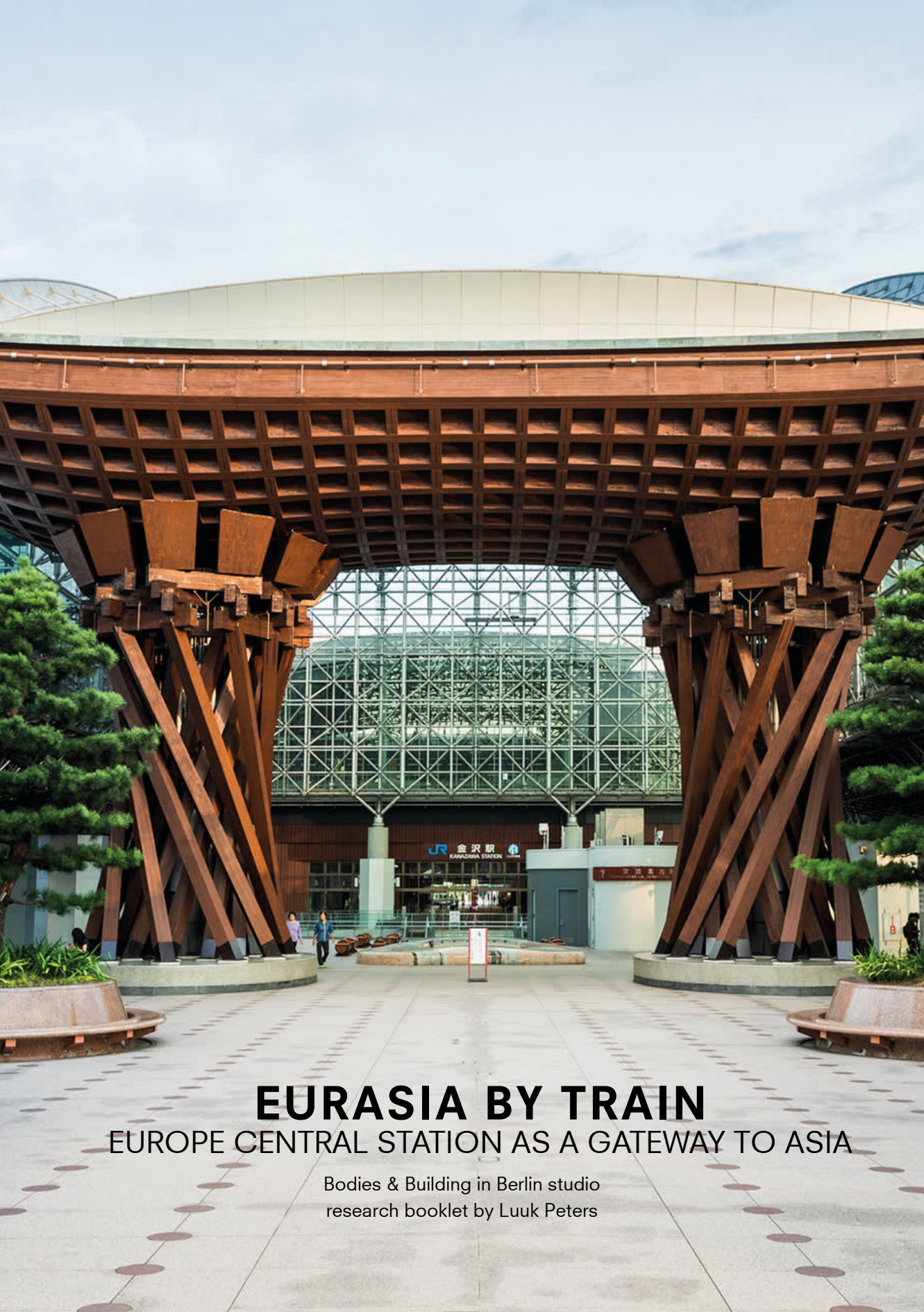


EURASIA BY TRAIN

EUROPE CENTRAL STATION AS A GATEWAY TO ASIA

Bodies & Building in Berlin studio
research booklet by Luuk Peters

INDEX

INTRODUCTION

01

Thesis Topic

In this Thesis, research is done on an intercontinental train station in Berlin as a gateway to the Silk Railroad that connects Europe & East-Asia. It shows the results of the research based on three topics: Client, Program & Site. These results are substantiated by further research on the trainstation itself such as; history, typology, type, morfology, flows, etc.

This Design Brief provides the requirements for how an intercontinental train station should be designed based on the three topics. It highlights what the ambitions of the client & stakeholders are & the needs of its users. It provides a detailed breakdown of the main program and 'new' program. And finally it shows what the best location is and how that location influences the massing of the trainstation.

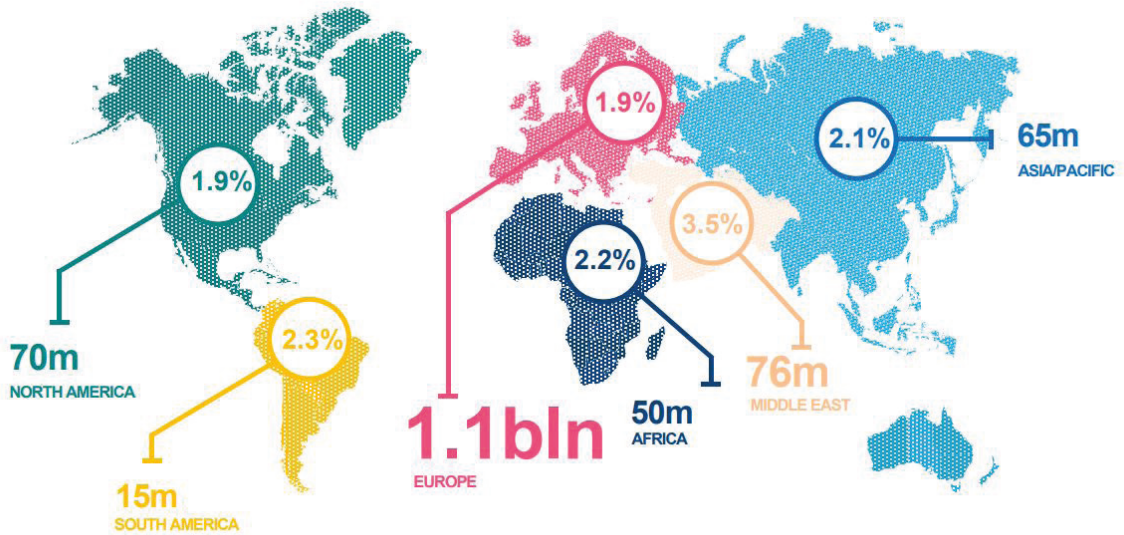
Problem Statement

Nowadays, climate change is on almost every country's agenda. Many agree that we must act now rather than later to keep the world a liveable place. Therefore, in 2015, 196 parties came together to discuss this topic at the twenty-first session for the Conference of the Parties (COP 21) in Paris, organized by the United Nations. This resulted in The Paris Agreement, which is a legally binding international treaty related to climate change. The long-term goal of this agreement is to limit global warming to below 1.5-2 degrees Celsius compared to pre-industrial values. The countries want to reduce the global greenhouse gas emissions as soon as possible to achieve this long-term goal and a climate neutral world before mid-century.[1]

Though, it is also estimated that the amount of passengers traveling by plane to Asia will increase in 2050 towards 65 million (Figure 1). And on top of that, long haul flights will still account for more than 50% of the CO_2 emissions of flights in 2050 (Figure 2). Besides, short haul flights still have the highest CO_2 emissions per kilometer per passenger (Figure 3).

Transporting more by train and less by plane could help to achieve the climate goals set by the Paris Agreement as it is much less CO_2 emmissions. Besides, the train is closing the speed gap with the airplane (figure 4) with the help of technical innovations. Furthermore, traveling by train has a higher comfort experience than traveling by train.

In Europe you can already notice a change as there is a growing demand for low-carbon travel. The overnight train services are making a comeback and countries are investing more



Figures 1 | Intercontinental flight passengers from Europe to other continents

in high-speed trains. This already resulted in a large connected high-speed railway (HSR) network in Europe (figure 4). However, this network could still be improved and HSR connections between continents are still lagging behind. For example, to get from Moscow to Beijing by train via the Trans-Mongolian railway route takes 6 days. Which costs way more time than traveling by plane.[2]

Therefore it is important to further develop the European HSR network to replace the short haul flights and to investigate new mobility concepts to travel between continents. The China Railway Rolling Stock Corporation (CRRC) already developed a high-speed magnetic levitation (maglev) train that could reach a top speed of 600 kilometers per hour.[6] Which would reduce the trip between Moscow and Beijing to only 10 hours.

By improving this intercontinental railway network (ICR), traveling by train between the continents could become more attractive. resulting in less flights between the continents and therefore less CO_2 emissions. There are already some ideas for this new connection to transport more freight by train and at some point passengers as well.[3]

A new direct connection between Europe and Asia would also ask for a new type of train station which can accommodate this new ICR connection. At the moment, such a station doesn't exist.

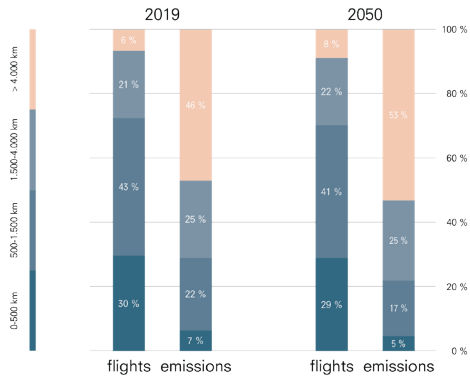


Figure 2 | Departing flights & CO2 emissions

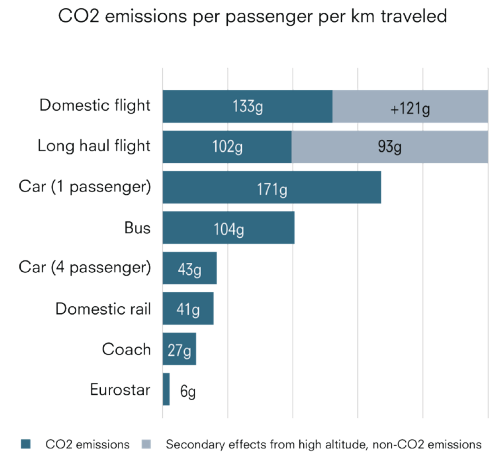
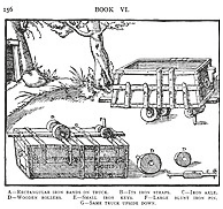


Figure 3 | Transport CO2 emissions

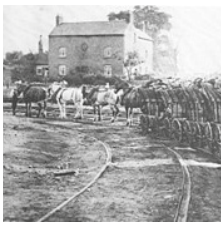
1556
Rail used in coal mines



1515
Wooden rails introduced

1500-1600

1604
Wallaton wagonway



1600-1750

1760
Metal rails introduced

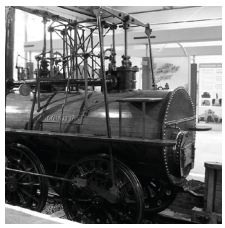
1758
Oldest operation railway (Middleton)

1750-1775

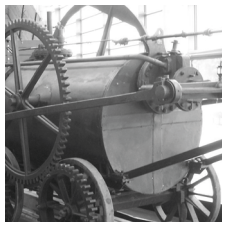
1788
Cast iron rails introduced

1775-1800

1825
Widespread of steam engines



1804
First steam engine Richard Trevithick



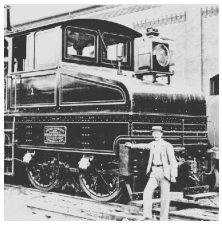
1800-1850

25 km/h

Figure 4 | train development; closing the speed gap with airplanes

2012
Hyperloop introduced

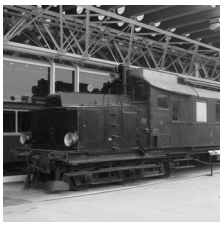
1895
Introduction of electrified trains



2014
Maglev trains introduced

1882
First electric rail vehichle

1914
Diesel trains introduced



1964
Shinkansen high speed train

2018
Hydrogen powered trains introduced

1968-2022
Boeing 747

1850-1900 | **1900-1950** | **1950-2000** | **2000 >** | **2000 >**

600 km/h **900 km/h**

Research Question

This Design Brief researches a futuristic scenario where the world is connected by train. It focusses on connecting Europe & Asia by train. A direct connection along the Silk Railroad is speculated between China & Germany; the largest economies of their continents (figure 5). Germany is also the geographical center of Europe and the Shengen area, therefore in the middle of the Trans-European Transport Network (Figure 6). That is why an intercontinental train station is proposed in Berlin.

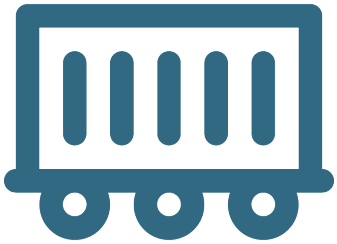
This Design Brief will research what the requirements are to design an intercontinental station, if intercontinental traveling by train becomes the standard? Several subquestions are given to provide an answer to this question:

- What are the potentials of a direct gateway to Asia?
- How can the train passenger experience be preserved in an intercontinental station while providing enough safety?
- What is the best location for an intercontinental train station in Berlin?

