

COMPLEX PROJECTS

TRACKS OF TRANSFORMATION

Redefining one of Berlins most historic U-Bahn stations to accomodate to current and future needs.

Ruben Verboom

P5 November 7th 2024

PROBLEM STATEMENT



Berlins trainstations are ageing and no longer meet our current or future needs.

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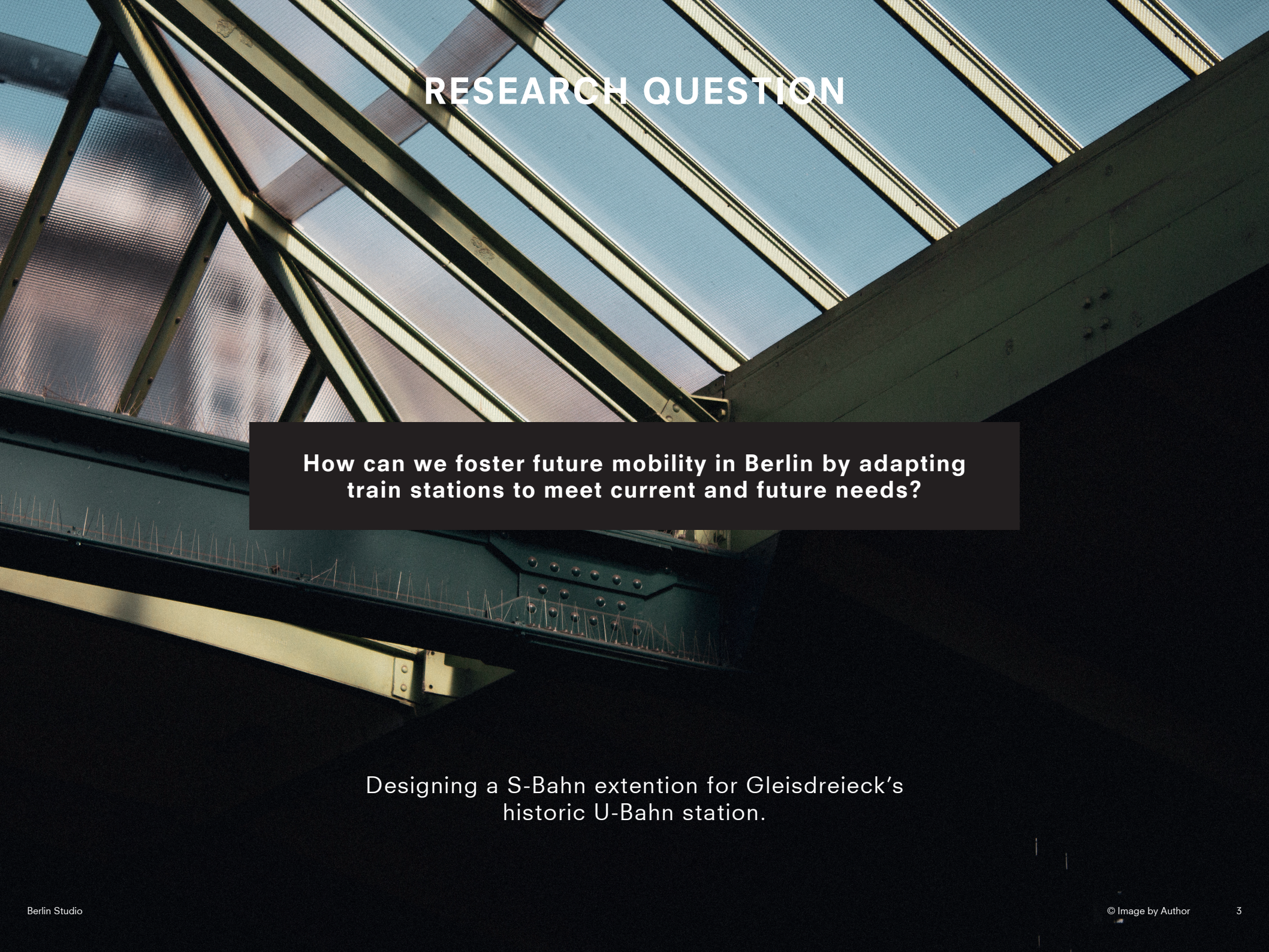
RESEARCH QUESTION



How can we foster future mobility in Berlin by adapting train stations to meet current and future needs?

Designing a S-Bahn extention for Gleisdreieck's historic U-Bahn station.

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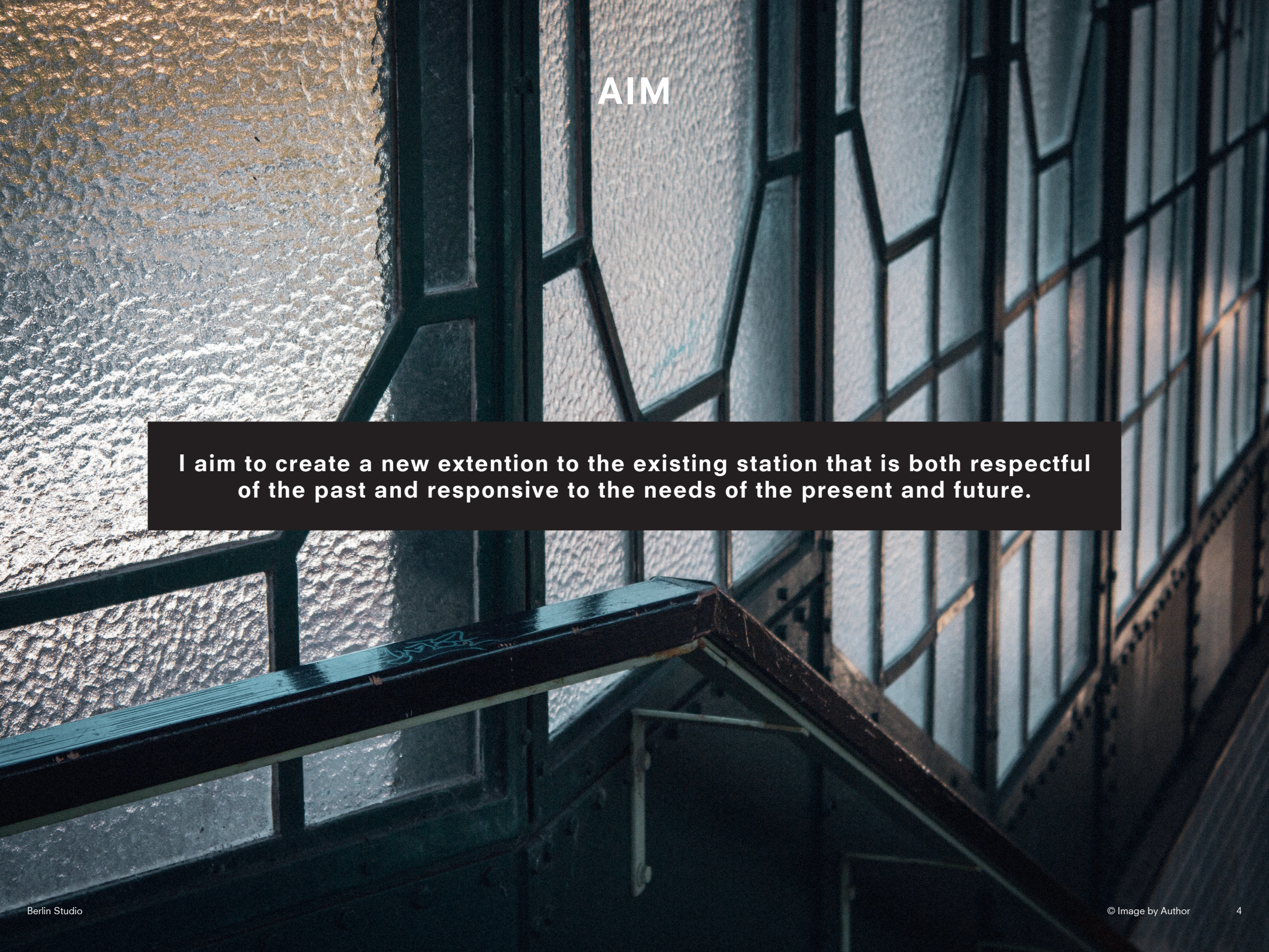
AIM



I aim to create a new extention to the existing station that is both respectful of the past and responsive to the needs of the present and future.

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WHERE IT ALL STARTED



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WHY ISN'T THIS USED?
23
Haltestellenservice
Lager 31
4m
Tor 3
LAGER 31
4m

HOW CAN GLEISDREIECK BE ADAPTED TO RESPOND TO BERLIN'S CHANGING NEEDS?



© Image by Author

DESIGN BRIEF

PROPOSED DESIGN

CONCLUSIONS AND REFLECTIONS

DESIGN BRIEF

PROPOSED DESIGN

CONCLUSIONS AND REFLECTIONS

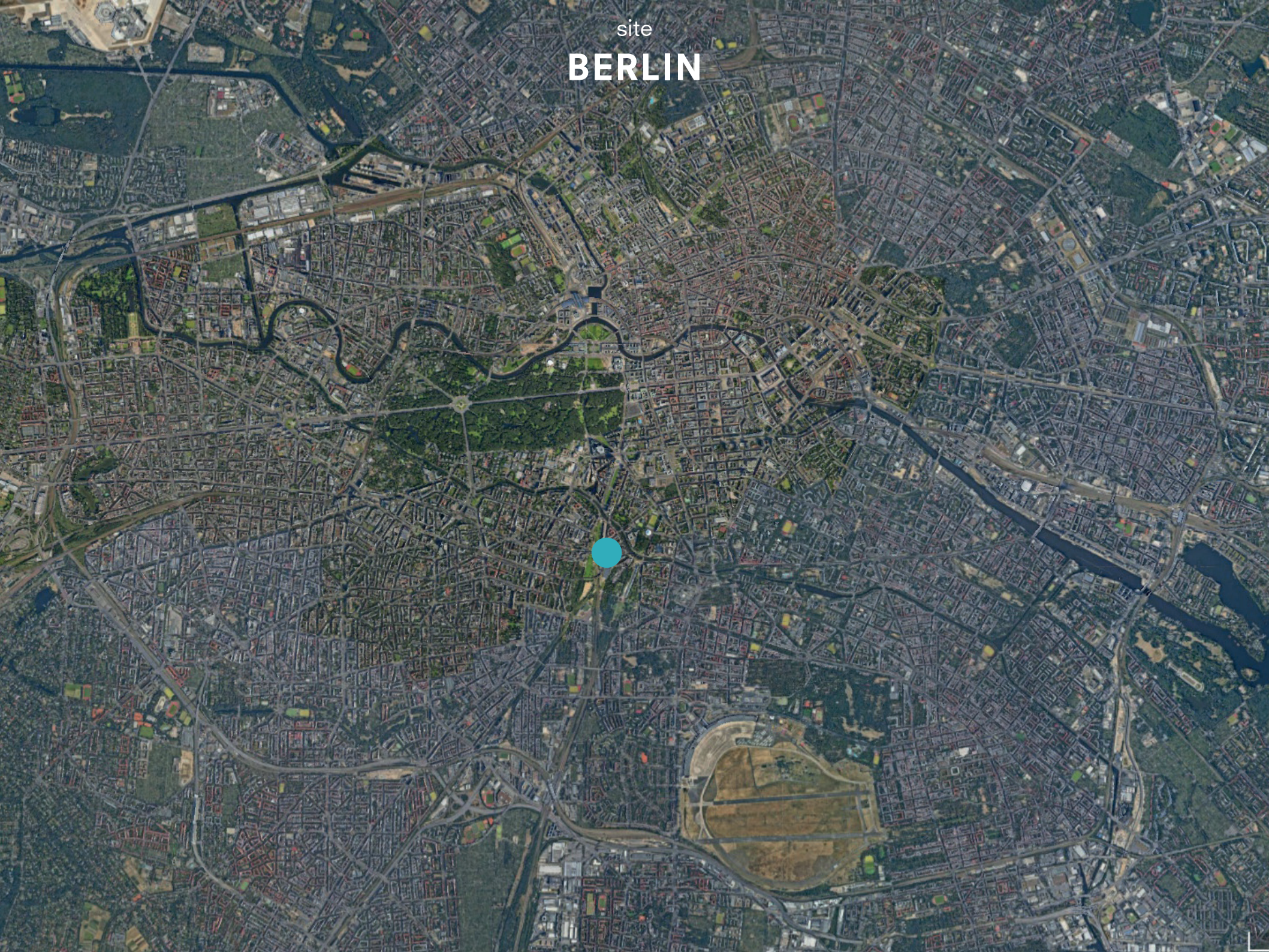
DESIGN BRIEF

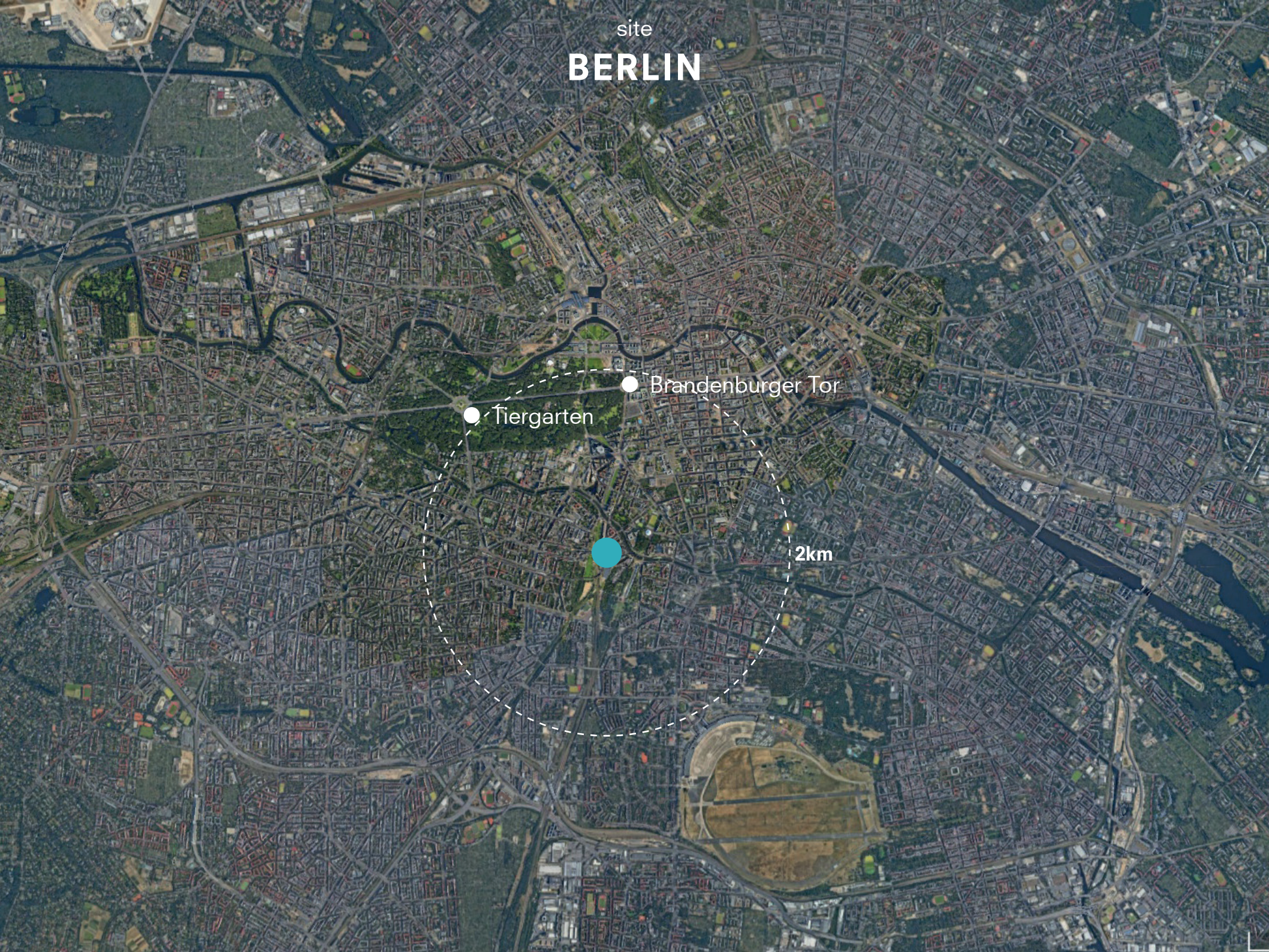
SITE

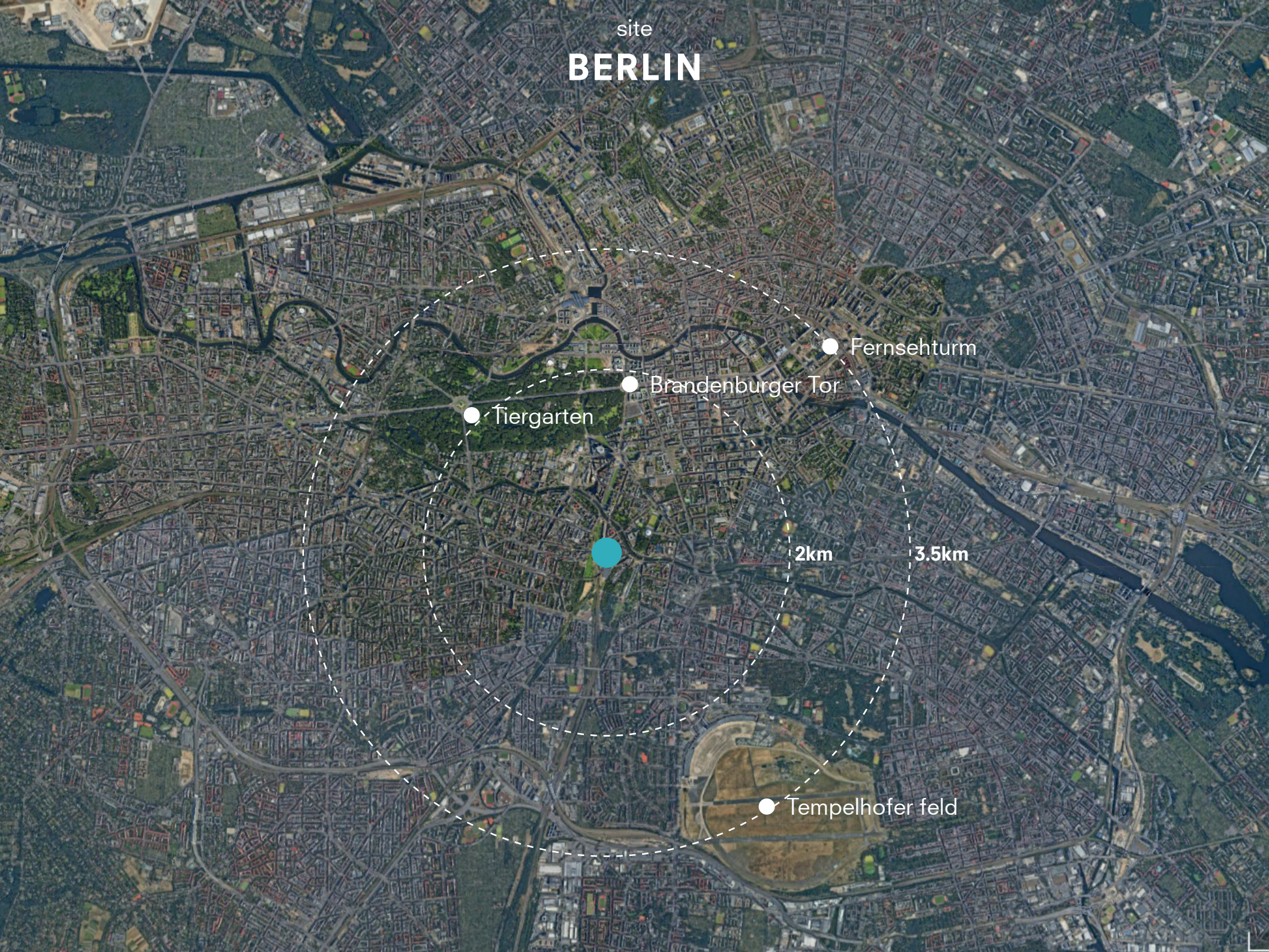
PROGRAM

CLIENT

DESIGN APPROACH


site
BERLIN

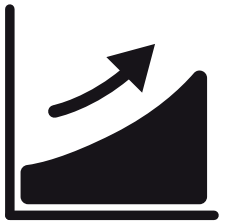

site
BERLIN
Brandenburger Tor
Tiergarten
2km


site
BERLIN
Fernsehturm
Brandenburger Tor
Tiergarten
2km
3.5km
Tempelhofer feld


site
BERLIN


site
BERLIN

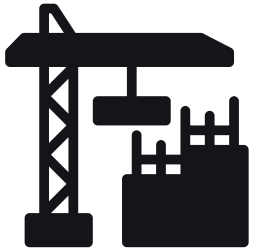
DEVELOPMENT FOCUS



Future densification of Berlin
requires a growth resistant trainstation

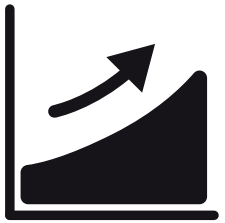


Planned North-South Line
connection to enhance Berlins S-Bahn ring



Urbane Mitte development plan
will ensure a large influx of users into the area

FOCUS



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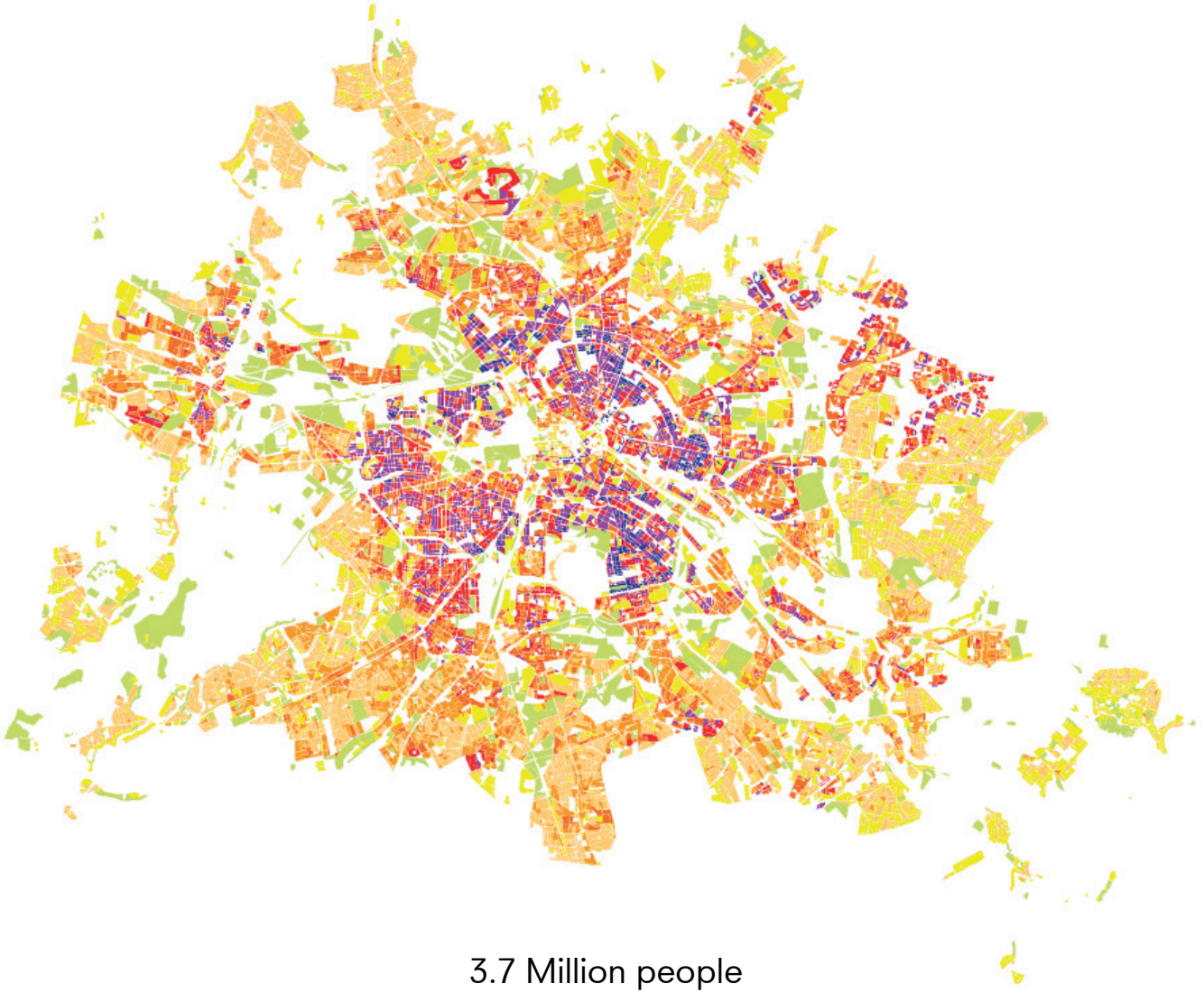
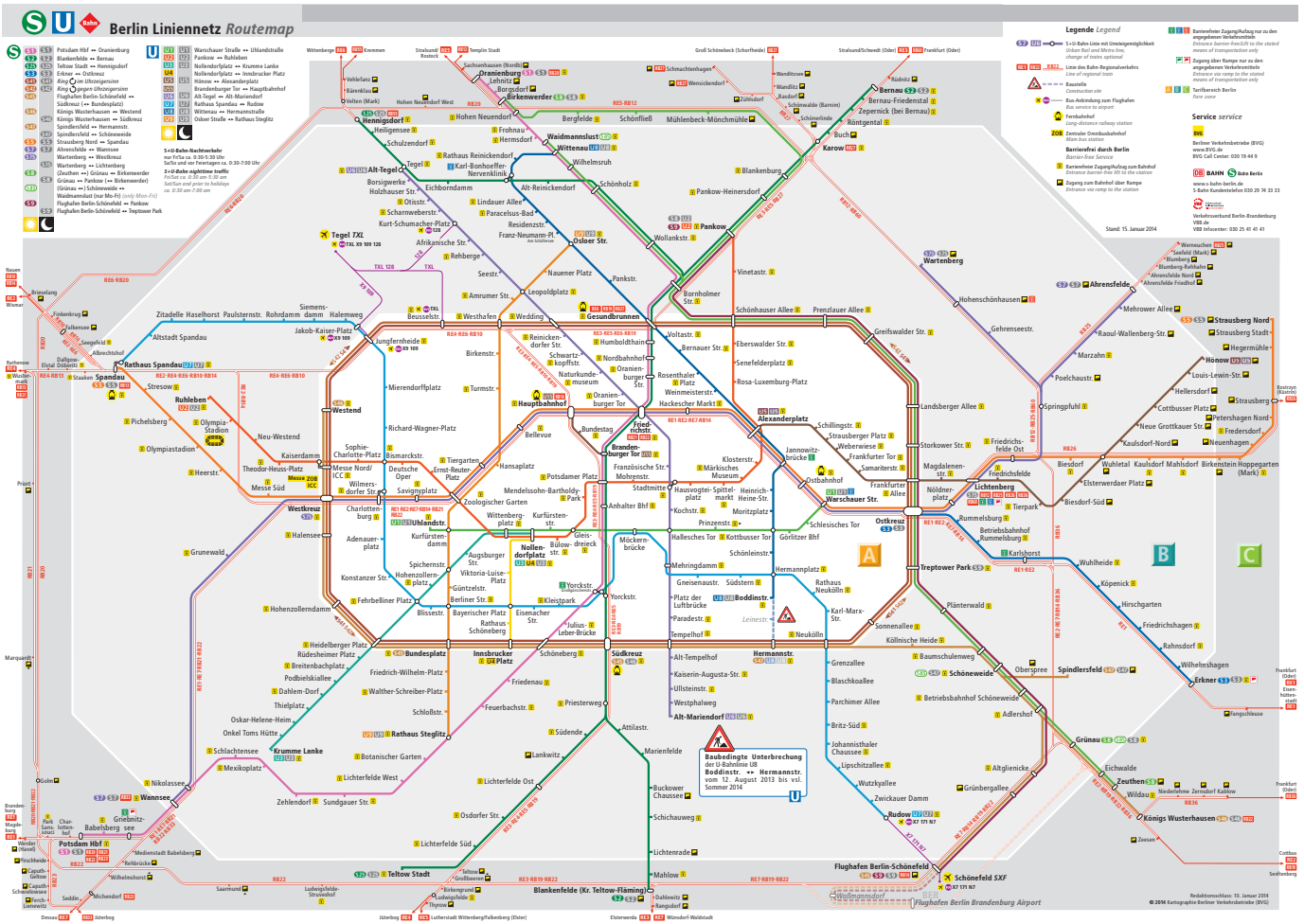
BERLIN



