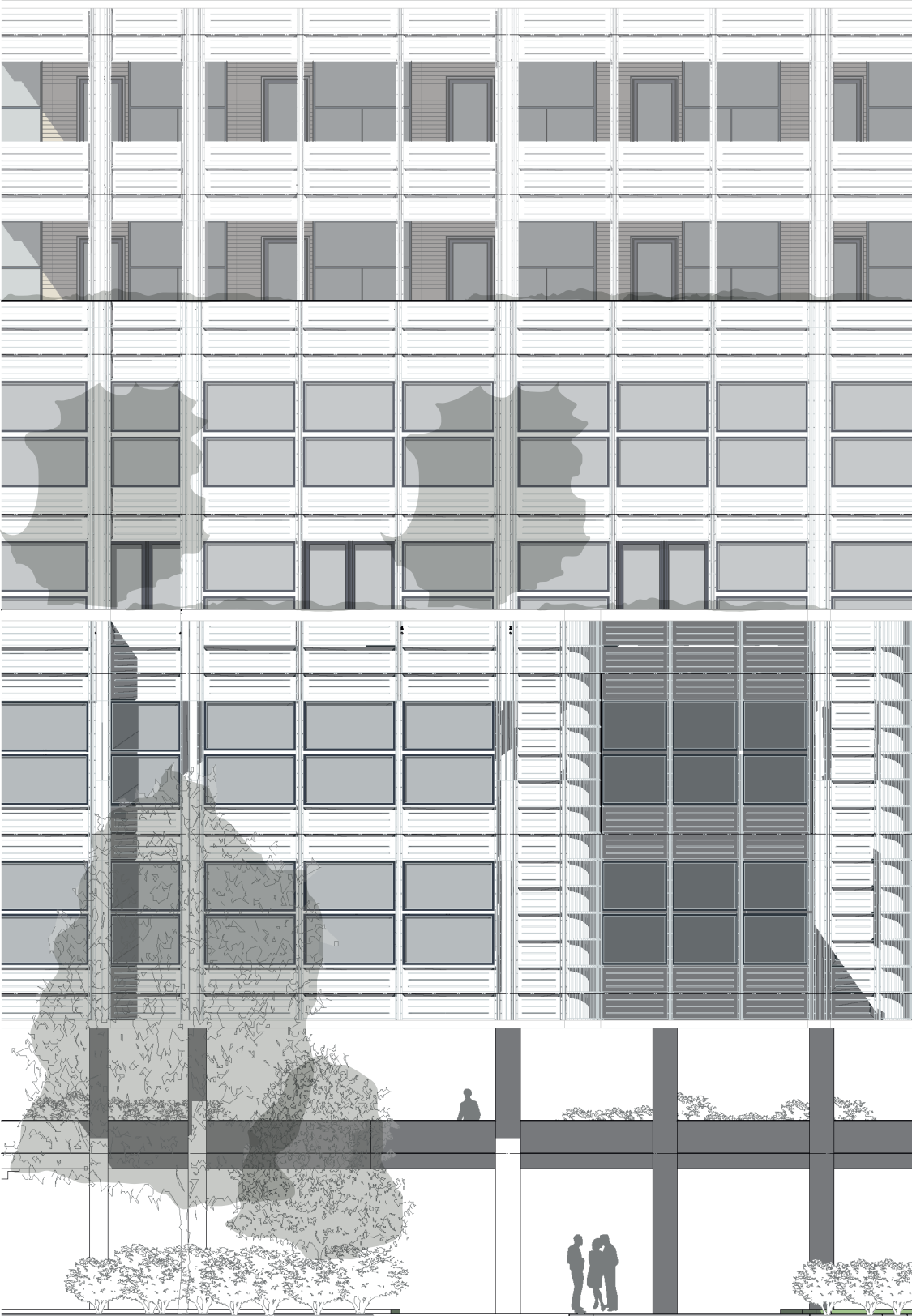


Section | 1:50 (scaled)

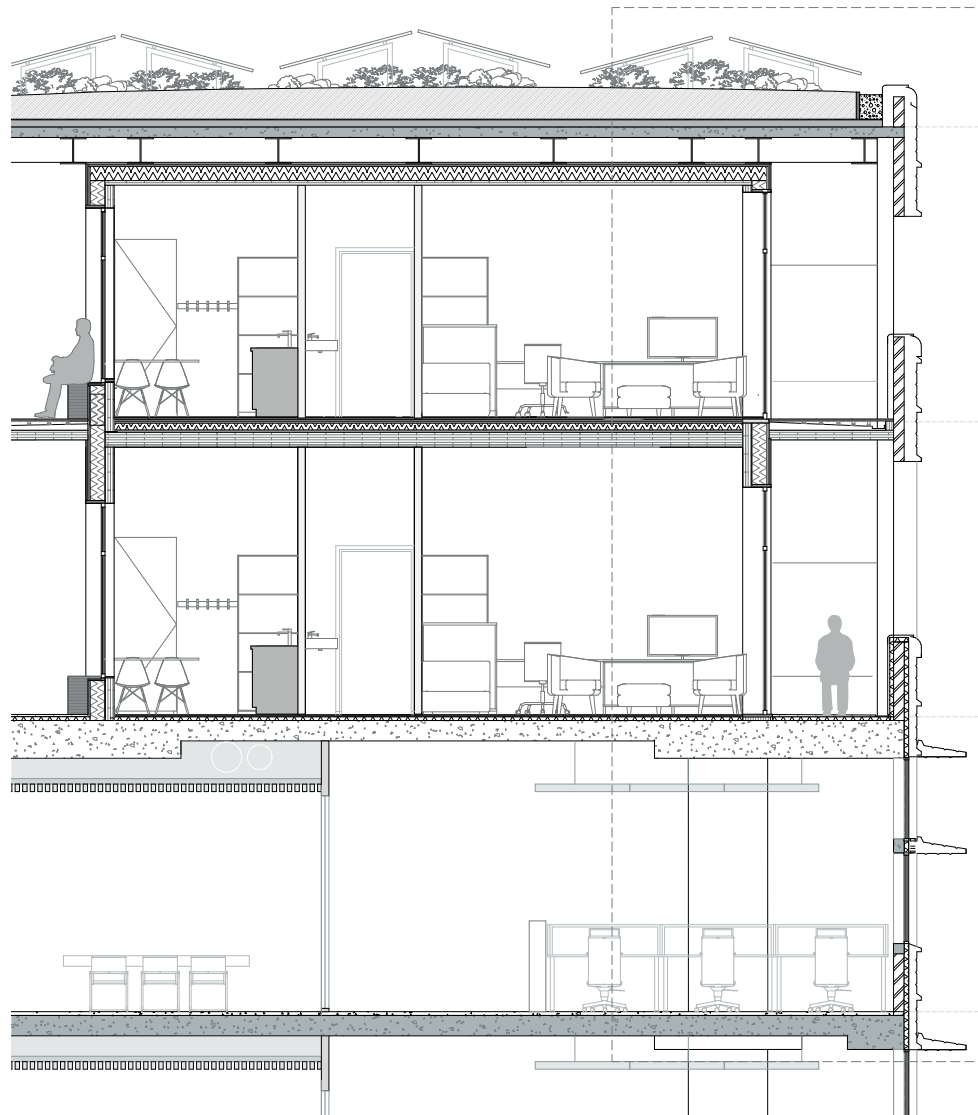
Facade | Existing



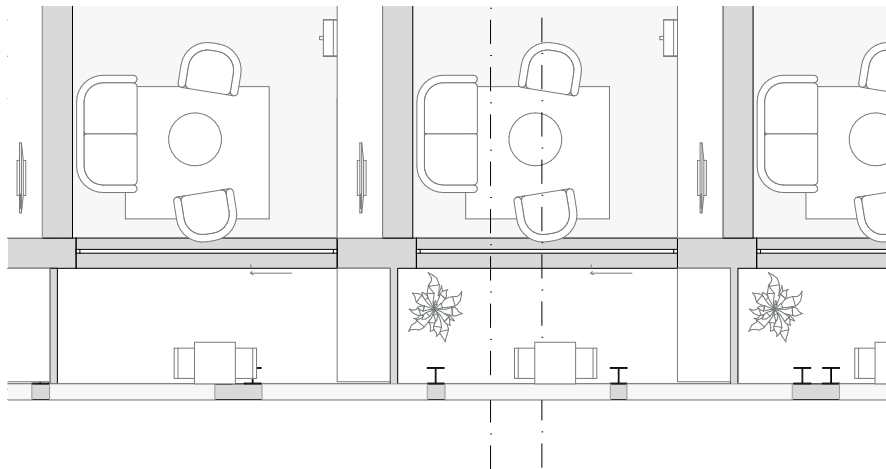
Facade | New

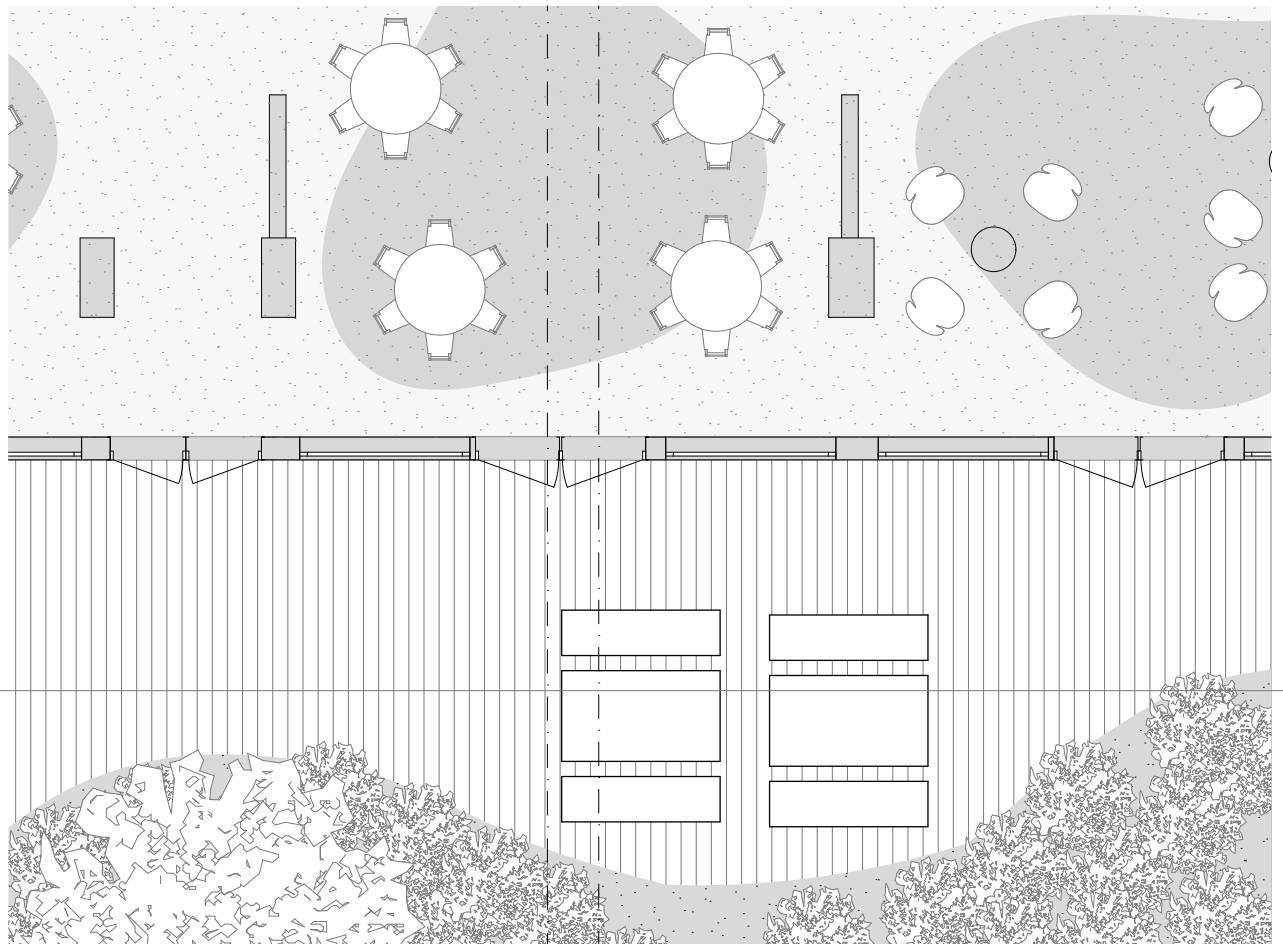
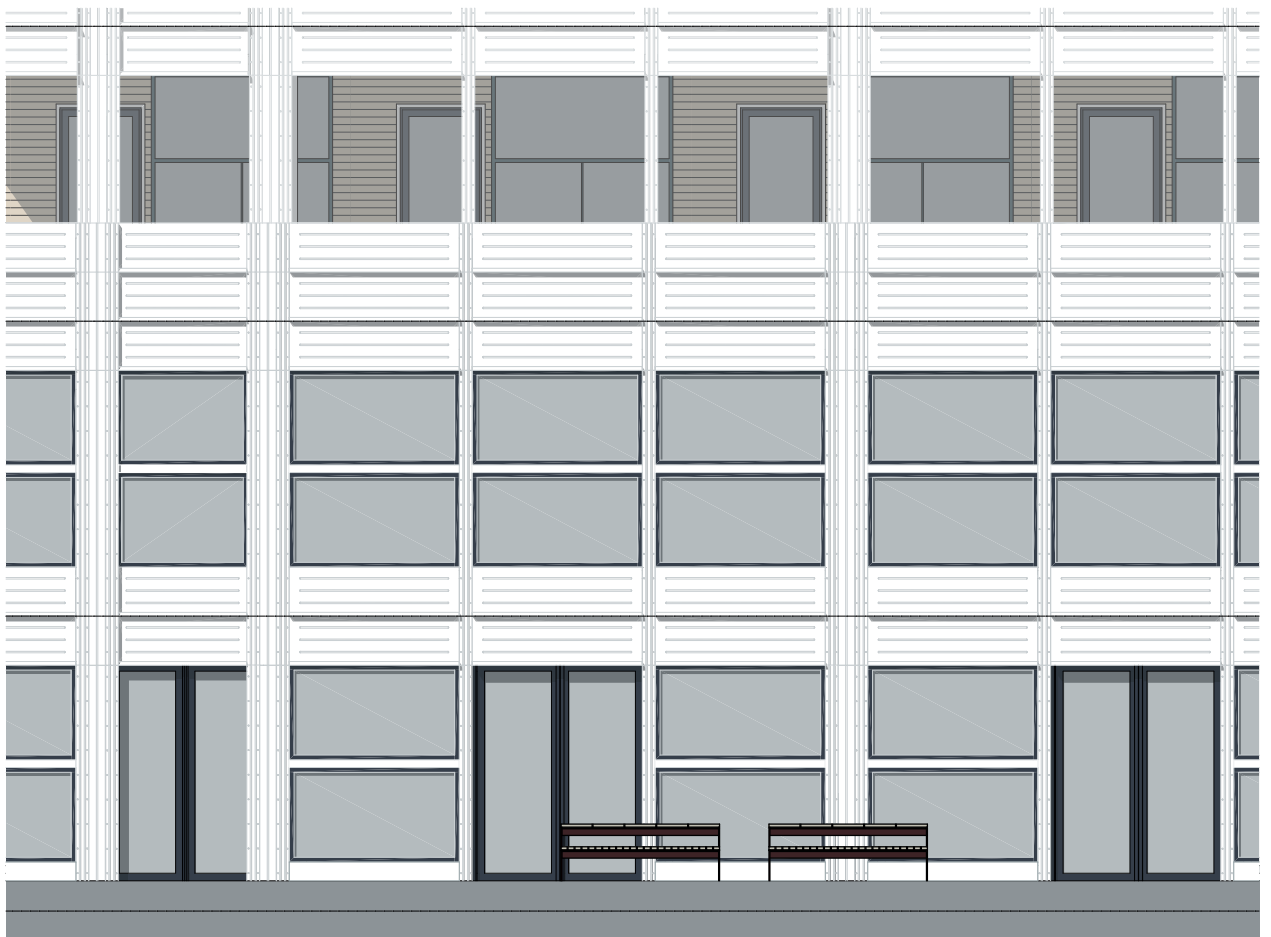