The research will provide the requirements to design an intercontinental train station in berlin as a gateway to the silk railroad that connects Europe & east-asia. The main outcomes are that there is a need for border control, the cultural encounter should be integrated in the design and extra prgoram is added to provide freight services along the connection.

border control

cultural encounter



economic gateway

Figure 5 | Railway connections between Berlin and Beijing

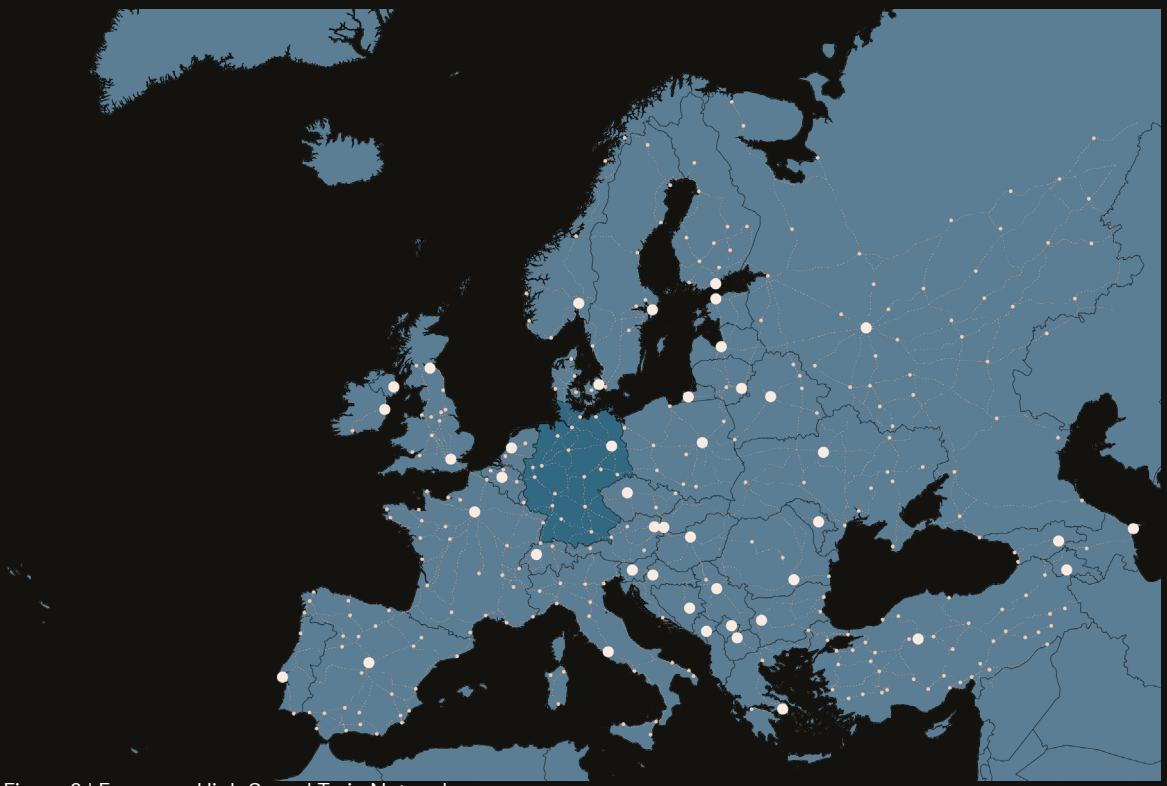


Figure 6 | European High Speed Train Network

RESEARCH FRAMEWORK

02

History

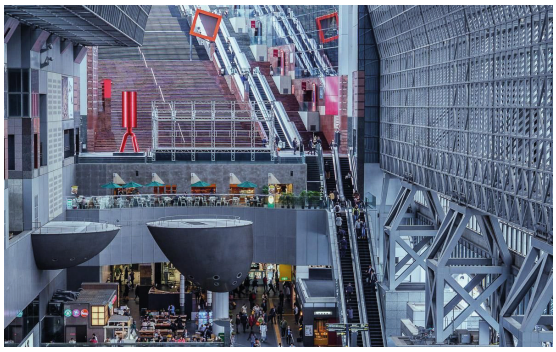
Throughout the years, the railway station has developed from a simple node at the outside of the city towards an interwoven entity inside the city with a lot of non-transport functions (Figure 7 & 8). Based on the needs of the users (travelers, tourists, commuters, residents, etcetera), more and more commercial services and activities are present in the train station nowadays. In Asia, in Japan and China for example, the station has become a tiny little city inside the city. These stations can almost be compared to airports regarding their passenger services.[4]

In Europe there is a slight difference. The commercial services and train station operational services are more separated and the focus is on a well organized mobility hub where an efficient connection between different kinds of transport modes is (also including bikes and carsharing). The surroundings of the train station should be integrated into its design without a front and back side, but rather two front sides. Although there are slight differences, in both cases the amount of commercial services increased by a lot.[5]

Thus, the railway station used to be a place just to depart or arrive from, but nowadays it is more a place to stay and spend time.[6, 7]

19th centure: outside city

20th century: inside the city



21st century: fusion with the city

Figure 7 | History of train stations

1830 - 1850	until 1900	until 1950	until 1970	until 2000	… future
ORIGINS	EXPANSION Bustling developments	MODERNIZATION	DECLINE	RENAISSANCE	CONSOLIDATION
Station>Node	Station>Node+Place	Station>Node+Place Surroundings> Place	Station> Node Station+Surroundings> Non Places	Station+Surroundings> Node+Place	Station+Surroundings> Node+Place
Experimentalism (Airport like)	Accent on Image Terminals Era			Accent on Image (Airport like - in the city)	Accent on Integration
Outside the	city	Inside the	city		*Fusion* with the city
Polarization Railway as a development	factor of city		*Front and back* Railway as an development	*side syndrome* obstacle to city	Interwoven Railway as a development partner

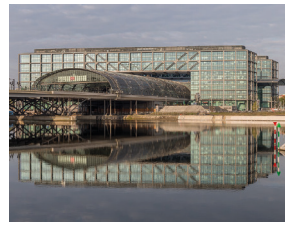
Figure 8 | Development periods of station areas

Types of trainstations

Looking at the stations of today, one can subdivide them into different categories. In Germany's case, there are seven categories based on capacity, size and provided services (Figure 10). They range from a simple halt (category 7) to a small urban city such as the Hauptbahnhof. (category 1). But the intercontinental station doesn't fit any of these categories, which makes this study relevant to find out what this new type of train station is and what the difference are with the other categories (Figure 9).

The question now is, will the needs and expectations for high quality commercial services of the train users increase when designing an intercontinental train station? Or are there other services this station should provide to satisfy the traveler?

Figure 9 | New type of train station; category 0



1. Hauptbahnhof

2. Postdamer Platz

3. Reutlingen

4. Bautzen

5. Koln-Holweide

6. Loxstedt

7. Eggesin

Figure 10 | Station categories in Germany

RESEARCH METHODS

03

Client
To research the involved Clients, online research will be conducted to determine relevant entities. The Client will be subdivided into four different groups: the 'client' that will own the station, the 'initiaters' that have who came up with the plan, the 'stakeholders' that are involved in the plan & the 'users' that will make use of the station.

For each group, their ambitions and needs are devined. These ambitions will provide the project with needed program, archtectural expressions & goals.

Program
To research the Program, several techniques will be used. Mainly the program will be defined by benchmarking, supported by online research, explorative interviews and 3d massing. First of all, the essence of an intercontinental train station is defined to better structure the benchmarking process. The core program and the additional program needed for intercontinental services will be defined by comparing international oriented train station. This will serve two main goals.

The first goal is to develop a program bar and a relation scheme for the different functions that should be present in an intercontinental train station. This research will result in the amount of square meters needed per functions, the height of the spaces and criteria of the spaces. This is done by comparing the core program of the case studies related to the amount users they have. Based on those factors, a educated guess is made to define the program size of the intercontinental station.

On top of that, the research will result in a relation scheme between the different functions. This relation scheme also provides a flow chart of the building, describing how passengers and other users move through the station. Furthermore, it will result in design recommendations to create good transitions between the different functions.

Key spaces such as the station hall, passage, platform & tracks and lounges will be researched in more depth.

The second goal is to provide pros and cons for different program configurations. Making sure that a well-considered design choice can be made between different massings for the optimal orientation.

Site
The site is chosen through map analysis based on relevant topics related to an intercontinental train station. This will provide key criterias to position the station in Berlin. The map analysis will research the local infrastructure of Berlin as well as the international railway connections to other capitals in Europe. On top of that, it will provide a good intercontinental connection to Asia.

It will research available plots inside Berlin which can accommodate an intercontinental train station. Also a connection should be made to the local and regional transport network. Research will provide design elements to make a good connection with the urban surroundings.

On top of these requirements related to the train station itself, there are also three group related requirements related to the topic 'Future' to define a location for the train station which should be taken into account. These requirements are related to the 'Development Areas', the 'Building Ages' and the 'Urban density' of Berlin.

Once the site is chosen, further map analysis will provide more detailed information about the site such as connections to other transport, important urban axes, size & function of surrounding buildings, etcetera. Furthermore, a site visit and online research will be executed to capture the current developments on the site. This will result in design elements to integrate the intercontinental train station within its urban surroundings.

With the research done, a massing study will provide the best configuration for the location.

Main research methods:

- One-on-one interview

- Focus groups

- Case study research

- Data research

- Site visit

DESIGN BRIEF

04

Client

To define the ambitions of the Client, the Client is subdivided into three different groups: the Client, the Initiaters and the Stakeholders. For each group, the ambitions are defined. Thereafter they will be compared to end up with overall client ambitions.

The Initiators of this project are the 'European Union' and the 'Asia Cooperation Dialogue' (Figure 12) as they want to provide a stronger connection between the two continents as there is a lot of trade between the continents, sharing of knowledge and a common responsibility to protect the environment (Figure 11). In the long-term, they want to replace the long-haul flights between the EU & Asia by rail traffic which results in 150.000 daily passengers in 2050.[8, 9]

For the train station in Europe, there are multiple political stakeholders involved; the 'European Commission' with several agencies such as the 'Agency for Railways', the 'Federal Government of Berlin' with the ministries of 'Foreign Affairs', 'Railways' & 'Digital and Traffic' and the 'City of Berlin'

Figure 12 | Initiators; European Union (EU) & Asia Cooperation Dialogue (ACD)

Figure 13 | Political stakeholders; European Commission, Federal Government of Germany & City of Berlin

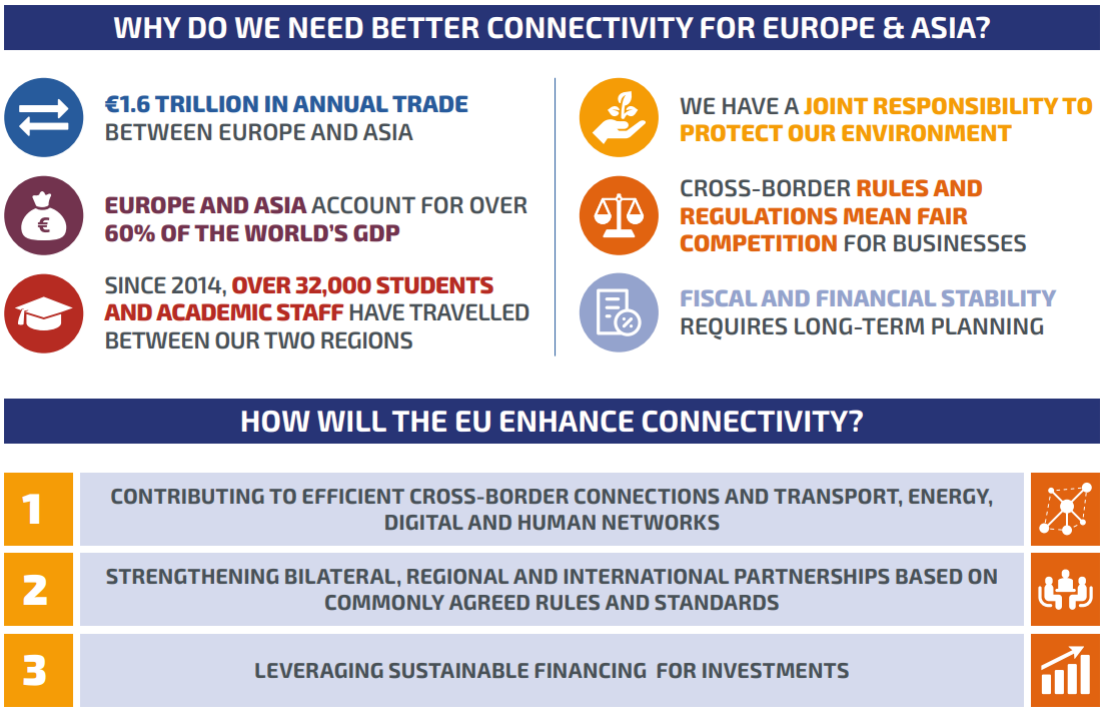


Figure 11 | reasons for better connectivity between Europe & Asia

(Figure 13). Their ambition is to create a sustainable gateway another culture and economy, while providing a safe, efficient and comfortable travel experience.
To guaranty a safe, efficient and comfortable travel experience for the passengers, an innovative border control solution should be integrated using new technologies such as e-tickets, e-passport control and independent baggage control.

As the station will bring two continents closer together, this should also be expressed. Exhibition space should be provided to educate passengers about the history of the Silk (Rail) Road. Furthermore, the cultures of Europe and Asia should be expressed in the architecture.