3.7 Million people

© State of Berlin | Environmental atlas

S&U-BAHN TRANSITMAP


Berlin Liniennetz Routemap
Legende Legend
Service service
Baubedingte Unterbrechung der U-Bahnlinie U8 Boddinstr. ↔ Hermannstr. vom 12. August 2013 bis vsl. Sommer 2014
Flughafen Berlin Brandenburg Airport
Potsdam Hbf
Teltow Stadt
Blankenfelde (Kr. Teltow-Fläming)
Schönefeld SXF
Flughafen Berlin-Schönefeld
Tegel TXL
Rathaus Spandau
Alt-Tegel
Hauptbahnhof
Alexanderplatz
Warschauer Str.
Ostkreuz
Treptower Park
Wartenberg
Ahrensfelde
Strausberg Nord
Strausberg Stadt
Hönow
Springpfuhl
Lichtenberg
Biesdorf
Biesdorf-Süd
Wuhletal
Kaulsdorf-Nord
Mahlsdorf
Birkenstein
Hoppegarten (Mark)
Neuenhagen
Fredersdorf
Petershagen Nord
Strausberg
Cottbusser Platz
Hellersdorf
Louis-Lewin-Str.
Hegermühle
Mehrower Allee
Raoul-Wallenberg-Str.
Marzahn
Poelchaustr.
Hohenschönhausen
Gehrenseestr.
Greifswalder Str.
Landsberger Allee
Storkower Str.
Friedrichsfelde Ost
Friedrichsfelde
Magdalenenstr.
Nöldnerplatz
Elsterwerdaer Platz
Tierpark
Rummelsburg
Betriebsbahnhof Rummelsburg
Karlshorst
Wuhlheide
Köpenick
Hirschgarten
Friedrichshagen
Rahnsdorf
Wilhelmshagen
Erkner
Fangschleuse
Spindlersfeld
Schöneweide
Oberspree
Betriebsbahnhof Schöneweide
Adlershof
Grünau
Eichwalde
Zeuthen
Wildau
Niederlehme
Zernsdorf
Kablow
Königs Wusterhausen
Zeesen
Sellenberg
Altglienicke
Grünbergallee
Wutzkyallee
Zwickauer Damm
Rudow
Johannisthaler Chaussee
Lipschitzallee
Britz-Süd
Parchimer Allee
Blaschkoallee
Grenzallee
Baumschulenweg
Plänterwald
Sonnenallee
Kölnische Heide
Neukölln
Karl-Marx-Str.
Leinestr.
Rathaus Neukölln
Hermannplatz
Schönleinstr.
Mehringdamm
Hallesches Tor
Kottbusser Tor
Görlitzer Bhf
Prinzenstr.
Moritzplatz
Heinrich-Heine-Str.
Hausvogteiplatz
Spittelmarkt
Kochstr.
Stadtmitte
Französische Str.
Mohrenstr.
Märkisches Museum
Klosterstr.
Jannowitzbrücke
Ostbahnhof
Frankfurter Allee
Frankfurter Tor
Samariterstr.
Weberwiese
Strausberger Platz
Schillingstr.
Rosa-Luxemburg-Platz
Weinmeisterstr.
Rosenthaler Platz
Bornholmer Str.
Wollankstr.
Pankow
Pankow-Heinersdorf
Vinetastr.
Schönhauser Allee
Prenzlauer Allee
Eberswalder Str.
Senefelderplatz
Voltastr.
Bernauer Str.
Oranienburger Str.
Nordbahnhof
Humboldthain
Gesundbrunnen
Oslo Str.
Leopoldplatz
Nauener Platz
Pankstr.
Amrumer Str.
Seestr.
Rehberge
Afrikanische Str.
Franz-Neumann-Pl.
Residenzstr.
Paracelsus-Bad
Lindauer Allee
Alt-Reinickendorf
Schönholz
Wilhelmsruh
Karl-Bonhoeffer-Nervenklinik
Eichborndamm
Borsigwerke
Holzhauser Str.
Otisstr.
Scharnweberstr.
Kurt-Schumacher-Platz
Tegel
Karow
Buch
Blankenburg
Mühlenbeck-Mönchmühle
Schönfließ
Bergfelde
Hermsdorf
Frohnau
Waidmannslust
Wittenau
Karl-Bonhoeffer-Nervenklinik
Rathaus Reinickendorf
Tegel
Alt-Tegel
Hermigsdorf
Schulzendorf
Heiligensee
Hohen Neuendorf
Bergfelde
Schönfließ
Mühlenbeck-Mönchmühle
Bernau
Bernau-Friedenstal
Zepernick (bei Bernau)
Röntgental
Schönerlinde
Wandlitz
Wandlitzsee
Basdorf
Schwanebeck (Barnim)
Wensickendorf
Zühlsdorf
Schmachtenhagen
Groß Schönebeck (Schorfheide)
Stralsund/Schwedt (Oder)
Frankfurt (Oder)
Rückhin
Sachsenhausen (Nord)
Oranienburg
Lehnitz
Borgsdorf
Birkenwerder
Hohen Neuendorf West
Stralsund/Rostock
Templin Stadt
Wittenberge
Krewmen
Velten
Vehlefanz
Bärenklau
Hohen Neuendorf
Frohnau
Hermsdorf
Waidmannslust
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Wartenberg
Ahrensfelde
Hohenschönhausen
Gehrenseestr.
Greifswalder Str.
Landsberger Allee
Storkower Str.
Friedrichsfelde Ost
Friedrichsfelde
Magdalenenstr.
Nöldnerplatz
Lichtenberg
Elsterwerdaer Platz
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Seestr.
Amrumer Str.
Leopoldplatz
Nauener Platz
Pankstr.
Oslo Str.
Gesundbrunnen
Wedding
Westhafen
Beusselstr.
Jungfernheide
Siemensdamm
Halemweg
Jakob-Kaiser-Platz
Zitadelle Haselhorst
Paulsternstr.
Rohrdamm
Altstadt Spandau
Rathaus Spandau
Spandau
Stresow
Ruhleben
Pichelsberg
Olympia-Stadion
Olympiastadion
Neu-Westend
Westend
Jungfernheide
Birkenstr.
Turmstr.
Mierendorffplatz
Richard-Wagner-Platz
Bellevue
Hauptbahnhof
Bundestag
Reichstagsgebäude
Reinickendorfer Str.
Schwartzkopffstr.
Naturkundemuseum
Oranienburger Str.
Hackescher Markt
Alexanderplatz
Schillingstr.
Strausberger Platz
Weberwiese
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Frankfurter Allee
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Hausvogteiplatz
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Moritzplatz
Prinzenstr.
Kochstr.
Anhalter Bhf
Potsdamer Platz
Hansaplatz
Tiergarten
Ernst-Reuter-Platz
Deutsche Oper
Savignyplatz
Zoologischer Garten
Mendelssohn-Bartholdy-Park
Wittenbergplatz
Kurfürstenstr.
Nollendorfplatz
Gleisdreieck
Bülowstr.
Augsburger Str.
Viktoria-Luise-Platz
Spichernstr.
Hohenzollernplatz
Güntzelstr.
Berliner Str.
Fehrbelliner Platz
Blissestr.
Bayerischer Platz
Rathaus Schöneberg
Eisenacher Str.
Kleistpark
Yorckstr.
Julius-Leber-Brücke
Möckernbrücke
Gneisenaustr.
Südstern
Platz der Luftbrücke
Boddinstr.
Paradestr.
Tempelhof
Yorckstr.
Südkreuz
Schöneberg
Innsbrucker Platz
Bundesplatz
Heidelberger Platz
Rüdesheimer Platz
Breitenbachplatz
Podbielskiallee
Dahlem-Dorf
Thielplatz
Oskar-Helene-Heim
Onkel Toms Hütte
Krumme Lanke
Schlachtensee
Mexikoplatz
Botanischer Garten
Rathaus Steglitz
Walther-Schreiber-Platz
Friedrich-Wilhelm-Platz
Friedenau
Feuerbachstr.
Schloßstr.
Priesterweg
Südende
Attilastr.
Lankwitz
Marienfelde
Alt-Tempelhof
Kaiserin-Augusta-Str.
Ullsteinstr.
Westphalweg
Alt-Mariendorf
Hermannstr.
Buckower Chaussee
Schichauweg
Lichtenrade
Mahlow
Lichterfelde Ost
Lichterfelde West
Lichterfelde Süd
Osdorfer Str.
Zehlendorf
Sundgauer Str.
Teltow Stadt
Teltow
Großbeeren
Ludwigsfelde-Struveshof
Saarmund
Potsdam Hbf
Babelsberg
Griebnitzsee
Wannsee
Nikolassee
Düppel
Mexikoplatz
Schlachtensee
Krumme Lanke
Dahlem-Dorf
Thielplatz
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Hohenzollernplatz
Fehrbelliner Platz
Güntzelstr.
Berliner Str.
Blissestr.
Bayerischer Platz
Rathaus Schöneberg
Eisenacher Str.
Kleistpark
Yorckstr.
Julius-Leber-Brücke
Möckernbrücke
Gneisenaustr.
Südstern
Platz der Luftbrücke
Boddinstr.
Paradestr.
Tempelhof
Yorckstr.
Südkreuz
Schöneberg
Innsbrucker Platz
Bundesplatz
Friedrich-Wilhelm-Platz
Walther-Schreiber

FOCUS

Future densification of Berlin
requires a growth resistant trainstation



Planned North-South Line
connection to enhance Berlins S-Bahn ring

Urbane Mitte development plan
will ensure a large influx of users into the area

EXISTING NETWORK OVERVIEW



ICE & IC LINES



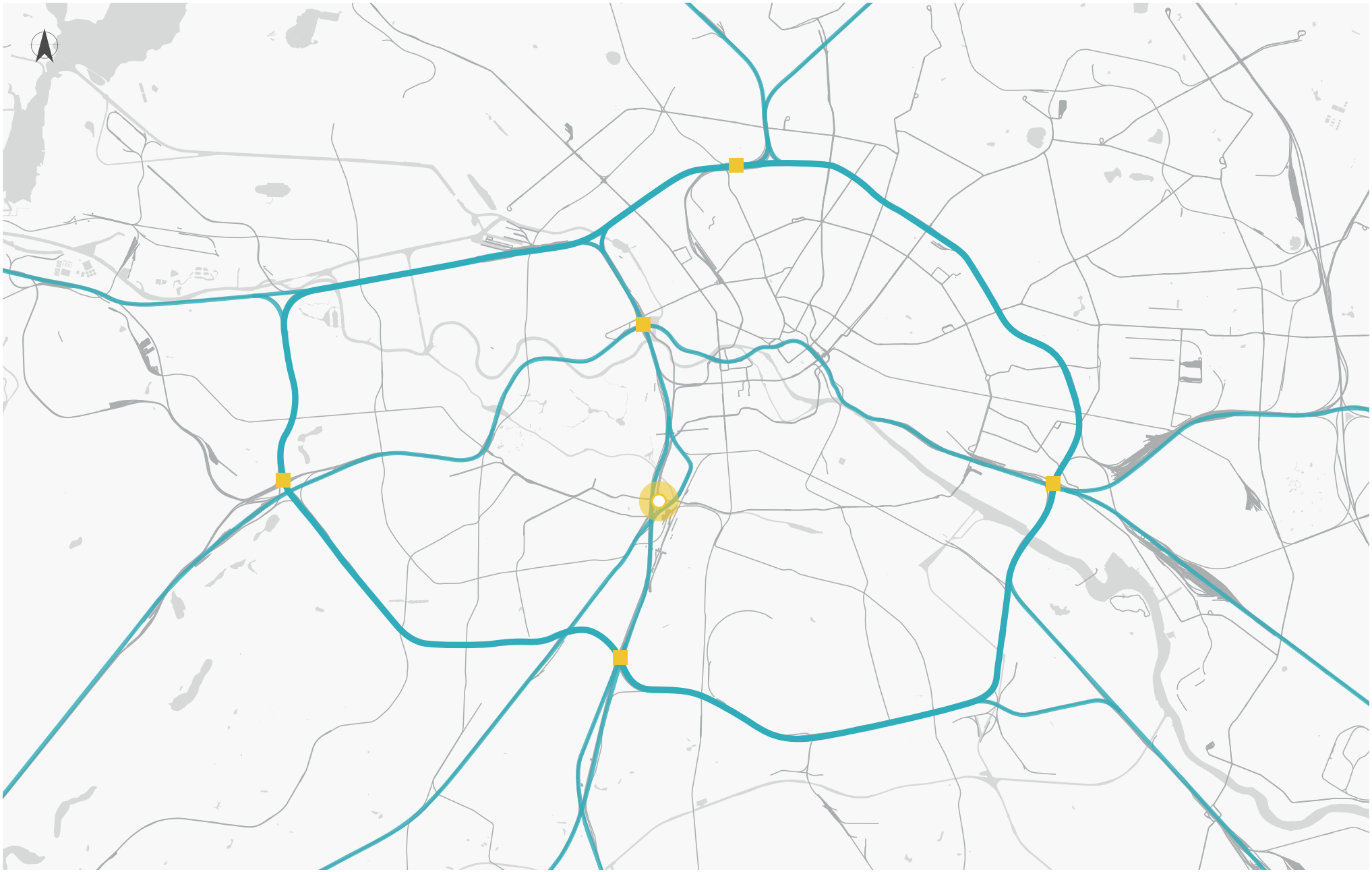
REGIONAL NETWORK



S-BAHN NETWORK



S-BAHN RING



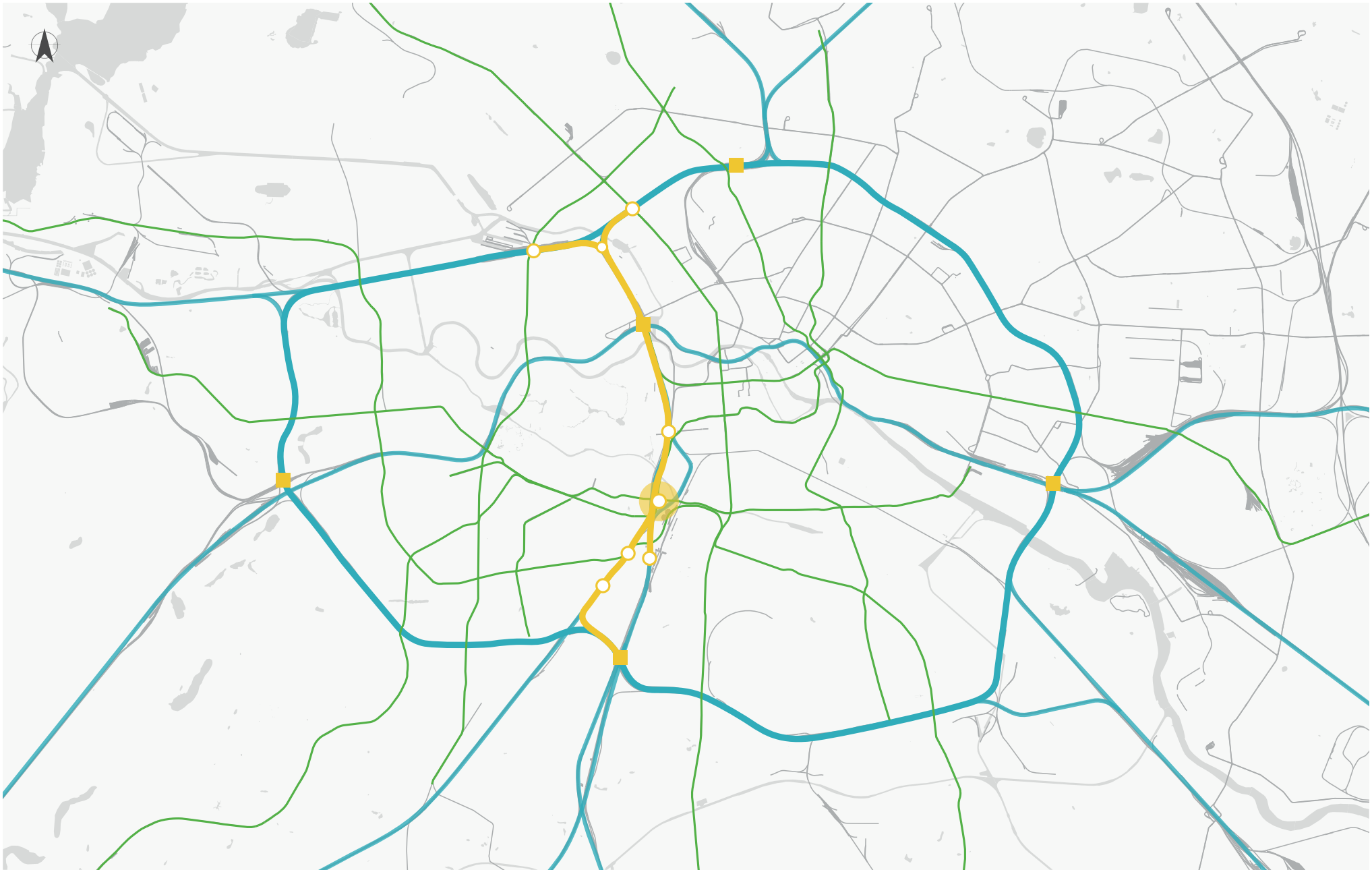
FUTURE S21 LINE



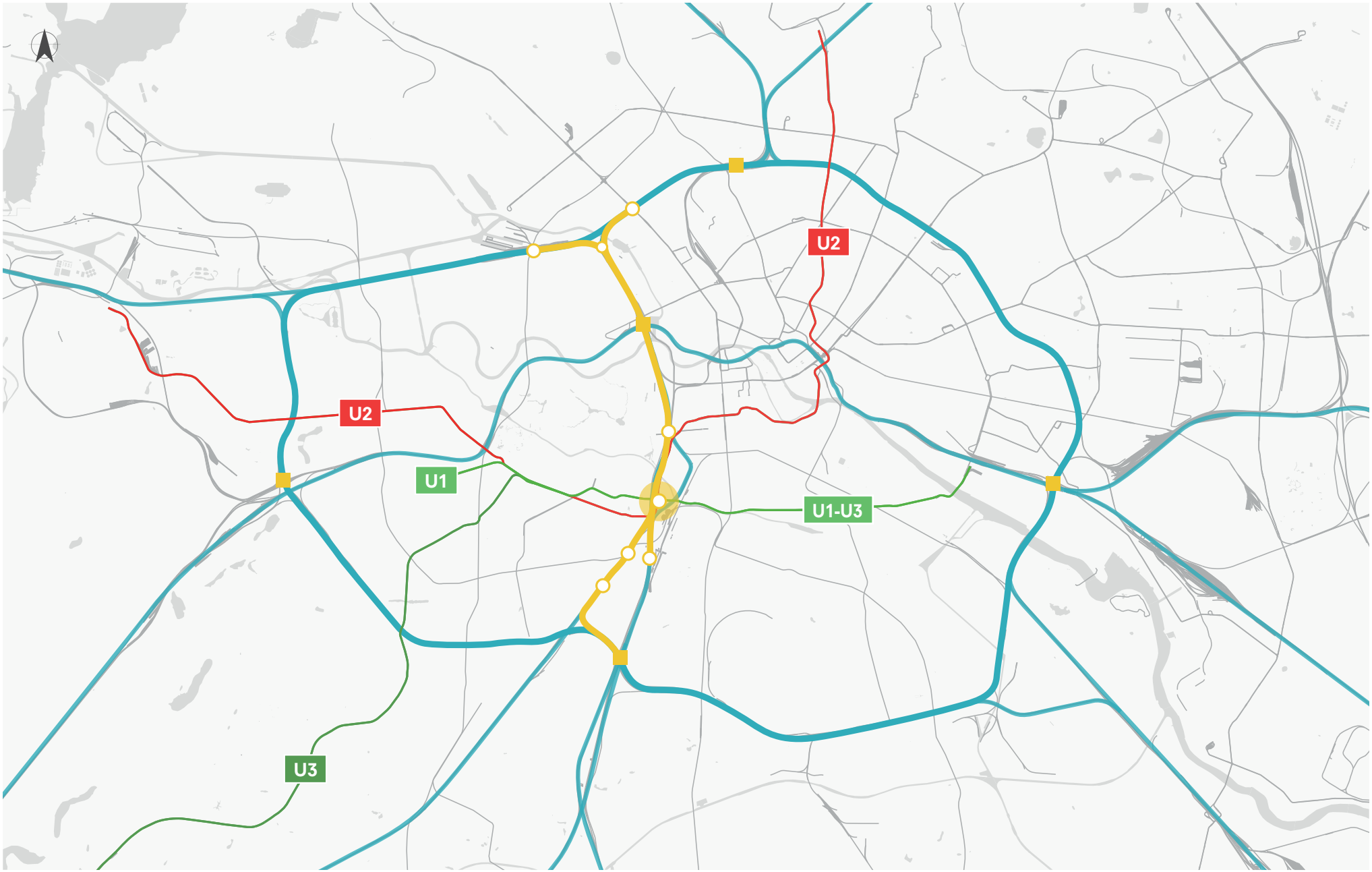
SPLITTING S-BAHN RING



U-BAHN NETWORK



CONNECTION FOCUS



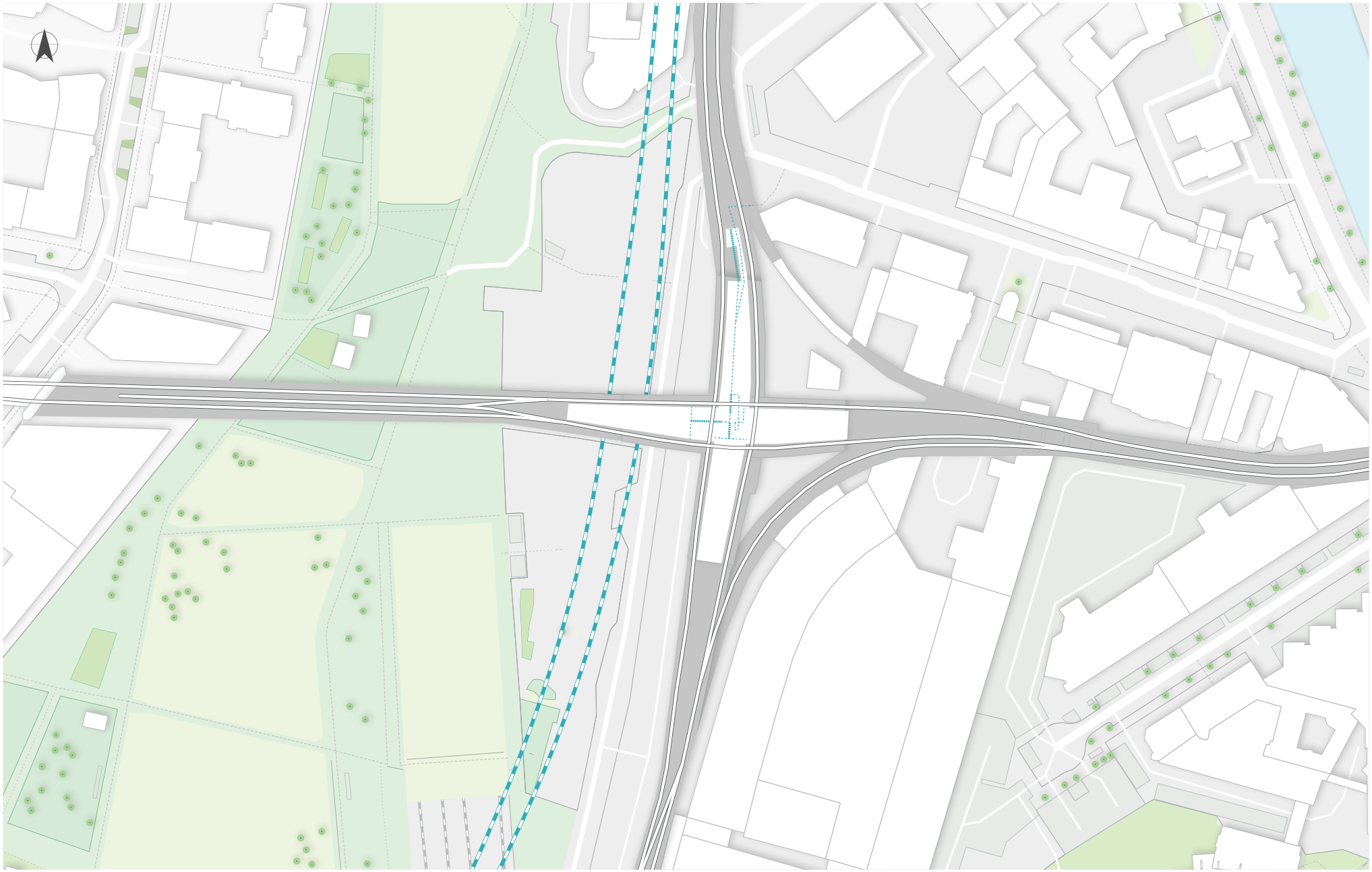
CURRENT SITUATION



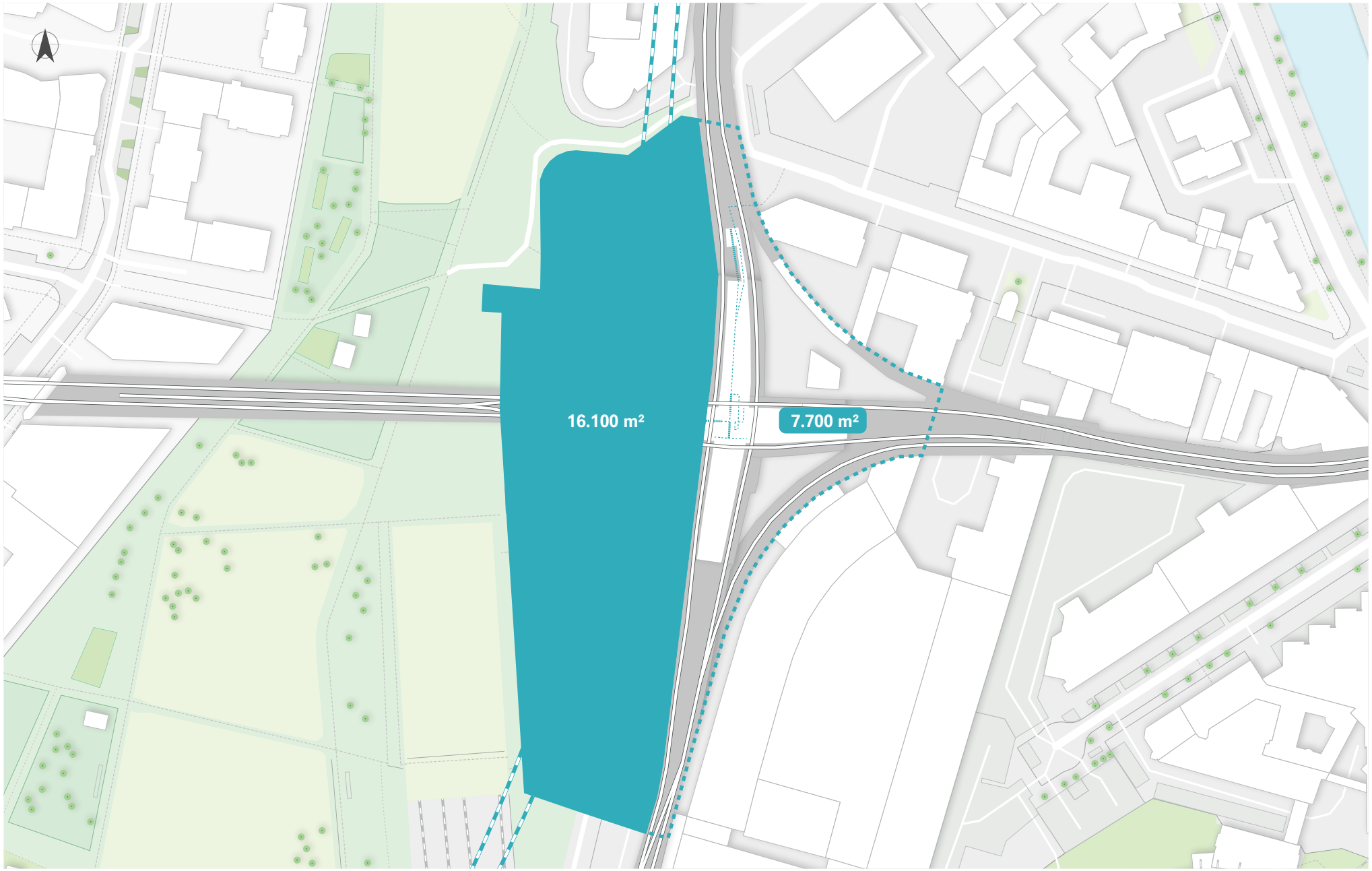
FUTURE S21 LINE



S21 LINE



AREA OF FOCUS



Total 24.400 m²

FUTURE S21 LINE



© Image by State of Berlin

FOCUS

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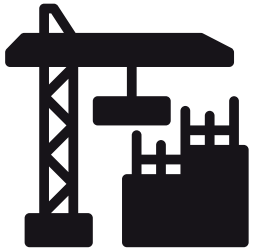
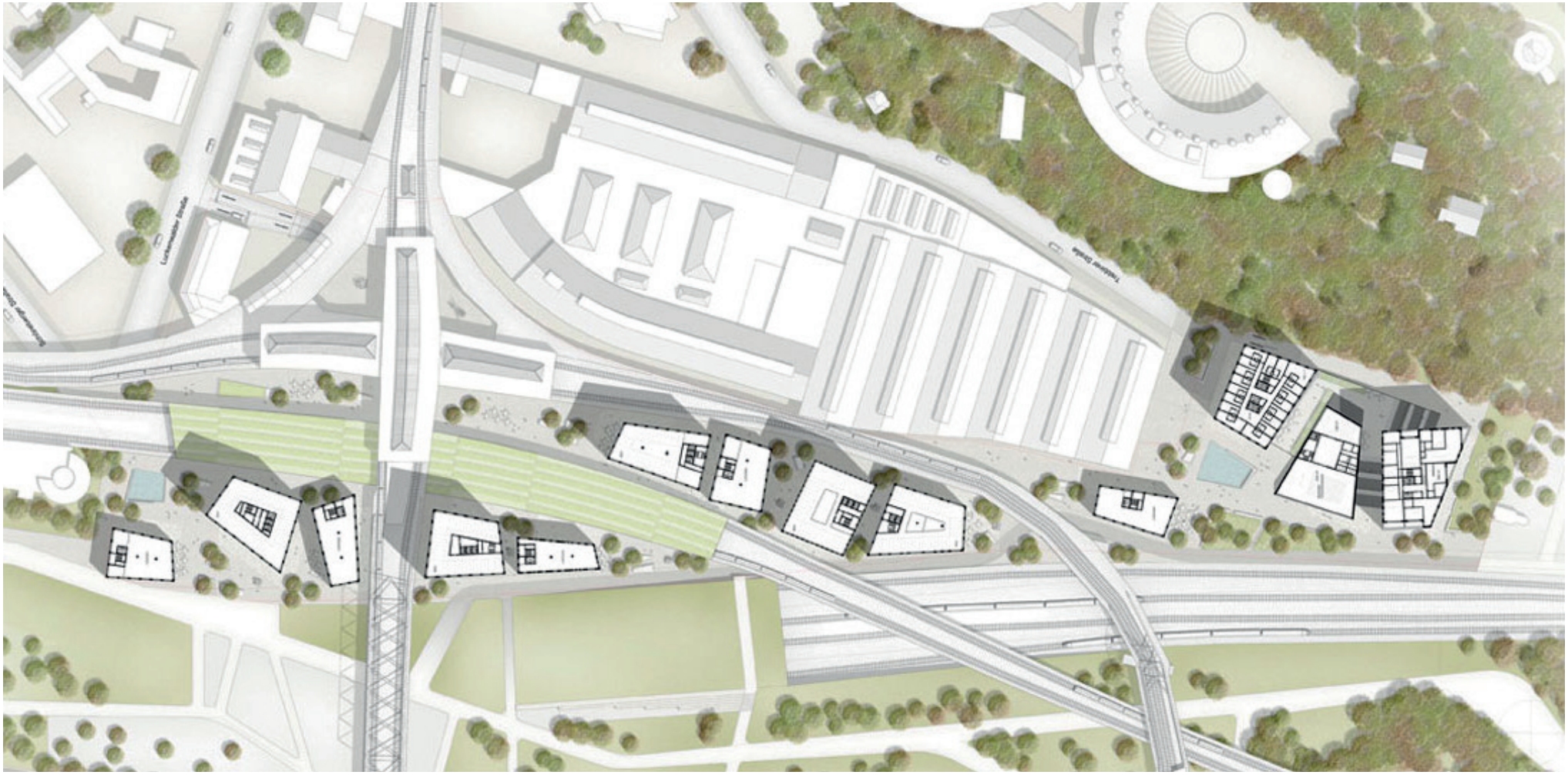
Planned North-South Line
connection to enhance Berlins S-Bahn ring



Urbane Mitte development plan
will ensure a large influx of users into the area

POSSIBLE DEVELOPMENT PLAN



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POSSIBLE DEVELOPMENT PLANS



Reacting to future development by factoring in future needs while allocating more space for development of the new trainstation.