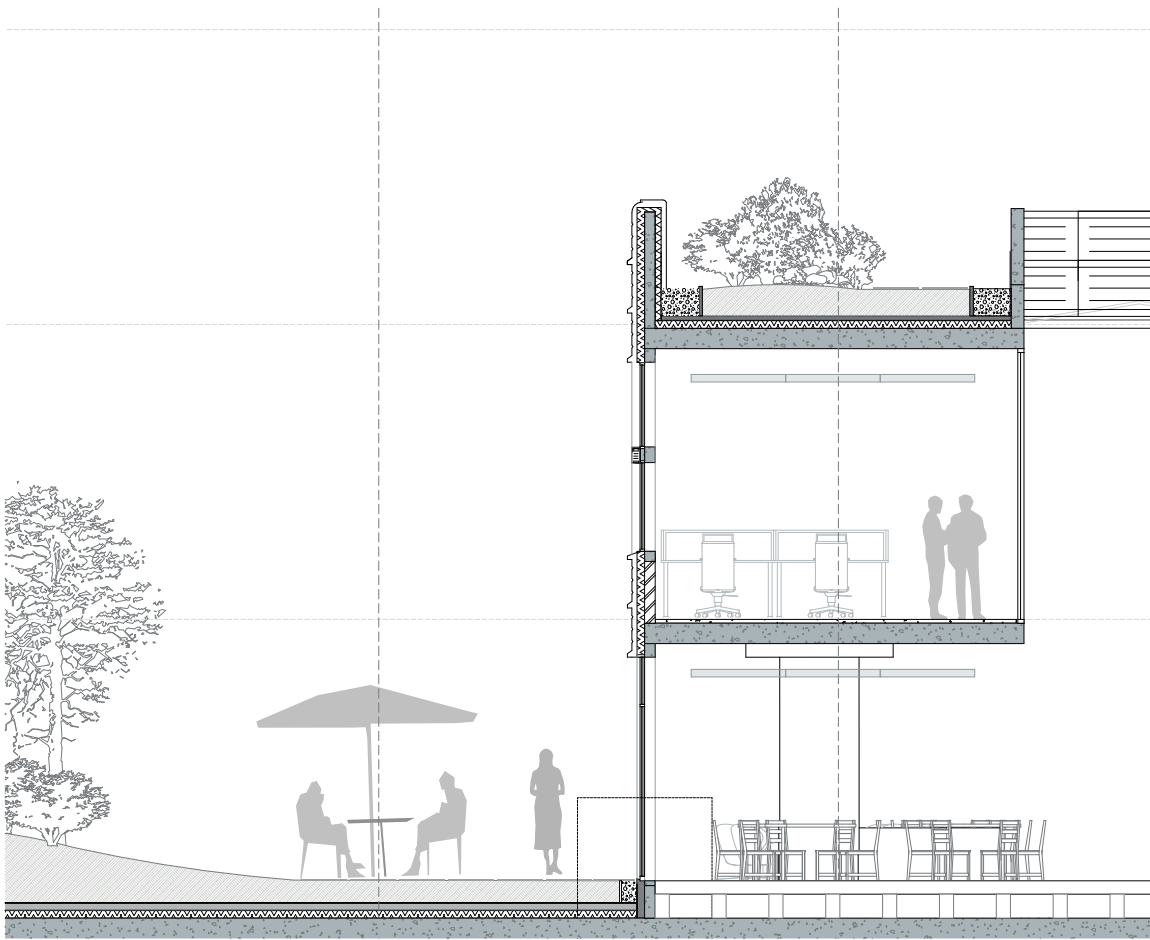
1:50 (scaled)



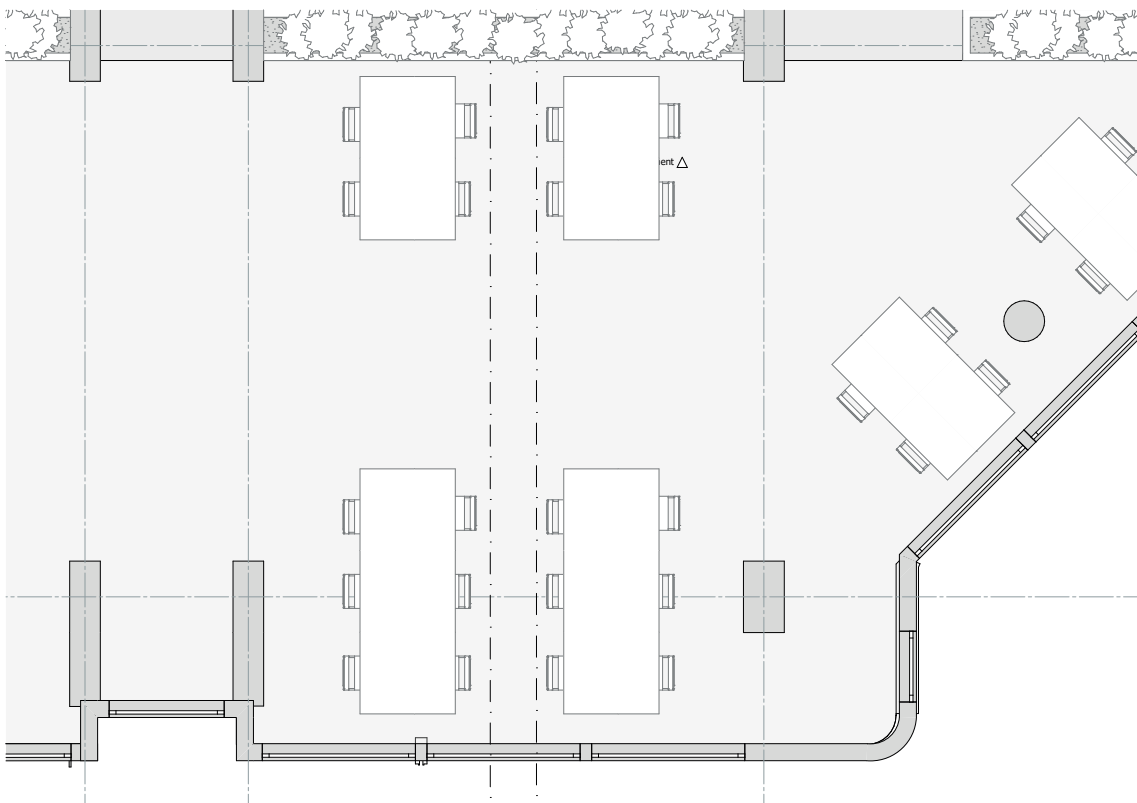
Facade | Fragment 1
1:20 (scaled)