For the gateway to another economy, the new connection will be used for packaging services, therefore three freight stakeholders are involved: DHL, SF Express for the packaging services and DB Schenker for the transport of the packages (Figure 14). Their ambition is to create a logistics hub at the station from where packages can be delivered by drones or further transported to other (parts of the) city via freight tubes underground.

Figure 14 | Freight services stakeholders; DHL, SF Express & DB Schenker

The main client for this station in Berlin is the Deutsch Bahn Group (DB Group). DB is the largest railway company in Germany operating passenger services, freight services (DB Schenker), the infrastructure (DB Netze Tracks) and more than 5.000 stations (DB Netze Stations) (image 15). The company also operates in other countries in the world, providing long distance transport for passengers and also freight.[10]

The ambitions of the DB Group is to provide train services for the climate, the people, the economy and Europe. They want to provide sustainable transport to achieve EU's climate goals, provide freigth services for a greener economy, preserve individual mobility as 85% of the population will live in metropolitan areas in 2050 and whant to be a pioneer for advancing European objectives as they are at the heart of the European rail network.[11]

Basic understanding of DB Group

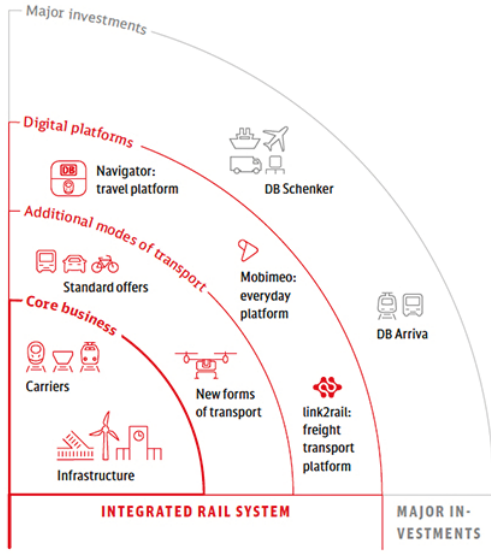


Figure 15 | Basic understanding of DB Group

Thus, the overall ambitions of the initiators, stakeholders & client can be defined as follow: 'create a sustainable transport gateway to Asia while providing a safe, efficient & comfortable travel experience to strenghten cultural and ecnomic relations'.

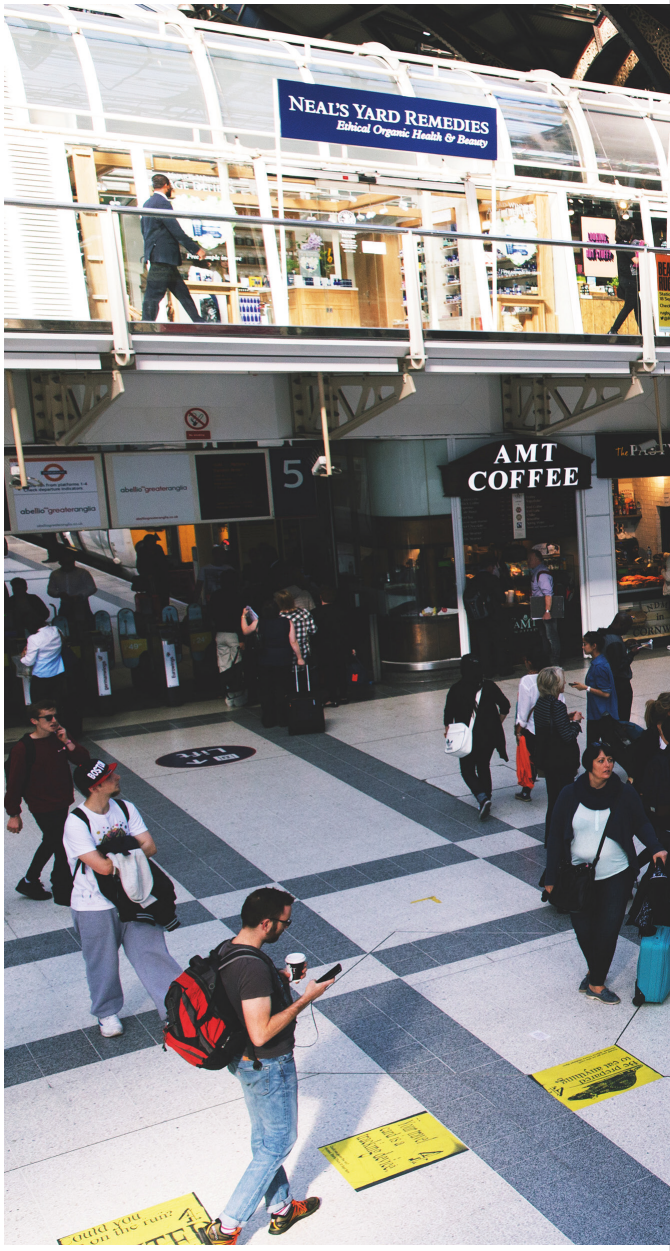
Besides the initiators, stakeholders and clients, the 'Users' are also defined. They can be subdivided into two groups: people traveling for leisure (individuals, families, groups, friends, elderly, etc.) or business (for meetings, business fairs, client visits, etc.).[12, 13]

The people traveling for leisure need the station to function as a destination. It is the start of their cultural journey and should provide information about the other culture. History about the Silk Road should be integrated in the station. Besides, support services such as a money exhange, information services and telephone providers should be present.

For the business travelers, enough office spaces should be present at the station while waiting on the train. On top of that there should be rooms for meeting such as board rooms, conference rooms & meeting rooms. Finally the journey should be as efficient as possible including fast border control and a door-to-door mobility service with autonomous pods where you'll be able to continue working.

Thus, the user needs can be concluded as a 'station as a destination' (providing cultural engagement, shops & food) & business friendly (providing work spaces, meeting/ conference rooms & door-to-door mobility).

Combining the ambitions of the Client and the needs of the users, there can be concluded that the station should act as a green gateway that provides a safe, efficient & comfortable travel experience to strengthen cultural & economic relations.




Welcome to Liverpool Street Station
LUSH
paper scripts
Network Rail welcomes Rugby World Cup 2015 supporters
15:36 09
Pick Your Own Offers. Only from Waitrose.
Start picking at waitrose.com
Waitrose
JCDecaux
Information
stanstedexpress.com
stanstedexpress
Train doors close up to 30 seconds before departure
East

A **GREEN GATEWAY** THAT PROVIDES A **SA**
EFFICIENT & COMFORTABLE TRAVEL **EXP**
STRENGTHEN CULTURAL & ECONOMIC

AFE, PERIENCE TO RELATIONS

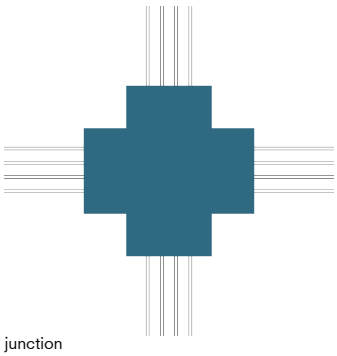
Program Use Case Study

For every use case, relevant data was gathered to compare the program of the different projects (Figure 17: for more information see Appendix 1). These are the use cases that are compared: St Pancras International, Amsterdam Central, Rotterdam Central, Utrecht Central, Ten Hague Central, Berlin Central, Hamburg Central, Zurich Central (figure 18). The program was subdivided into different categories: Mobility, Passenger services, Operational facilities, Circulation space, Addtional program & Extra program. These were further divided into multiple spaces.

The mobility consist of the platforms & tracks for the train, metro, tram and bus. The passenger services consist of information, tickets & luggage services as well as lounges. The operational facilities consists of station offices & security. The circulation space consist of the station hall & passage. The additional program consists of commercial, parking, station square, & logistics. And the extra program consists of Hotel, Offices, etc. The data of the casestudies is used to make calculated guess for the program of the intercontinental station.

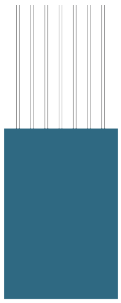
In the specific case of HSR stations, outcomes indicate that through-stations in city centers work better than termini, emphasizing the role of feeder systems for those located on the outskirts (UIC 2010).[14, 15] (Figure 16). It has multiple directions, efficient flow-through, is efficient with space and has a clear layout.

Based on 150.000 passengers a day in 2050, there is a need for 14 tracks which results in 14 platforms; 4 intercontinental, 6 international & 4 local. The intercontinental and international platforms are 500m long as these trains can be that length. The platforms need to be between 9-15 meters wide. The distance between the platforms should be between 8-12m. The height of the shed should be between 10-30 m heigh (depending on if it is undergound or above ground). This results in a space of around 150x500m = 75.000 m^2.



junction

flow through



terminal

Figure 16 | Types of stations

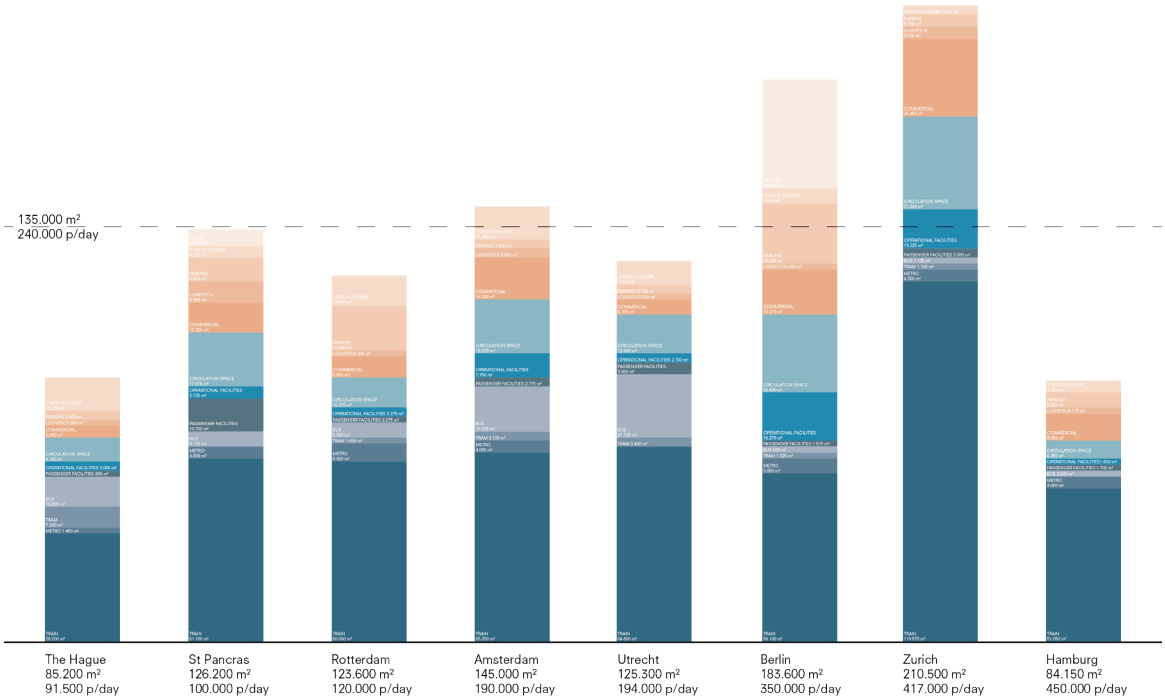


Figure 17 | Case studies; program bar

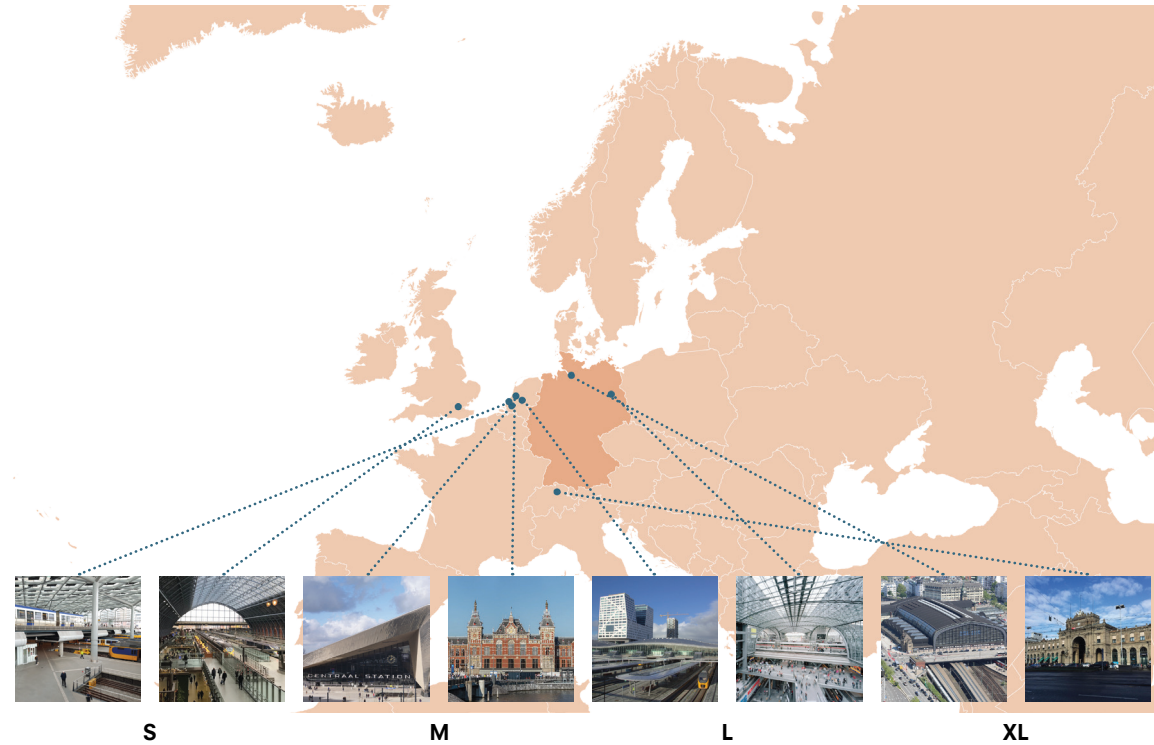


Figure 18 | Case studie; location

To access the platforms, vertical clusters are used in the lounges consisting of a lift, multiple escalators and stairs. For the long platforms, two access clusters are needed that are 90-150m apart from each other. The height differences between the platforms and lounges should be minimal, to prevent long stairs and escalators (figure 20).