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DESIGN BRIEF

SITE

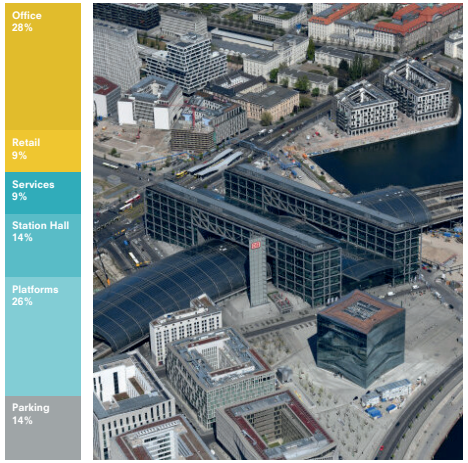
PROGRAM

CLIENT

DESIGN APPROACH

RESEARCH QUESTION

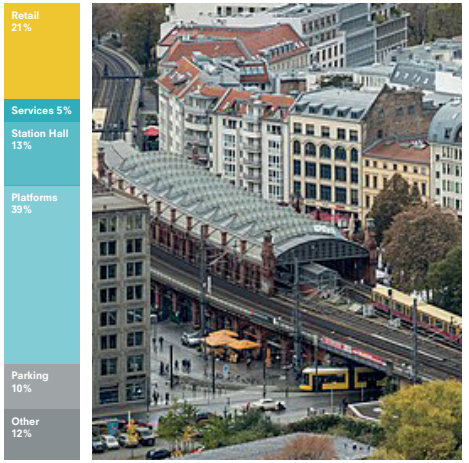
REFERENCE ANALYSIS



Berlin Hauptbahnhof

175.000 m²

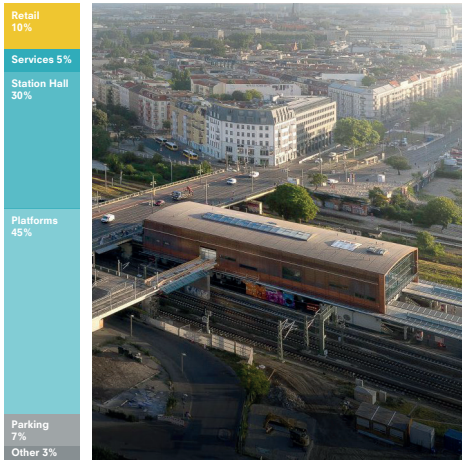
Kind:	International station
Site:	60.000 m²
Passengers:	350.000 /day
Tracks	12
Location	Berlin, DE



Hackescher Markt

15.500 m²

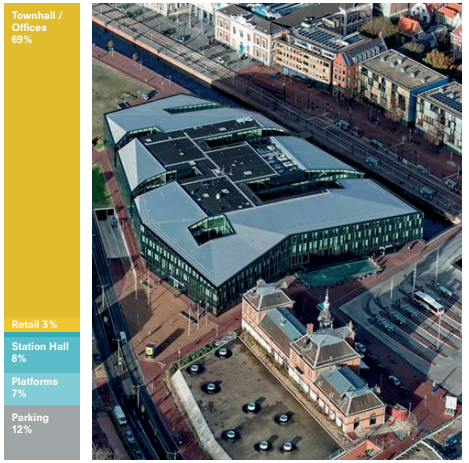
Kind:	Regional station
Site:	10.900 m²
Passengers:	230.000 /day
Tracks	2
Location	Berlin, DE



Warschauer Straße

11.000 m²

Kind:	Regional station
Site:	8.800 m²
Passengers:	85.000 /day
Tracks	6
Location	Berlin, DE

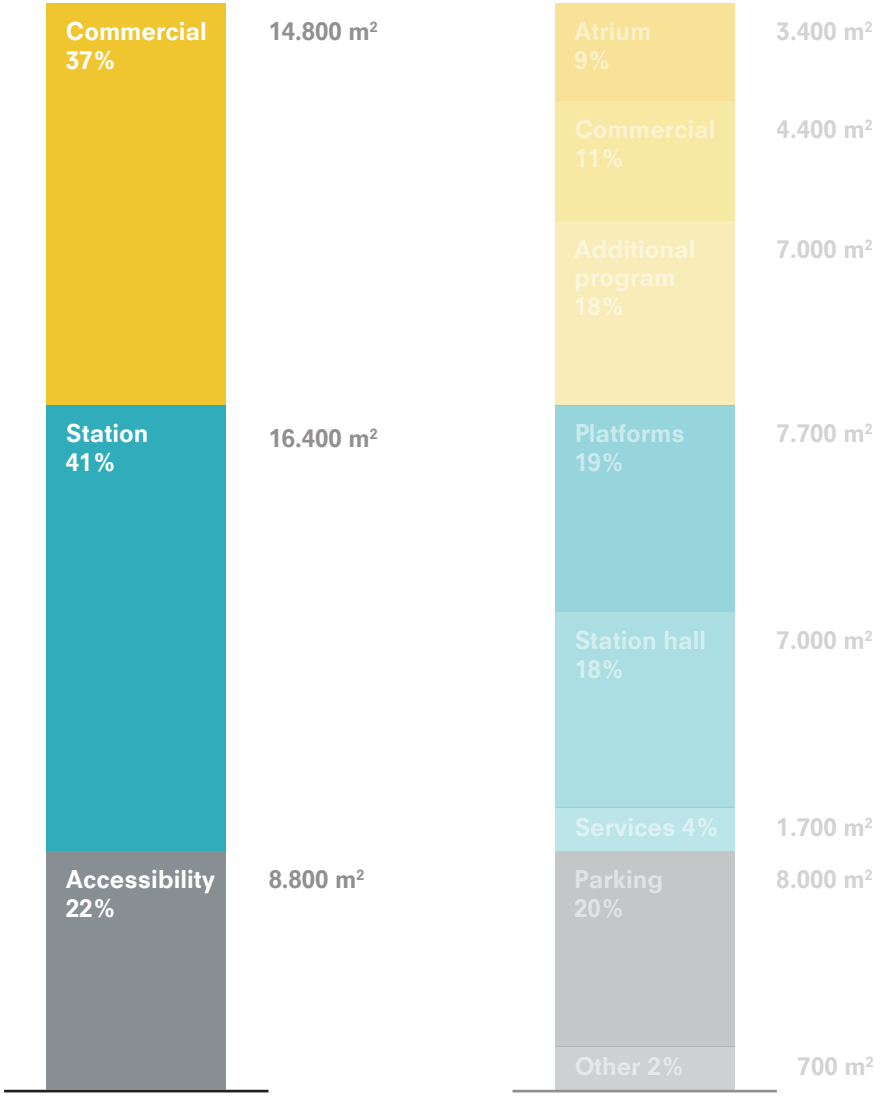


Delft Station / Townhall

28.320 m²

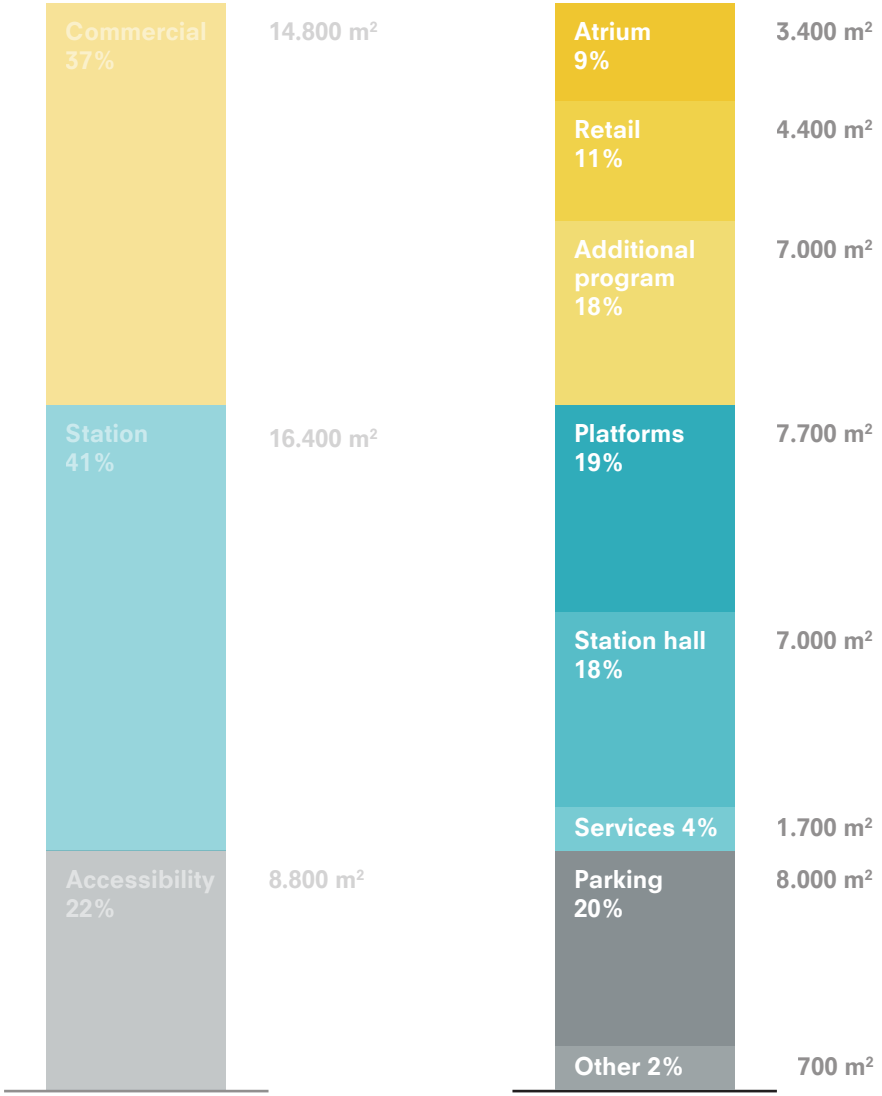
Kind:	Regional station
Site:	9.800 m²
Passengers:	31.700 /day
Tracks	4
Location	Delft, NL

KEY SPACES



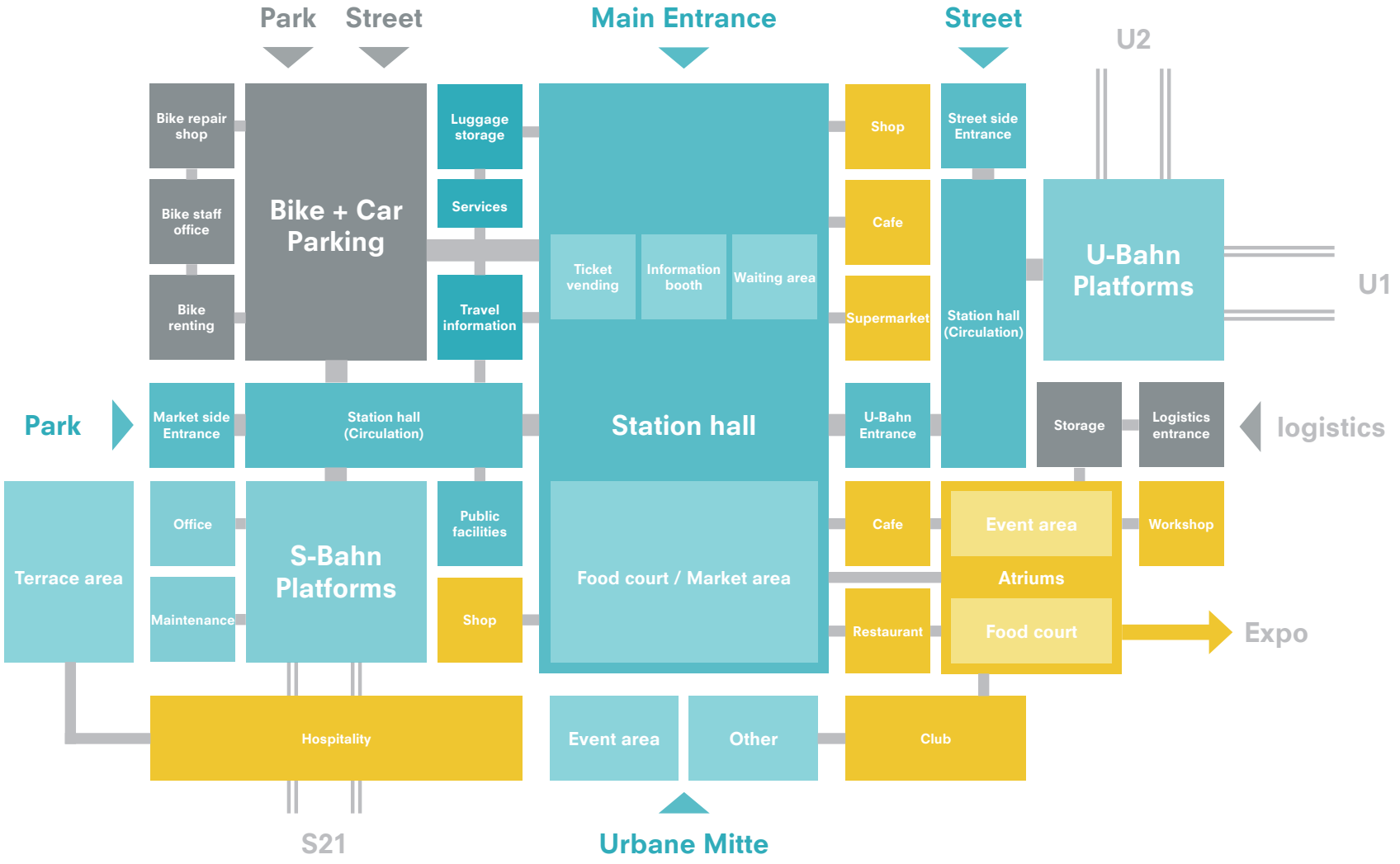
Program total
40.000 m²

KEY SPACES

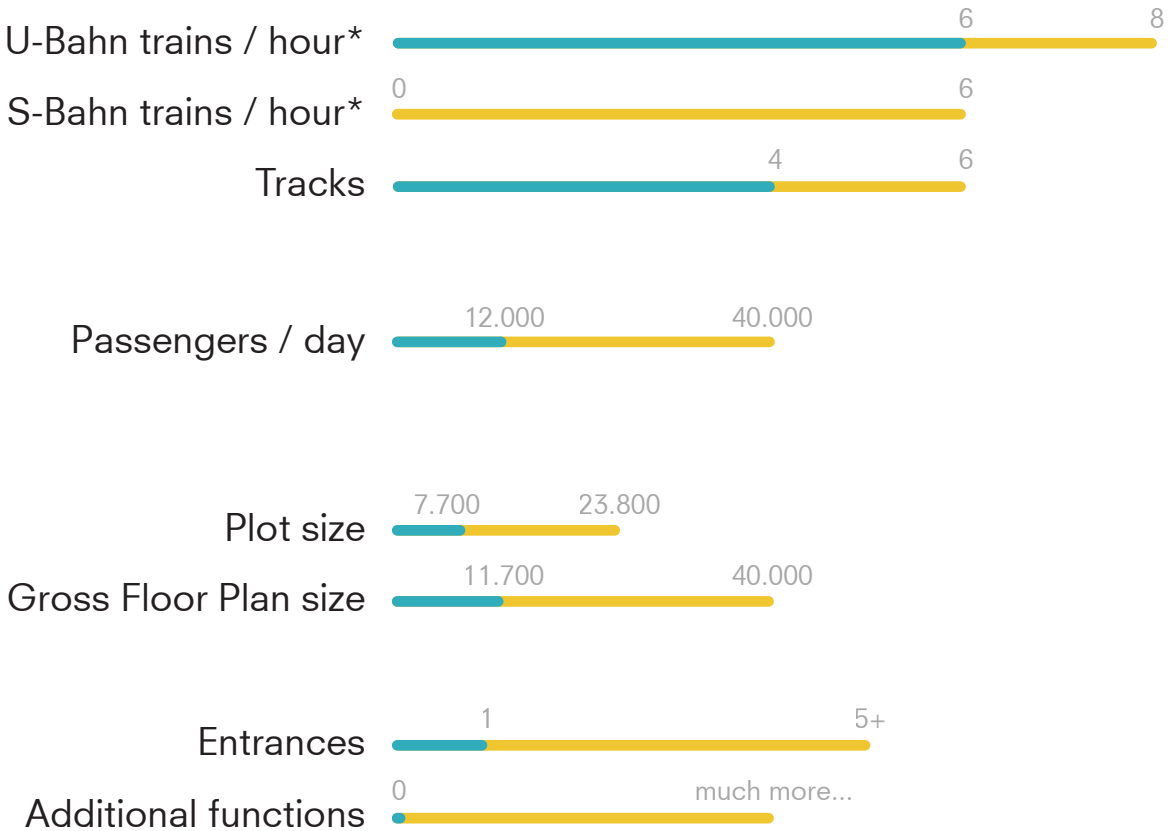


Program total
40.000 m²

PROGRAMMATIC LAYOUT

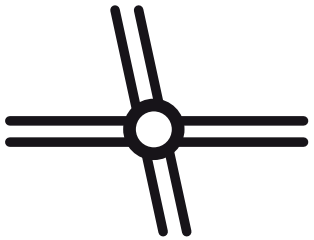


CHANGING REQUIREMENTS



*Based on daily schedule and calculated in amount of trains per direction

FOCUS



Connecting regional S and U-Bahn station
able to support over 40.000 users per day

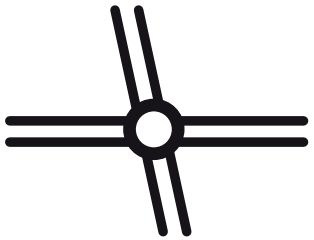


Built for different users
passing through, destination and non-travelers



Additional program focus
on recreative, commercial and cultural functions

FOCUS

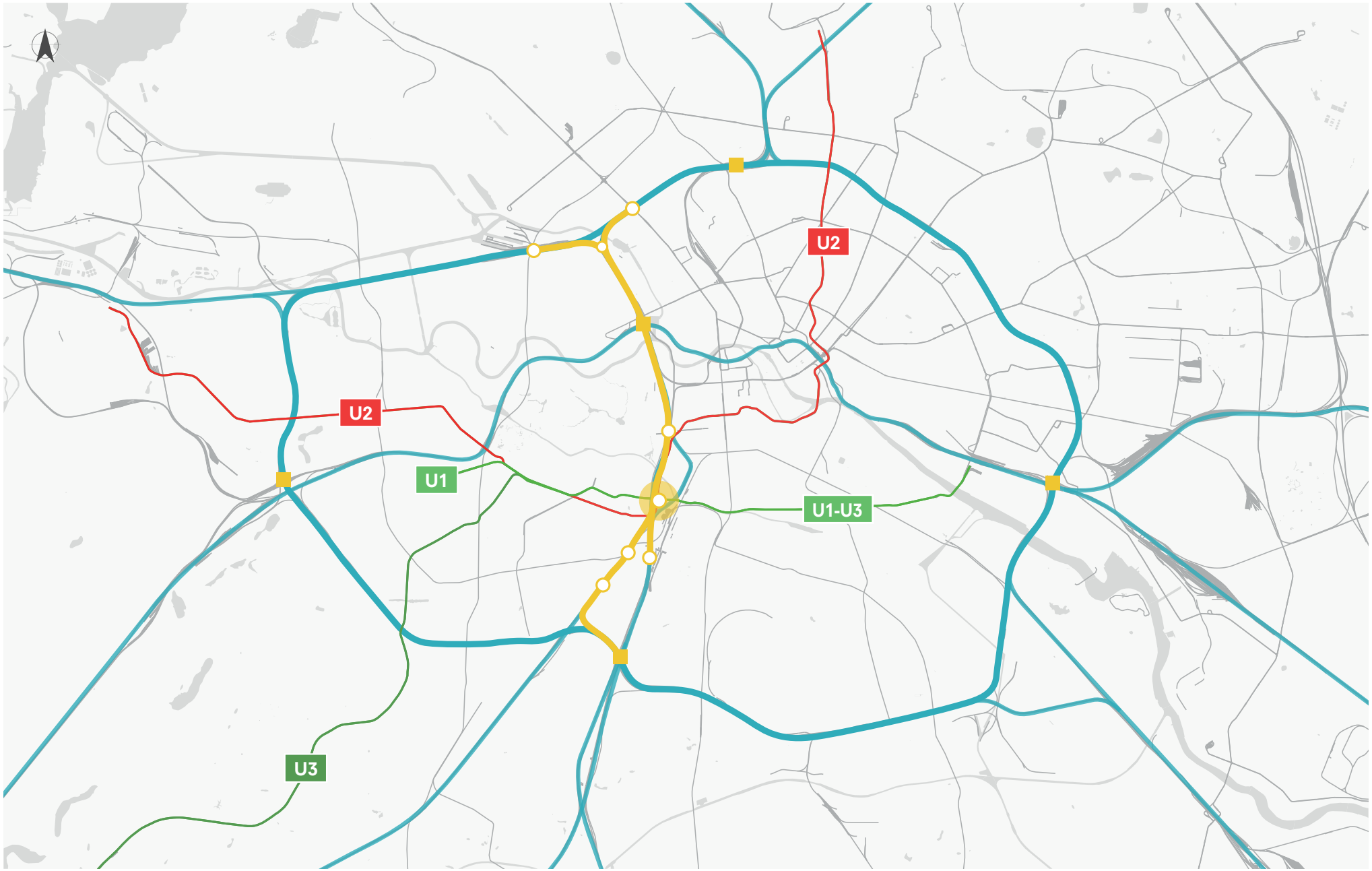


Connecting regional S and U-Bahn station
able to support over 40.000 users per day

Built for different users
passing through, destination and non-travelers

Additional program focus
on recreative, commercial and cultural functions

NETWORK FOCUS



FOCUS

Regional S and U-Bahn station typology
able to support over 40.000 users per day



Built for different users
passing through, destination and non-travelers

Additional program focus
on recreative, commercial and cultural functions

USERS



Pass-through travelers
Using the station as a transfer point.



Destination travelers
Using the station as departing or destination point.



Non-travelers (visitors)
Using the station for reasons other than travel.

FOCUS

Regional S and U-Bahn station typology
able to support over 40.000 users per day

Built for different users
passing through, destination and non-travelers



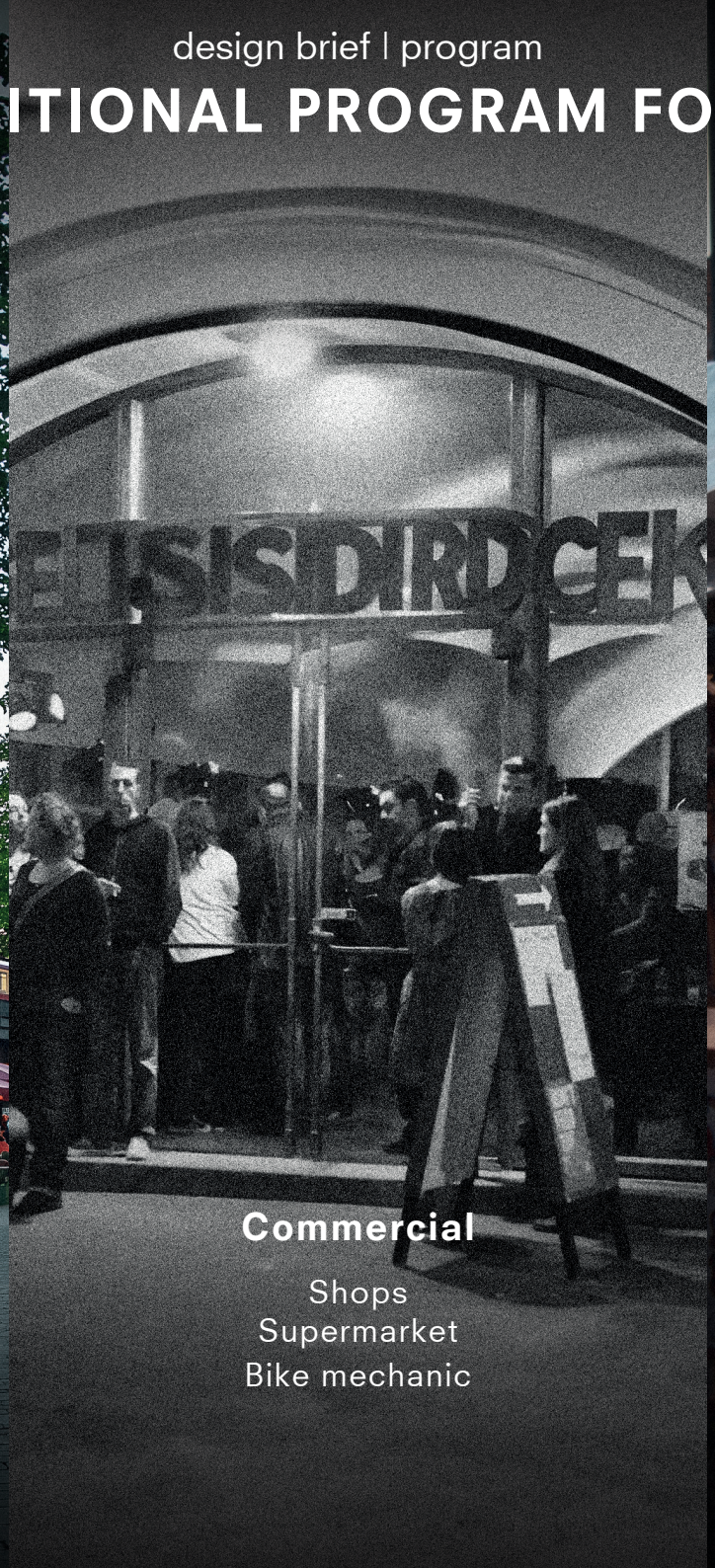
Additional program focus
on recreative, commercial and cultural functions

ADDITIONAL PROGRAM FOCUS



Recreational

BRLO Brewery
Cafe
Restaurant
Park



Commercial

Shops
Supermarket
Bike mechanic

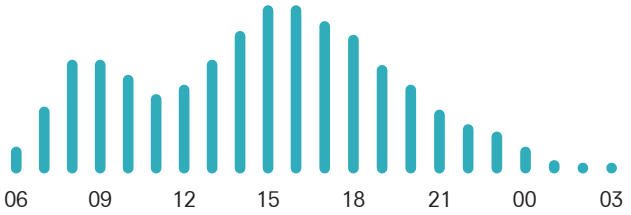


Cultural

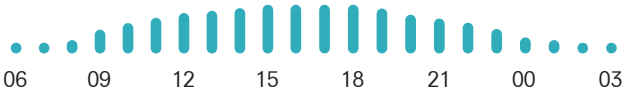
Expo Berlin
Workshop
Material Hub

© Images by Author

CURRENT BUILDING USAGE

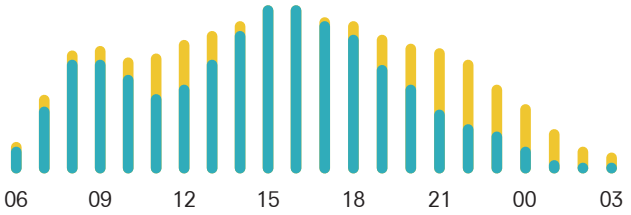


Weekday use

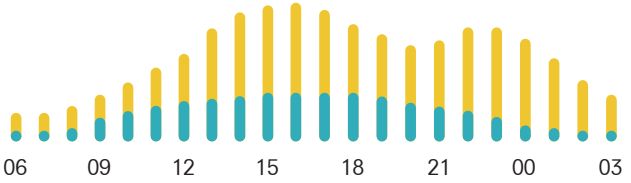


Weekend use

BUILDING USAGE GOAL



Weekday use



Weekend use

DESIGN BRIEF

SITE

PROGRAM

CLIENT

DESIGN APPROACH

RESEARCH QUESTION

MAIN INITIATORS

Bundesministerium
für Verkehr, Bau
und Stadtentwicklung

German federal government

BERLIN

Berlin municipality

Funding transport and infrastructure

RAILWAY CLIENTS



Deutsche Bahn



Berliner Verkehrsbetriebe

Owner and manager of railway infrastructure

STAKEHOLDERS

URBANE MITTE
AM GLEISDREIECK
Development Network

Urbane Mitte Development Network

STATION BERLIN

STATION Berlin Expo

Connecting businesses and activities

DESIGN BRIEF

SITE

PROGRAM

CLIENT

DESIGN APPROACH

RESEARCH QUESTION

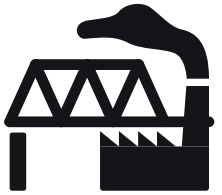
FOCUS



Monumental station
Existing station cannot be demolished



Reviving rail
Reviving an old connection by building a line on the same place



Industrial character
Should be respected by reacting to existing or former architectural elements or *material* use

DESIGN APPROACH



Monumental station
Existing station cannot be demolished

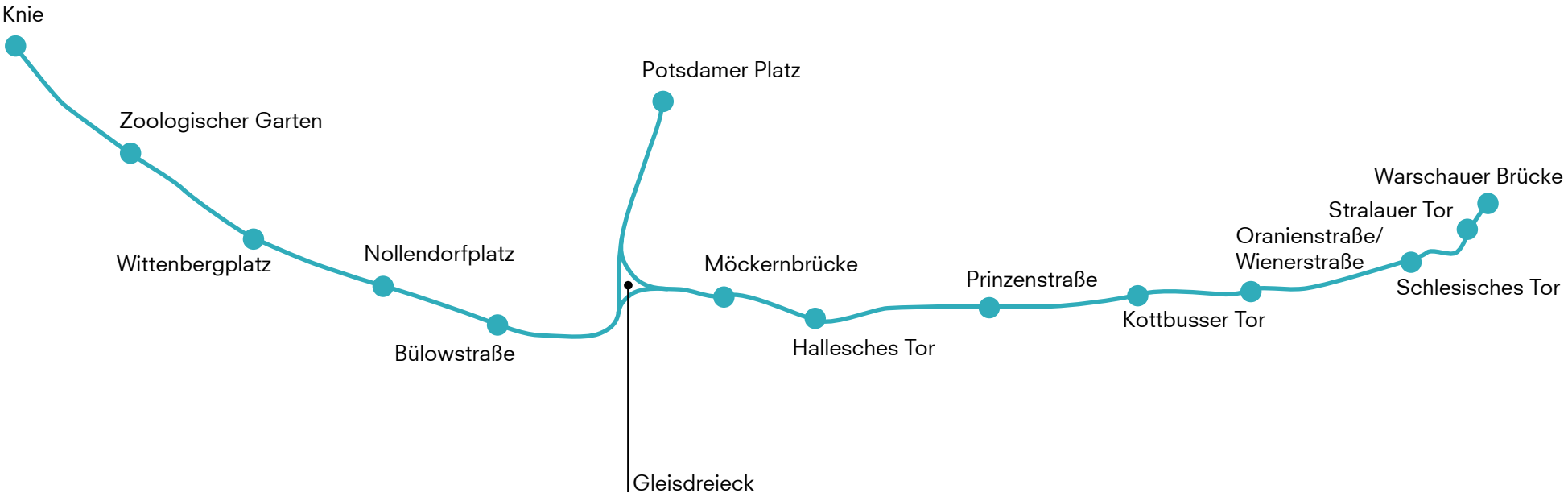
Reviving rail
Reviving an old connection by building a line on the same place

Industrial character
Should be respected by reacting to existing or former architectural elements or *material* use

TIMELINE

1902

The first U-Bahn track consisted of 3 lines: K1, K2 & K3.



1837 — 1900 — 2000 — now

1902

Construction of the Gleisdreieck rail triangle.



1837 1900 2000 now

© stiftung deutsches technikmuseum berlin



1908

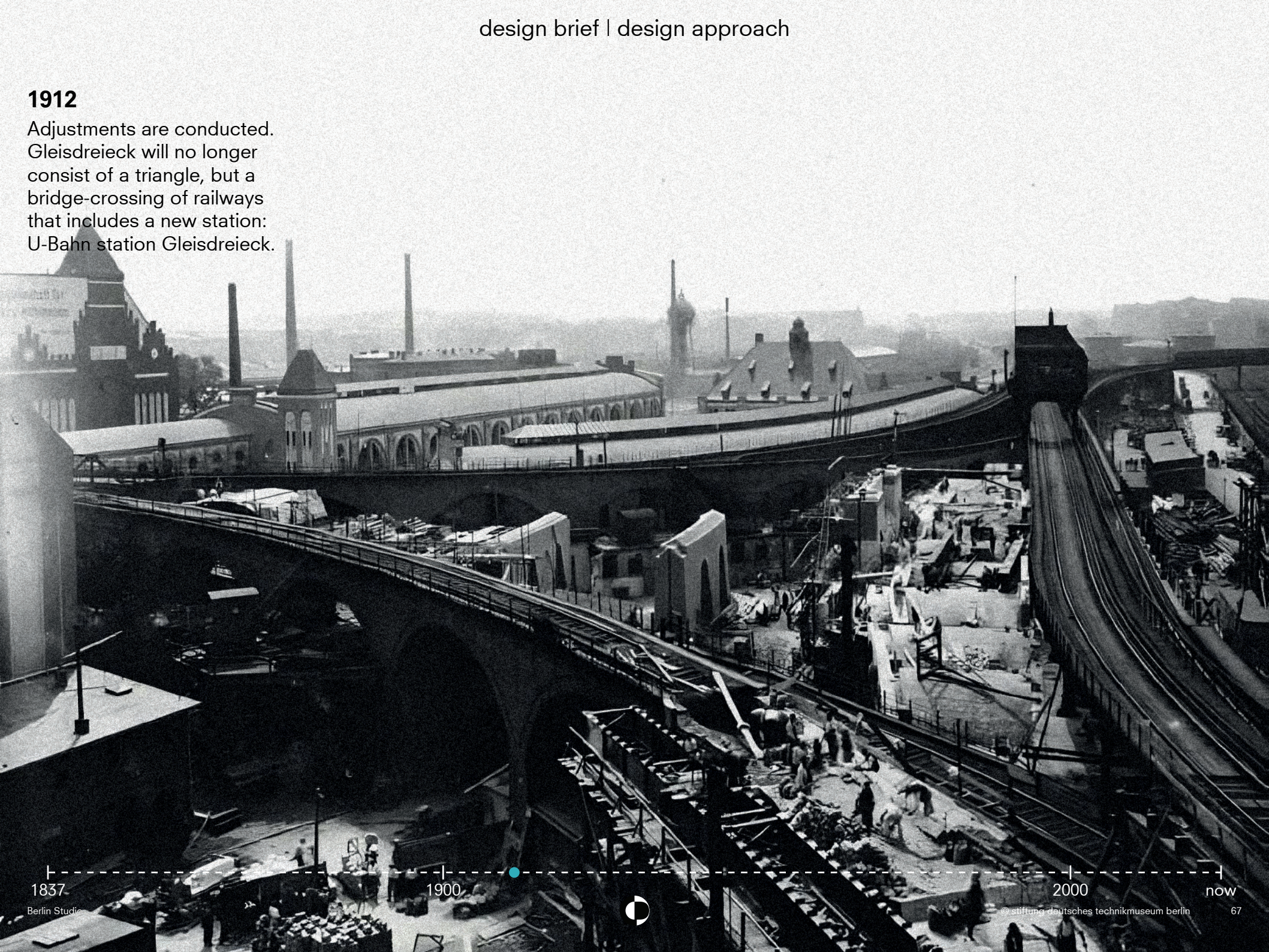
"Die hochbahnkatastrophe"
Two trains of the elevated railway collided at the track triangle.

1837 — 1900 — 2000 — now

© stiftung deutsches technikmuseum berlin

1912

Adjustments are conducted. Gleisdreieck will no longer consist of a triangle, but a bridge-crossing of railways that includes a new station: U-Bahn station Gleisdreieck.