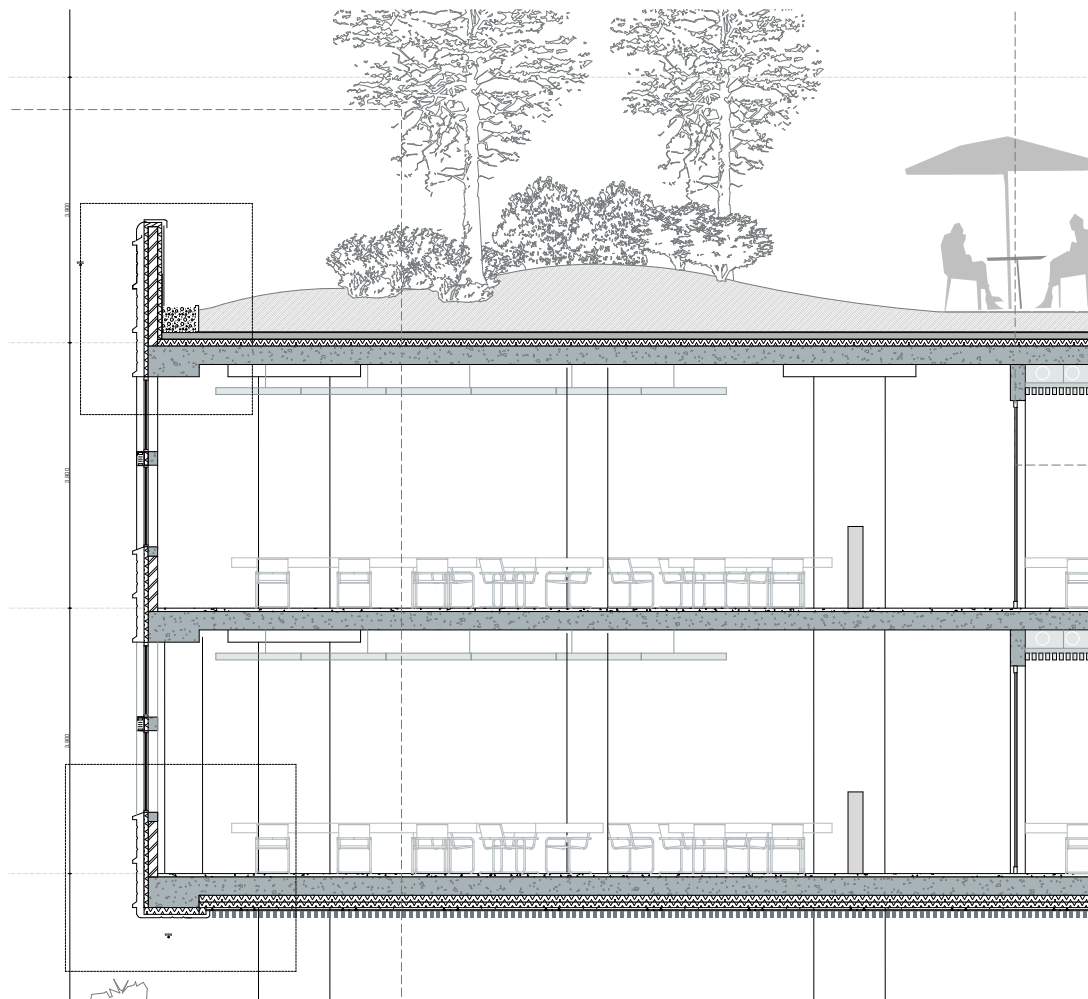




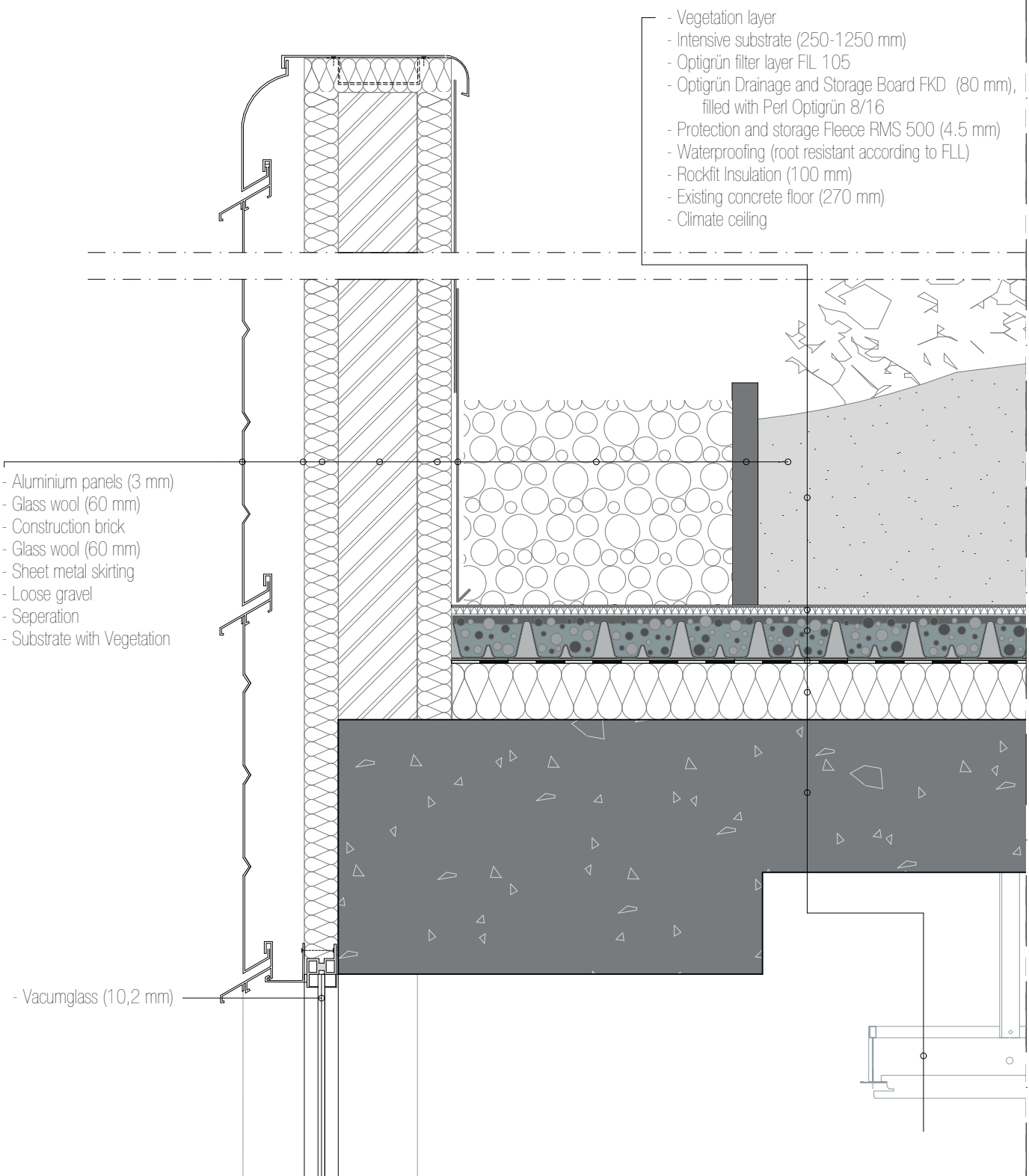


Facade | Fragment 2
1:20 (scaled)





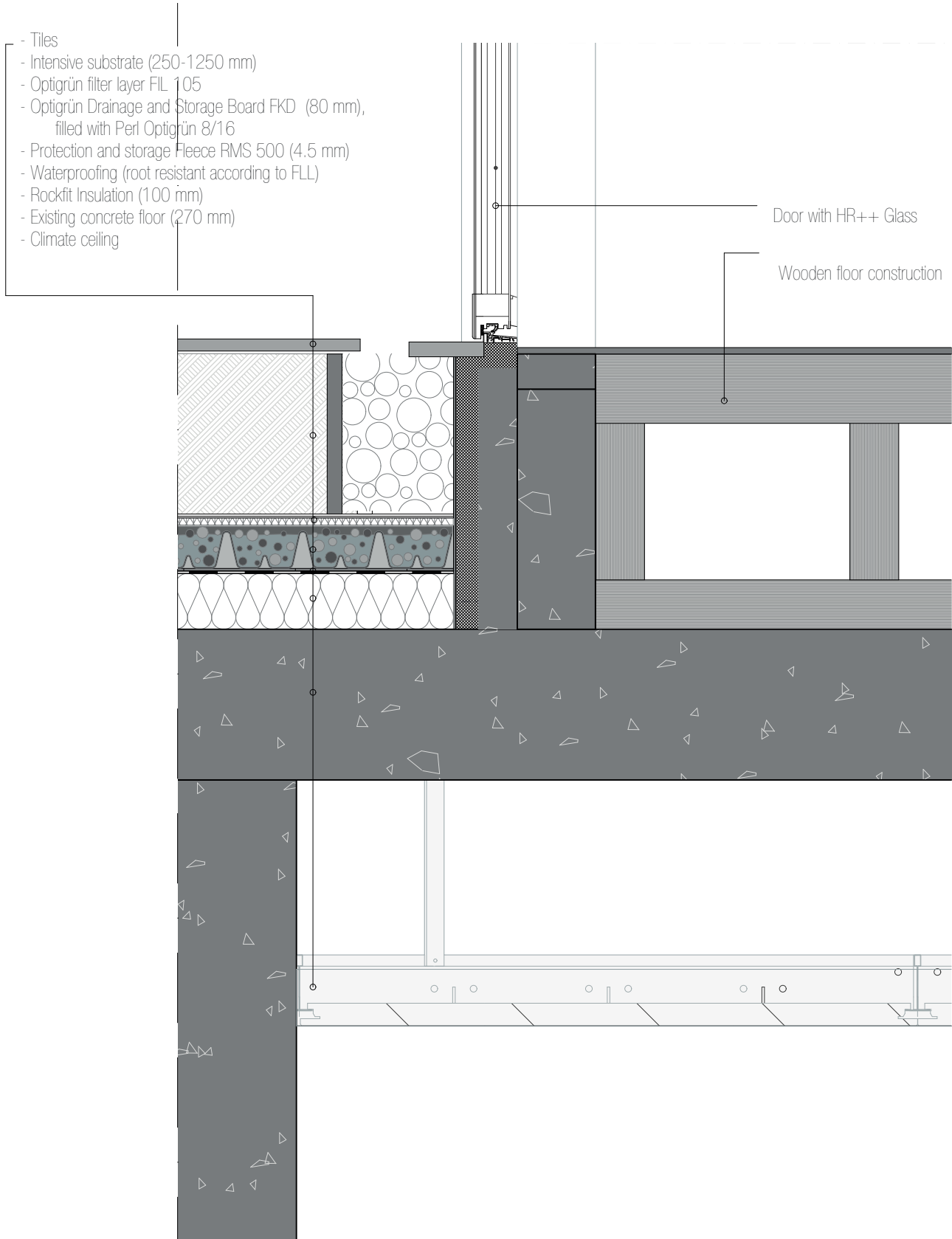
Facade | Fragment 3
1:20 (scaled)



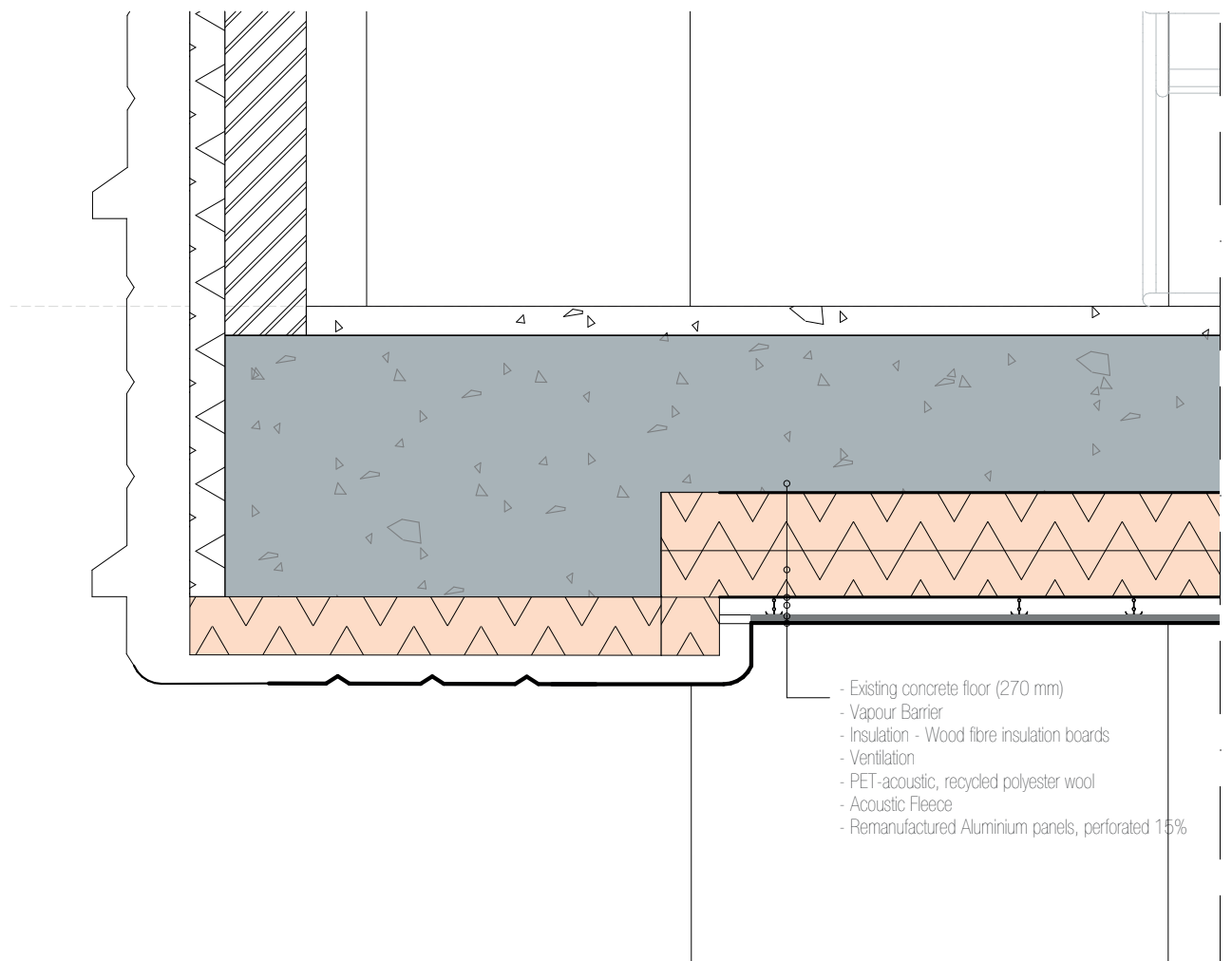
- Vegetation layer
- Intensive substrate (250-1250 mm)
- Optigrün filter layer FL 105
- Optigrün Drainage and Storage Board FKD (80 mm), filled with Perl Optigrün 8/16
- Protection and storage Fleece RMS 500 (4.5 mm)
- Waterproofing (root resistant according to FLL)
- Rockfit Insulation (100 mm)
- Existing concrete floor (270 mm)
- Climate ceiling

- Aluminium panels (3 mm)
- Glass wool (60 mm)
- Construction brick
- Glass wool (60 mm)
- Sheet metal skirting
- Loose gravel
- Separation
- Substrate with Vegetation

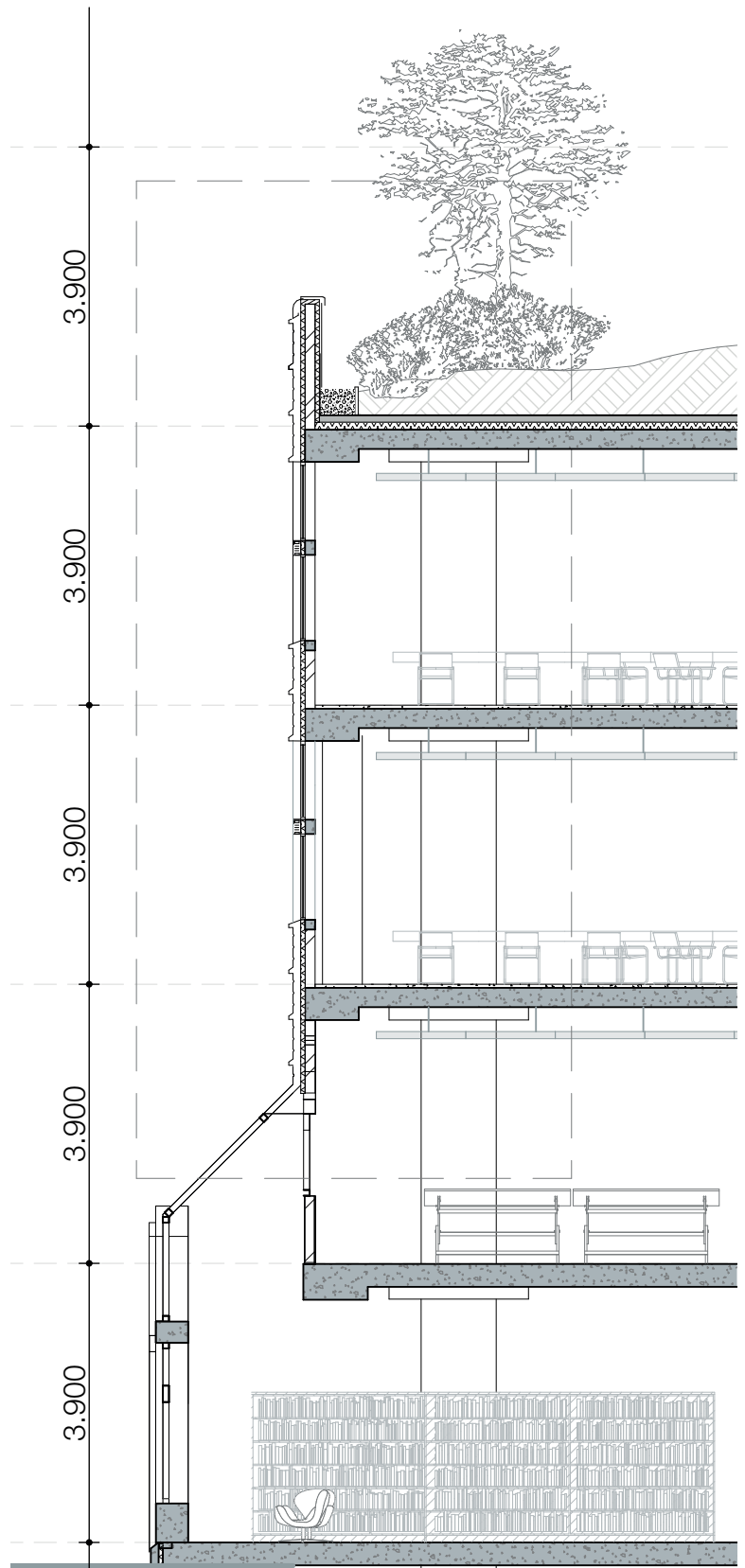
- Vacuumglass (10,2 mm)