The passage should connect the two sides of the station and is therefore minimal 150m long and 30m wide, around 10.000 m^2. Two passages are needed and they can be stacked. Adjacent to the passage should be the passenger services and some of the additional program (commercial). This is commercial for on the go consisting of fast-food, coffee shops, etc.

The station hall should be a landmark of 7.000 m^2, making it easy to find the entrance of the station.

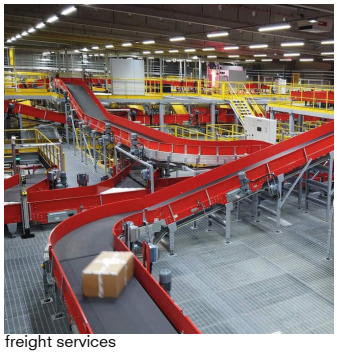
Extra program

The extra program added for an intercontinental train station are border control, packaging services & the expression of the two cultures (Figure 19). On top of that, the lounges are much larger compared to traditional stations.

For border control new technologies are implemented, making it more efficient (timewise and space it takes). The border control consists of ticket gates, e-passport gates and independed luggage control. These new technologies can handle 10 persons/ minute[16], which resuls in 10 departure lines (ticket, passport & luggage check) and 10 arrival (passport check) lines resulting in 700 m^2. Besides there are backoffices to keep an eye on the process which takes 500 m^2. The border control is located in front of the lounges.

For freight services, a logistics hub of 50.000 m^2 is needed to handle to packeges automatically.[17] The packages are further transported by freight tubes or drones (Figure 21).

border control


freight services

cultural encounter

Figure 19 | Extra program

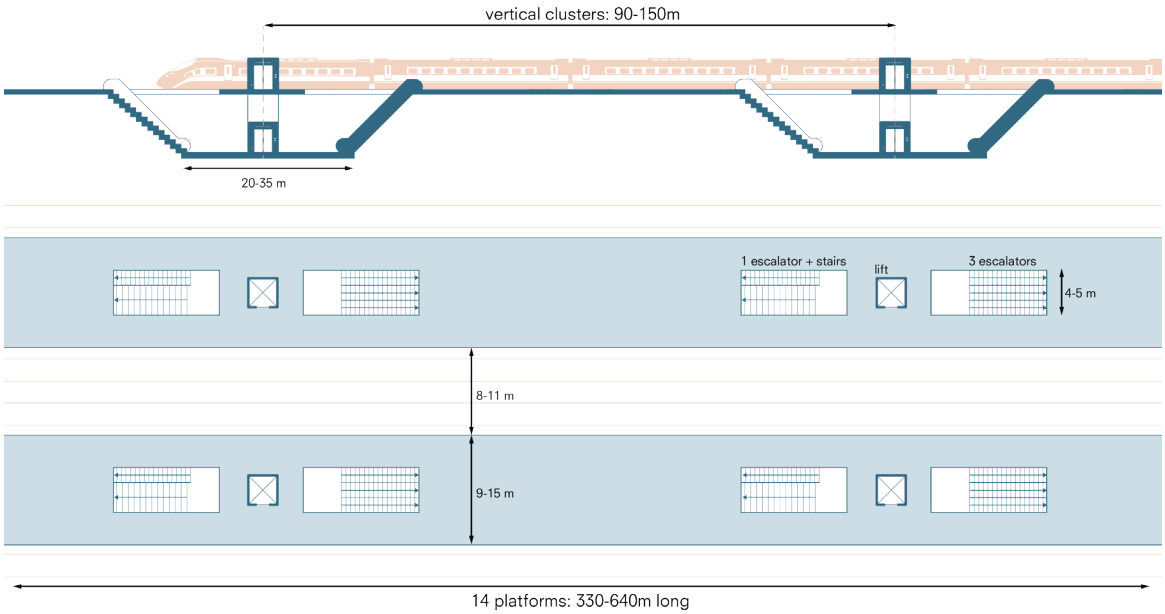


Figure 20 | Platforms & tracks measurements and accessibility

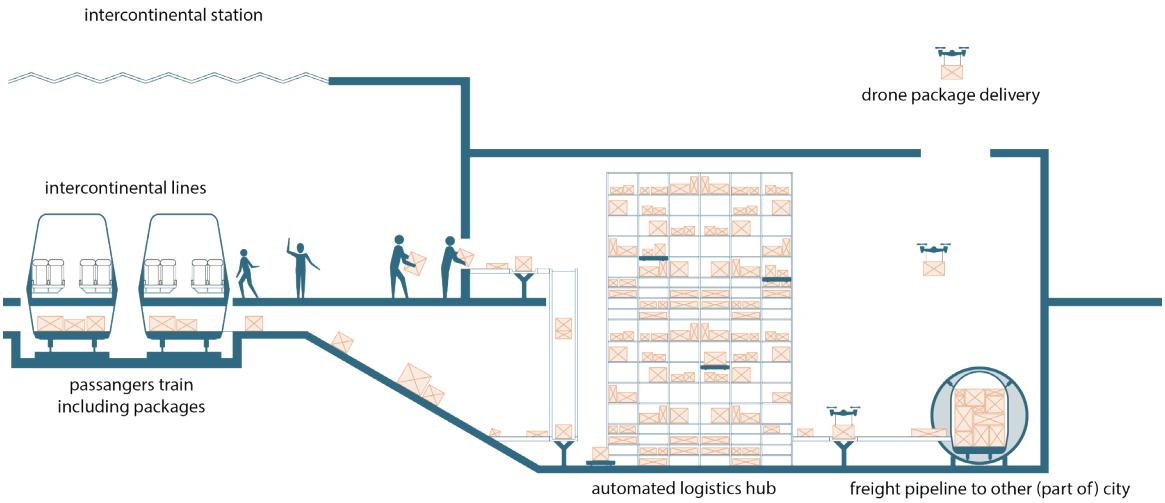


Figure 21 | Packaging services

The expression of culture is done by exhibitions spaces (4.000 m²) which provides information about the Silk Road connection and expresses the two cultures. These exhibiton spaces are located in the lounges.

The lounges are quite largers (12.000 m²) as they need to handle al the intercontinental and international passengers. The lounges are split into two; one for the intercontinental platforms, one for the international platforms. In the lounges the border control, exhibition spaces and commercial program is located. The commerical in the lounges is of higher quality and more relaxt as people spend more time here.

Program bar & relations

With the data of the casestudies and the research done on the extra program, an educated guess can be made for the entire program which is showcased in the program bar (Figure 23).

A further investigation on the different flows inside the station (passengers, staff, freight & goods) results in the program relation scheme (Figure 22).

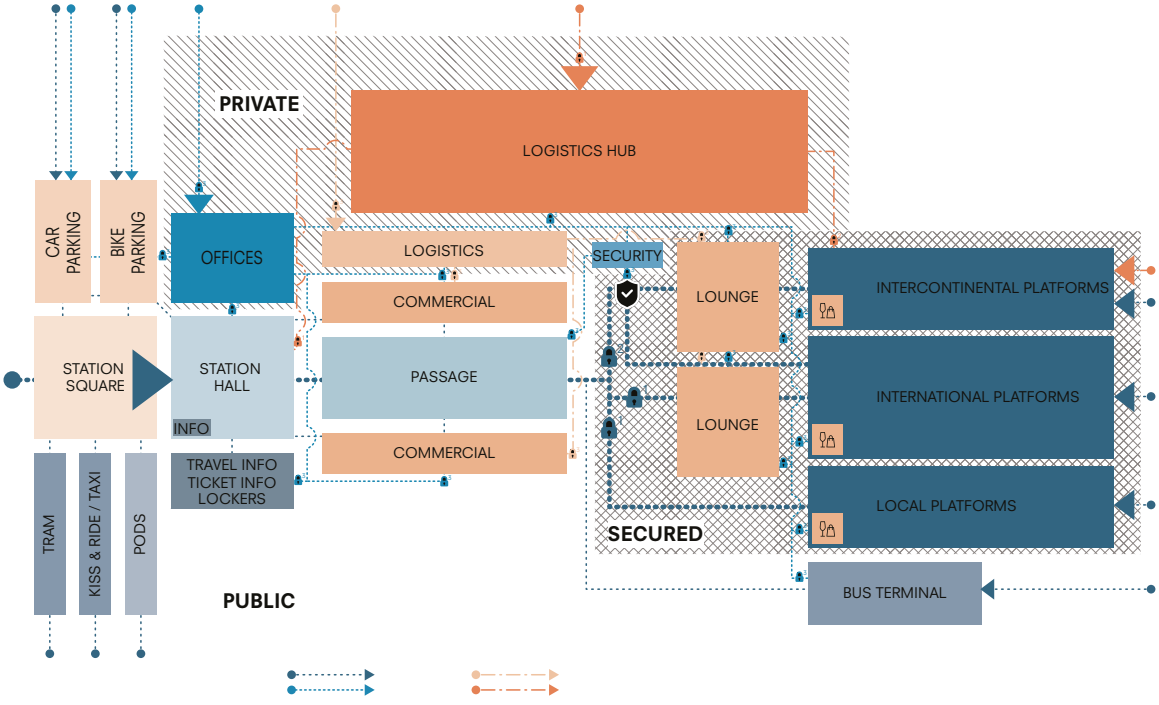


Figure 22 | Relationscheme program Europe Central Station

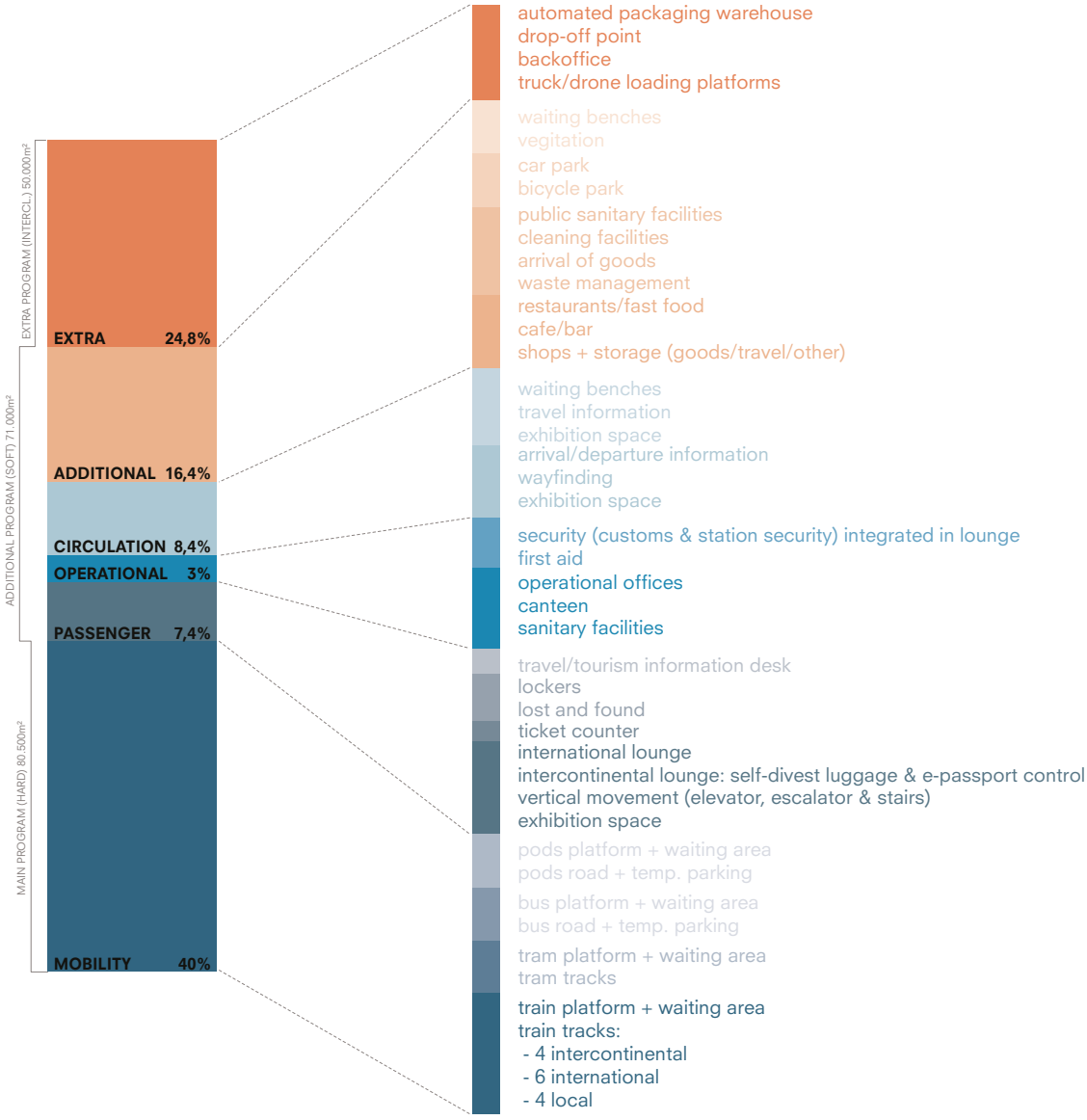


Figure 23 | Basic program breakdown of Europe Central Station

Massing
A massing study is done to find the optimal configuration for the program. The folowing three configurations are best suited (for the other studies see Appendix 2):