1837 1900 2000 now

© stiftung deutsches technikmuseum berlin

HISTORY

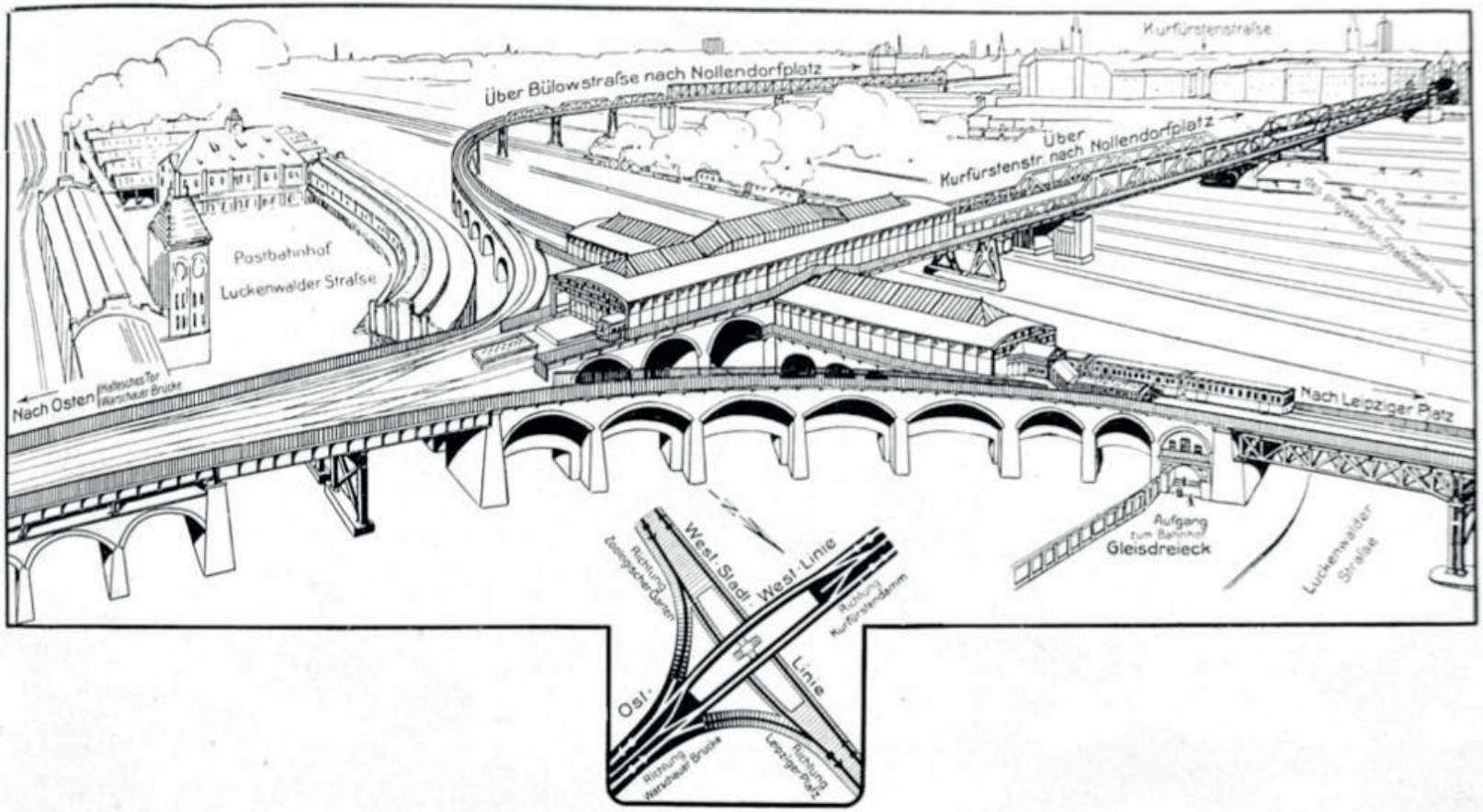
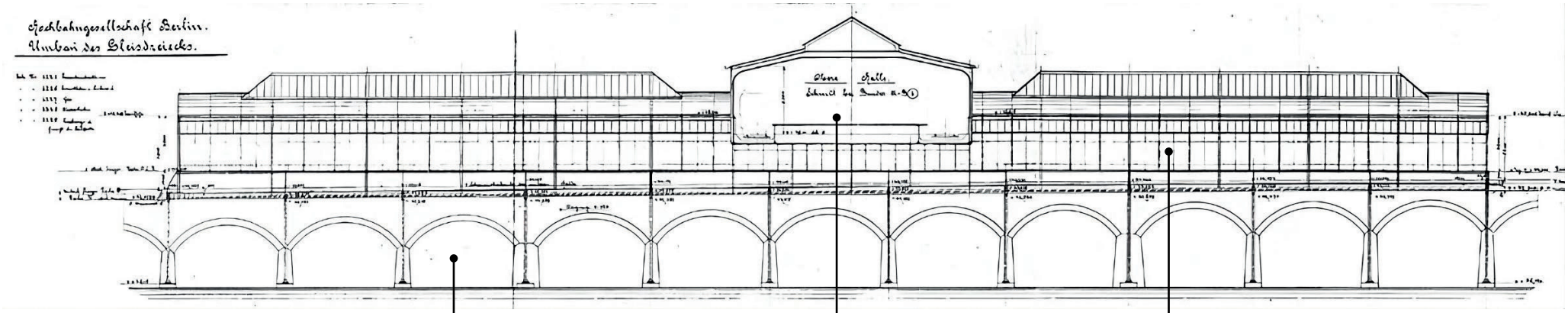


Abb. 71. — Gleisdreieck nach dem Umbau

HISTORY

1914

Adjustments are conducted. Gleisdreieck will no longer consist of a triangle, but a bridge-crossing of railways that includes a new station: Gleisdreieck.



Brick arches that often functioned as storage

U1 & U3 (later) Platform

U2 Platform

1837 1900 2000 now

FOCUS

Monumental station
Existing station cannot be demolished



Reviving rail
Reviving an old connection by building a line on the same place

Industrial character
Should be respected by reacting to existing or former architectural elements or *material* use

FORMER TRAINLINE

1930

The Gleisdreieck area reaches its industrial expansion peak.



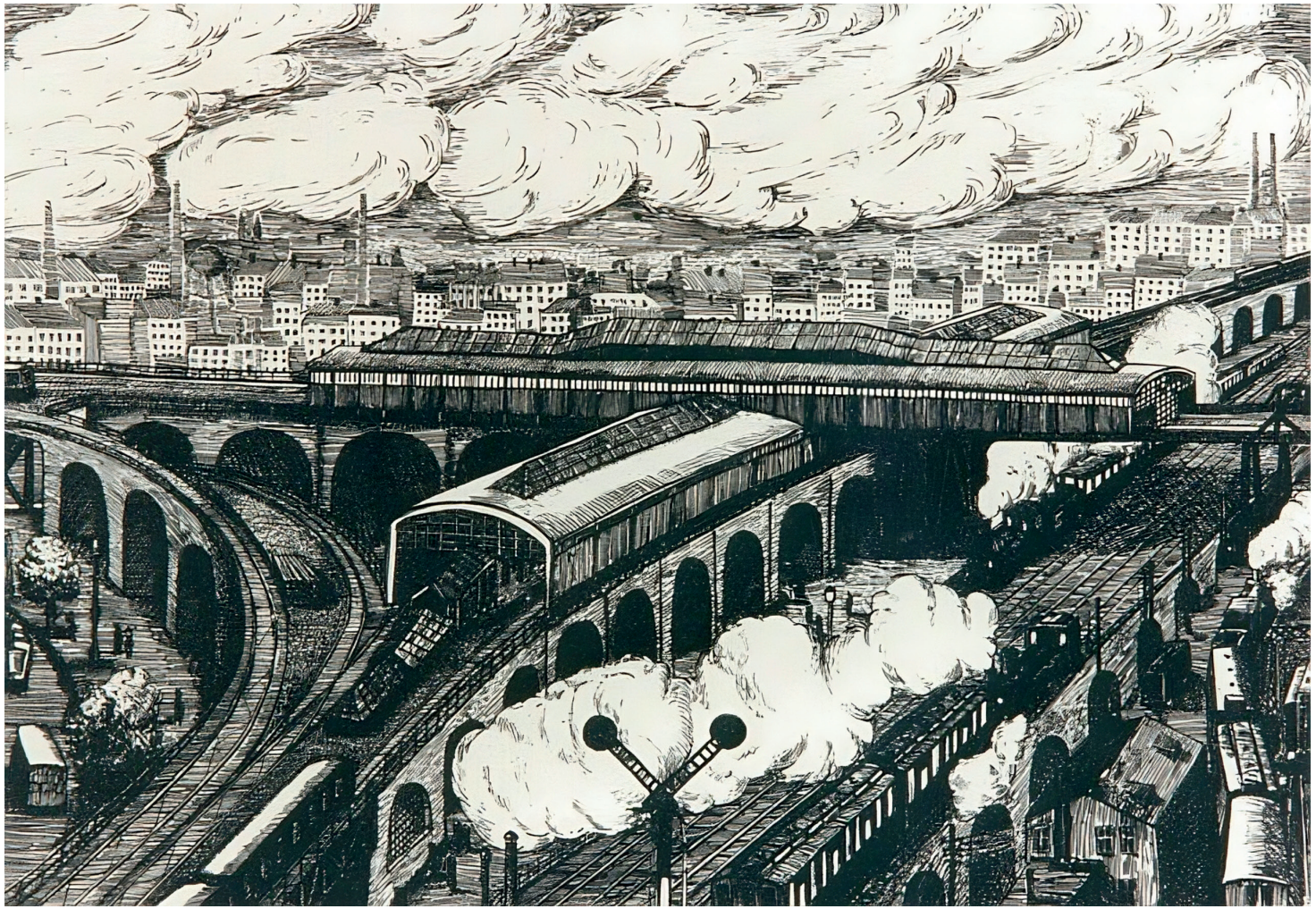
1837 1900 2000 now

© Map data retrieved from IndustrieKultur Berlin

FORMER TRAINLINE

1930

The Gleisdreieck area reaches its industrial expansion peak.



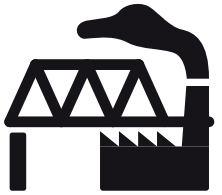
1837 — 1900 — 2000 — now

© Etching by unknown artist, 1931

FOCUS

Monumental station
Existing station cannot be demolished

Reviving rail
Reviving an old connection by building a line on the same place

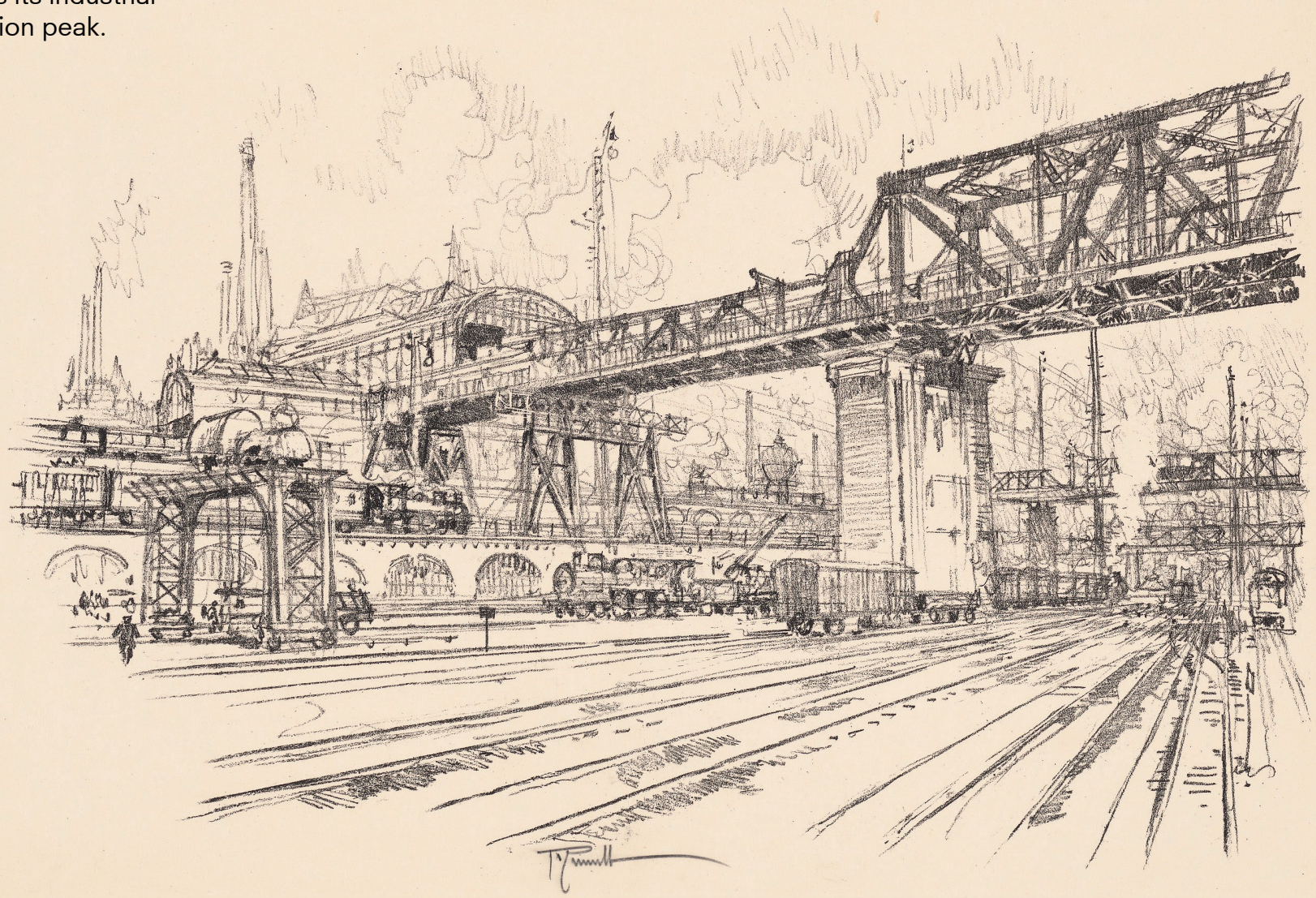


Industrial character
Should be respected by reacting to existing or former architectural elements or *material* use

INDUSTRIAL CHARACTER

1930

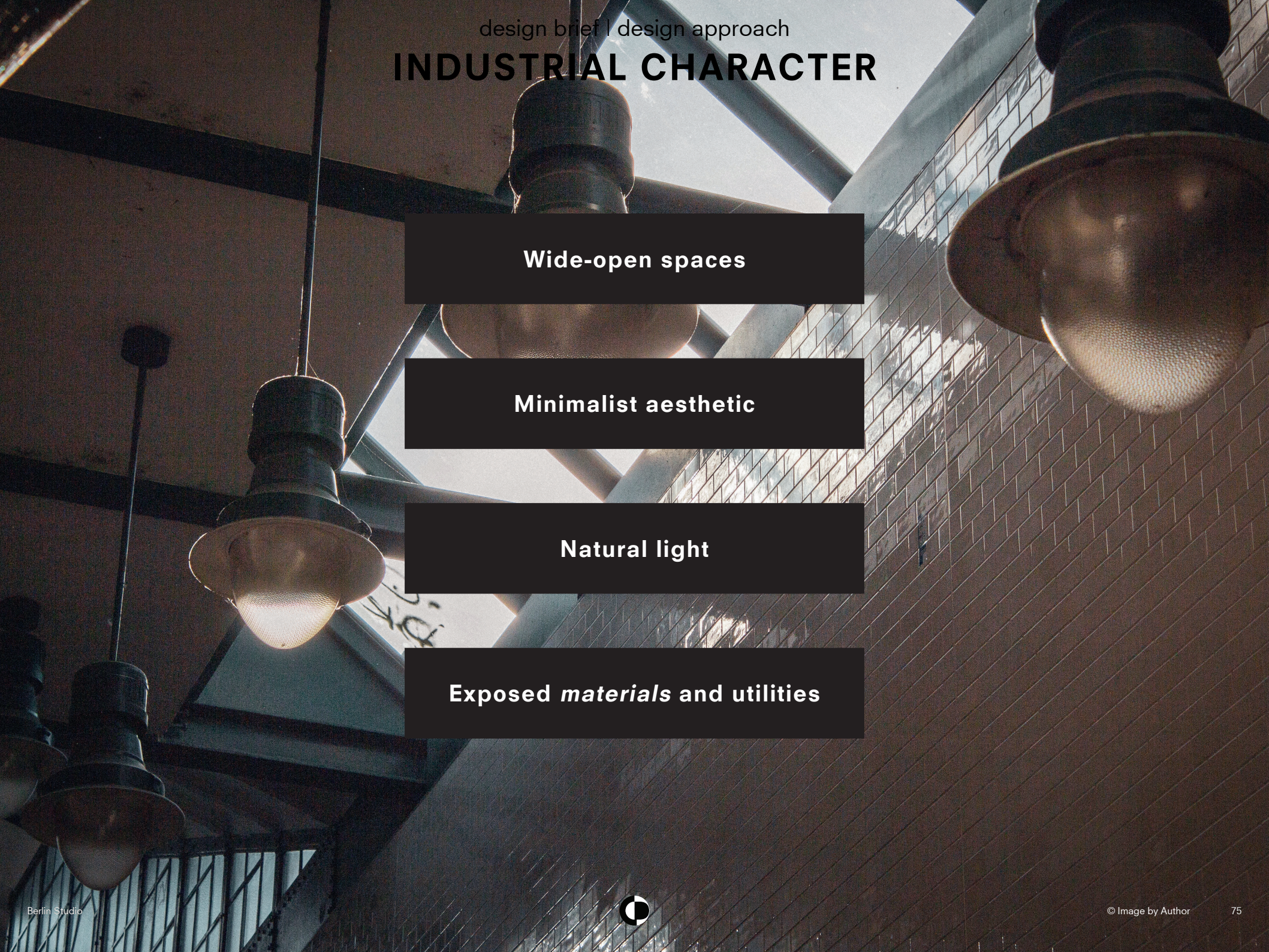
The Gleisdreieck area reaches its industrial expansion peak.



1837 — 1900 — 2000 — now

© Pencil drawing by Joseph Penell, 1926

INDUSTRIAL CHARACTER



Wide-open spaces

Minimalist aesthetic

Natural light

Exposed *materials* and utilities

© Image by Author

MATERIAL REQUIREMENTS



Using materials that reference those already present while conveying a contemporary look.

© Image by Author

MATERIAL SELECTION

Existing

Facade



Structural



Transparent



MATERIAL SELECTION

	Facade	Structural	Transparent
Existing			
Extention			

MATERIAL GROUP AMBITION



We aim to set a new benchmark for material use within society; which abandons all carbon positive materials and on-site constructions methodologies. Creating a new precedent for society and architecture.

© Image by Author

GROUP REQUIREMENTS

Sourcing

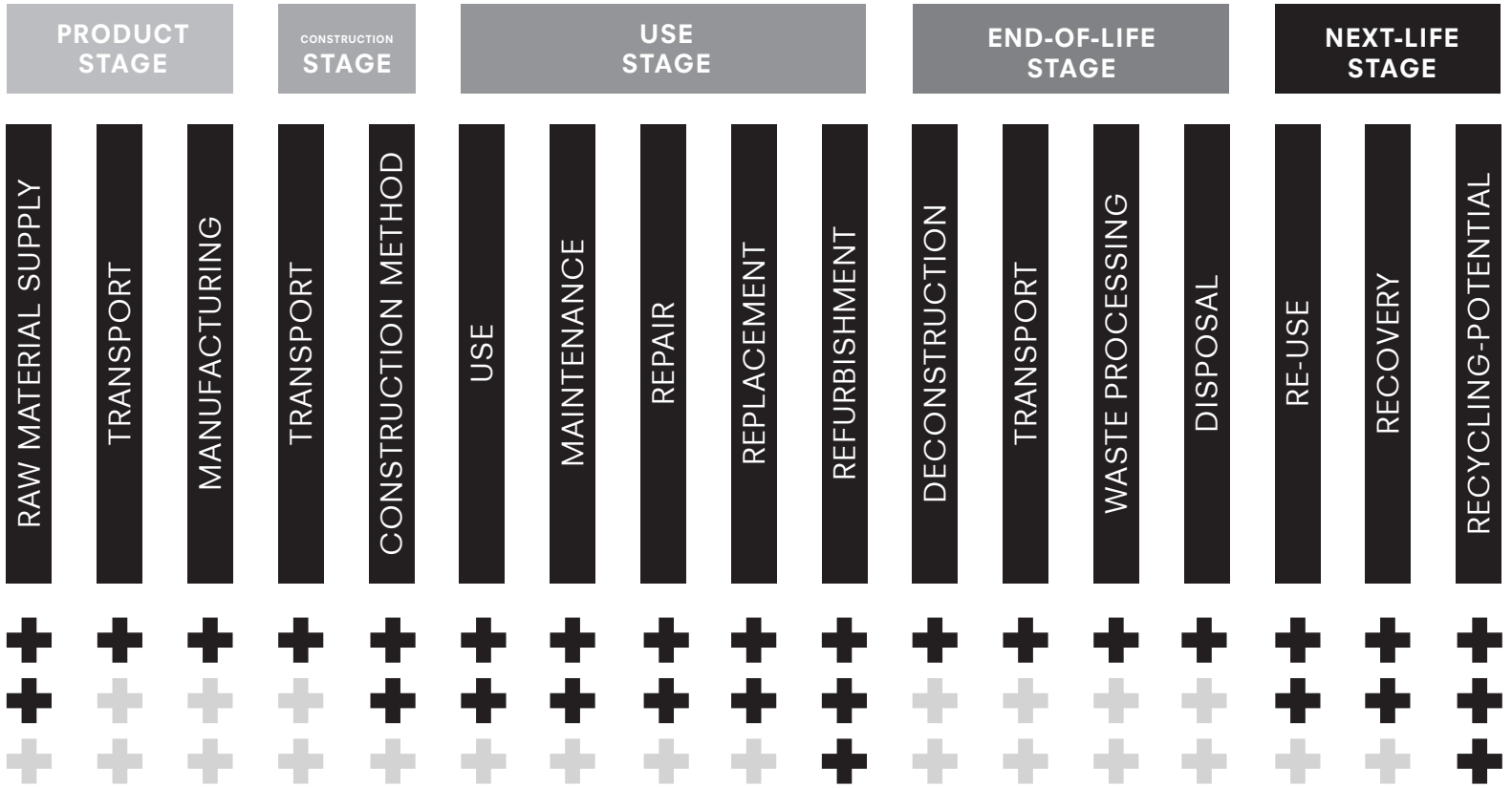
Accessibility

Reuse

Prominence

SOURCING MATERIAL MATRIX

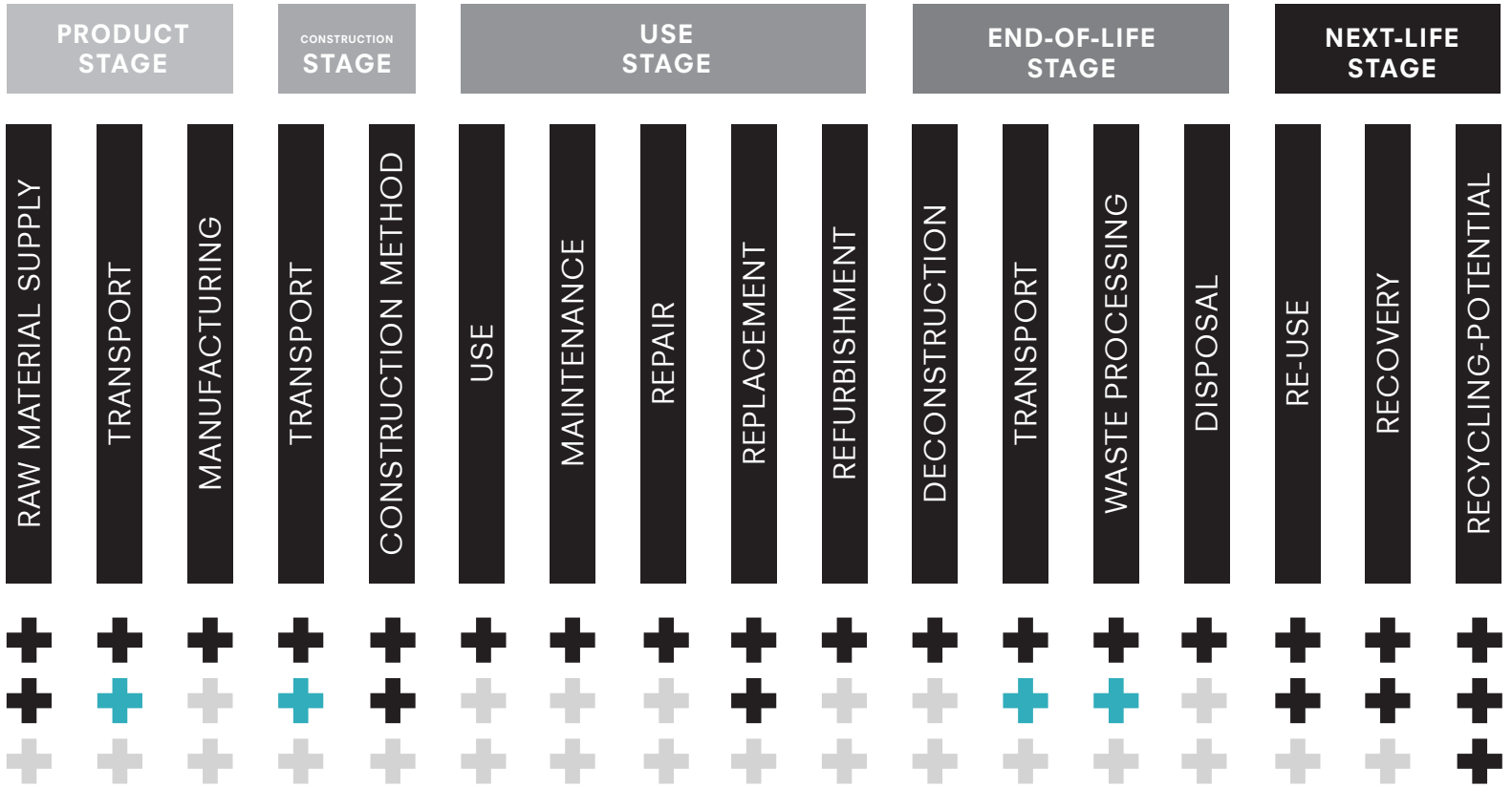
“POINT & WEIGHT SYSTEM”



STEEL

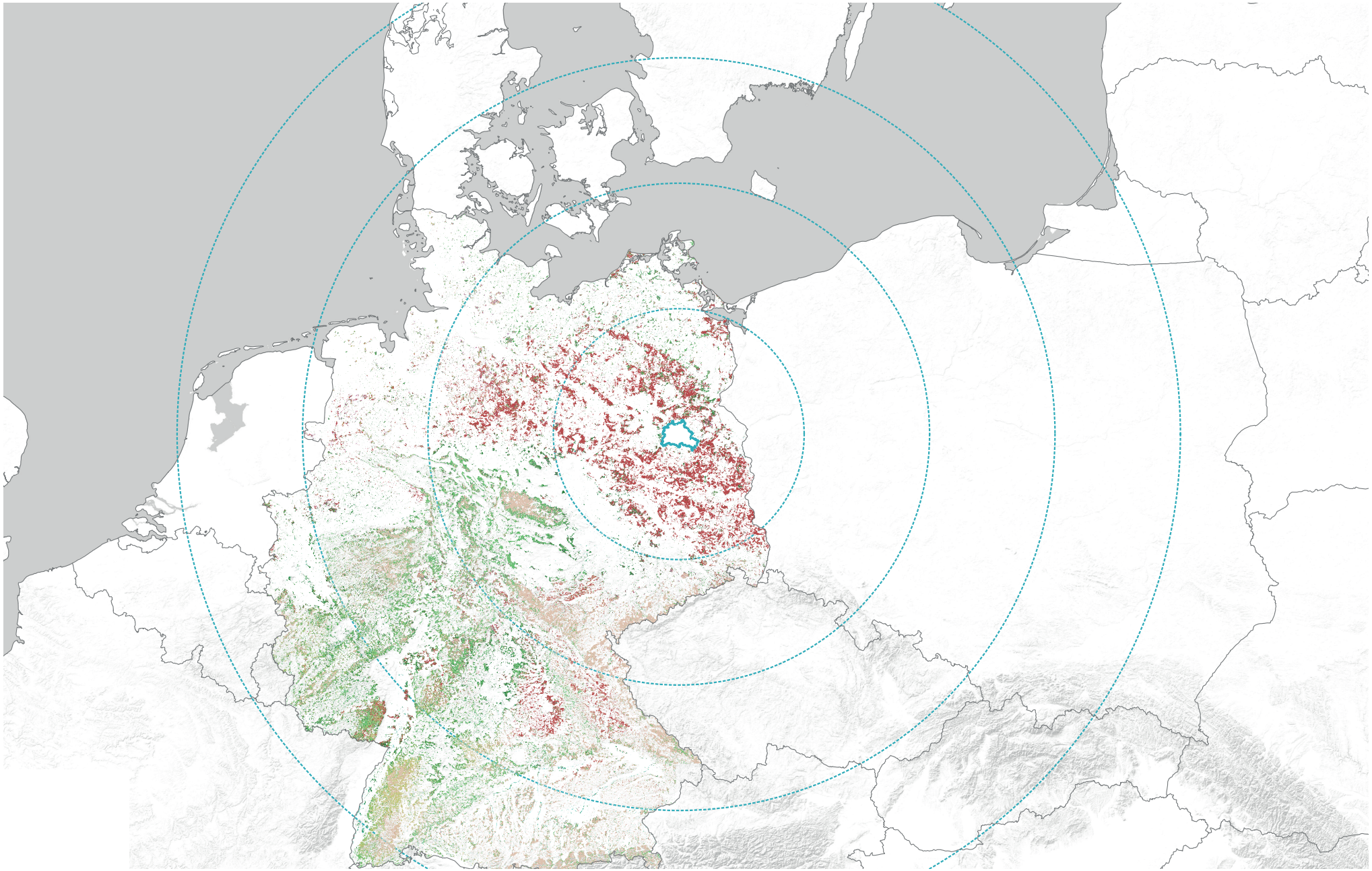
SOURCING MATERIAL MATRIX

“POINT & WEIGHT SYSTEM”