Details | 1 & 2
 1:5 (scaled)

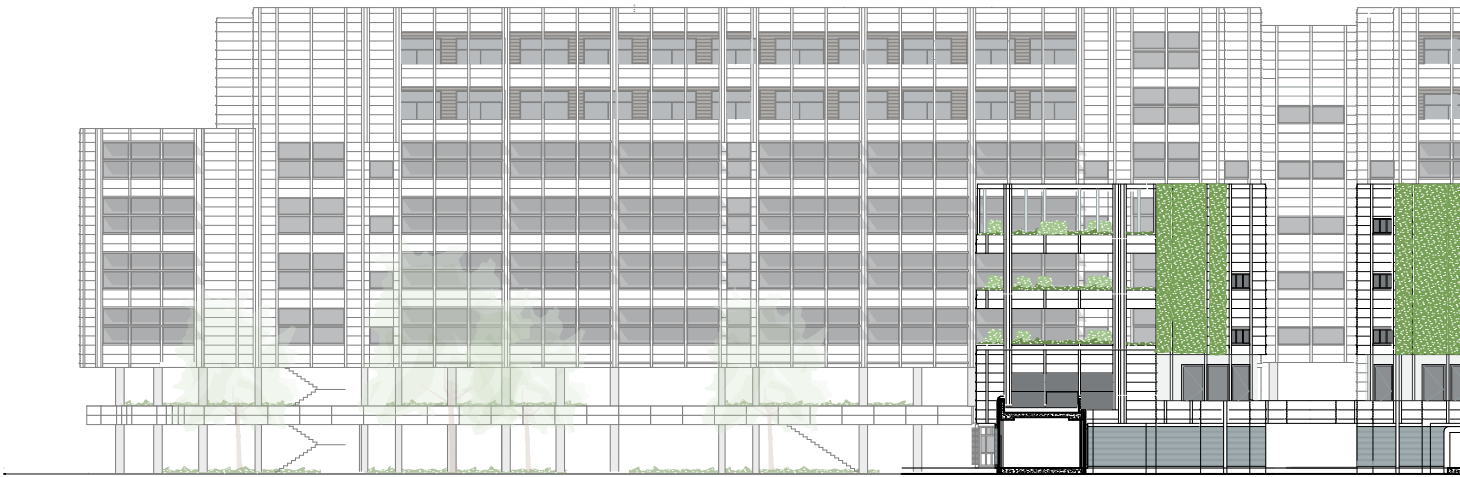


Details | 3

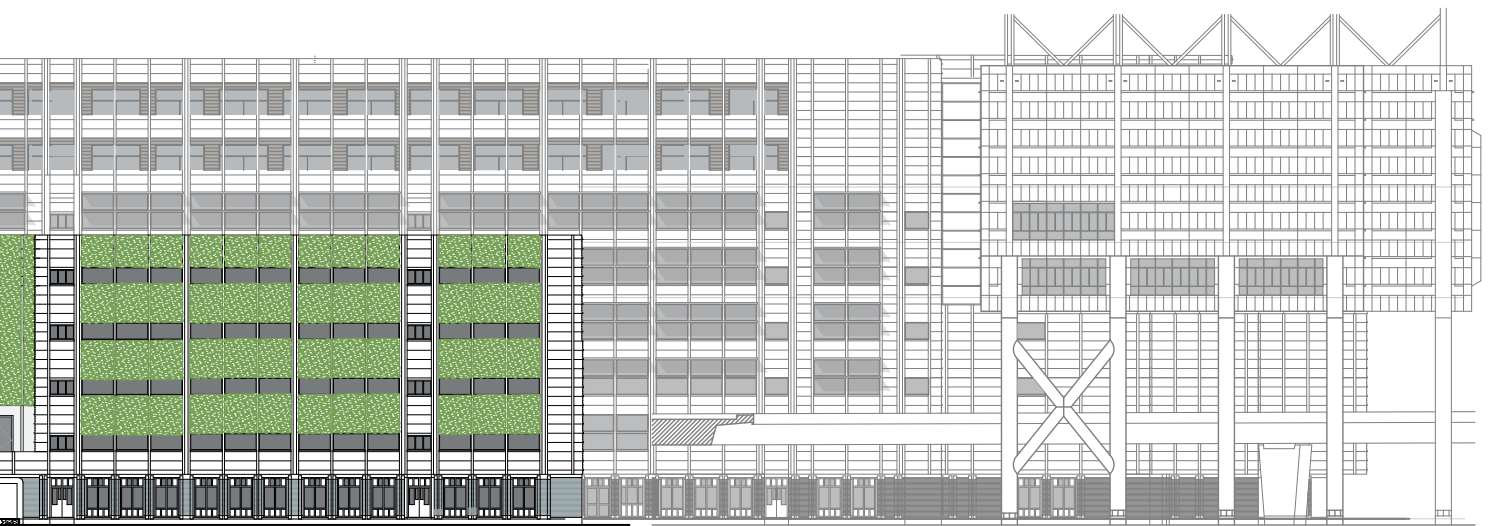


Facade | KB Library
1:50 (scaled)



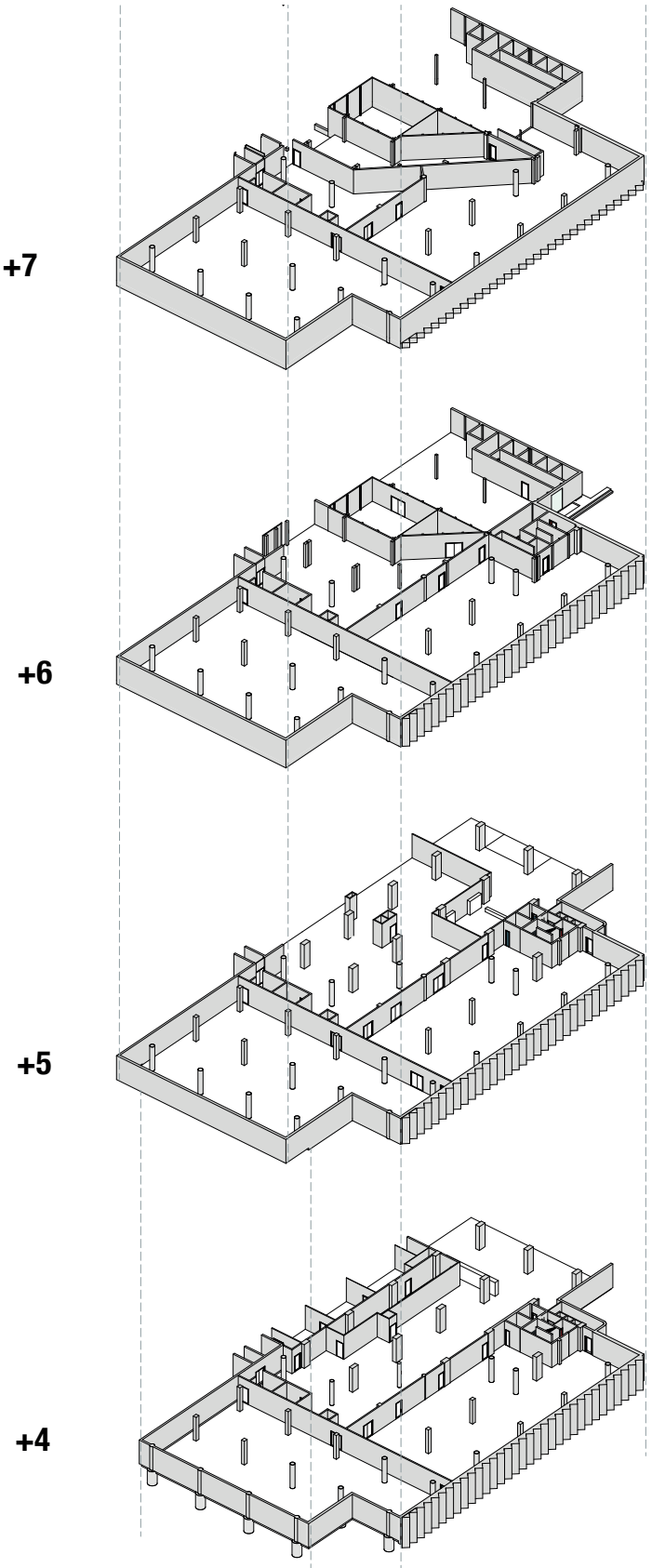


Facade | south-east
1:100 (scaled)



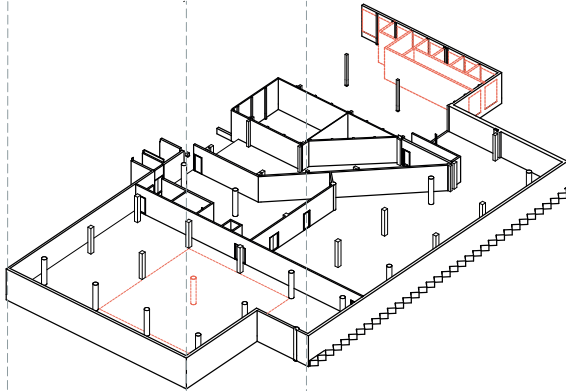
Construction of Multifunctional Halls

Existing situation

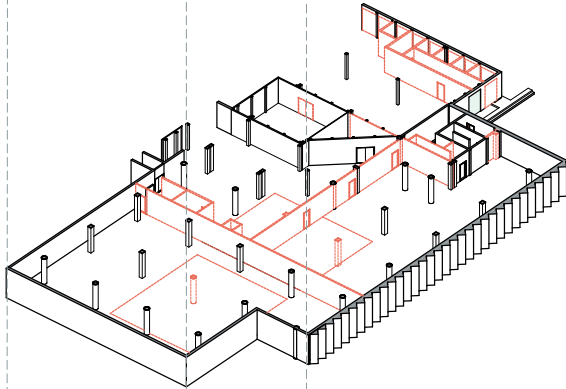


To Be Demolished

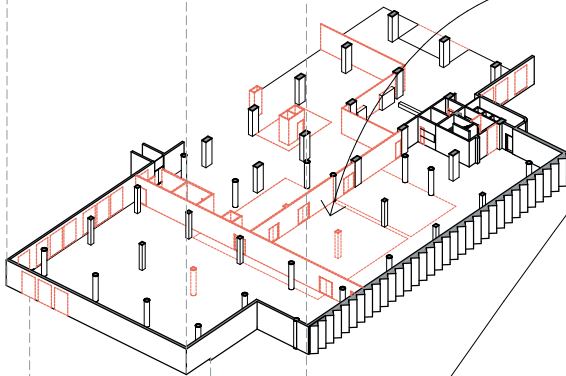
+7



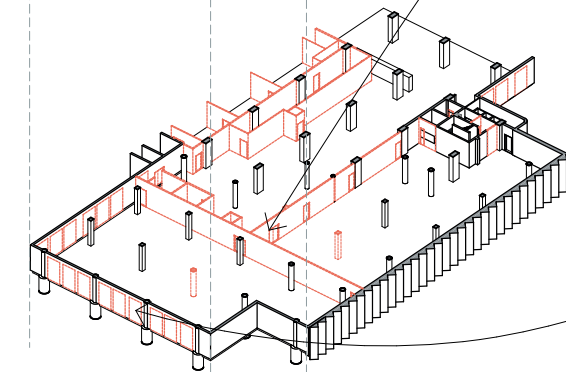
+6



+5



+4

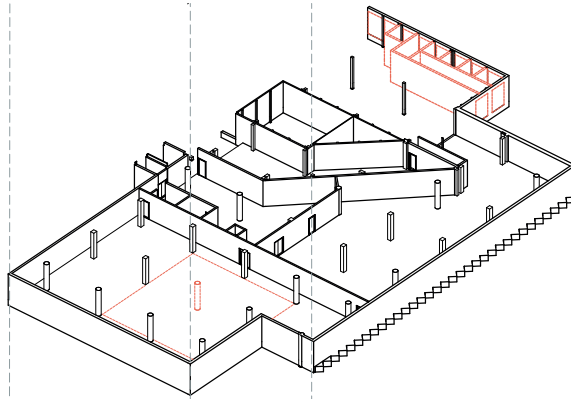


Remove parts of concrete floor and internal walls

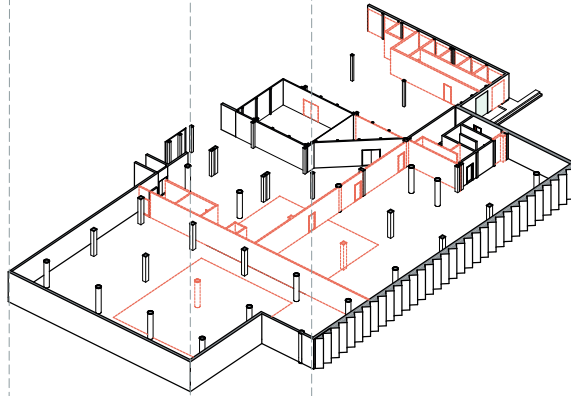
Remove parts external walls for windows in foyer