Stacked above ground (Figure 24)

+ ideal passenger flow
+ ideal for packaging
+ ideal for staff
+ compact design
+ one main passage

- split levels
- not ideal for capacity

Compact under & above ground (Figure 25)

+ ideal passenger flow
+ ideal for staff
+ one main passage
+ compact design

- not ideal for packaging
- not ideal for commercial (2nd floor)
- split level
- not ideal for capaicty

Spread underground (Figure 26)

+ compact design
+ ideal for capacity

- not ideal for passengers
- not ideal for packaging
- not ideal for staff
- program spread far away

logistics hub

parking

additional program

circulation

operational program

passenger facilities

mobility

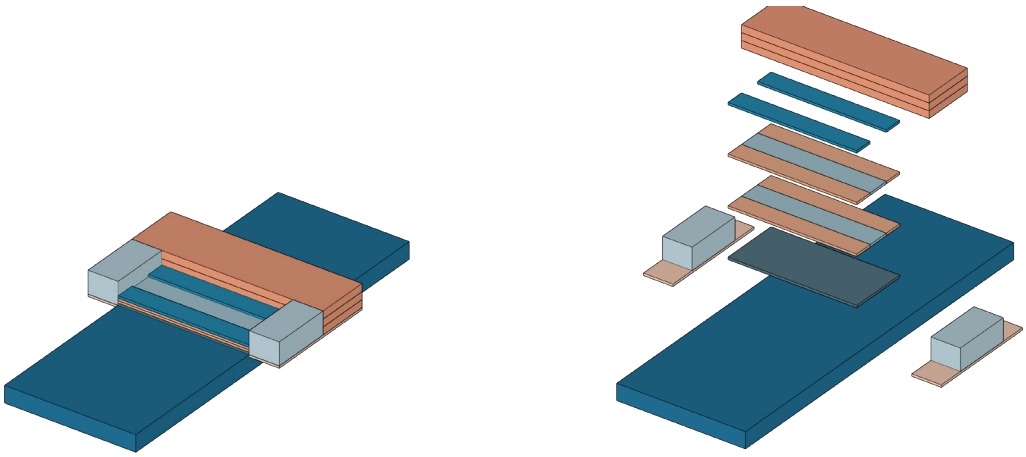


Figure 24 | Relationscheme program Europe Central Station

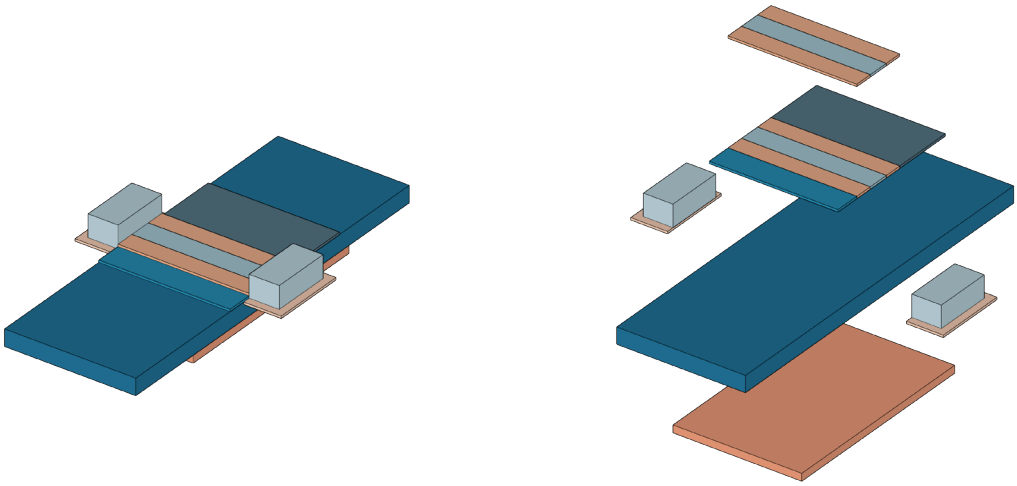


Figure 25 | Relationscheme program Europe Central Station

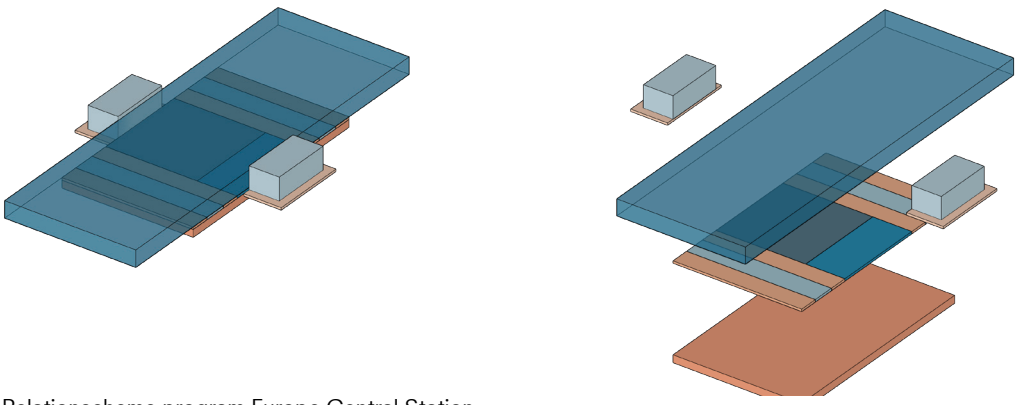


Figure 26 | Relationscheme program Europe Central Station

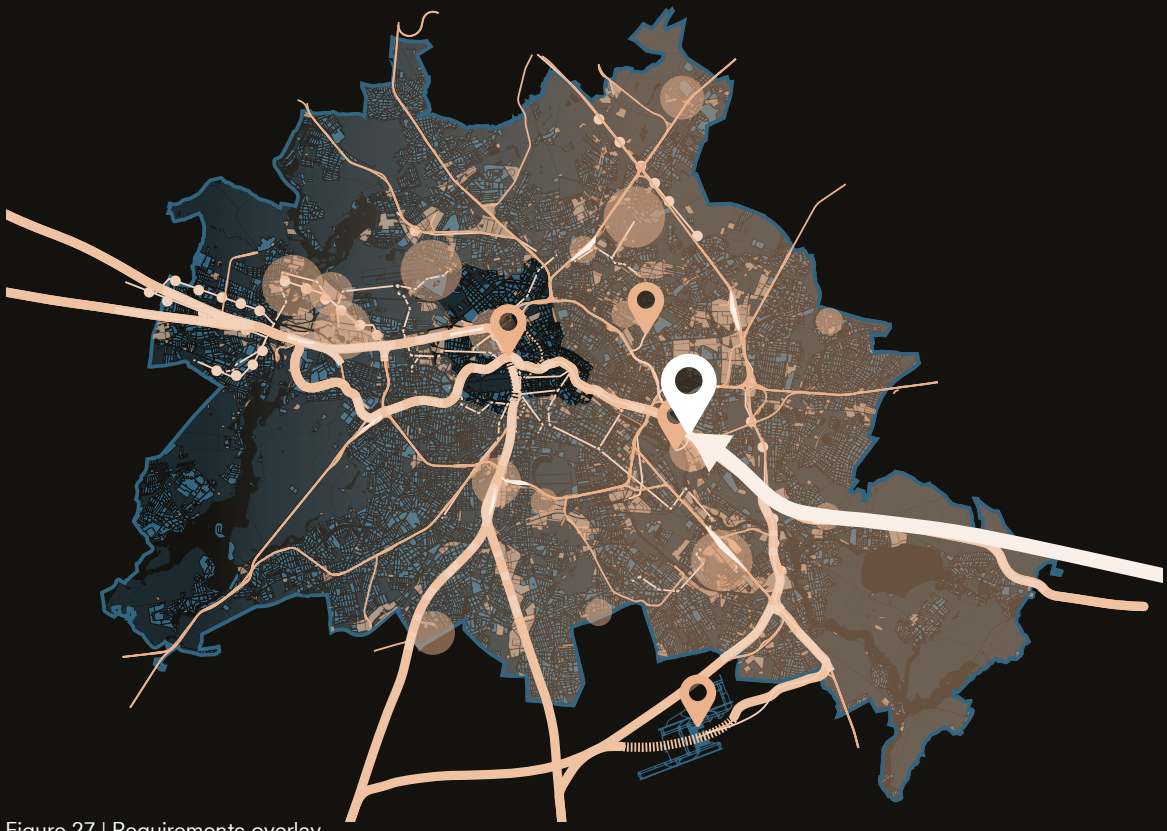
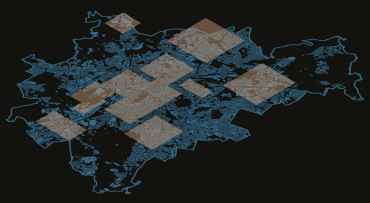


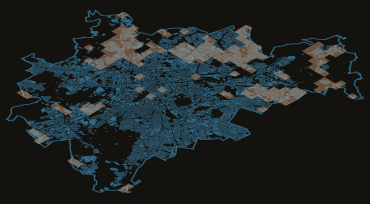
Figure 27 | Requirements overlay



future development

railway corridors

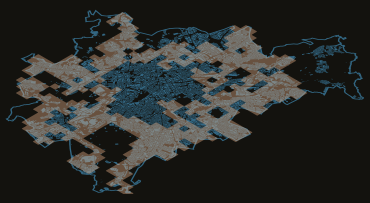
industry



building age < 1989

railway barriers

shunting yards



low density

current city development

intercontinental, international & local rails

Figure 28 | Requirements mapping

Site requirements

To choose the site, there are three main requirements that should be taken into account. First of all there are three group requirements related to the Future theme, secondly there are the general station requirements and thirdly you have the intercontinental station requirements. These three requirements are subdivided into multiple requirements (Figure 28).

For the future of Berlin, we've mapped future development areas, the low density areas and the areas where the age of the buildings are below 1989. This was done to map the areas in Berlin where future development is more likely. The conclusion is that Mitte is relatively well developed compared to the other districts. On top of that, there is more potential for development in the East of Berlin. Therefore the intercontinental train station should be positioned in the East of Berlin.

The train & intercontinental requirements were divided into six different requirements: placing the station on a railway corridor,;placing the station somewhere on a railway barrier (to use the station as a connection); place the station next to current city development; place the station next to industry (for potential development); place the station on a shunting yard (enough space); make sure the station has connections to the new intercontinental network, the international network and the local network.

By overlaying these requirements, the optimal location for an intercontinental train station in Berlin is found (Figure 27). This is located in the distric Rummelsburg. There is already a train station present at this site (Betriebsbahnhof), but this station is very small and outdated (see next page).

interc., intern. & local connections

on railway corridor

removing railway barriers

close to important locations

enough space (shunting yard)