TIMBER

TIMBER AVAILABILITY





BACK TO GLEISDREIECK

DESIGN BRIEF

PROPOSED DESIGN

CONCLUSIONS AND REFLECTIONS

DESIGN

CONCEPT

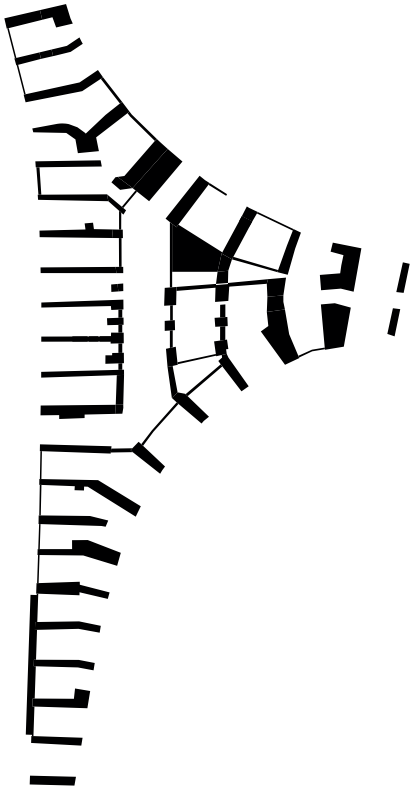
TRANSFORMING THE EXISTING

FUNCTIONING

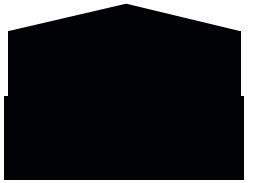
MATERIALITY

WALKTHROUGH

EXISTING STRUCTURE

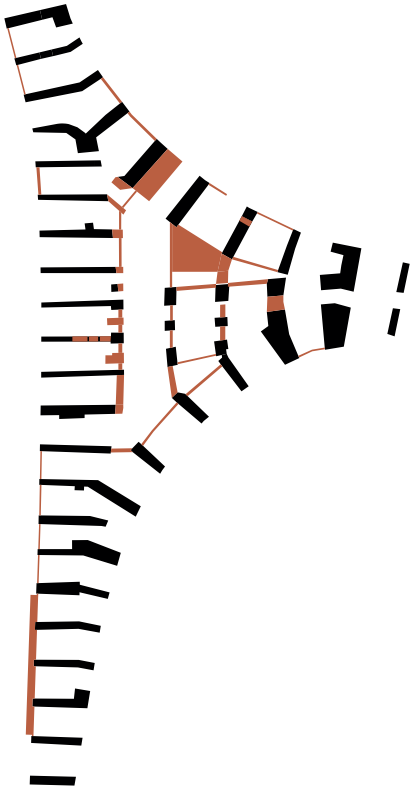


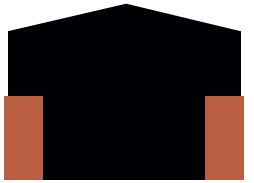
plan



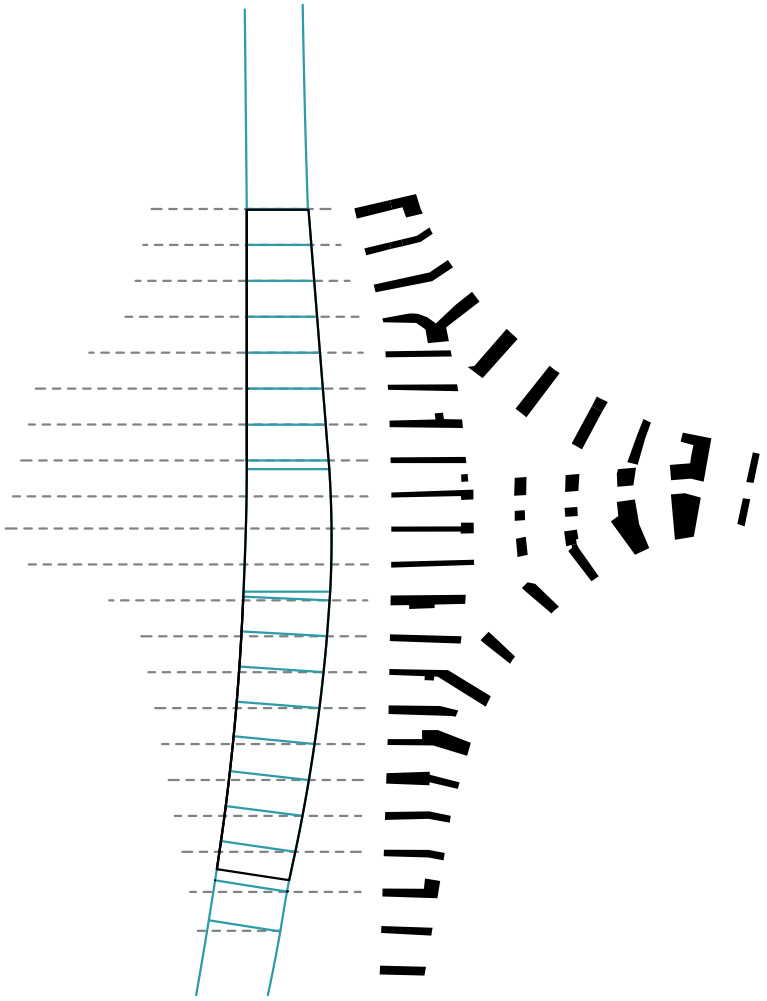
section

OPENING UP EXISTING STRUCTURE



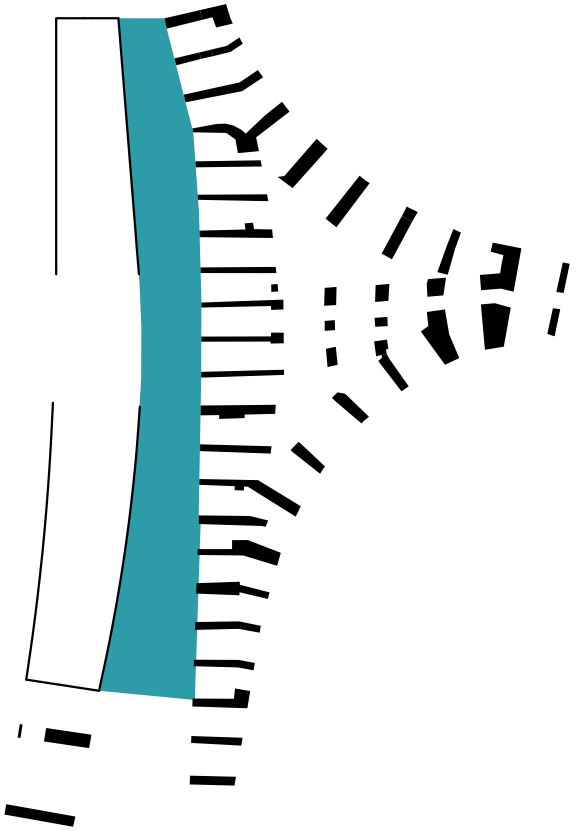


EXTENDING THE STATION



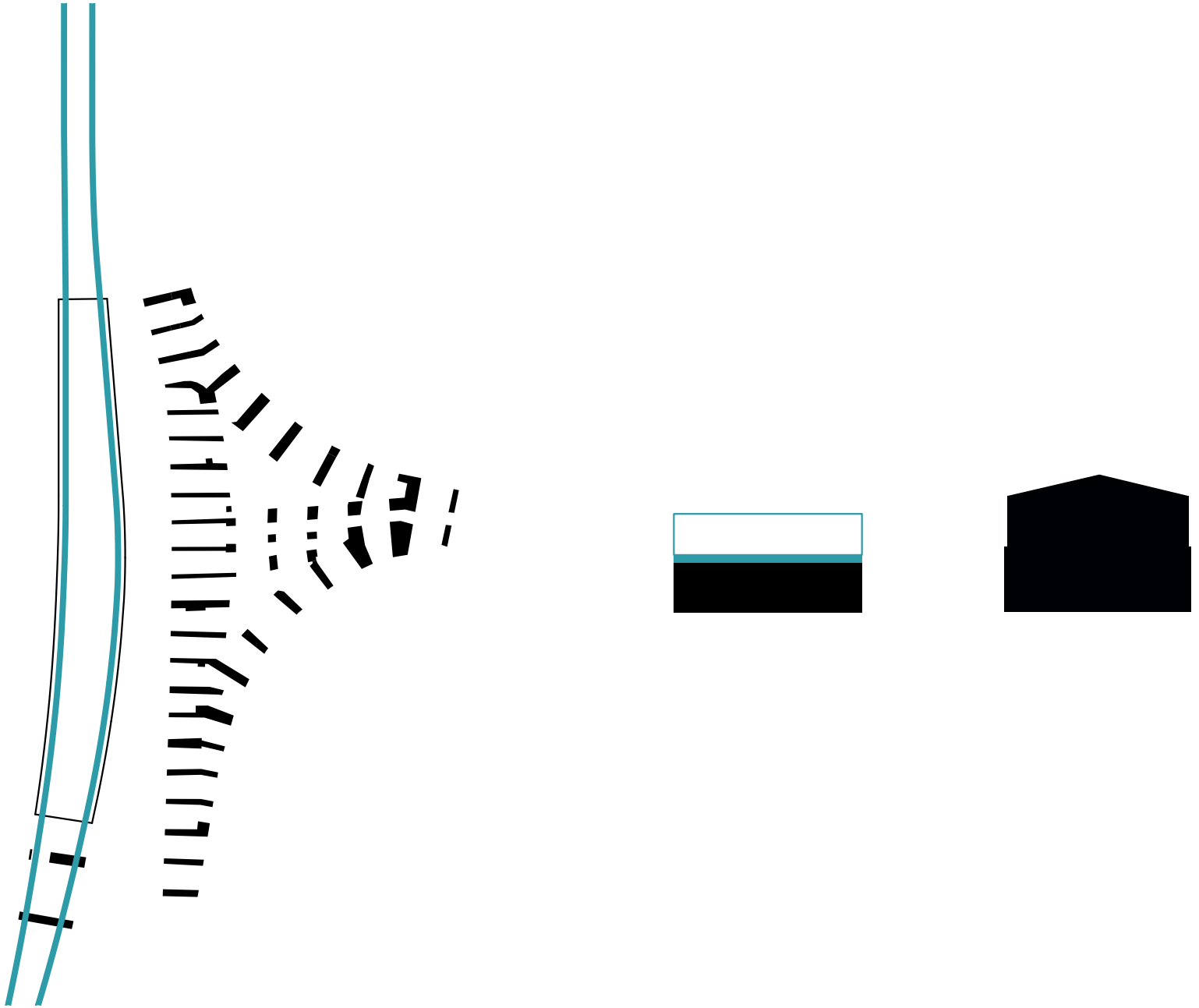


CREATING STATION STREET

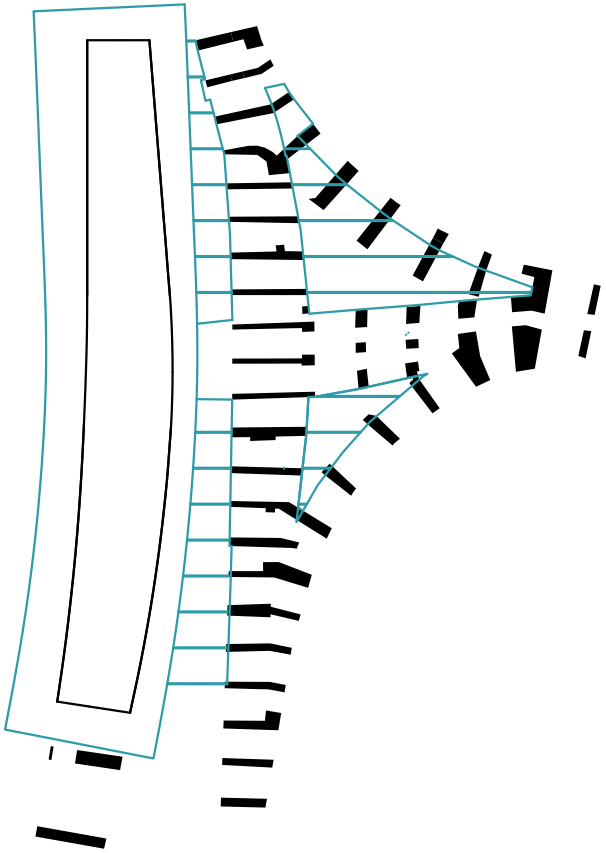




NEW S21 LINE

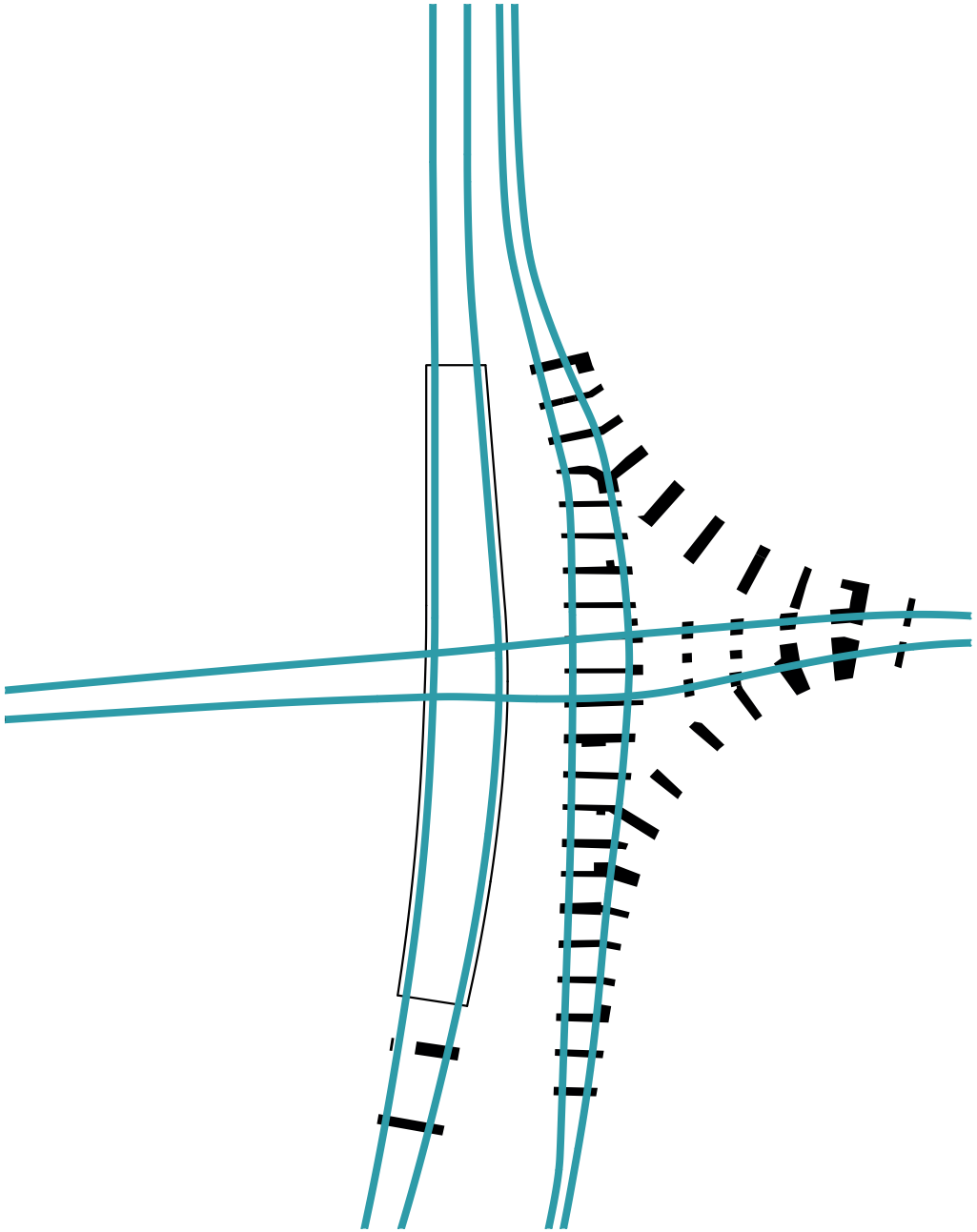


CREATING SHELTERED SPACES



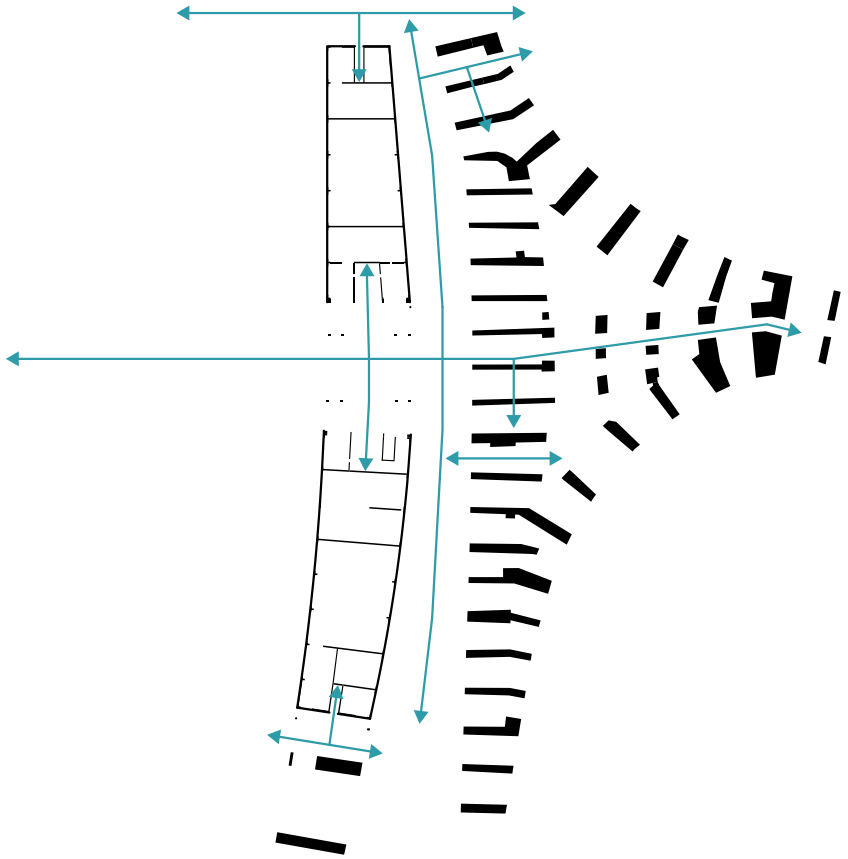


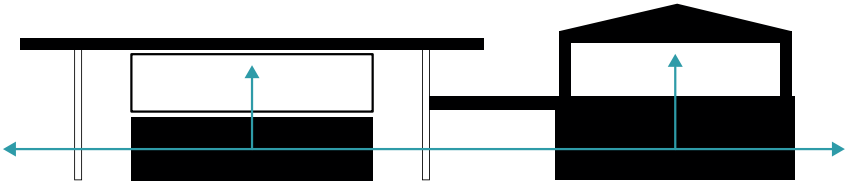
INFRASTRUCTURE NODE



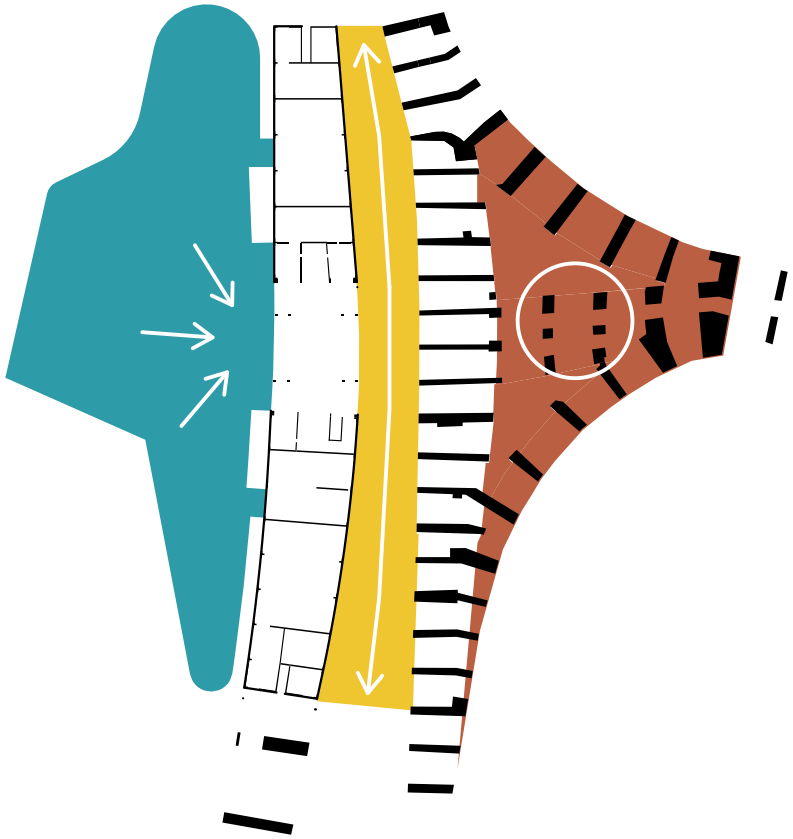


GUIDING FLOWS





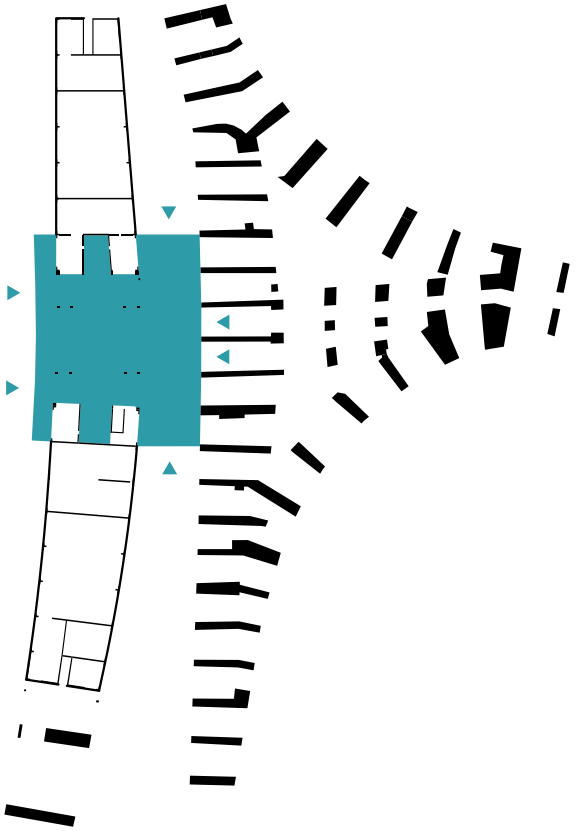
DEFINING PROGRAM AREAS





Recreational area **Commercial street** **Cultural atrium**