To Be Demolished

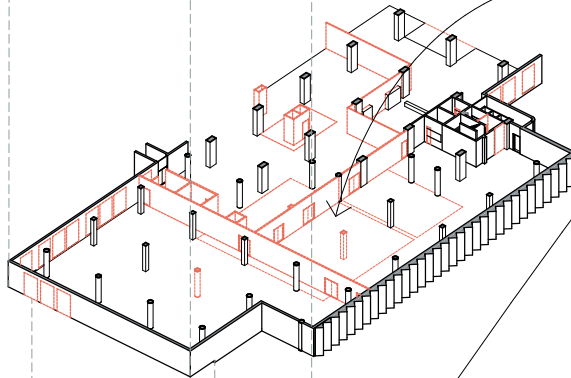
+7



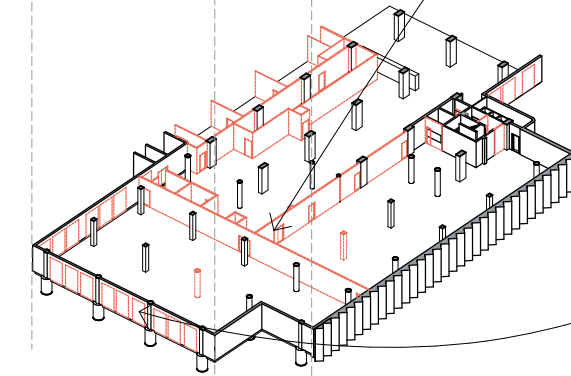
+6



+5



+4



Remove parts of concrete floor and walls

Remove parts external walls for window foyer

Co2 Impact Calculation

Continuously Reinforced Concrete C30/37 CEM III/B

Phase A : Production & Build	= $3,264 \times 10^2 \text{ kg Co}_2$	= $326,4 \text{ Co}_2/\text{m}^3$
Phase C : Demolition and Processing	= $2,165 \times 10^1 \text{ kg Co}_2$	= $21,7 \text{ Co}_2/\text{m}^3$
Phase D : Outside Life Cycle	= $-1,984 \times 10^1 \text{ kg Co}_2$	= $-19,8 \text{ Co}_2/\text{m}^3$

Total Embodied CO₂:
 $326,4 + 21,7 - 19,9 = 328 \text{ kg Co}_2/\text{m}^3$

Concrete Volume [m3 per m2 GFA]

Following Material-intensity benchmarks typical for Institutions
= ~0,30 m³ per m² GFA (inc. walls, columns, beams, slabs)

Total Embodied Co2 [per m2 GFA]

$328 \text{ kg Co}_2/\text{m}^3 \times 0,30 \text{ m}^3 \text{ per m}^2 \text{ GFA} = 98 \text{ kg Co}_2/\text{m}^2 \text{ GFA}$

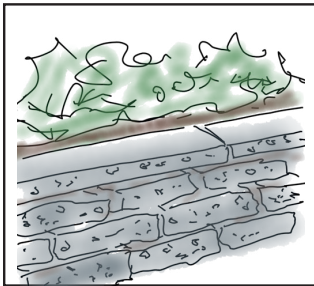
Total Co2 impact / carbon footprint [kg Co₂]

Removed parts of Depot: +/- 1.340 m²
 $98 \times 1.340 \text{ m}^2 = 131.320 \text{ kg CO}_2 = 131 \text{ t CO}_2$

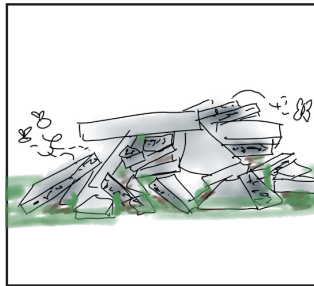
Numbers and Values retrieved from Nationale Milieudatabase (2023)

d internal

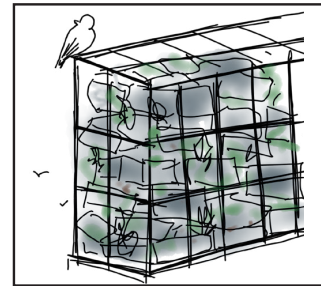
Material Reuse Options



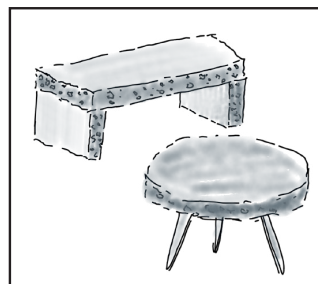
Low Retaining Walls for Landscape Design



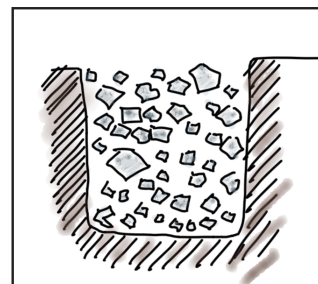
Concrete Pile Shelter for Animals on Roofs



Separation Wall for Wind Protection and Animal Shelter



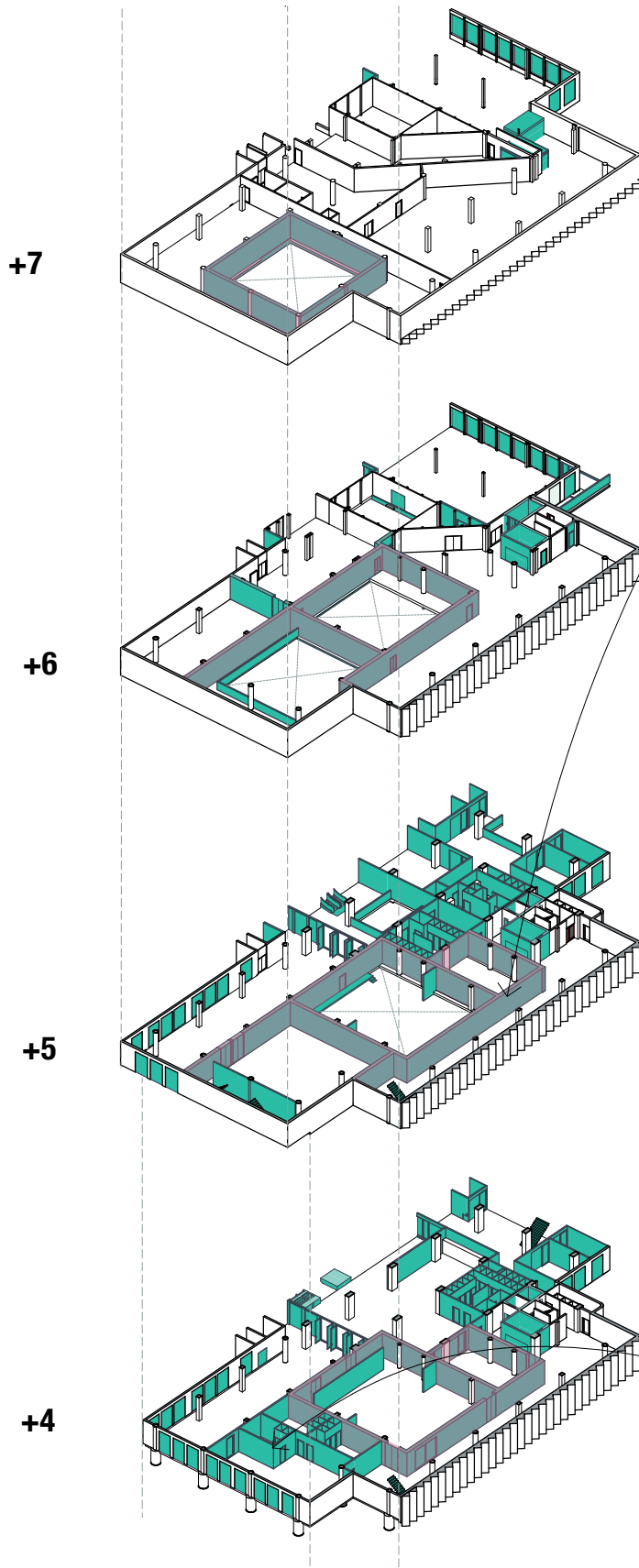
Furniture for Gardens & Roofs



Grit Fill for Drainage

ws in

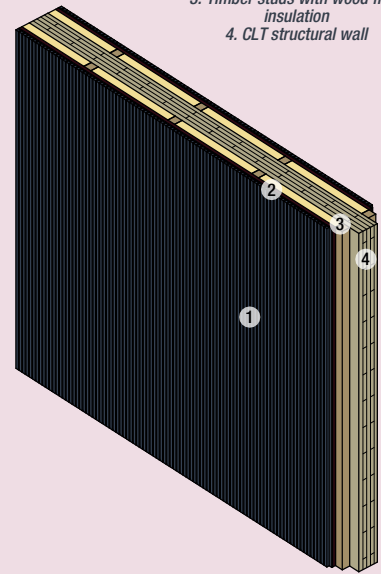
To Be Built



New CLT structure with acoustic layer for Halls

Acoustic + Biobased Wall for Halls:

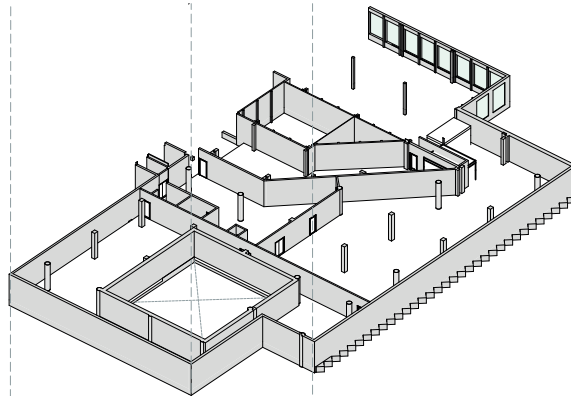
1. Wooden slat panel with acoustic felt backing
2. Rigid wood fiberboard
3. Timber studs with wood fiber insulation
4. CLT structural wall