potential future development

accessible location

Image 2 | Betriebsbahnhof Rummelsburg

Image 3 | Shunting yard in back

Image 4 | Park in front

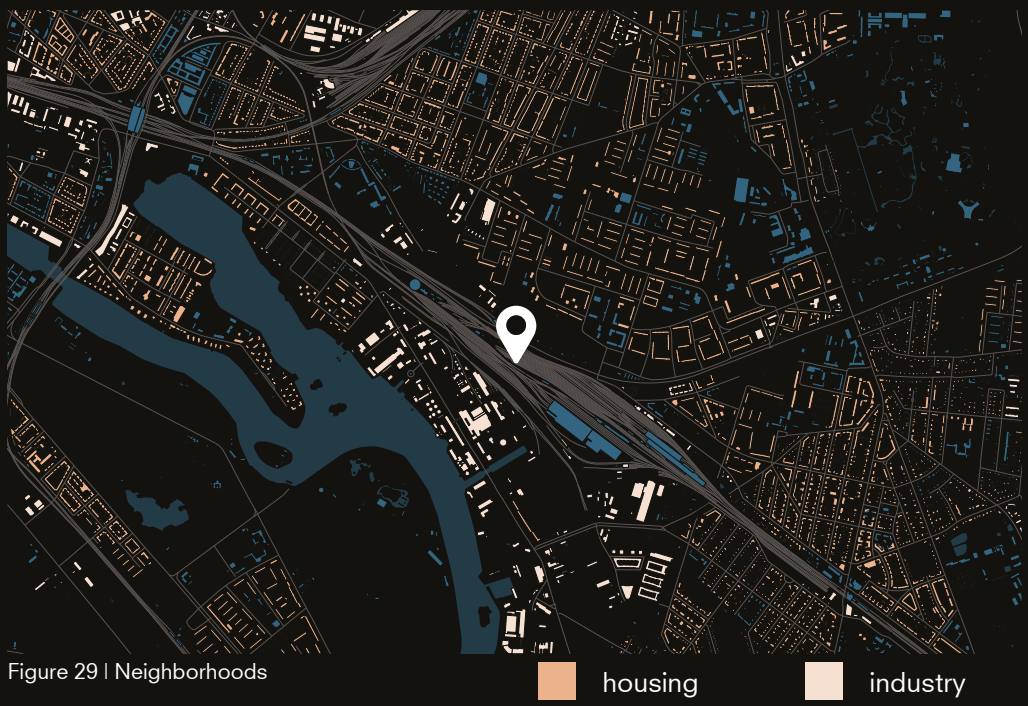


Figure 29 | Neighborhoods

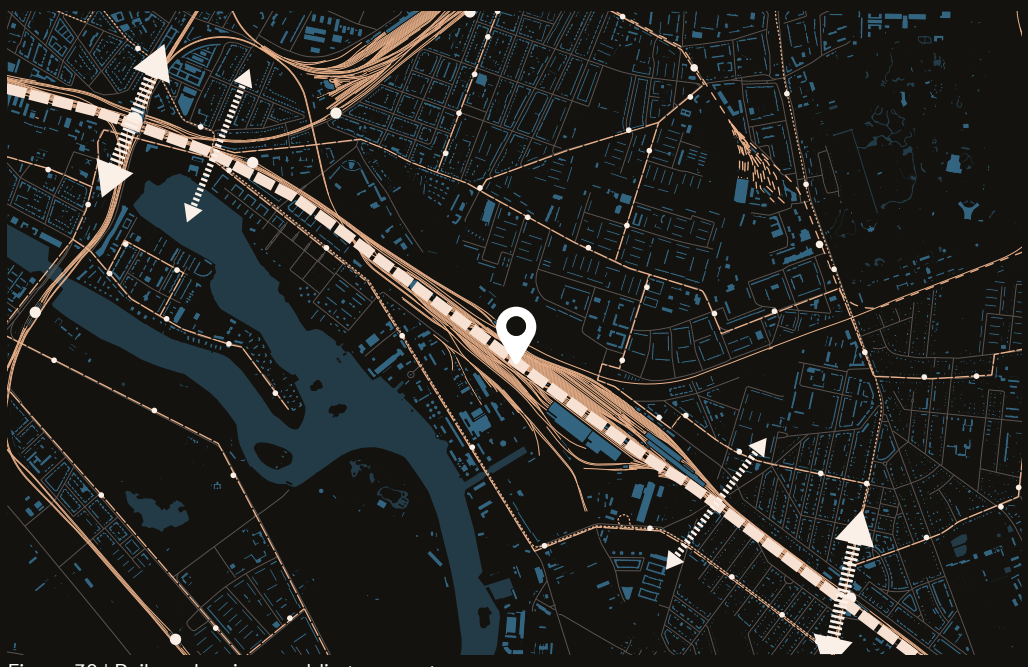


Figure 30 | Railway barrier + public transport

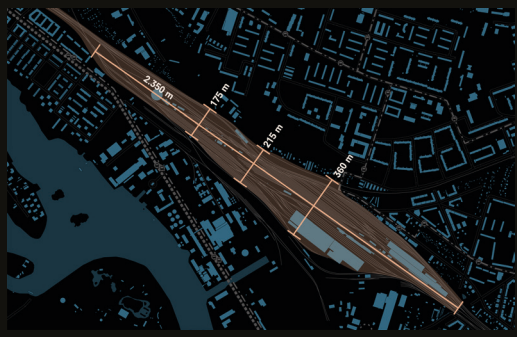


Figure 31 | Enough space

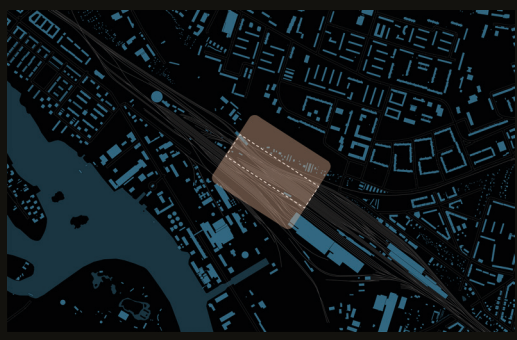


Figure 32 | Space for landmark

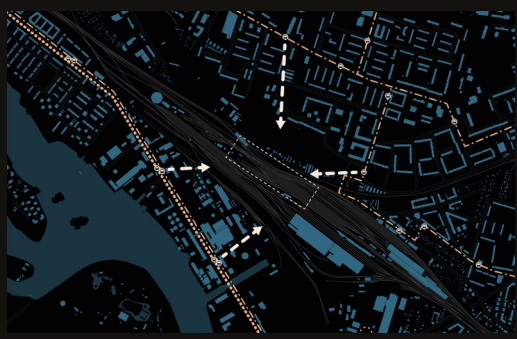


Figure 33 | Accessibility

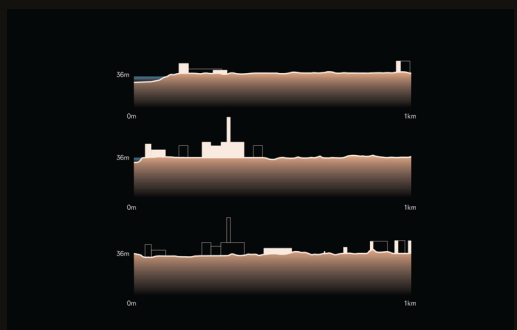


Figure 34 | Site sections

1 | 40.000

Site analysis

Further analyzing the site provides a better understanding on where the station should be positioned and what kind of area it is positioned.

Starting with an analysis on the neigbhorhood (Figure 29). On the north side it is mostly housing with 'Plattenbau' buildings. Compared to Mitte the density is very low here: In Rummelsburg it is 71-250 inhabitants/ha & 0,1 to < 0,2 land to building ratio and in Mitte to 250-450 inhabitants/ha (max 550 or more) & 0,6 to < 0,7 land to building rati0. Therefore there is potential to further densify the North side.

On the South side you will mostly find industry. This has the potential to be redeveloped into an Intercontinental Business District (IBC). But some of the industrial heritages should be preserved.

Looking at the railway barrier (Figure 30), the station should be positioned somewhere in the middle to provide an extra connection between the two sides.

Zooming in on the shunting yard, there is enough space for the multiple platforms of 500m long and enough space for the station hall to create a landmark (Figure 31 & 32).

Finally, the station area is well accissible by other modes of transport (Figure 33), but they should be more integrated into the new station plan. Besides, the area is well accessible for the pedestrian and cyclist as the site is relatively flat (Figure 34).

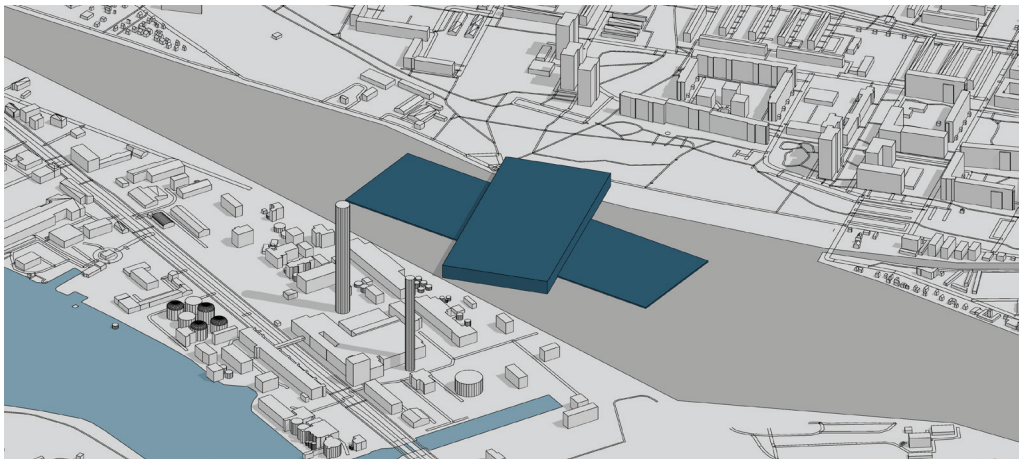


Figure 35 | Cross

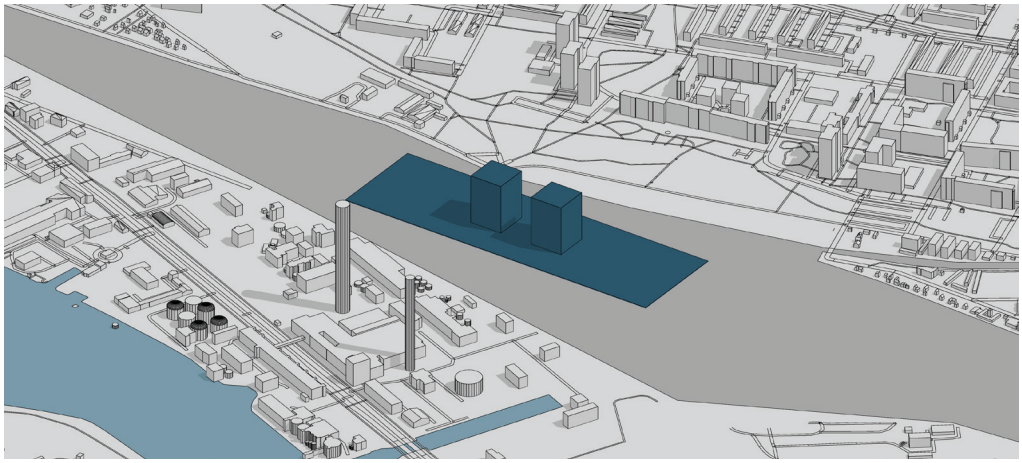


Figure 36 | Two towers

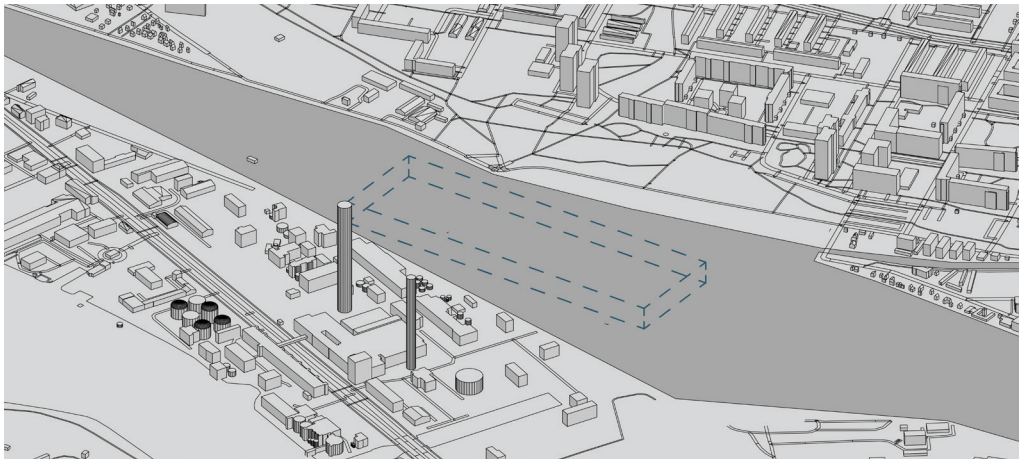


Figure 37 | Underground

Site masing

With the conclusions from the analysis, a site massing study is done (Appendix 3). This resulted in three possible configurations; The cross, the two towers & everything underground.

In all the three options, the railways are underground as this solves the visual barrier and impact on the location the best. In addition, it provides a lot of land for future development an a park.