CENTRAL CORE





DESIGN

CONCEPT

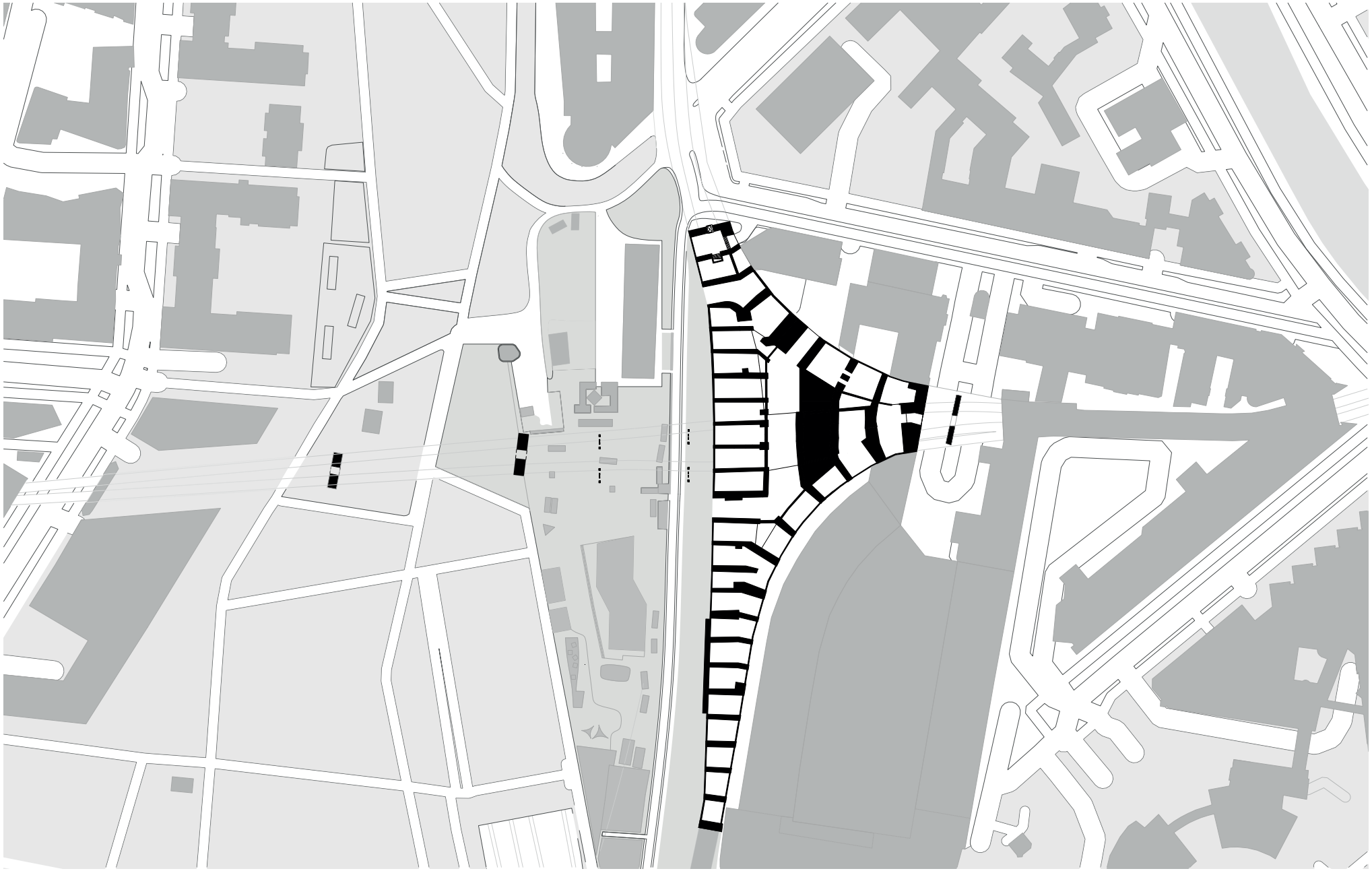
TRANSFORMING THE EXISTING

FUNCTIONING

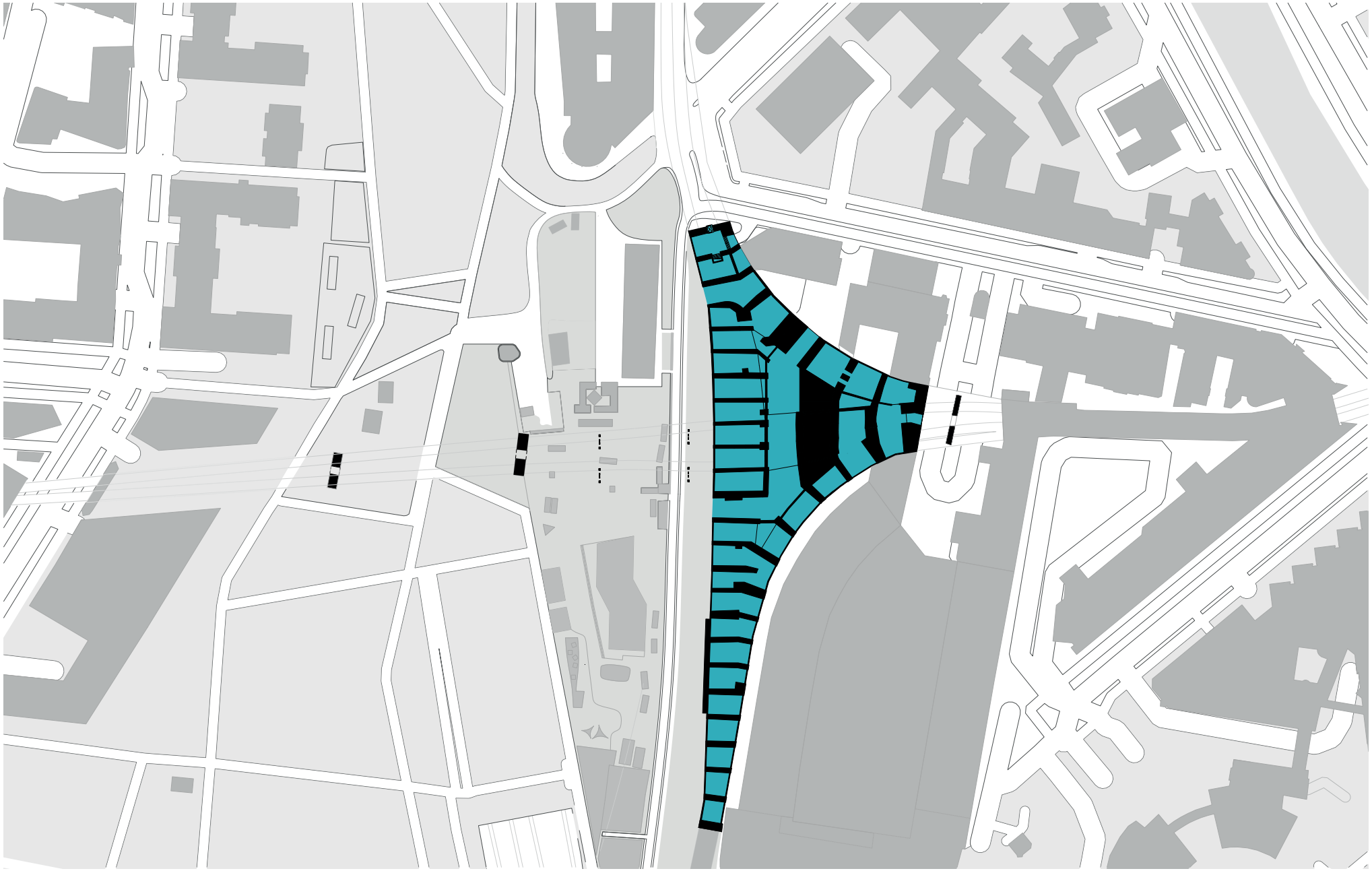
MATERIALITY

WALKTHROUGH

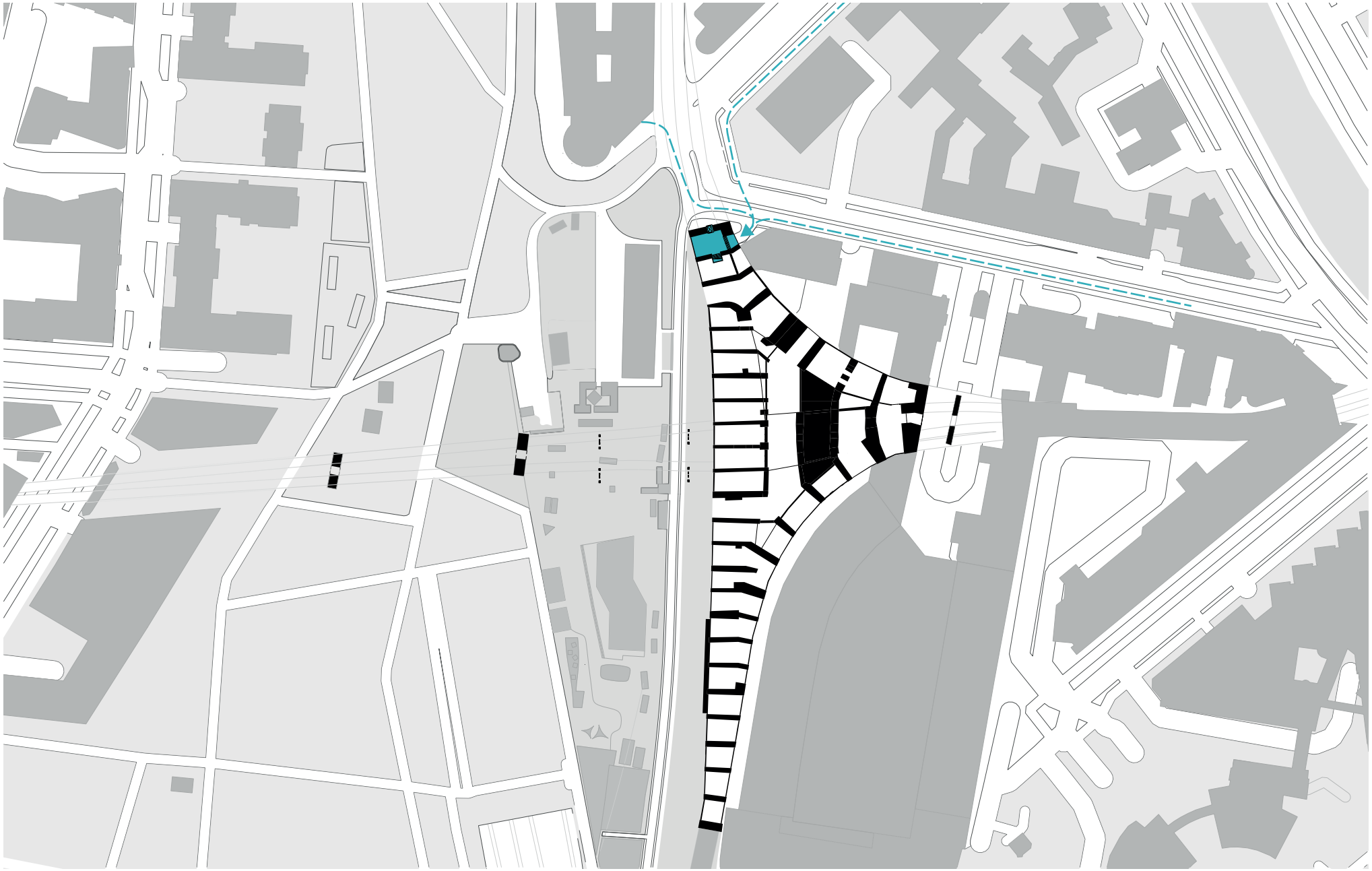
CURRENT SITUATION



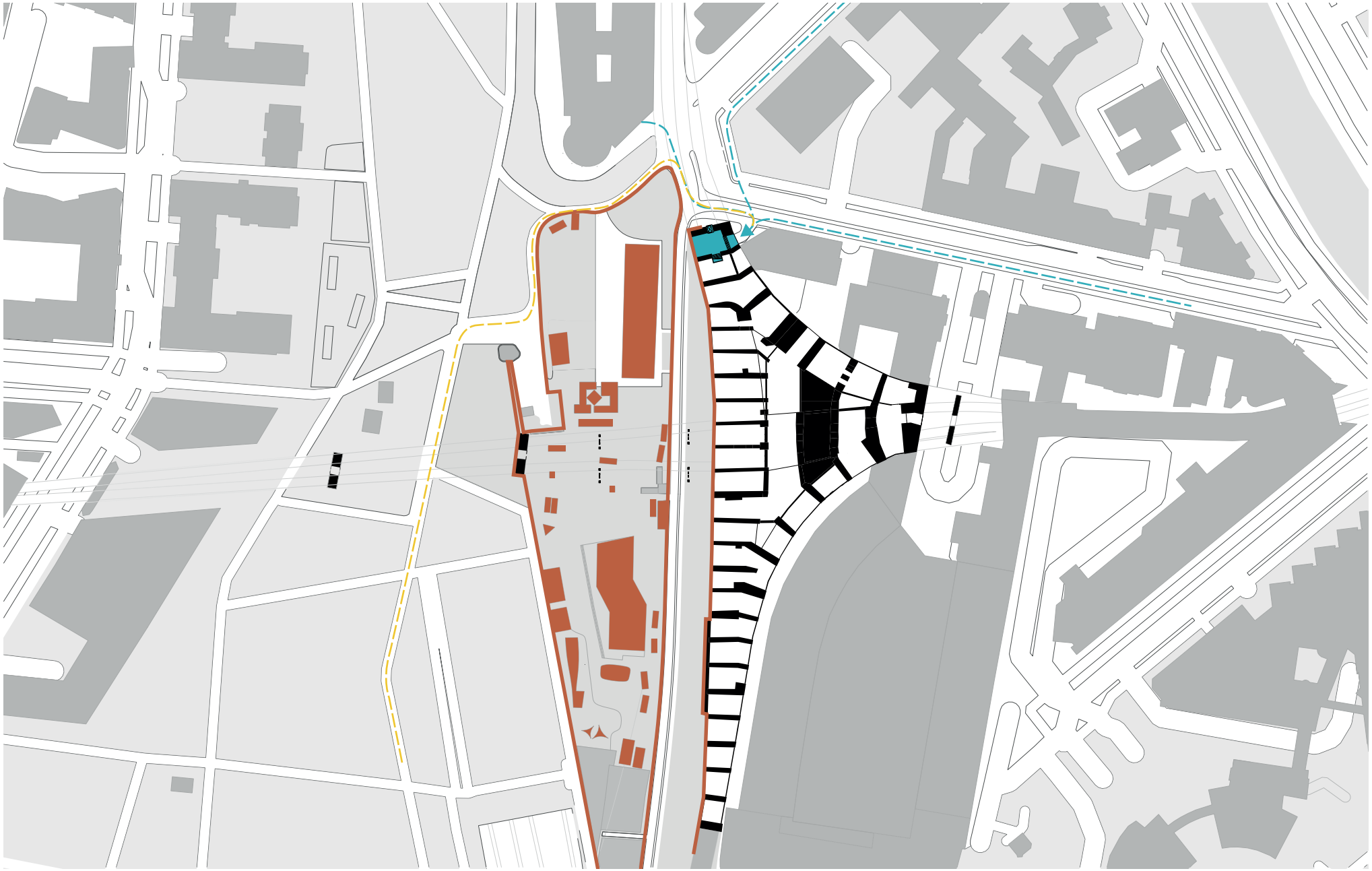
EXISTING STRUCTURE



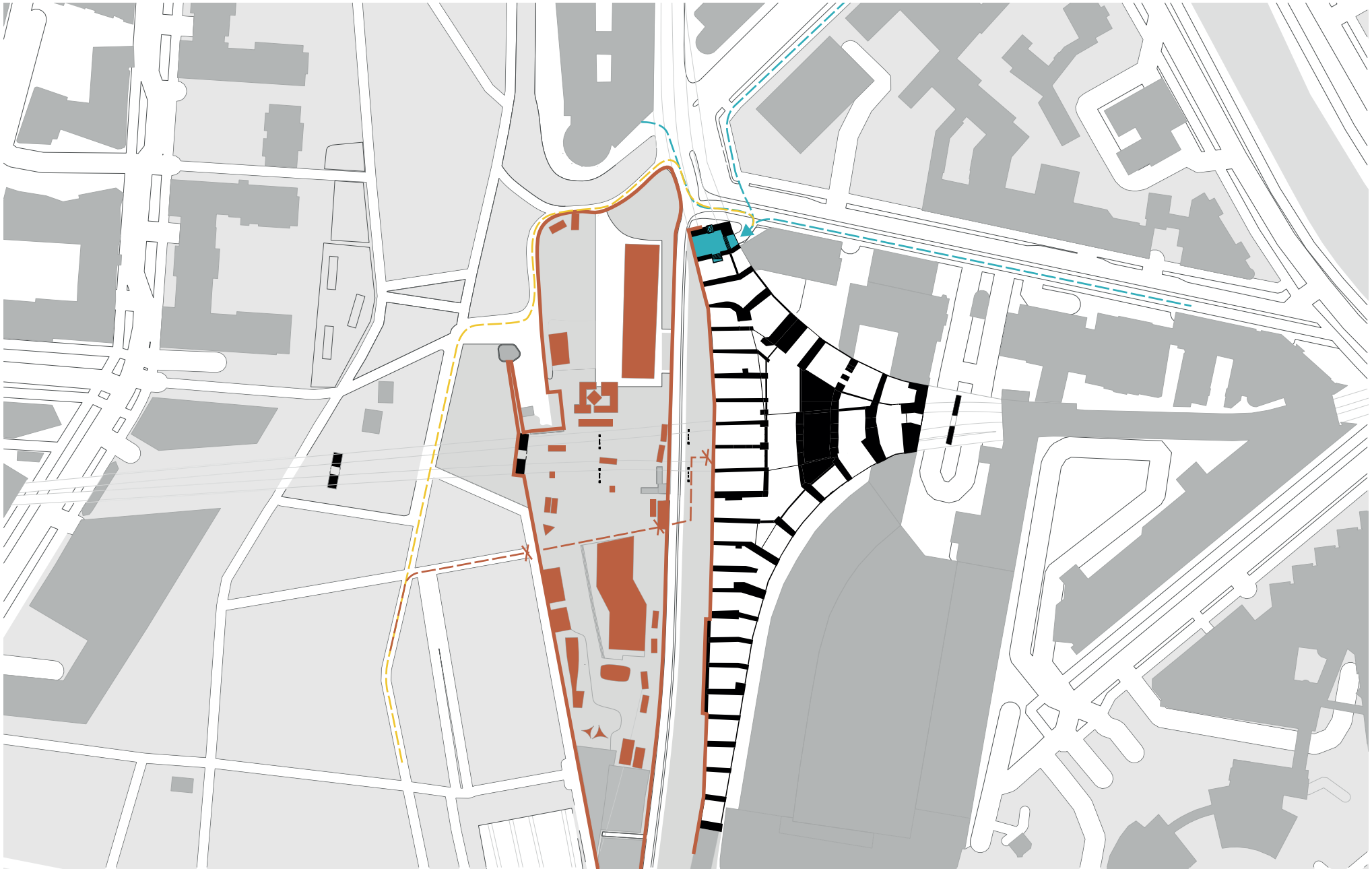
ONE ENTRANCE



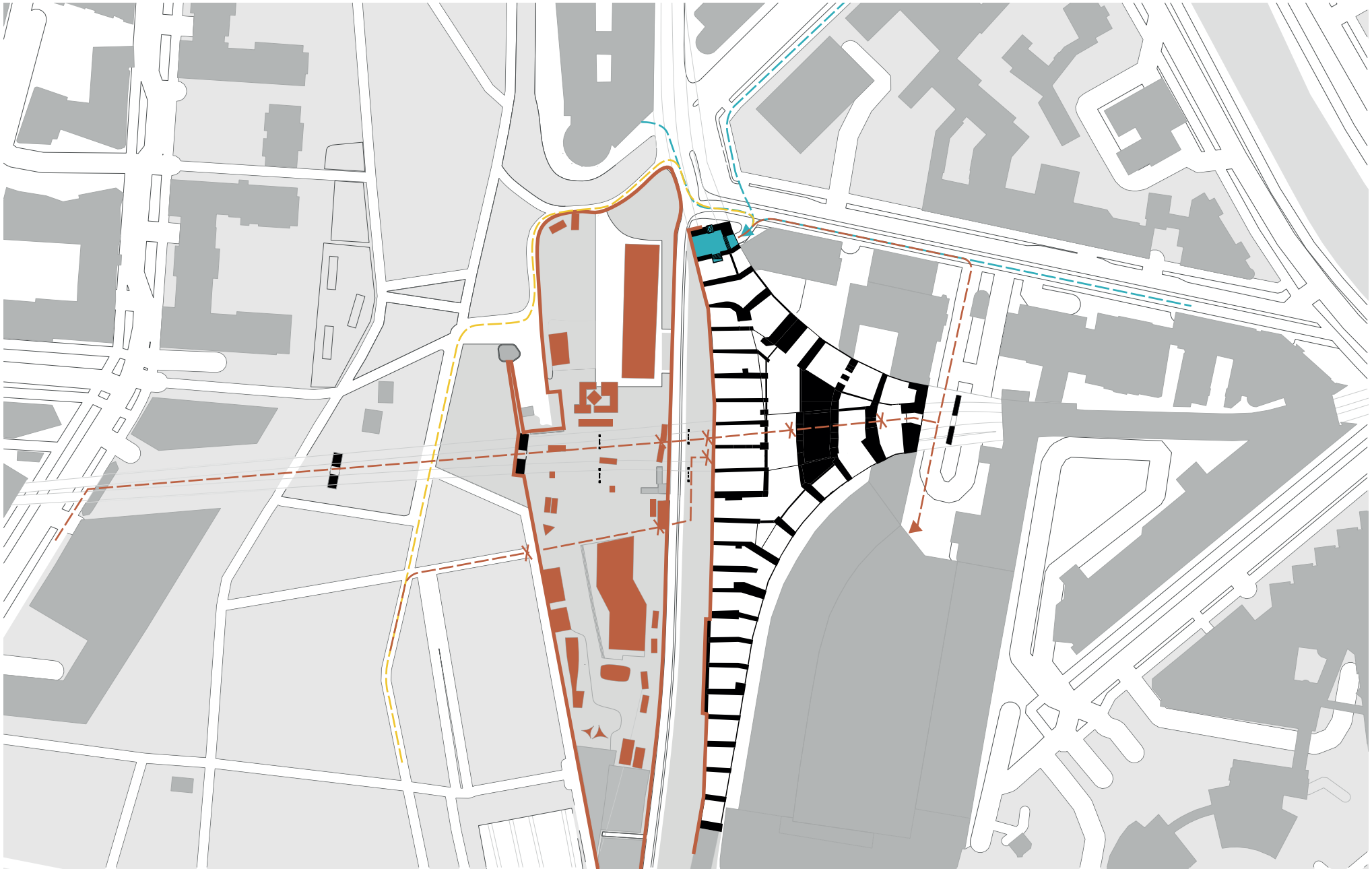
DIFFICULT TO REACH



DIFFICULT TO REACH



DIFFICULT TO REACH



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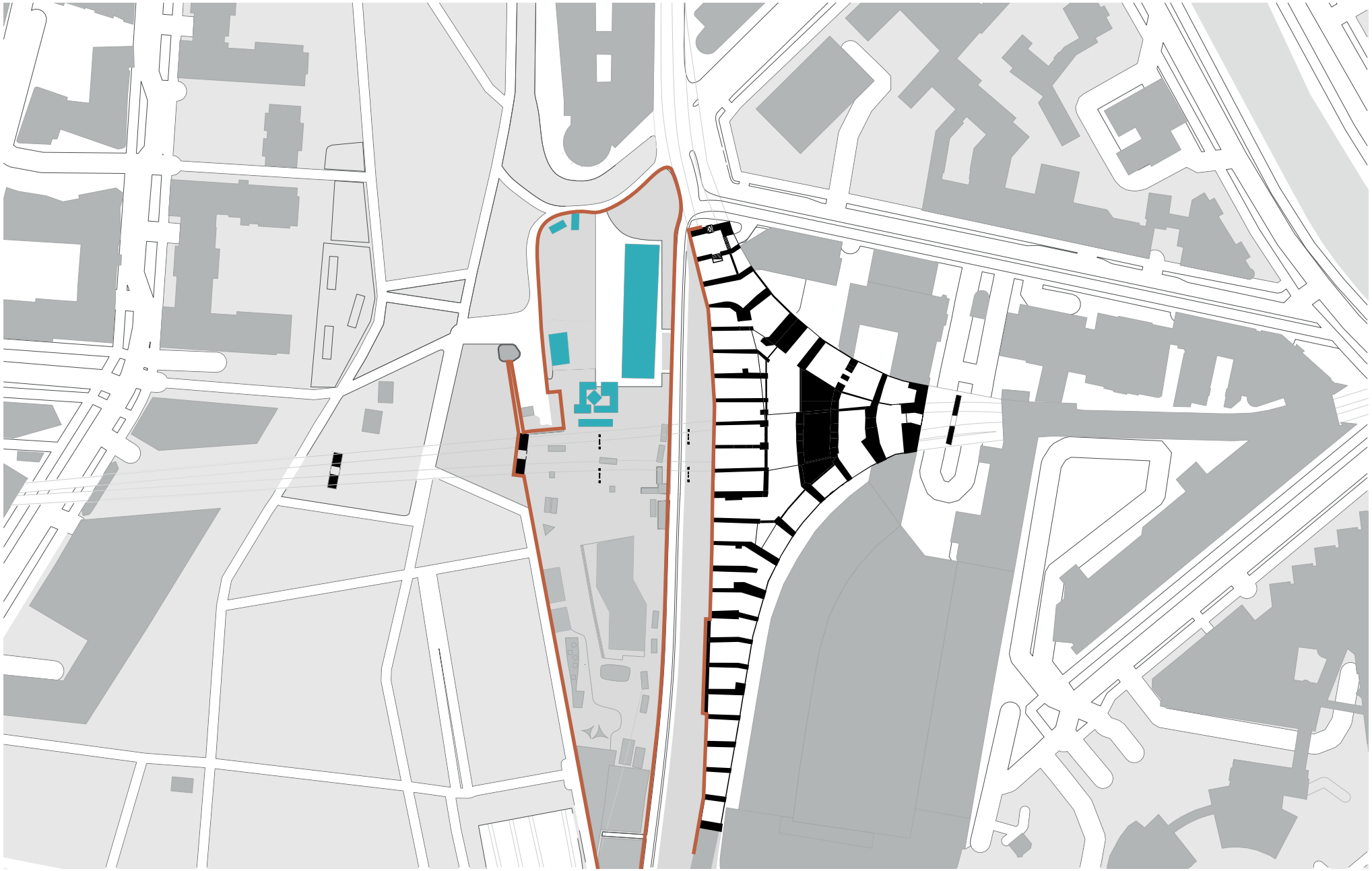

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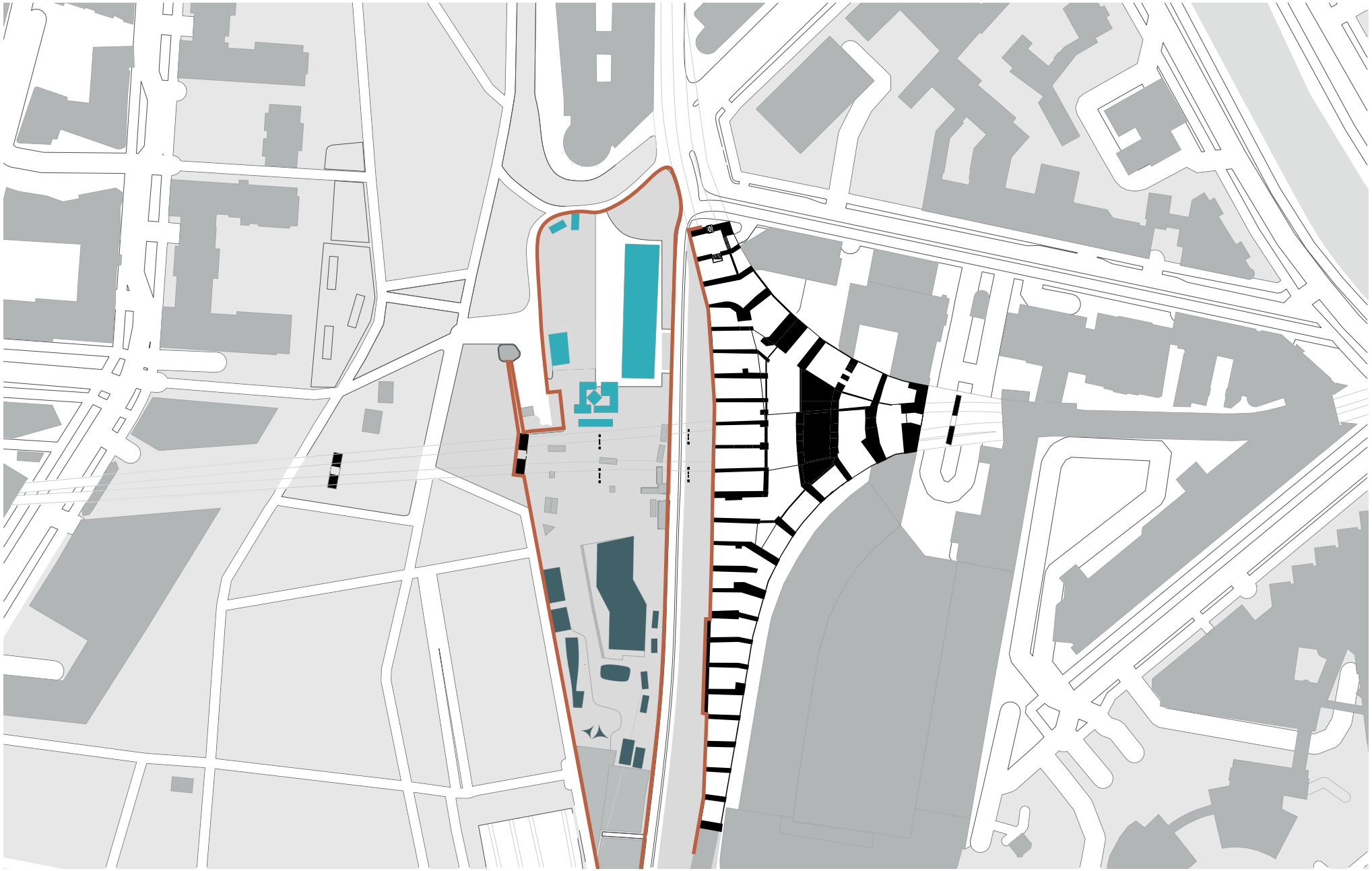

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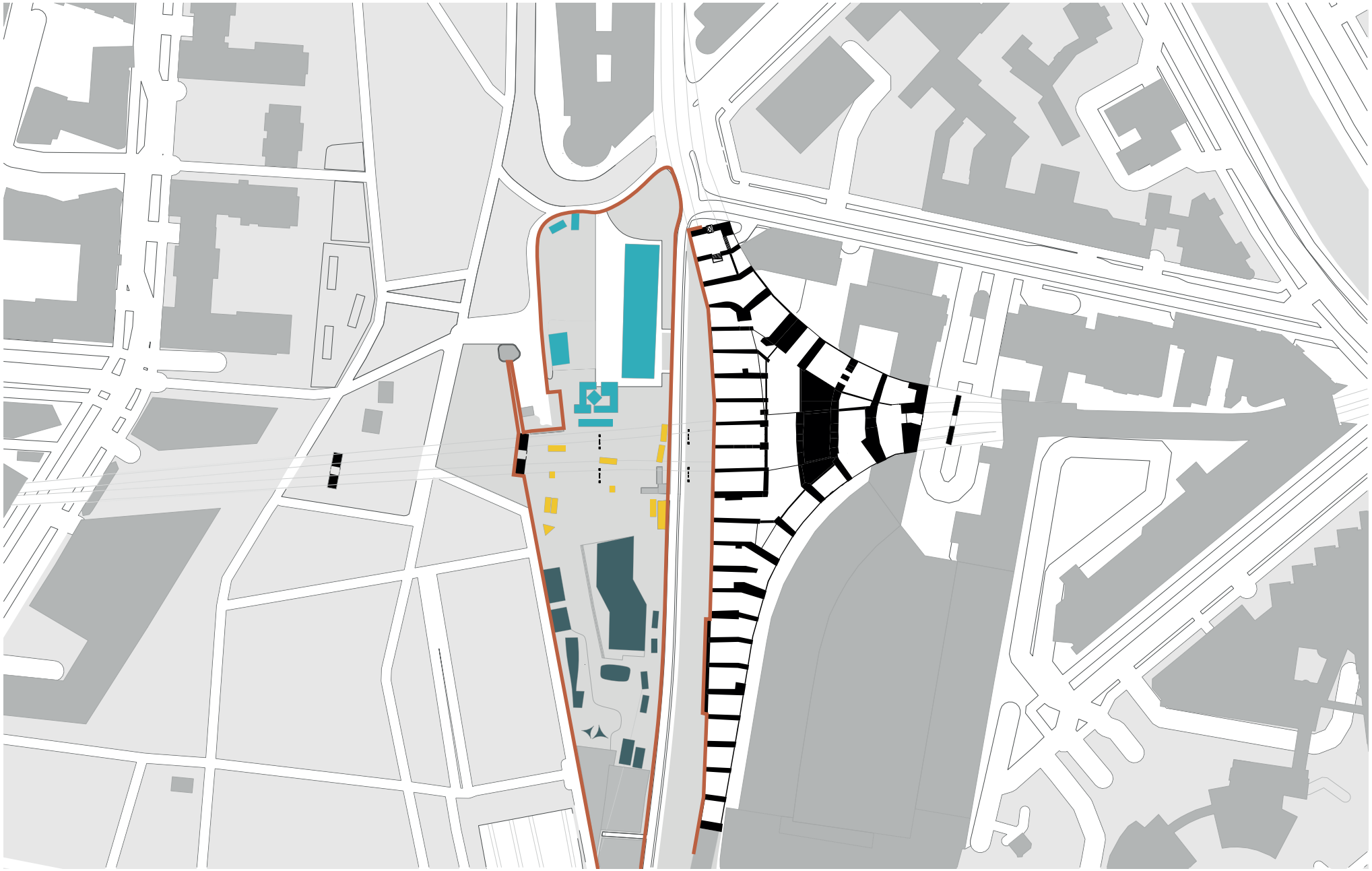

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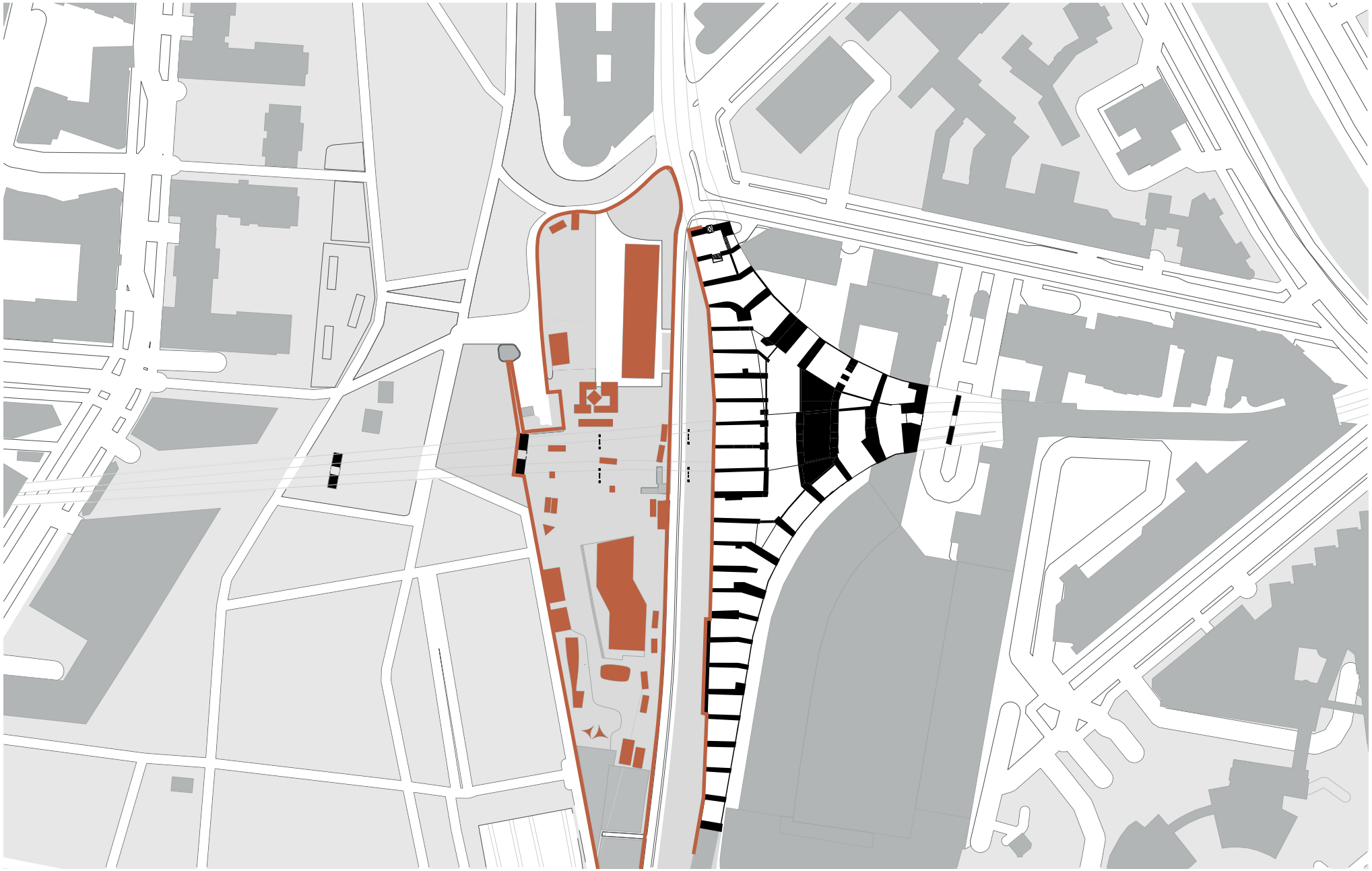

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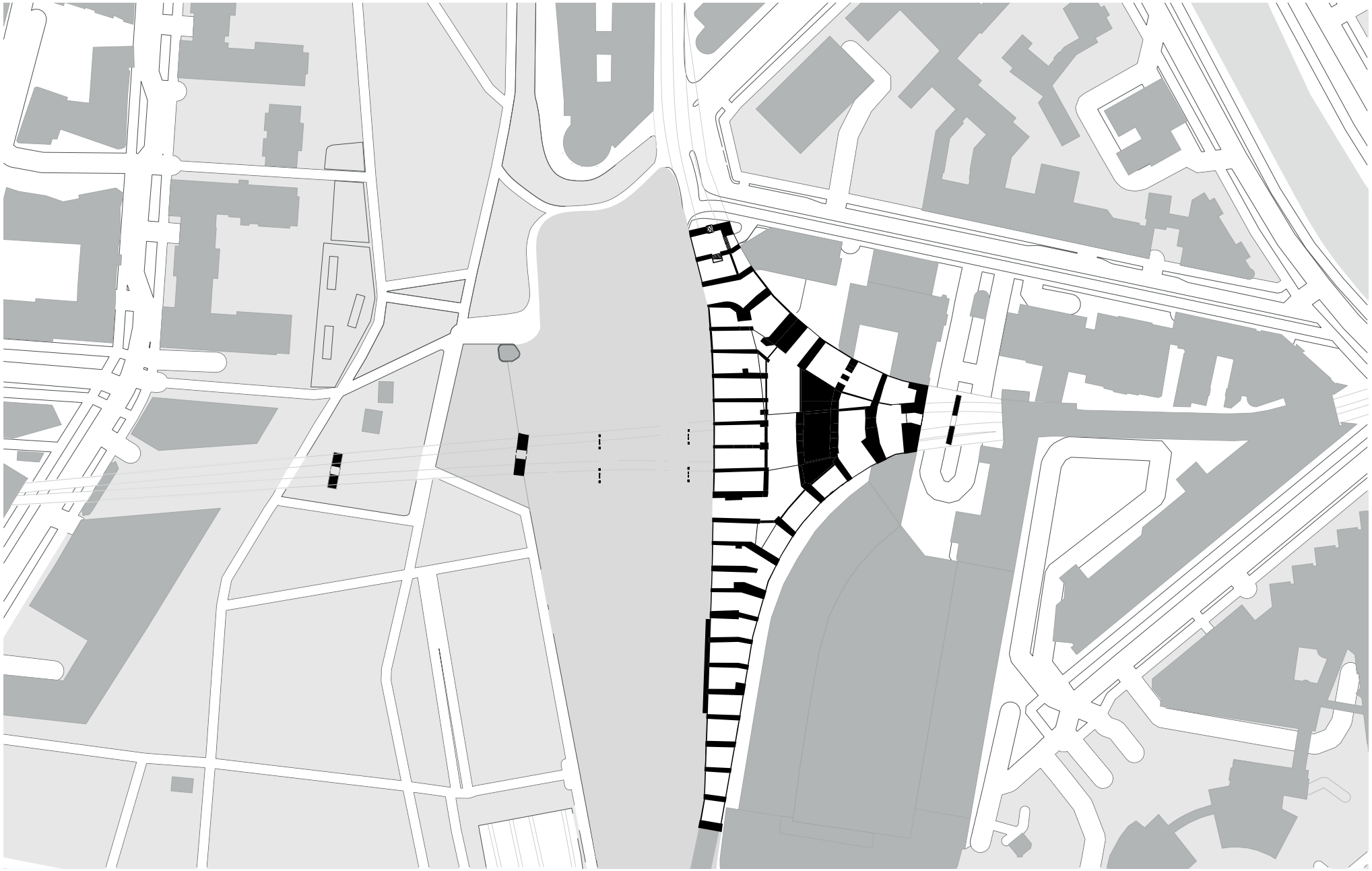
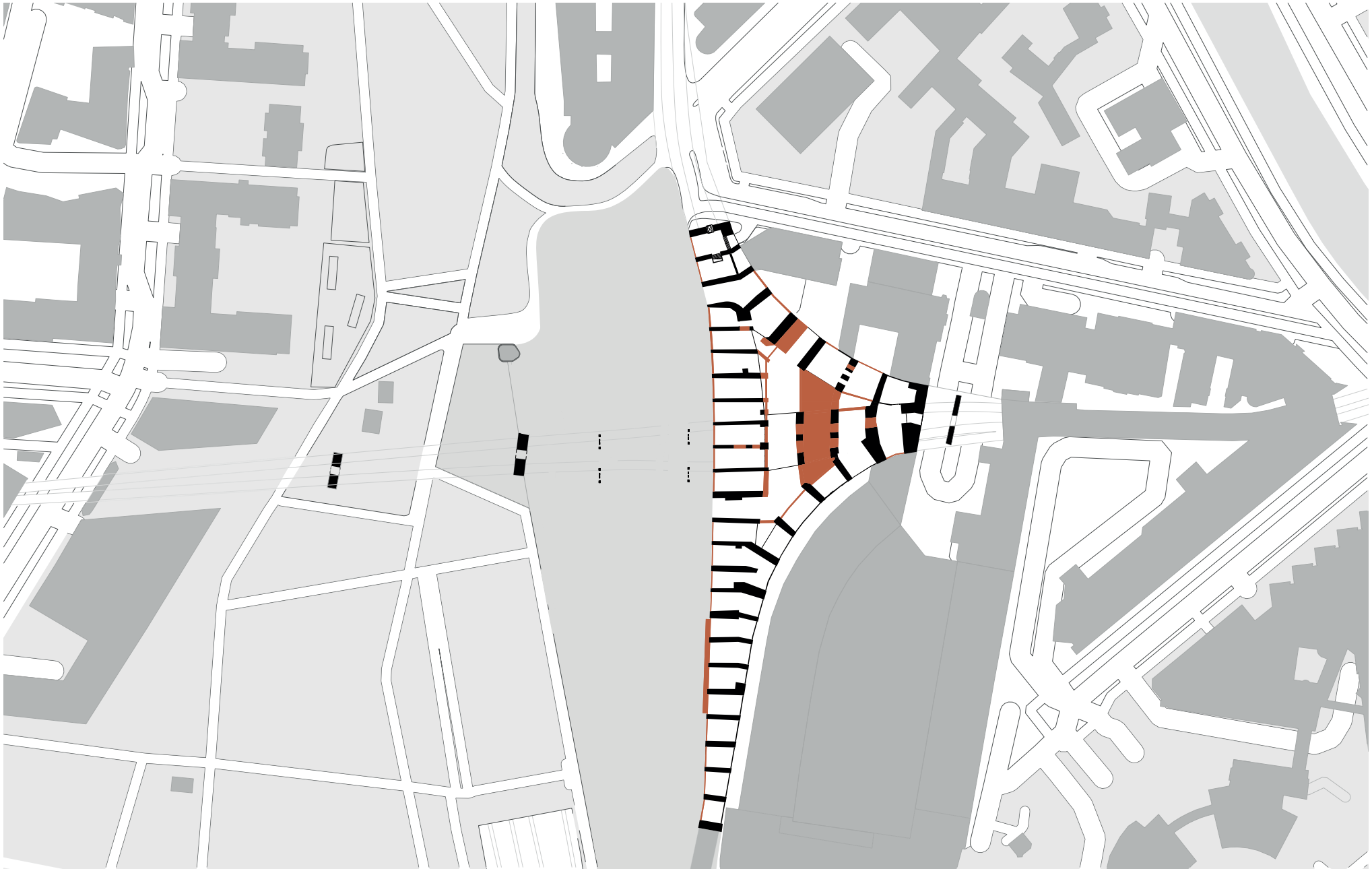
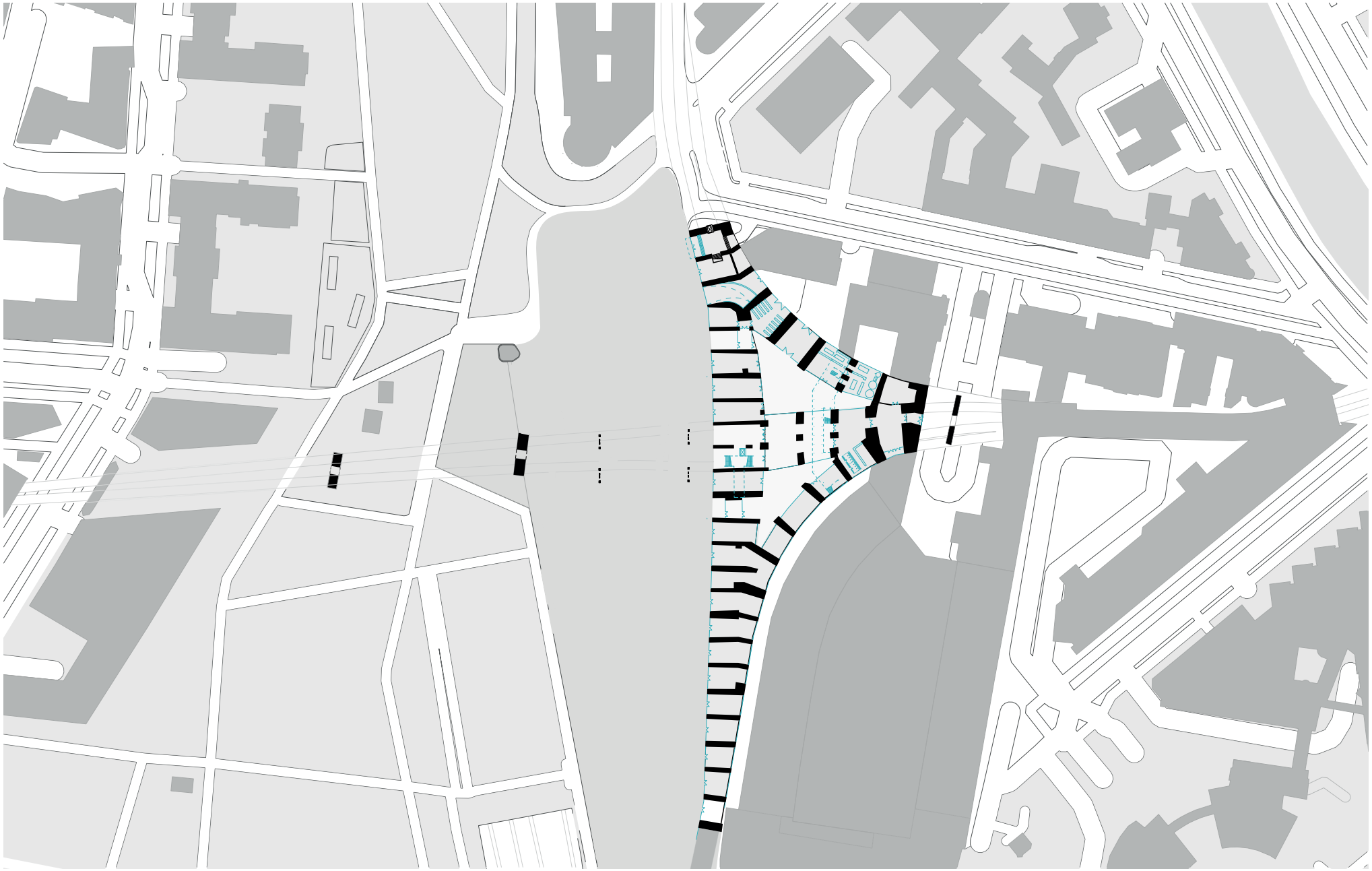