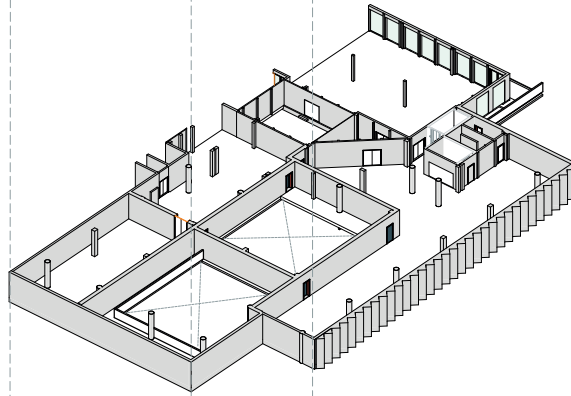
CLT structure for new internal walls

New Situation

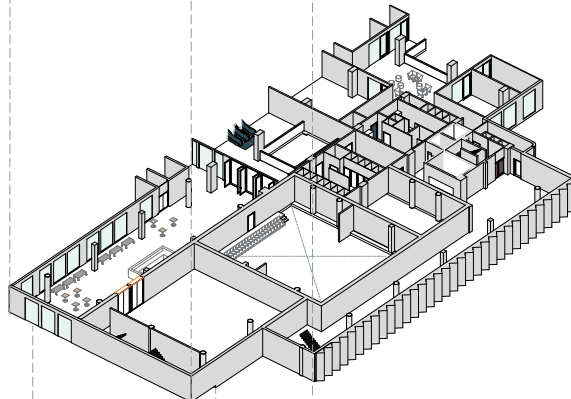
+7



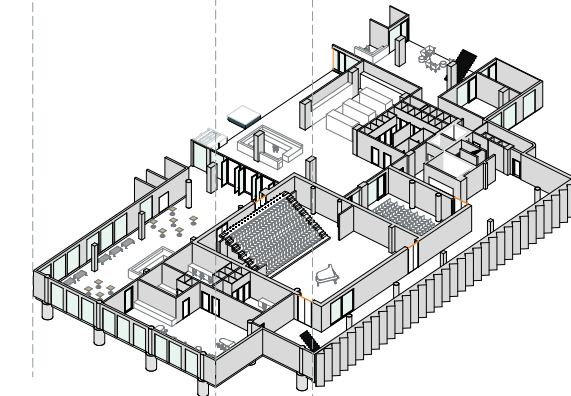
+6



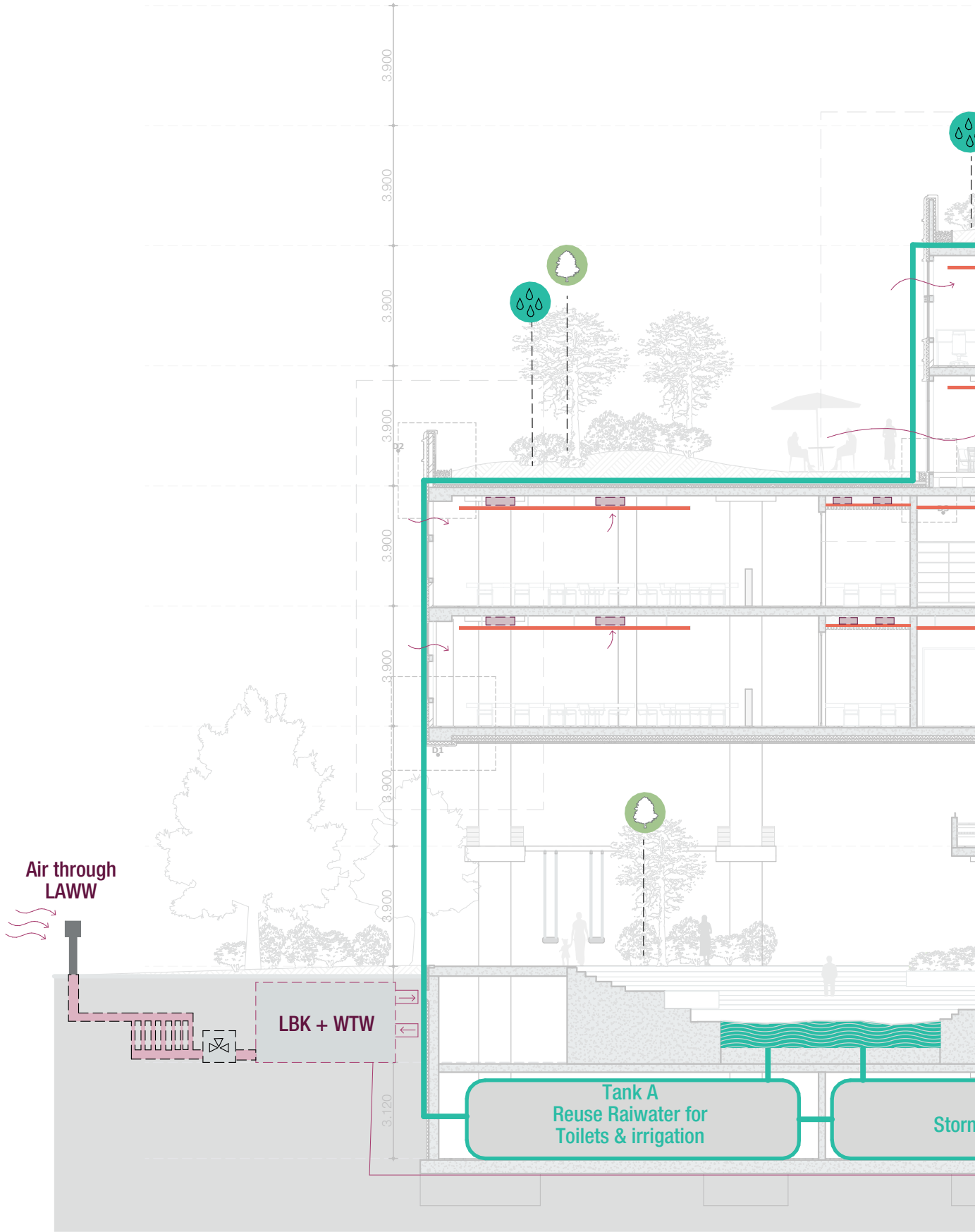
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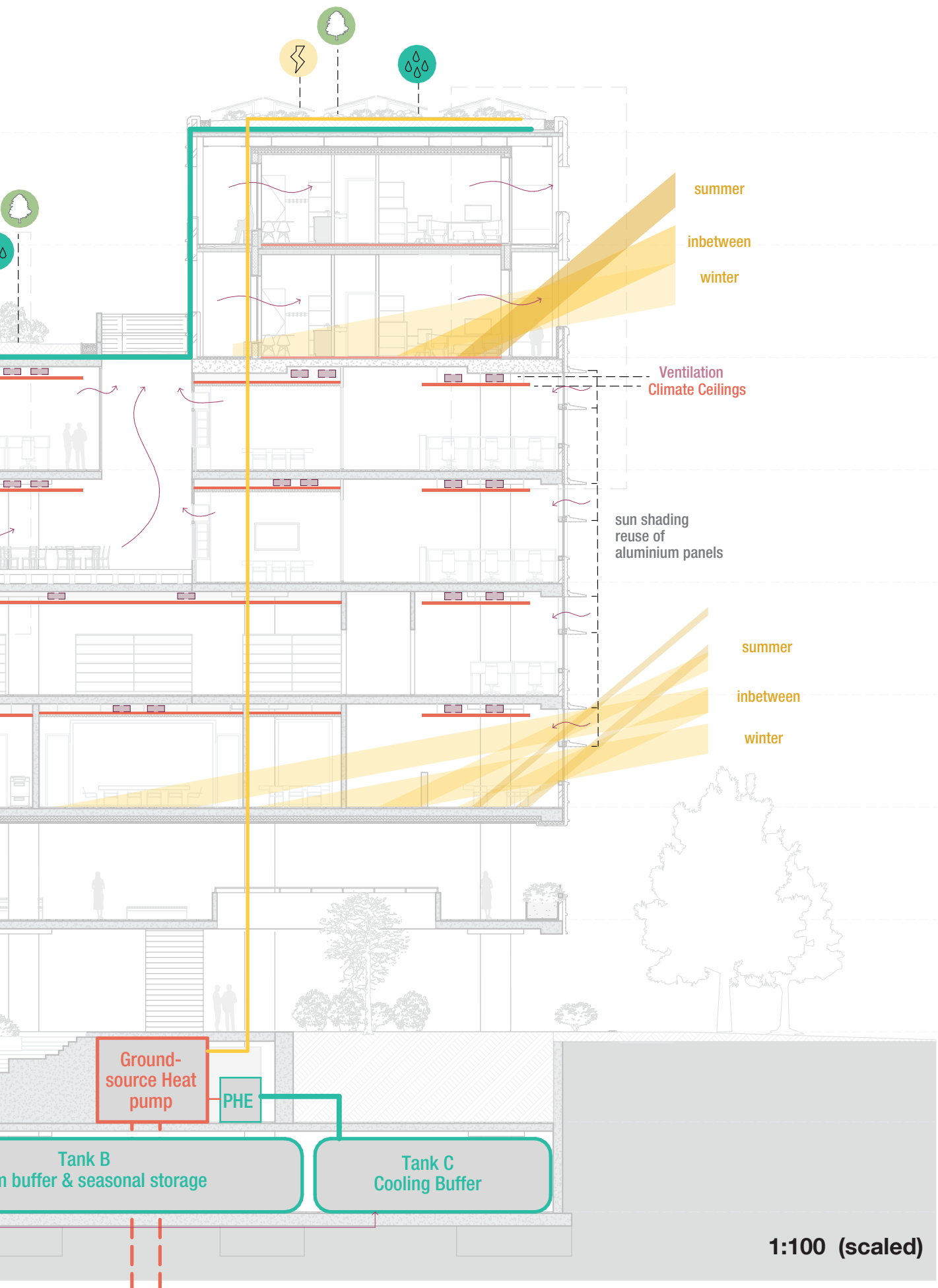


+4

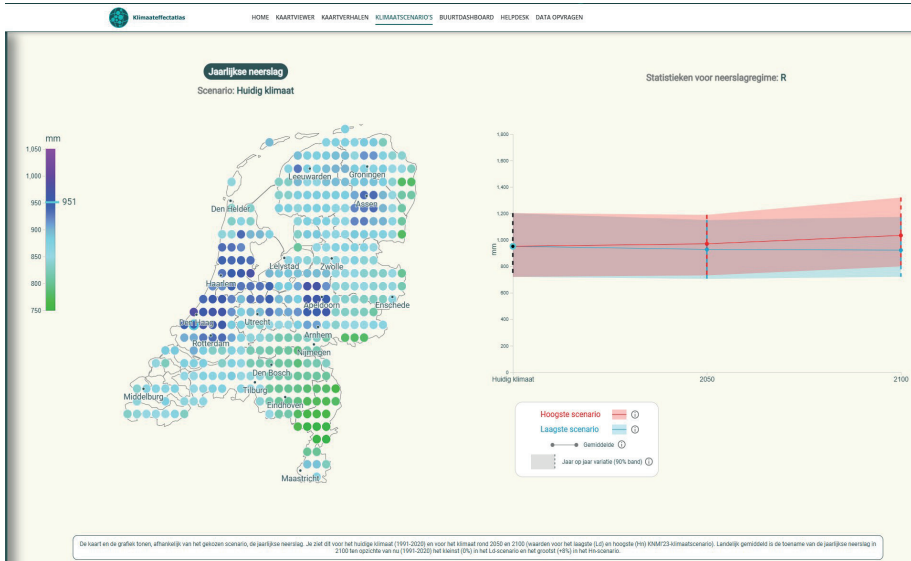


Section I Climate Scheme





Building Climate | Waterstorage Calculation



Average precipitation KB - mm per m

Current Climate:

951 mm

2050:

lowest scenario: 928 mm

highest scenario: 970 mm

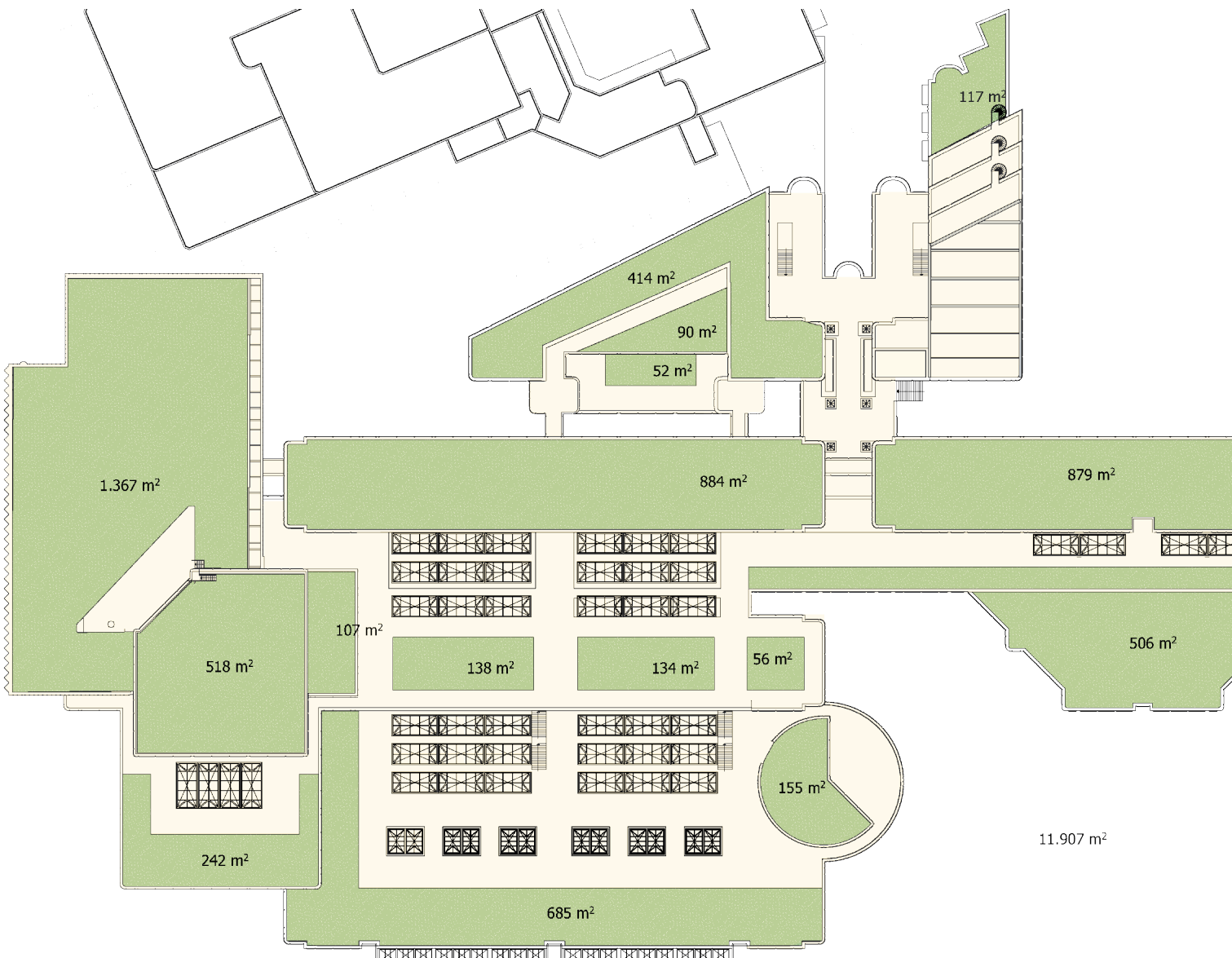
2100:

lowest scenario: 922 mm

highest scenario: 1.034 mm

Average precipitation - mm per m2

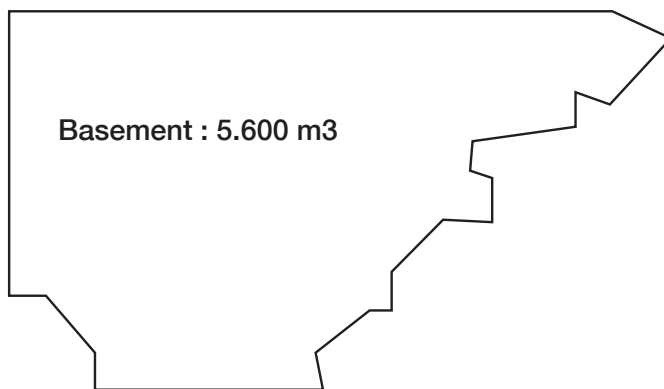
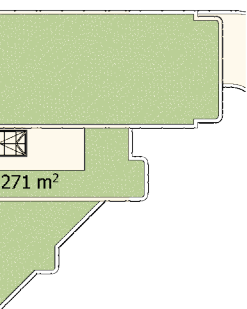
<https://www.klimaateffectatlas.nl/nl/klimaatscenario's>