The first two options also highlight the green corridor of the site. The first with its volume and the second with its gap. The pro's and cons are as followed:

Cross, tracks underground (Figure 35)

+ barrier mostly gone
+ highlighting green corridor by shape
+ clear entrance points
+ space for new development
+ less noise/air pollution
+ shape as landmark

- small barrier on other axis

Two towers, tracks underground (Figure 36)

+ barrier mostly gone
+ space for new development
+ less noise/air pollution
+ towers as landmark
+ green corridor

- not a station configuration

Everything underground (Figure 37)

+ barrier completely gone
+ no sound/air pollution
+ lots of area to develope

- no symbole/landmark

URBAN VISION 2050 | STATION AS GREEN CONNECTOR

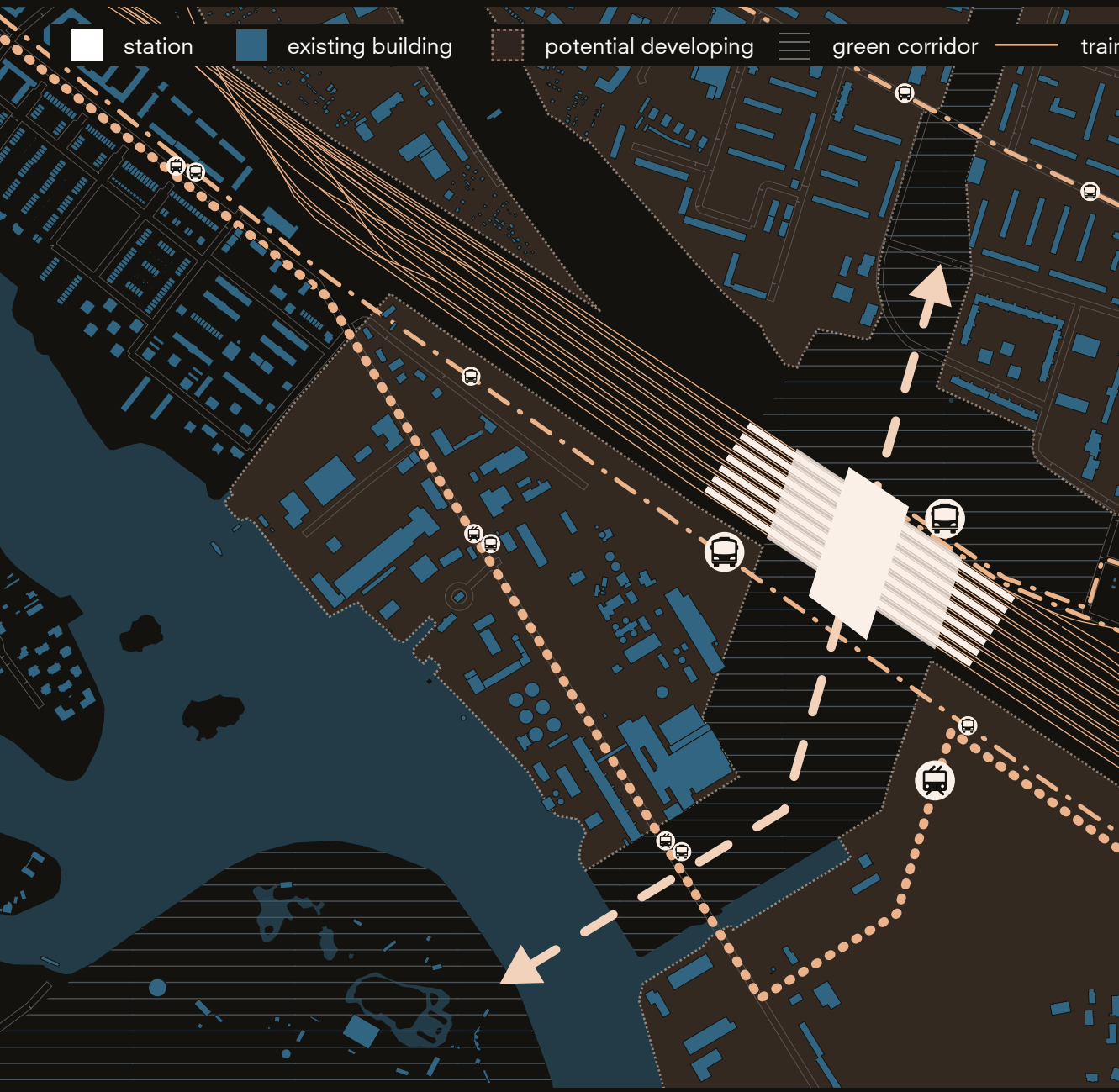
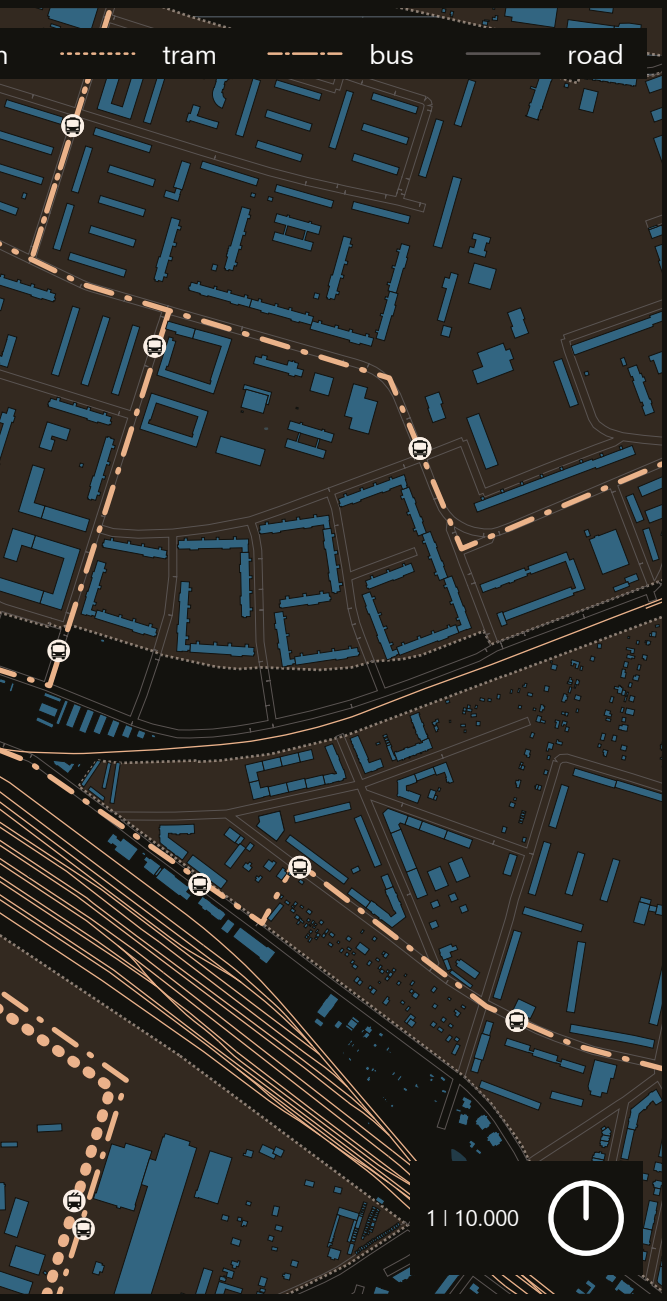


Figure 38 | urban vision 2050



Site

The Urban vision is to use the station as a green connector in the neigborhood (Figure 38). The shunting yard is reused for the new station and the position is positioned in line with the green corridor. This connection can be further extended across the river, as there a specialized brain hospitel is located.

The other modes of transport are extended a little bit to make new stops at the train station. The bus terminal is the most important, as the tram network isn't that huge in Berlin.

On the South side, the industry can be redeveloped into a Intercontinental Business District while preserving industry heritage. On the North side the 'Plattenbau' housing neighborhoods can be further densified.

INITIAL MASSING | CROSS

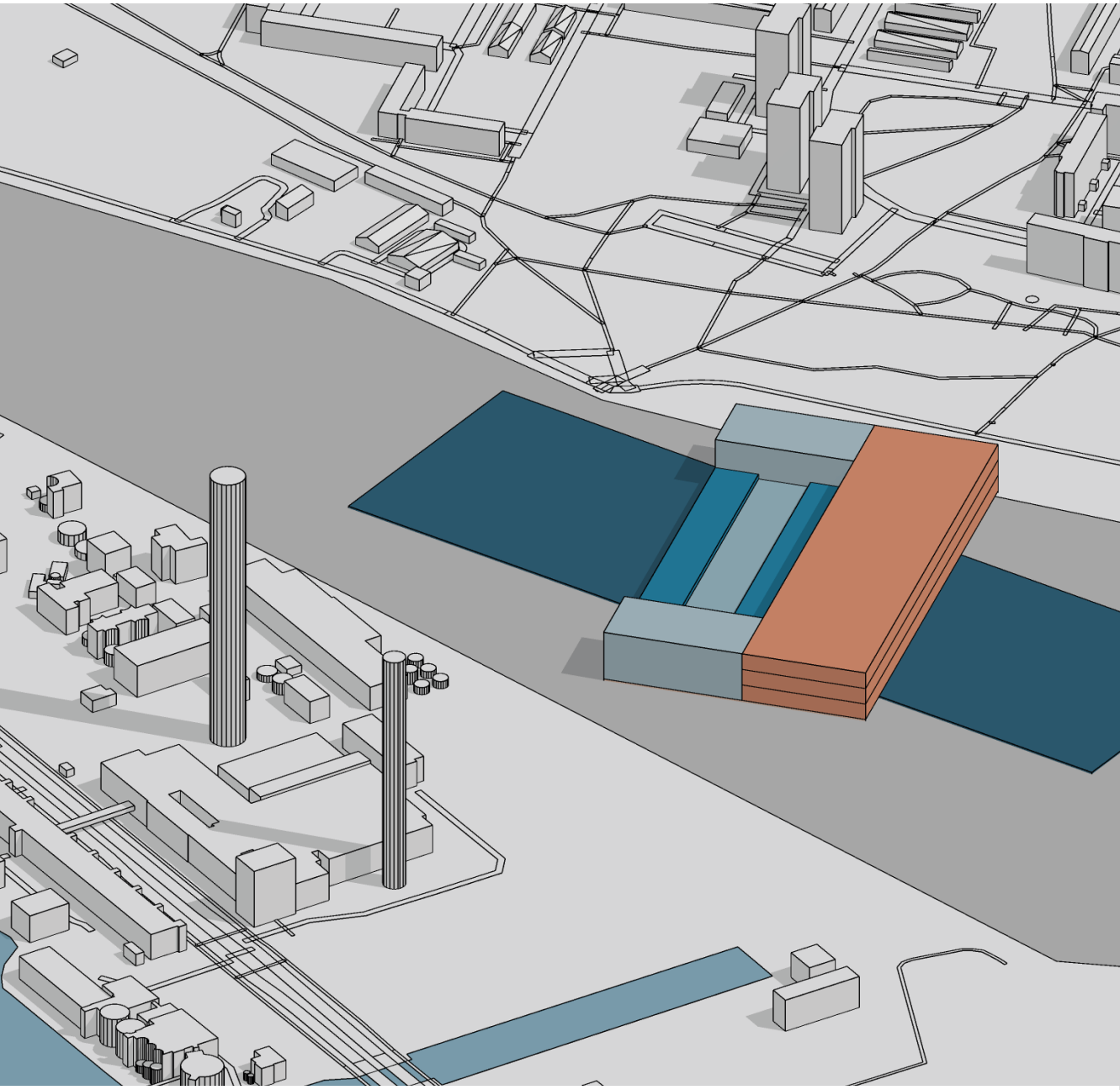
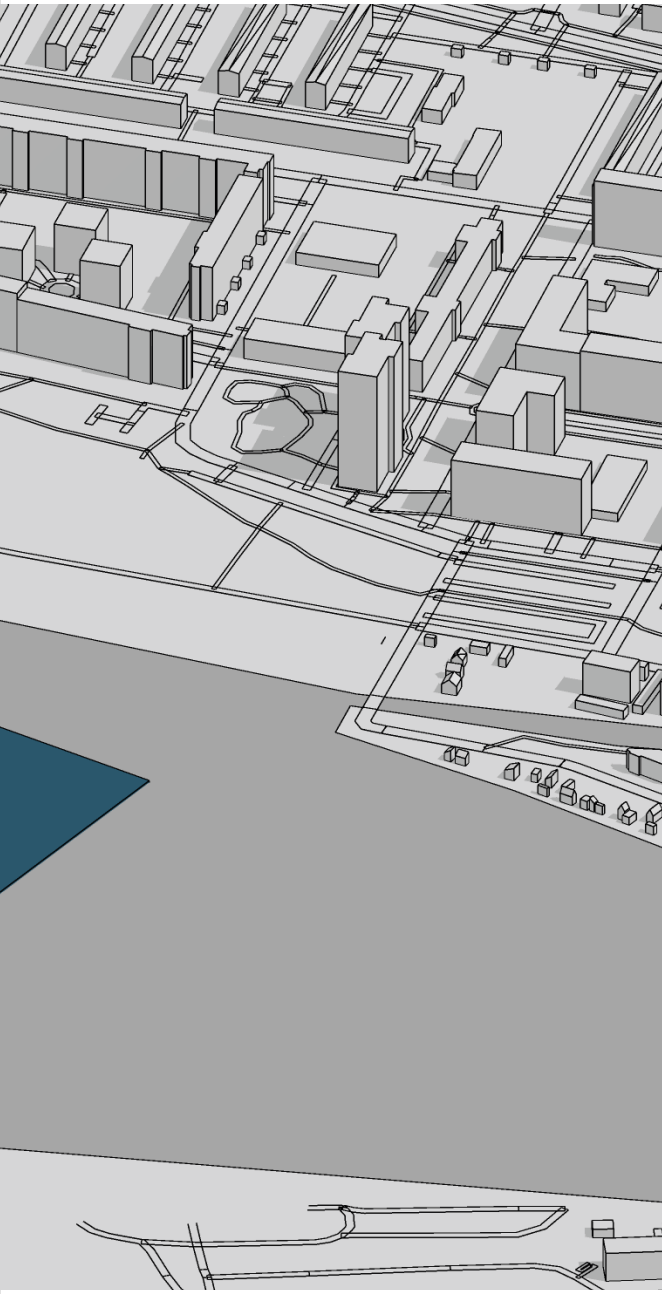


Figure 39 | Final initial massing



ational program circulation logistics hub

Conclusion

To anwser the question "what the requirements are to design an intercontinental train station if intercontinental traveling by train becomes the standard', research has been done on the three topics of Client, Program & Site.

For the Client it is concluded that the ambition is to design a 'Green gateway to Asia that provides a safe, efficient & comfortable travel experience to strengthen the cultural and economic relations'.

For the Program it is concluded that there is a need for extra program, consisting of: border control, logistics hub & exhibition space to express the cultures.

For the Site it is concluded that Rummelsburg is the best location in Europe for an intercontinental train station based on several requirements. At this location, the station should act as a green connecter, bringing the neighborhoods together.

Finally the research of the three topics is brought together to come up with a first initial massing configuration (Figure 39). This configuration has the ideal flow for passengers, staff, goods and freight, removes the border of the railways, is a landmark in the neighborhood and highlights the green corridor with its shape.