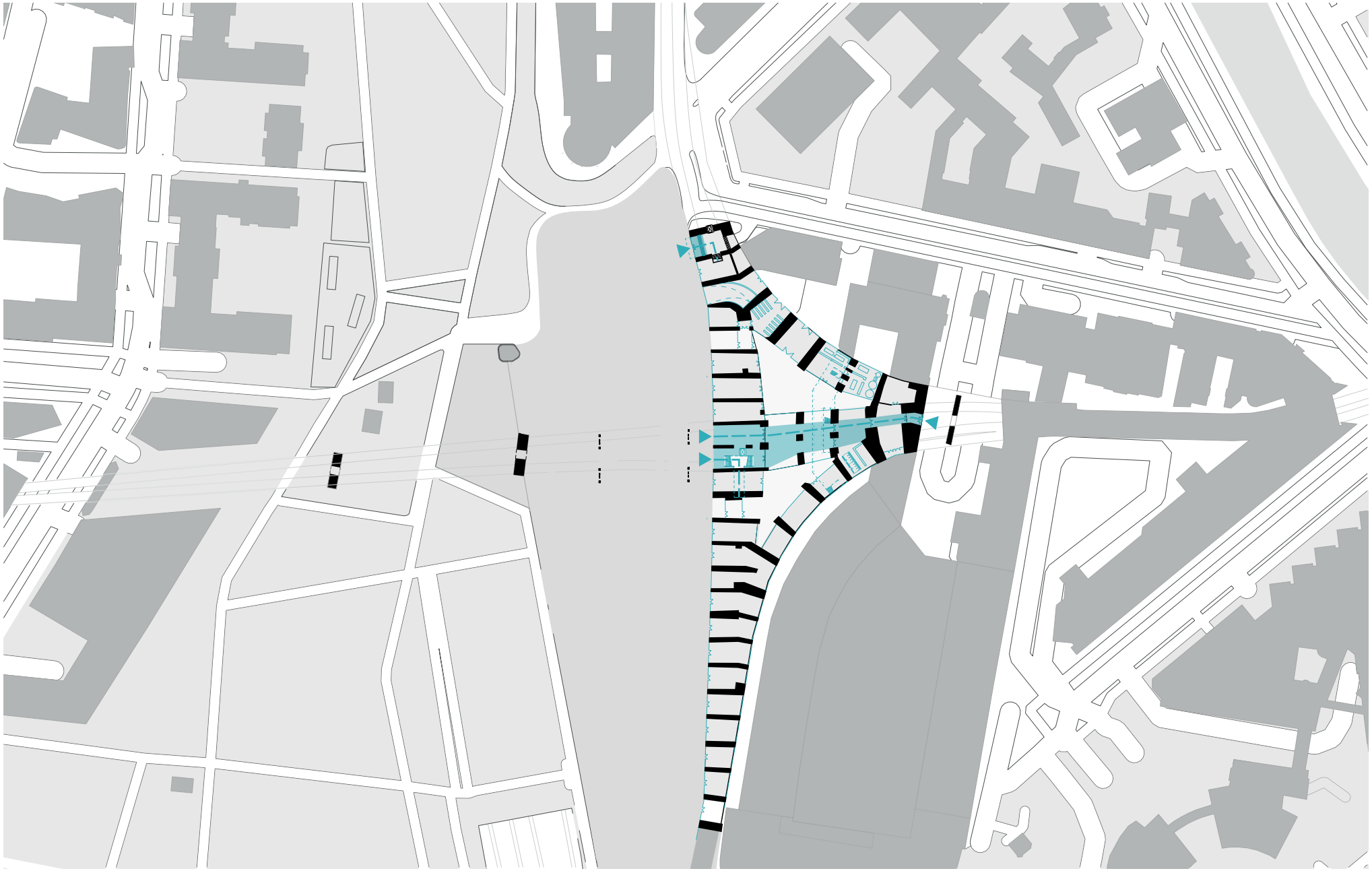
REMOVING PARTS EXISTING STRUCTURE



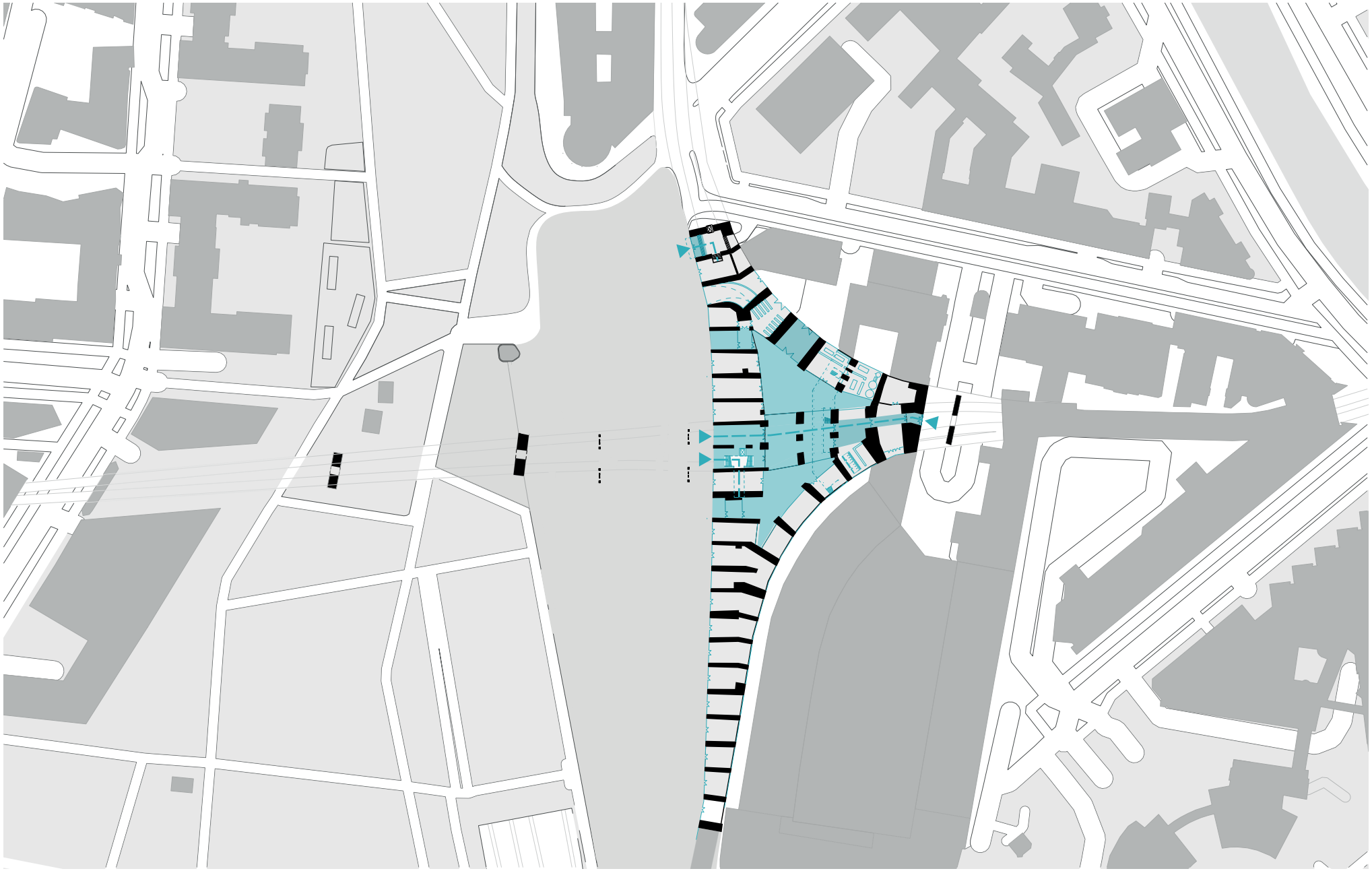
TRANSFORMATION



NEW ROUTES



ACTIVATING COURTYARDS



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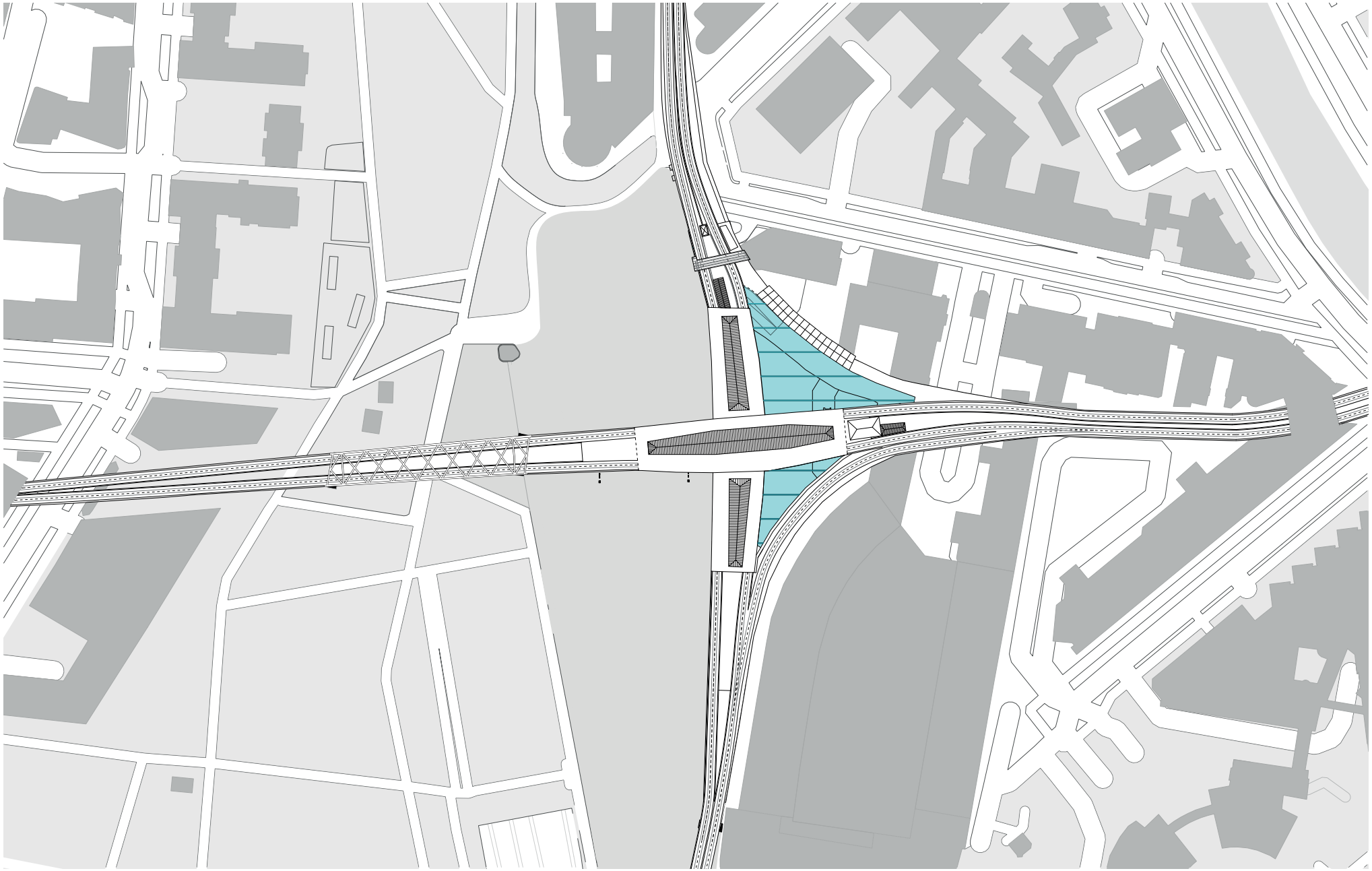

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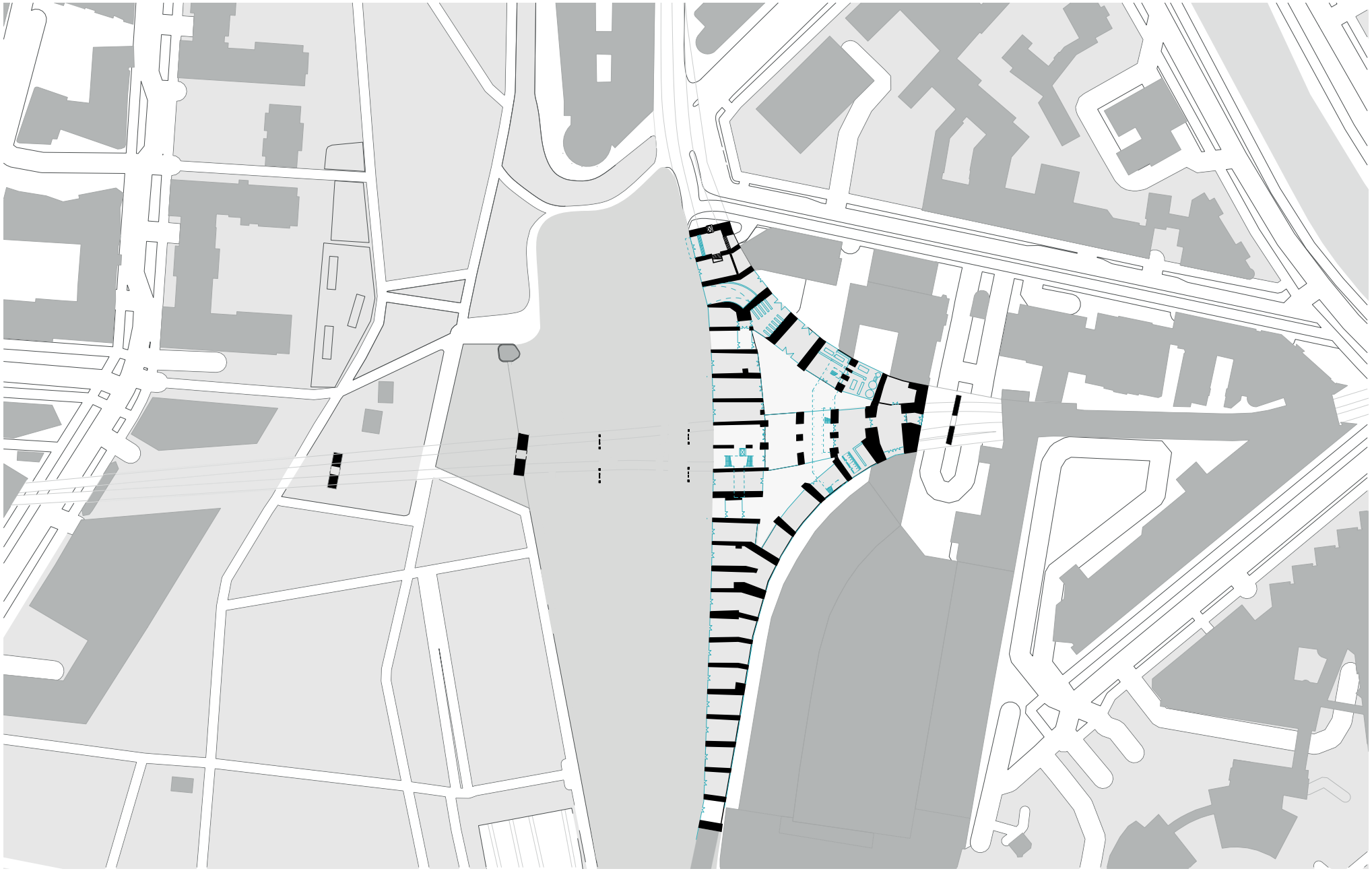
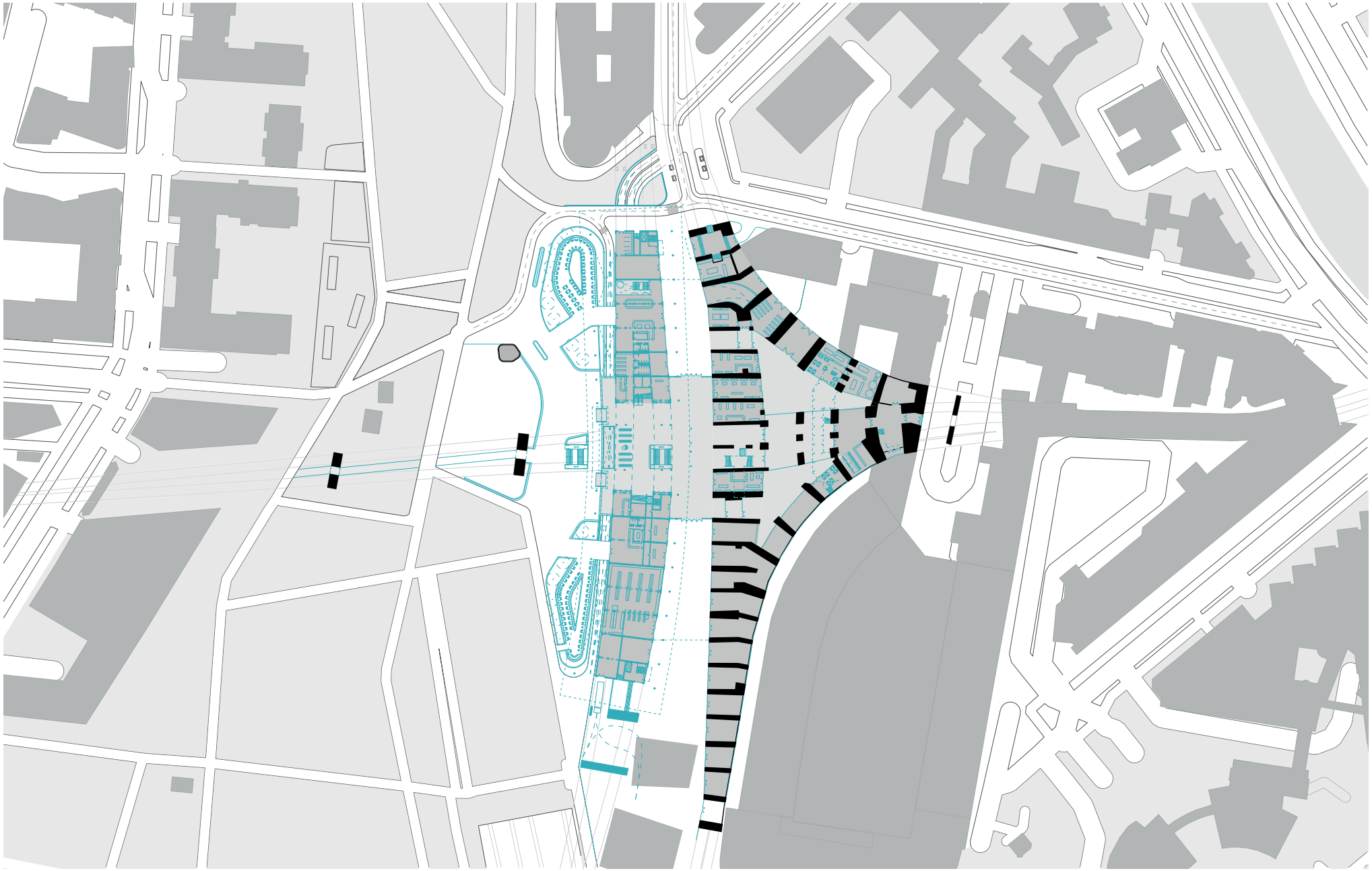
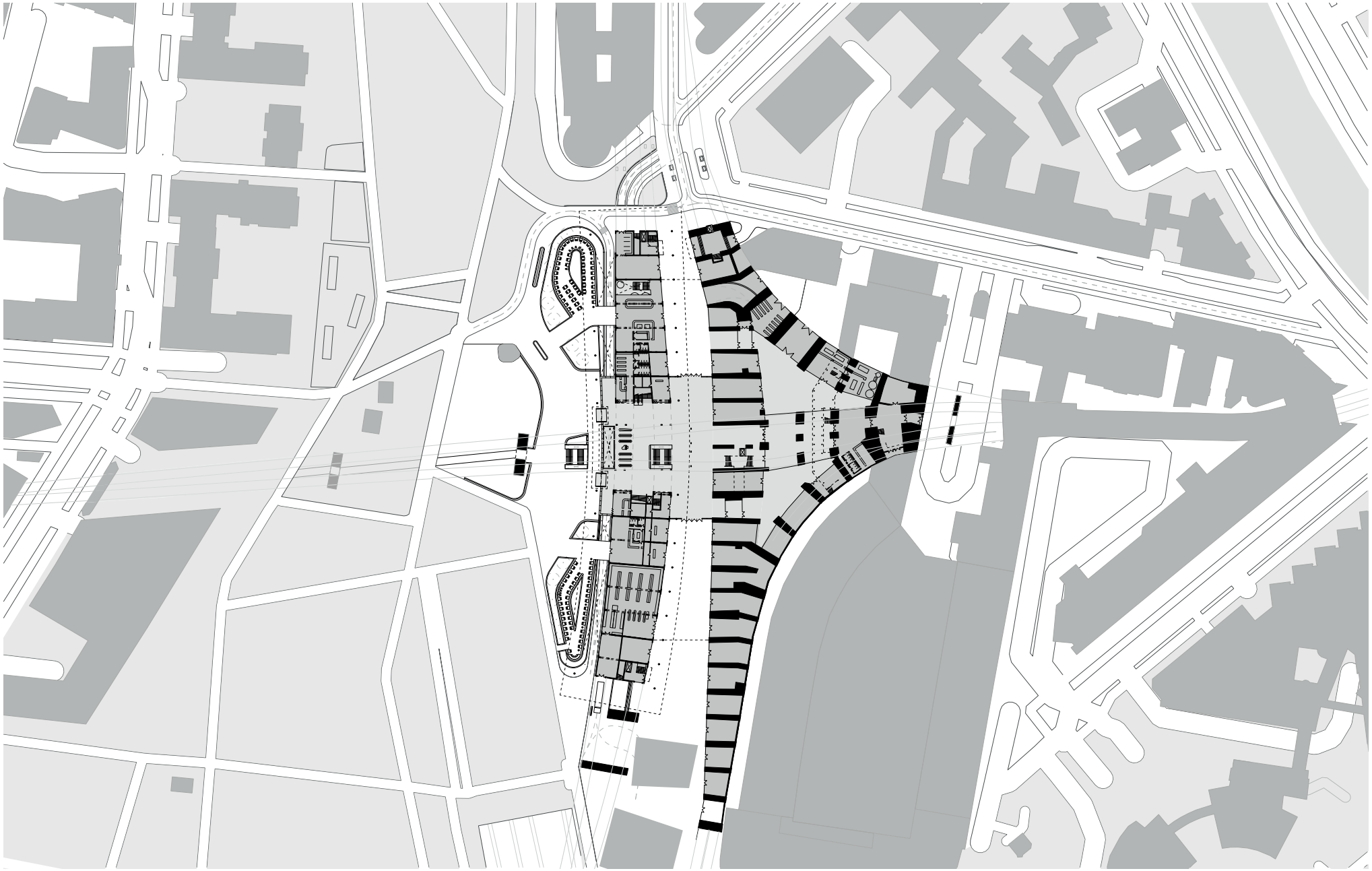