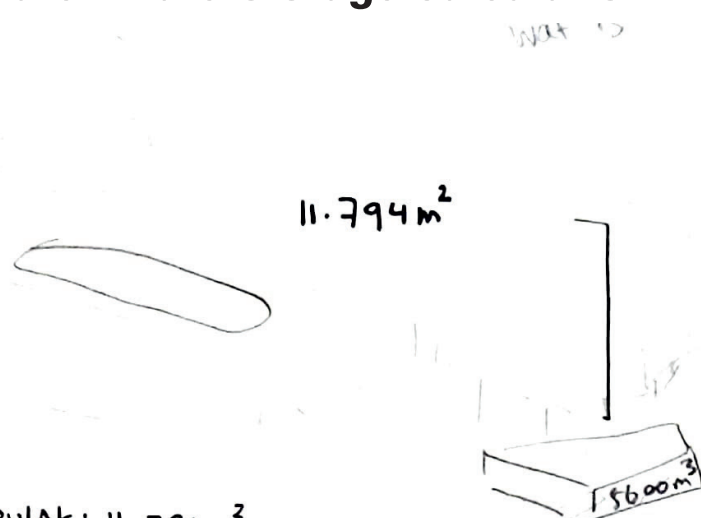
m2

Roof area: 11794 m2
- Routing: 4.807
- Green roof: 6700 m2

Yearly: $11.794 \times 951 \text{ mm} = 11.216 \text{ m}^3/\text{jaar}$



Building Climate | Waterstorage Calculation



- DAKOPPERVLAK: 11.794 m^2
- NEERSLAG = 954 mm/jaar .
- Opslag (kelder) = 5.600 m^3
- $1 \text{ mm/m}^2 = 1 \text{ Liter}$

$\rightarrow \pm 11.216.094 \text{ L/jaar}$
 $= 11.216 \text{ m}^3/\text{jaar}$

GROEN DAK.
 $\pm 6.700 \text{ m}^2$
 ↓
 Retentie 50-90%
 VERTR...

VRAAG WATER in GEBOUW

- toiletspoeling = 30 L/pp/dag .

- Bezetting:
- kantoor = 300 p
 - bibliotheek = 200 p
 - woningen = 120 p
 - 400 p/d.
 - rehearsal = 100-150 p/d.
 - zalen = $3 \times 300 \text{ p}$



dagelijks toiletverrag
 laag $\approx 24 \text{ m}^3/\text{d}$
 typisch $\approx 28,1 \text{ m}^3/\text{d}$
 piek $\approx 32,6 \text{ m}^3/\text{d}$



jaarlijks "typisch"
 $\approx 10.260 \text{ m}^3/\text{jaar}$

VOOR Kwaliteit van
 WATER verblijftijd 4-6 weken.

ZONE A HERGERWIJK

$28,1 \text{ m}^3/\text{d} \times 30 \text{ d} \approx 840 \text{ m}^3$

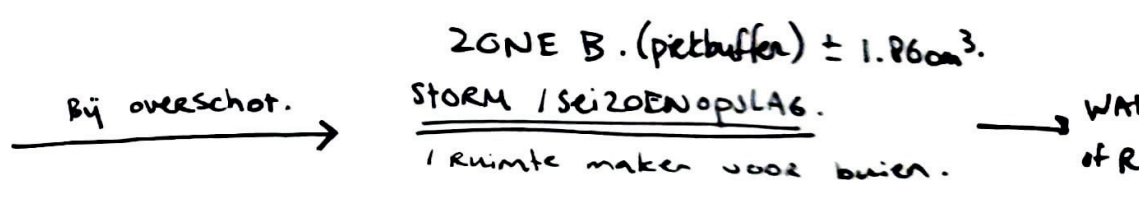
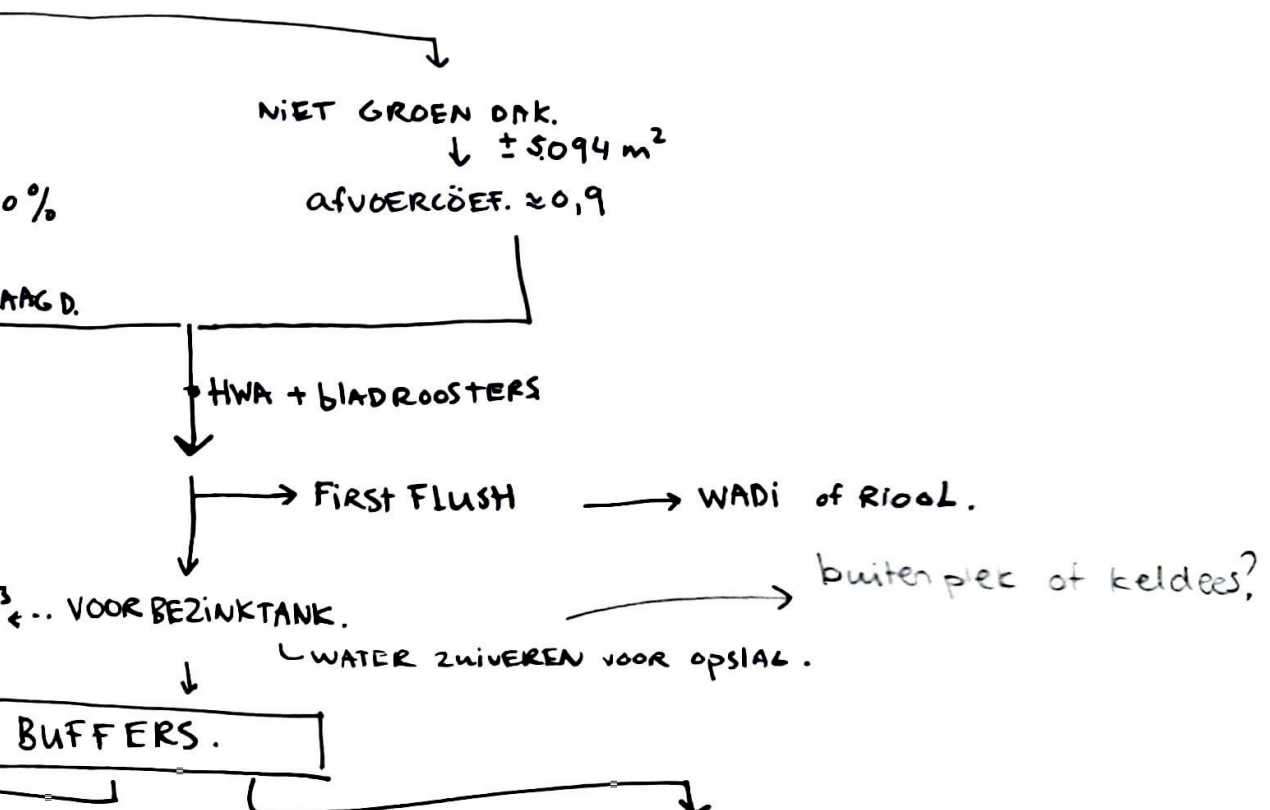


900 - 1000 m³ opslag.

toiletten

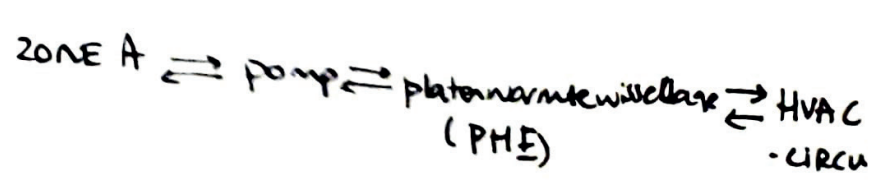
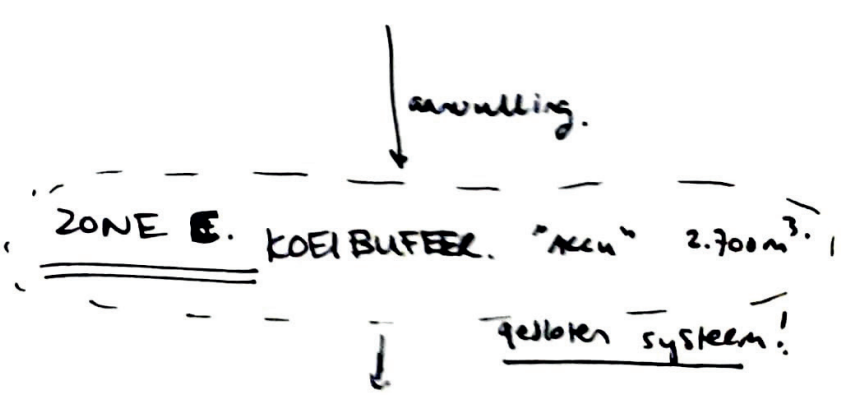
IRRIGATIE
(seizoensgebonden)

40 m

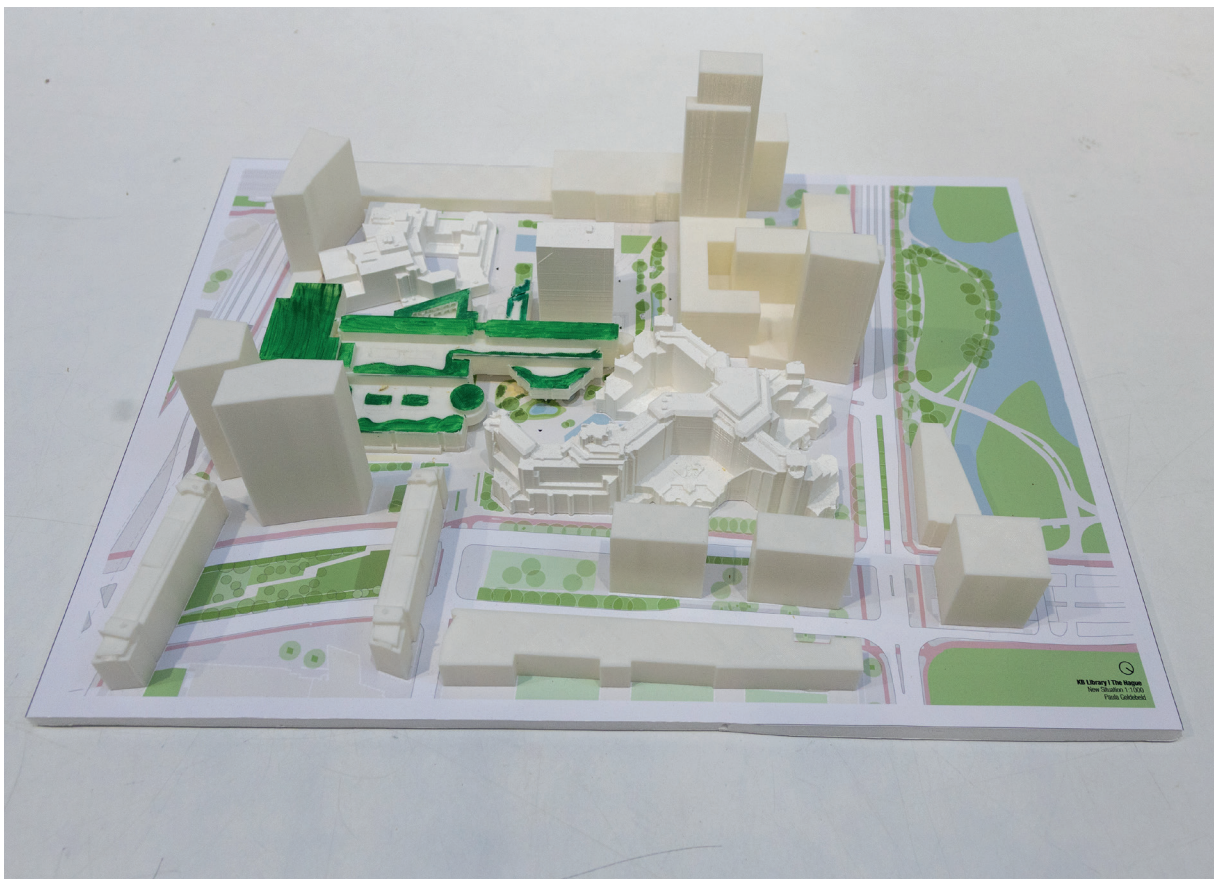
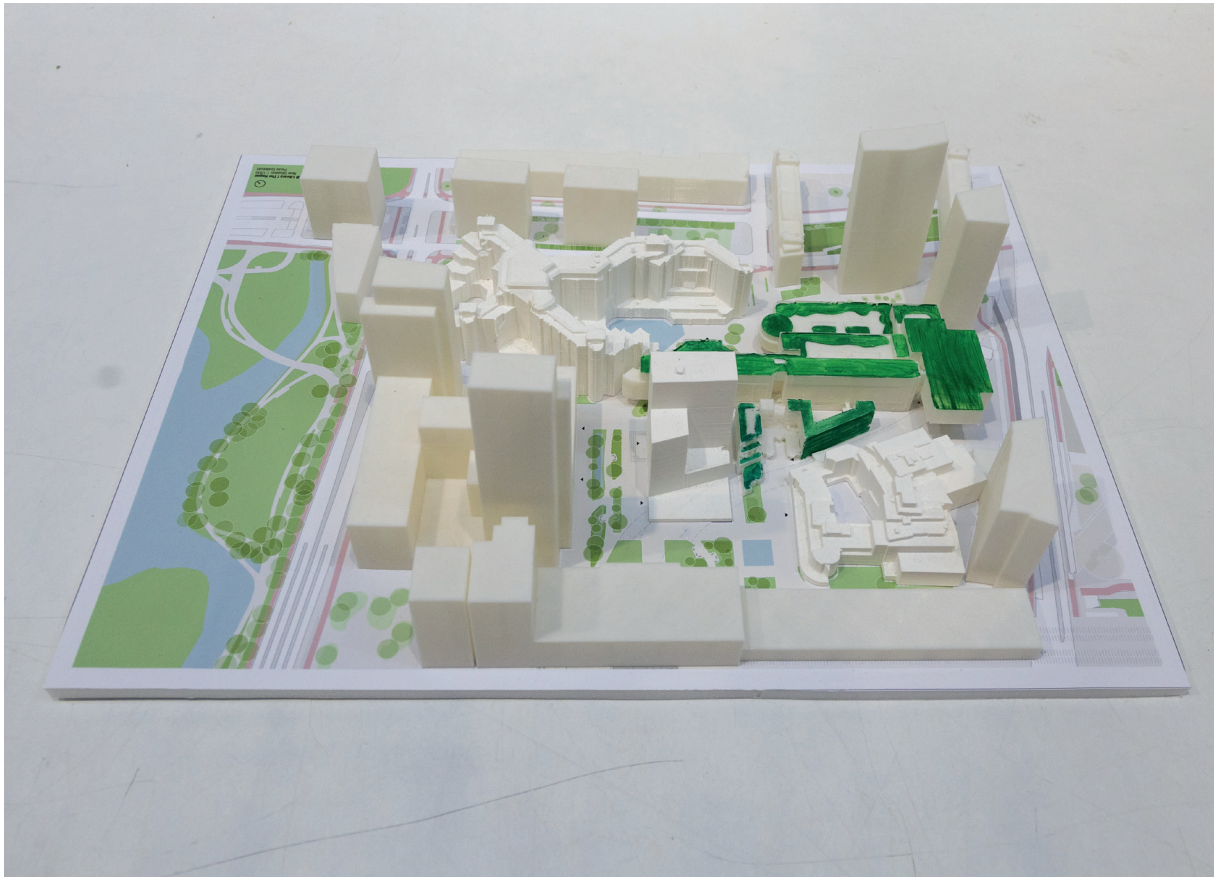