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05

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Figures 1. Elisabeth van der Sman et al., Destination 2050 | A Route To Net zero European Aviation, (Amsterdam: 2021), 23.

Figure 2. "Eurocontrol aviation outlook 2050", Eurocontrol, April, 2022, 14.

Figure 3. "Climate change: Should you fly, drive or take the train?", BBC, August 24, 2019, https://www.bbc.com/news/science-environment-49349566

Figure 4. "World's fastest maglev train of 600 km/h exits CRRC's factory", Railtech.com, 21 July, 2021, https://www.railtech.com/rolling-stock/2021/07/21/worlds-first-600-km-h-maglev-train-exits-crrcs-factory/.

Figure 5. Author Creation

Figure 6. "Trans-European Transport Network (TEN-T)," European Commission, https://transport.ec.europa.eu/transport-themes/infrastructure-and-investment/trans-european-transport-network-ten-t_en

Figure 7. History of train stations

Figure 8. Martins da Conceição Ana Luisa. "From City's Station to Station City : An Integrative Spatial Approach to the (Re)Development of Station Areas." Dissertation, s.n, 2014, 40.

Figure 9. Siemens station

Figure 10. "German railway station categories". Germanu-Bahn. Accessed on September 27, 2022. https://germanu-bahn.fandom.com/wiki/German_railway_station_categories

Figure 11. "Connecting Europe & Asia, the EU strategy". EEAS Europa. Accessed on January 5, 2023. https://www.eeas.europa.eu/sites/default/files/europe_asia_connectivity_factsheet_1.pdf

Figure 12. Initiators

Figure 13. Martins da Conceição Ana Luisa. "From City's Station to Station City : An Integrative Spatial Approach to the (Re)Development of Station Areas." Dissertation, s.n, 2014, 212.

Figure 14. Freight stakeholders

Figure 15. "Deutsche Bahn Universe 2021". Deutsche Bahn. Accessed January 10, 2023. https://ibir.deutschebahn.com/2021/en/universe-db/start/#universe-fleet-section-introduction

Figure 16. Author Creation

Figure 17. Author Creation

Figure 18. Author Creation

Figure 19. Extra program

Figure 20. Author Creation

Figure 21. Author Creation

Figure 22. Author Creation

Figure 23. Author Creation

Figure 24. Author Creation

Figure 25. Author Creation

Figure 26. Author Creation

Figure 27. Author Creation

Figure 28. Author Creation

Figure 29. Author Creation

Figure 30. Author Creation

Figure 31. Author Creation

Figure 32. Author Creation

Figure 33. Author Creation

Figure 34. Author Creation

Figure 35. Author Creation

Figure 36. Author Creation

Figure 37. Author Creation

Figure 38. Author Creation

Figure 39. Author Creation

Images

Image 1. Front cover: Kanazawa station - Ryuzo Shirae

Image 2. Author Creation

Image 3. Author Creation

Image 4. Author Creation

APPENDIX

06

The Hague Central Station

BnthmCrwl, 2016
GFA: 19.000 m2
Site: 62.500 m2
Passengers: 91.500 /day

St Pancras Station

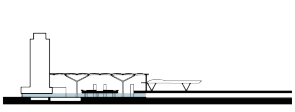
Pascal&Watson, 2007
GFA: 57.000 m2
Site: 60.000 m2
Passengers:100.000 /day

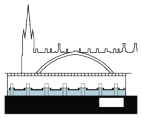
Rotterdam Central Station

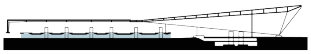
Team CS, 2014
GFA: 40.000 m2
Site:7 5.000 m2
Passengers: 120.000 /day

Amsterdam Central Station

BnthmCrwl, 2020
GFA: 41.000 m2
Site: 100.000 m2
Passengers: 190.000 /day





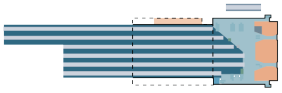


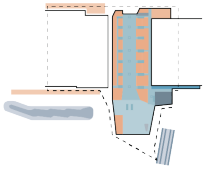
The Hague
85.200 m²
91.500 p/day

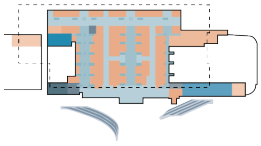
St Pancras
126.200 m²
100.000 p/day

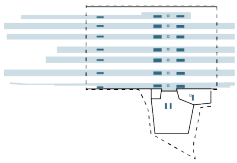
Rotterdam
123.600 m²
120.000 p/day

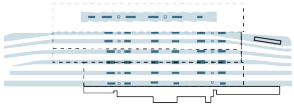
Amsterdam
145.000 m²
190.000 p/day

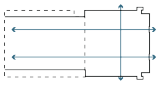


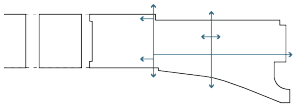


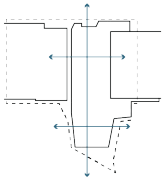


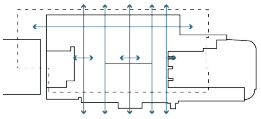


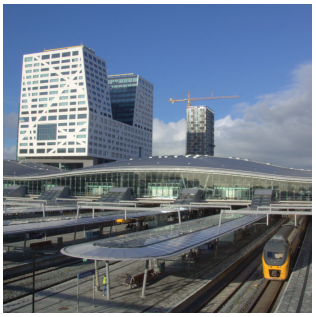






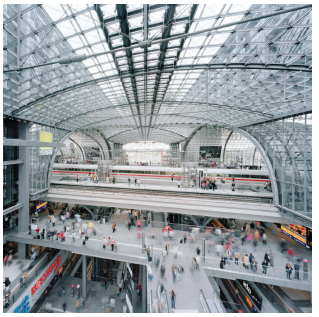






Utrecht Central Station

BnthmCrwl, 2016
GFA: 28.500 m2
Site: 70.000 m2
Passengers: 194.000 /day



Berlin Central Station

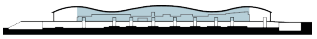
GMP, 2006
GFA: 80.000 m2
Site: 60.000 m2
Passengers: 350.000 /day

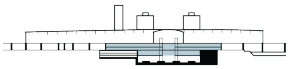
Hamburg Central Station

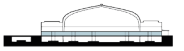
Team CS, 2021?
GFA: 25.000 m2
Site: 60.000 m2
Passengers: 450.000 /day

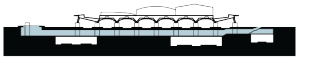
Zurich Central Station

Durig AG, 2014
GFA: 81.000 m2
Site: 80.000 m2
Passengers: 417.000 /day







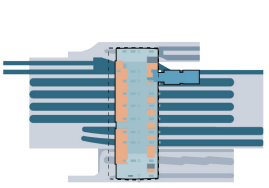


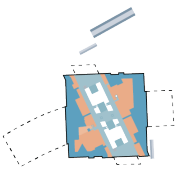
Utrecht
125.300 m²
194.000 p/day

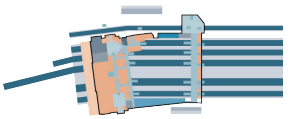
Berlin
183.600 m²
350.000 p/day

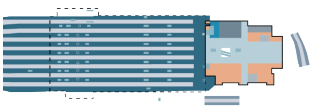
Hamburg
84.150 m²
450.000 p/day

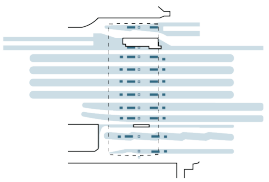
Zurich
210.500 m²
417.000 p/day

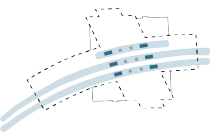


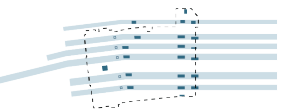


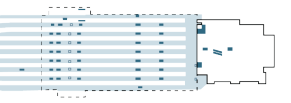


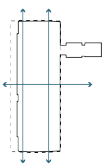


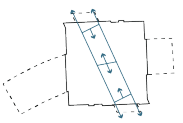


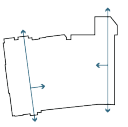


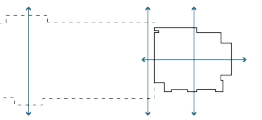


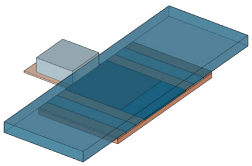




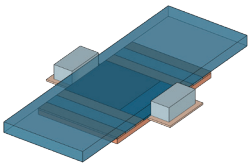




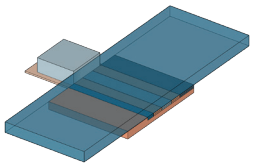




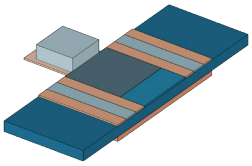
spread under



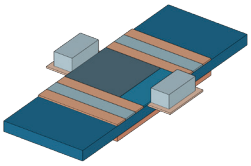
spread split under



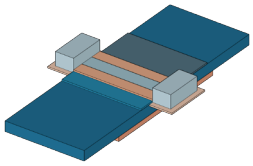
compact under



spread above



spread split above



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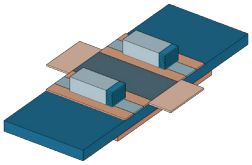
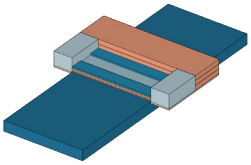
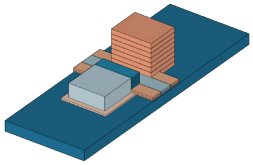


split

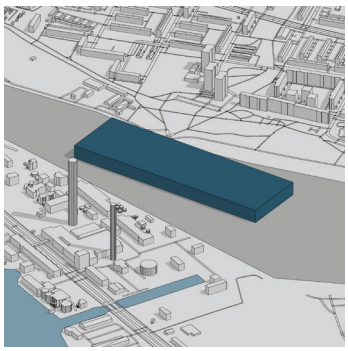


stacked

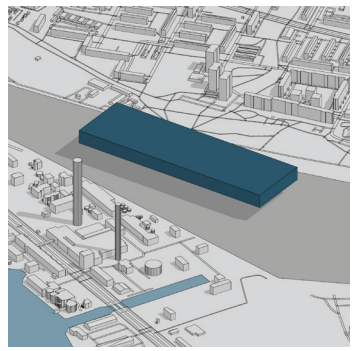


tower

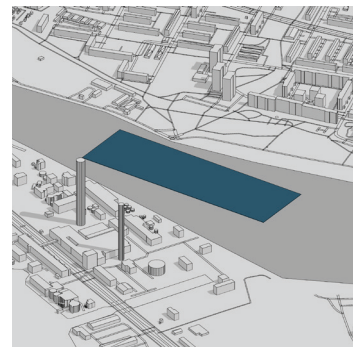
- circulation
- operational program
- passenger facilities
- mobility
- logistics hub
- parking
- additional program



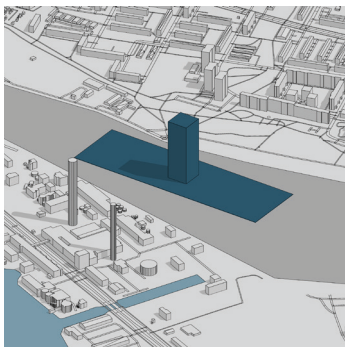
linear



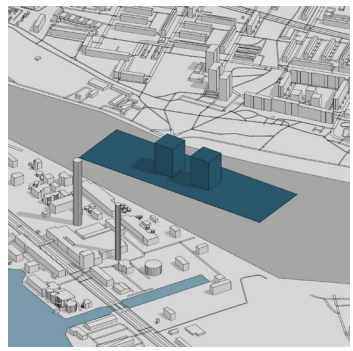
raised



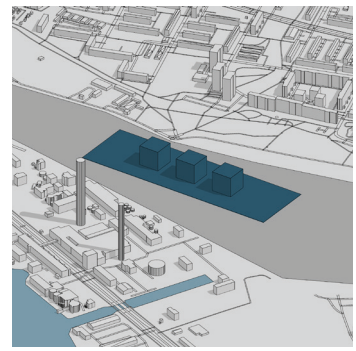
underground



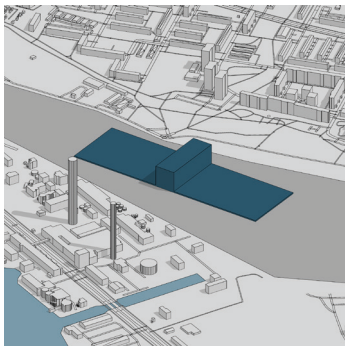
1 tower



2 tower



3 tower



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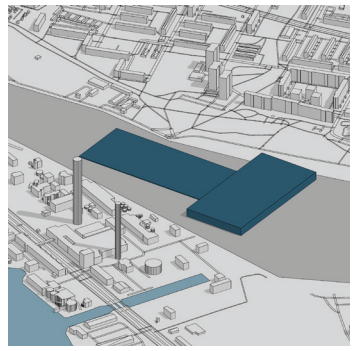

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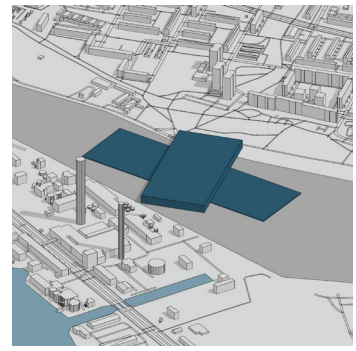

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