(UV+FijnFILTER)

EN)

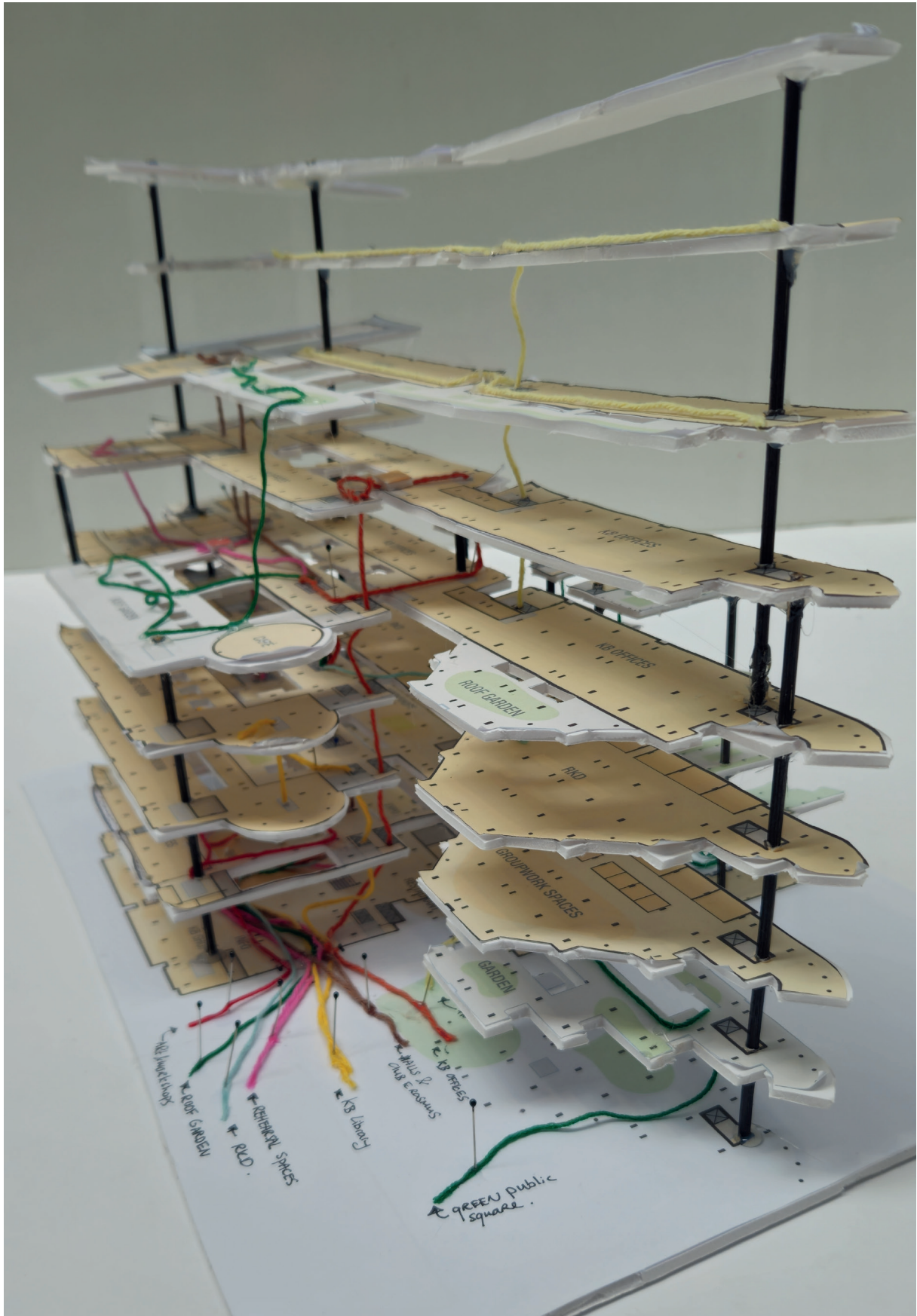


4. Models

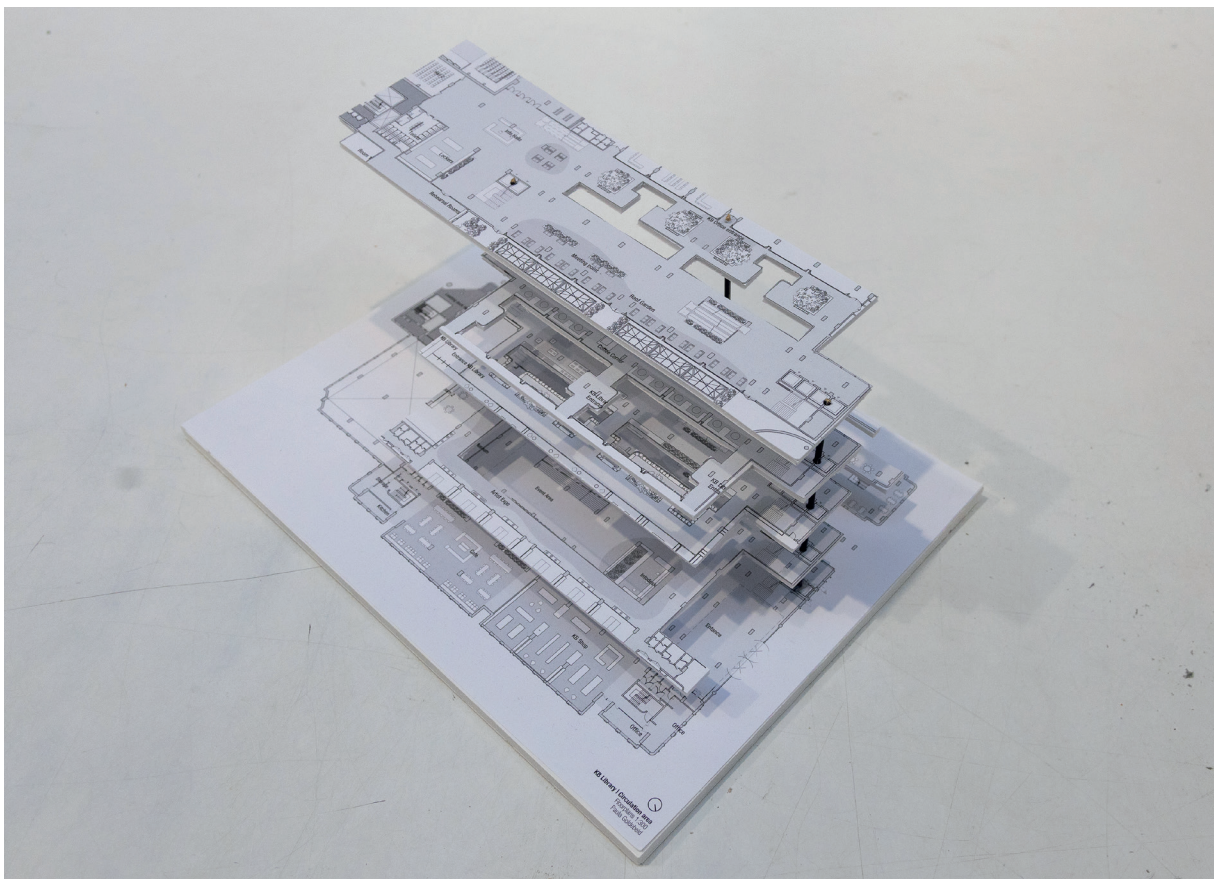
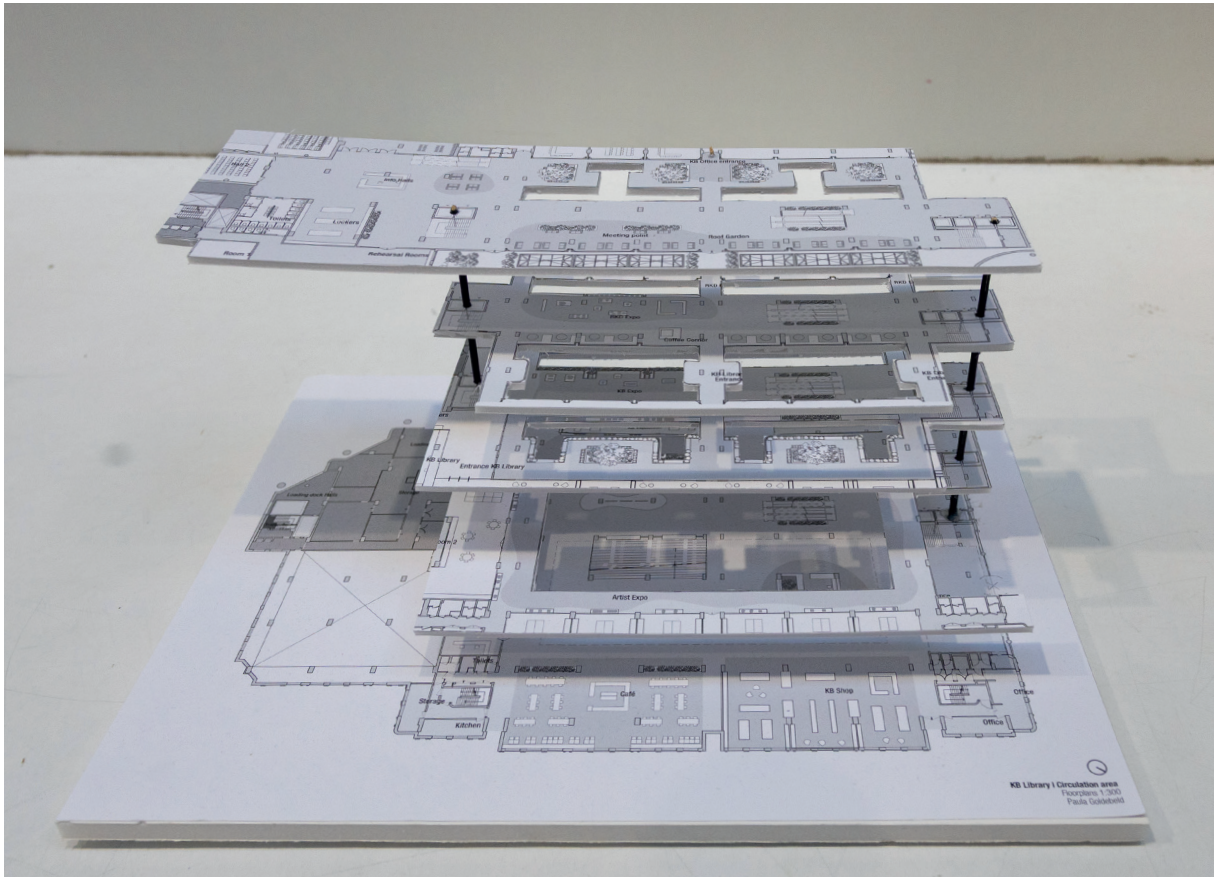




Urban model | 1:1000



Circulation model | 1:500







Section model | 1:100





Section model | 1:100





Section model | 1:100





Section model | 1:100





Section model | 1:100





Section model | 1:100













Research 6

Design 68

Appendix 260

Appendix

1. Survey questions
2. Transcript of interviews

Appendix 1 | Survey Questions

Appendix 2 | Transcript of interviews

Paula Goldebeld
2025/2026