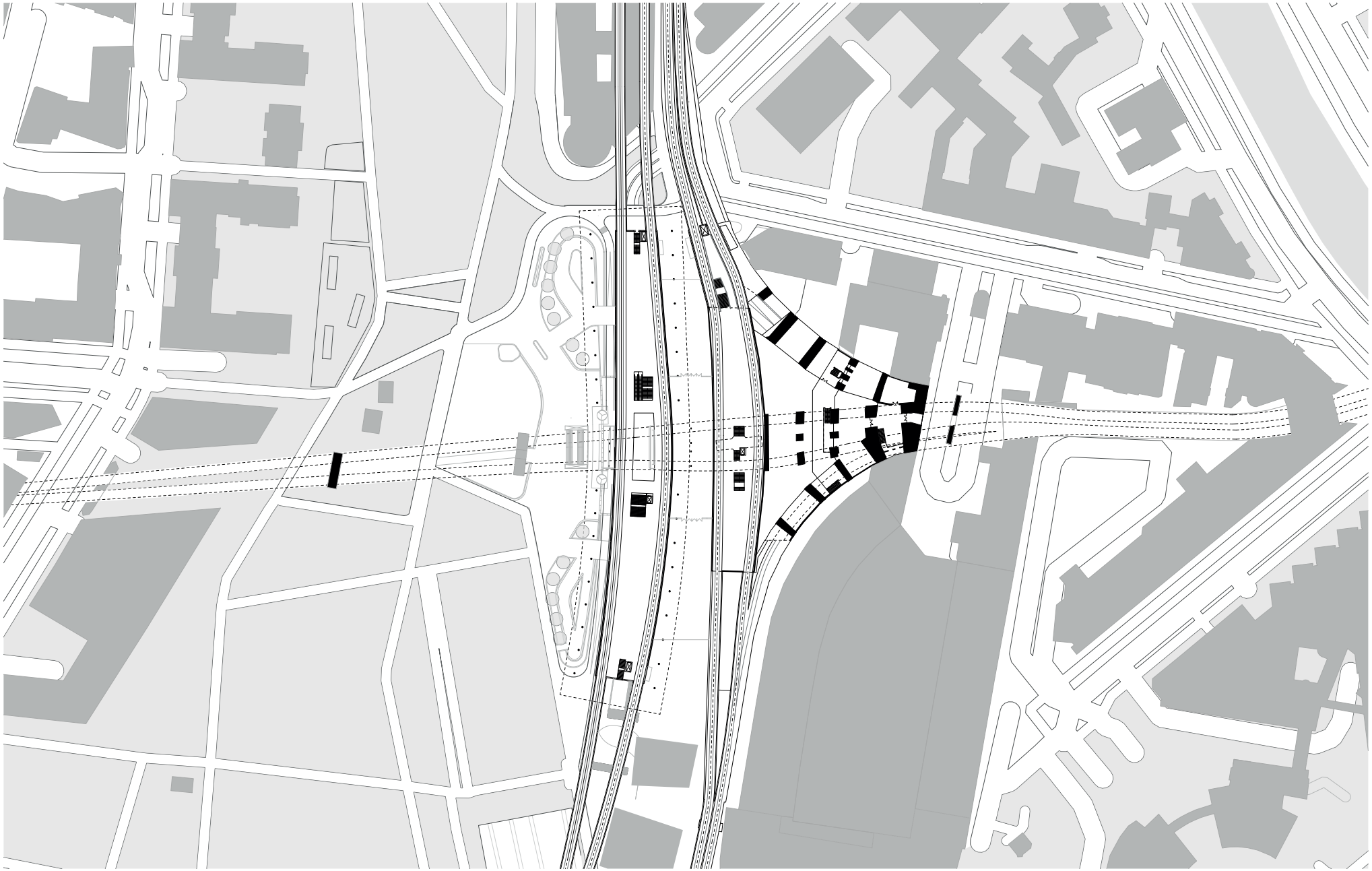
NEW STATION



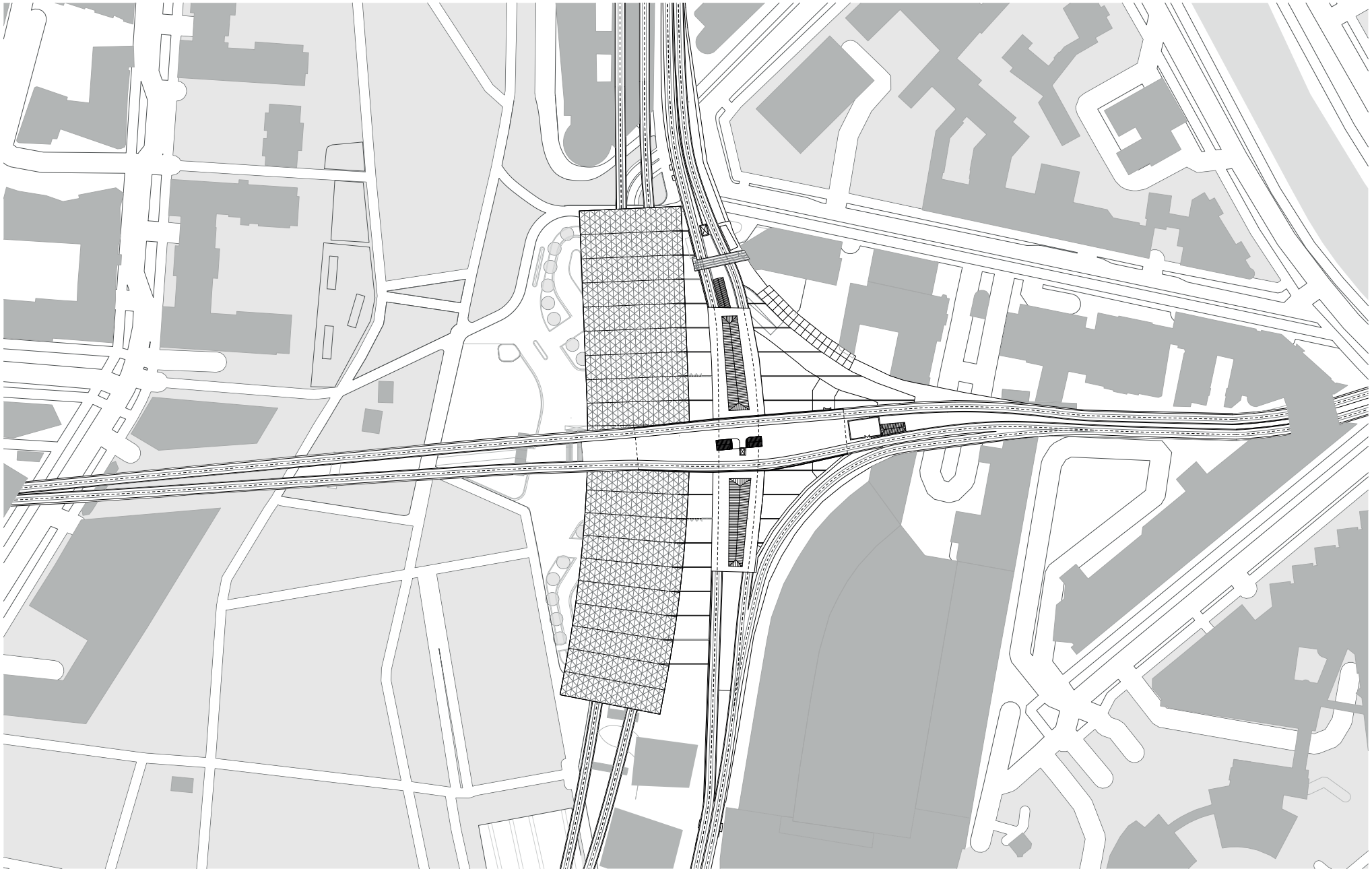
NEW STATION



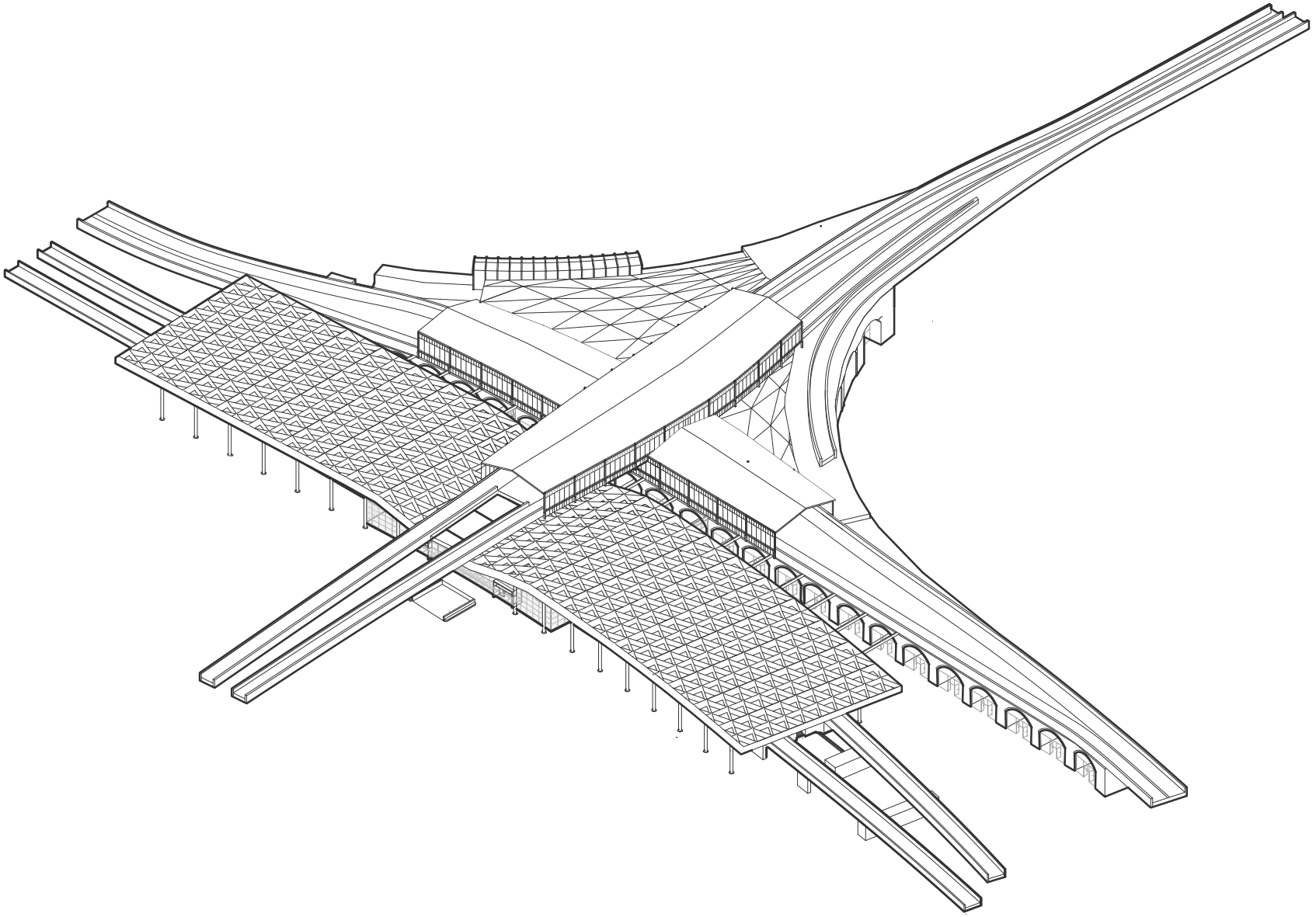
01 | S21-U2 PLATFORMS



02 | U1-U2 PLATFORM



AXONOMETRIC





Station Gleisdreieck

INTRODUCTION

DESIGN

CONCEPT

TRANSFORMING THE EXISTING

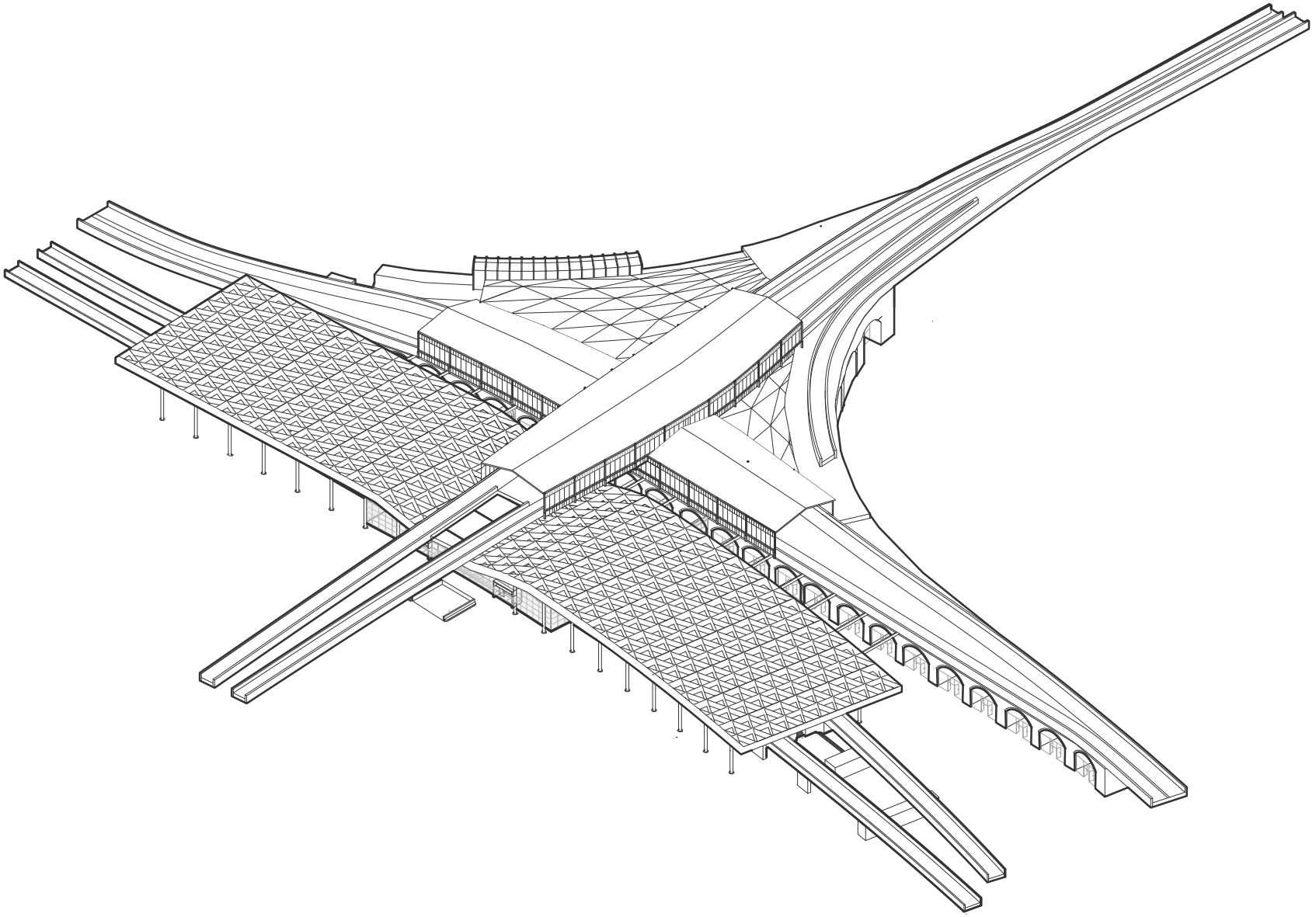
FUNCTIONING

WALKTHROUGH

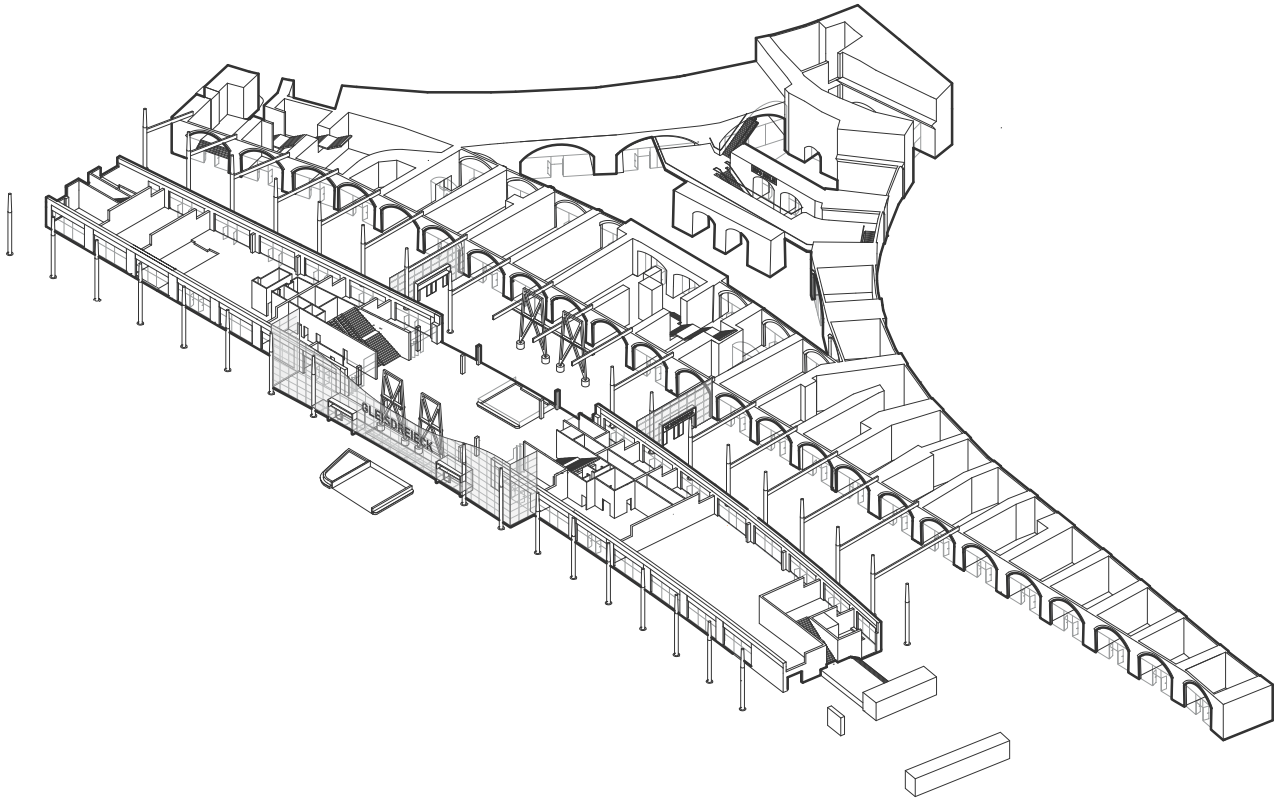
LINK TO RESEARCH QUESTION

WHAT TO DEVELOP FURTHER

AXONOMETRIC



GROUNDFLOOR



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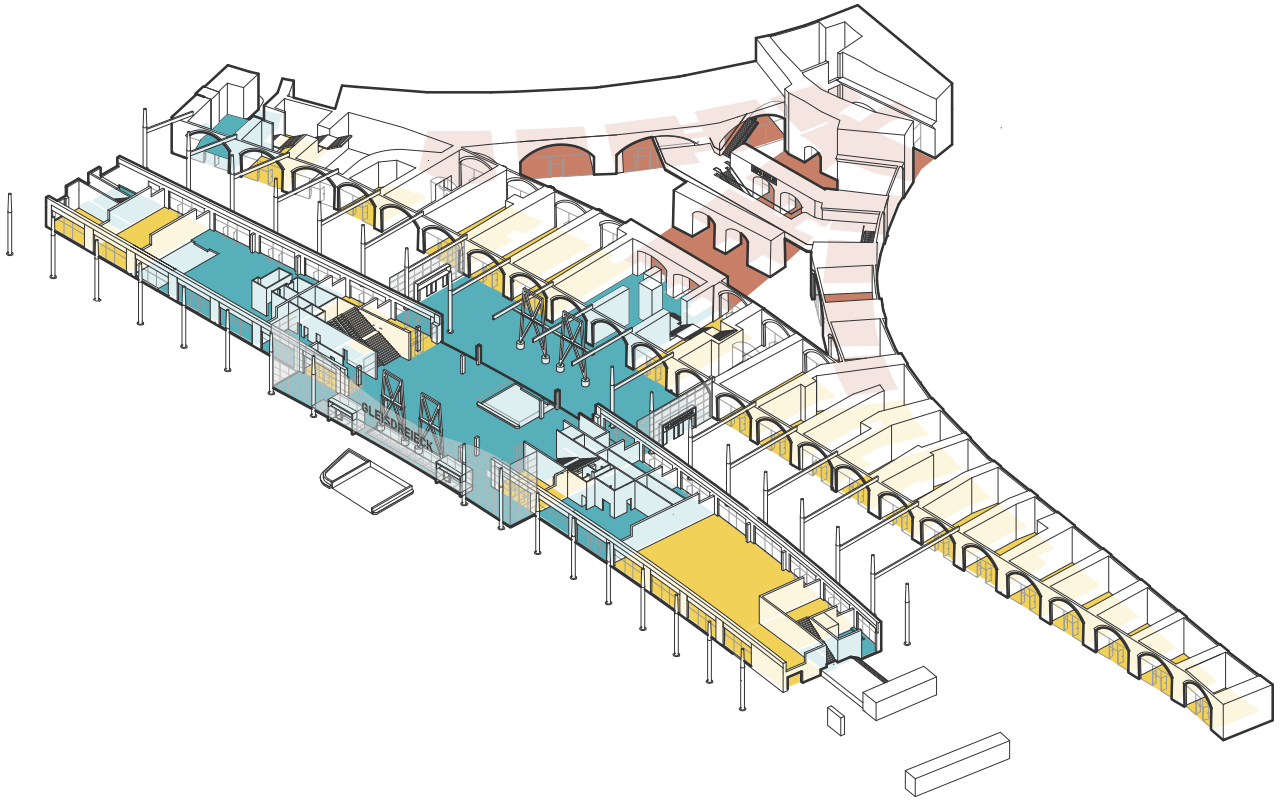

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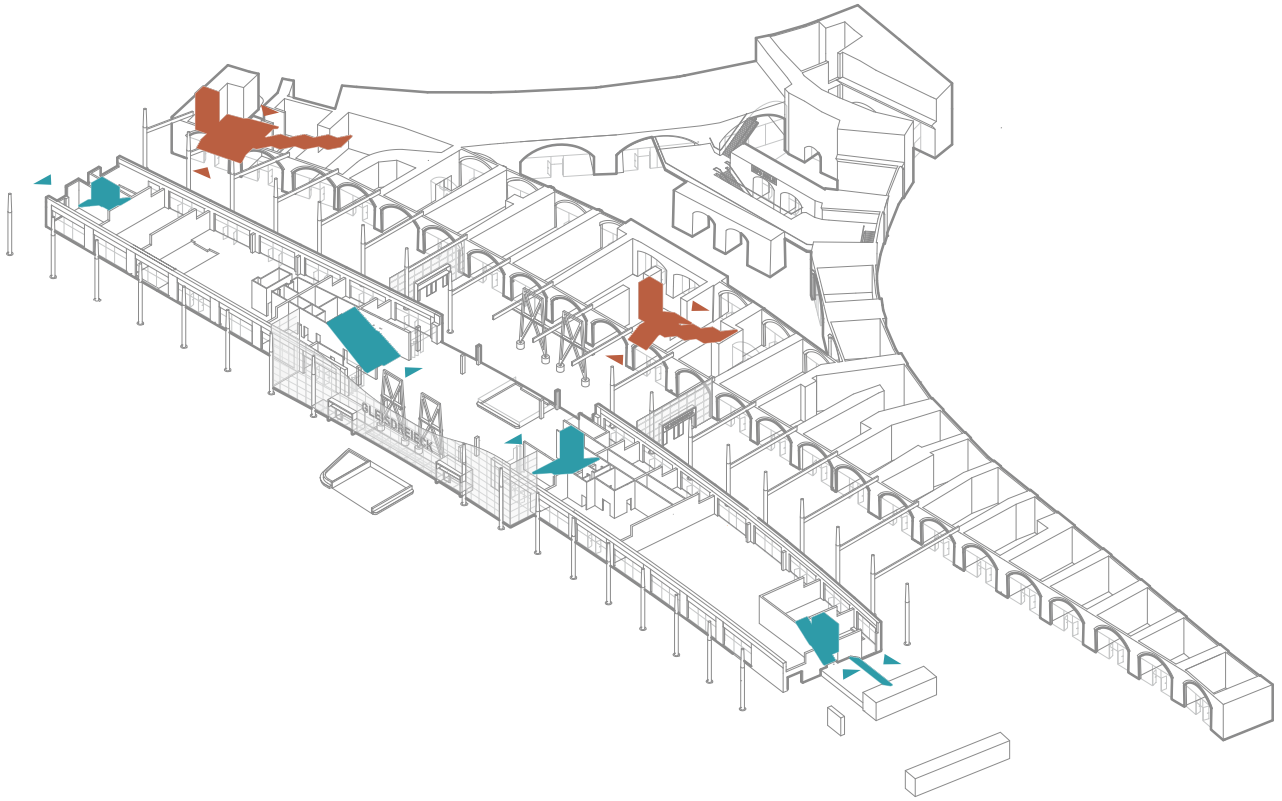

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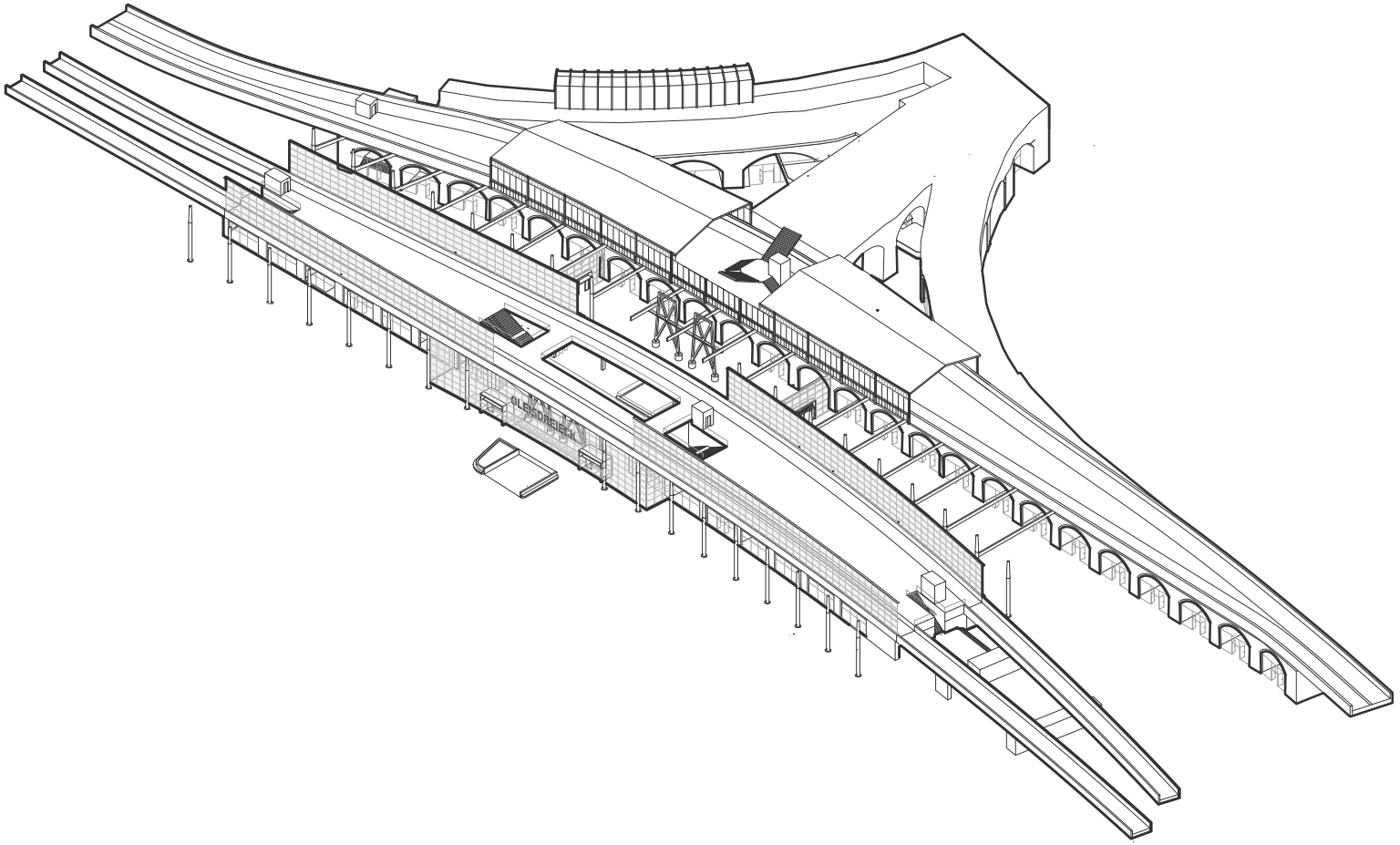

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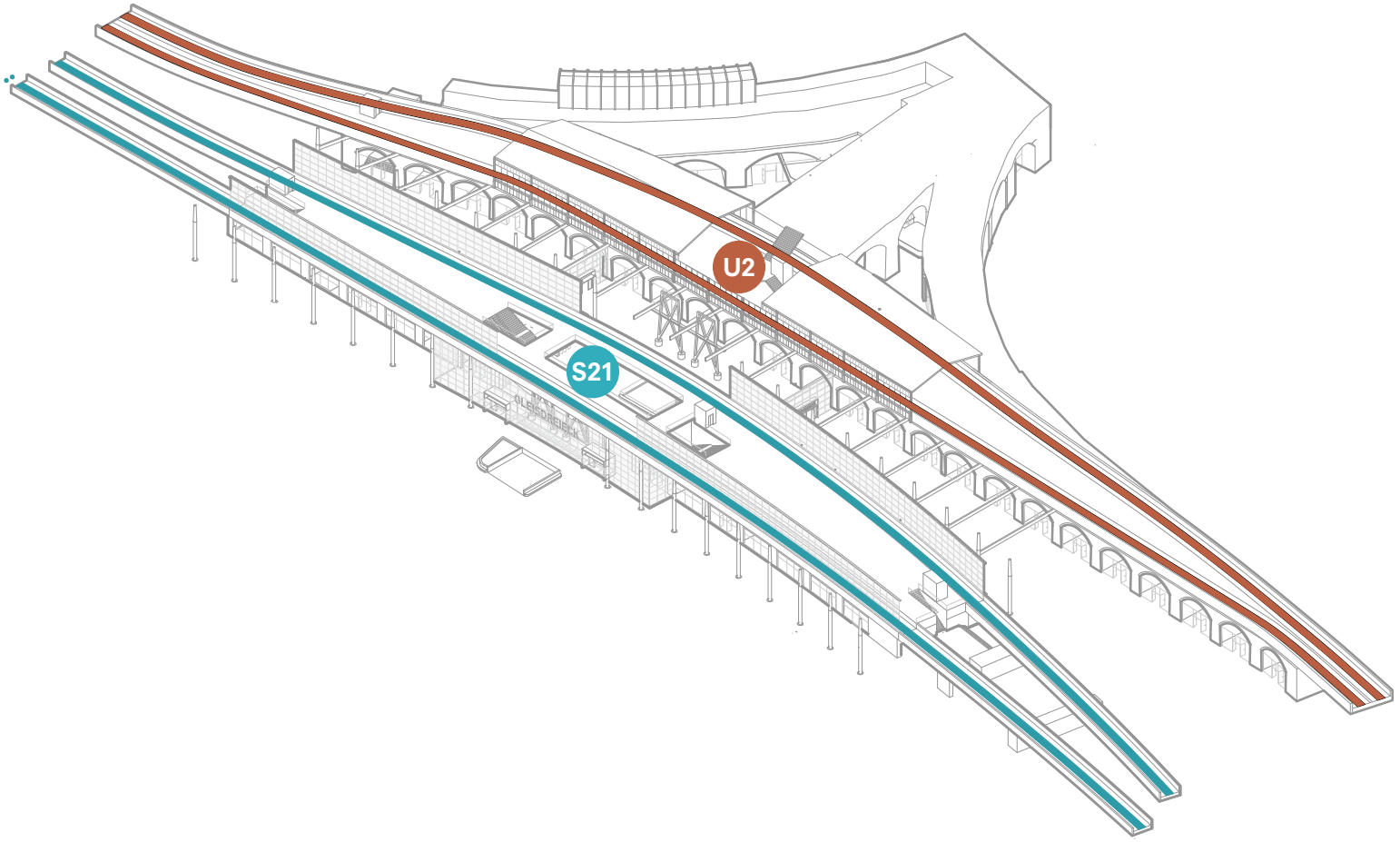

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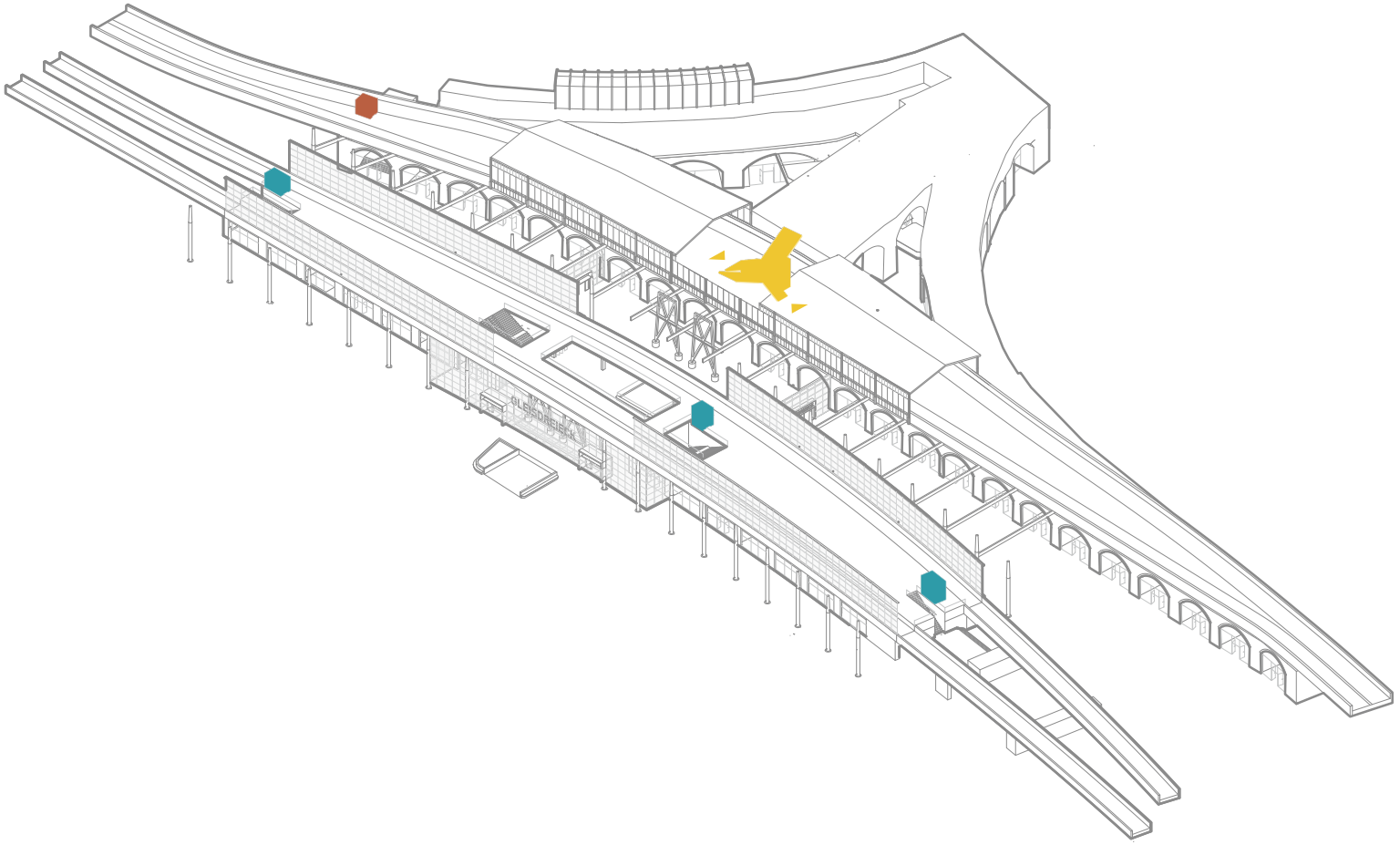

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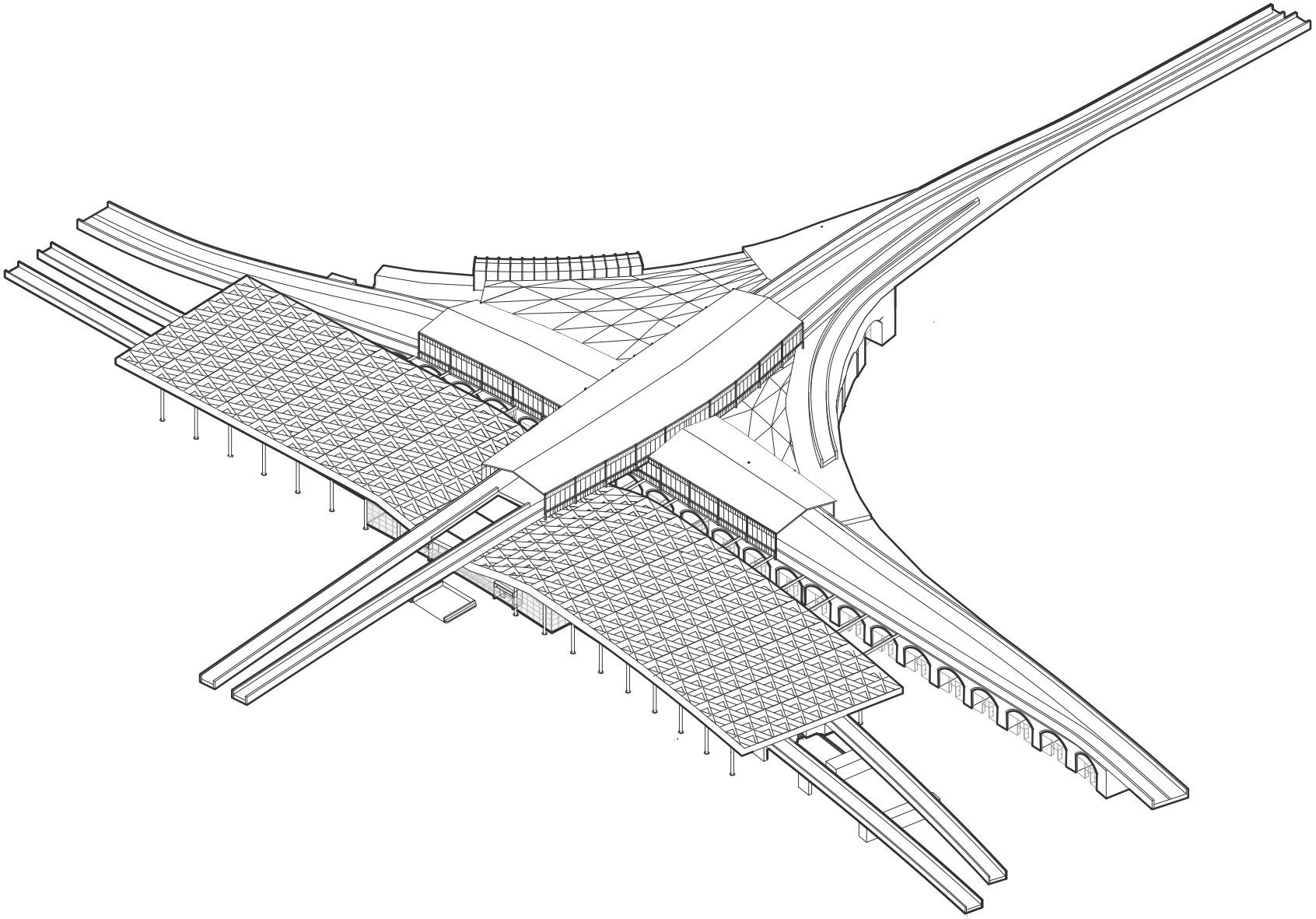

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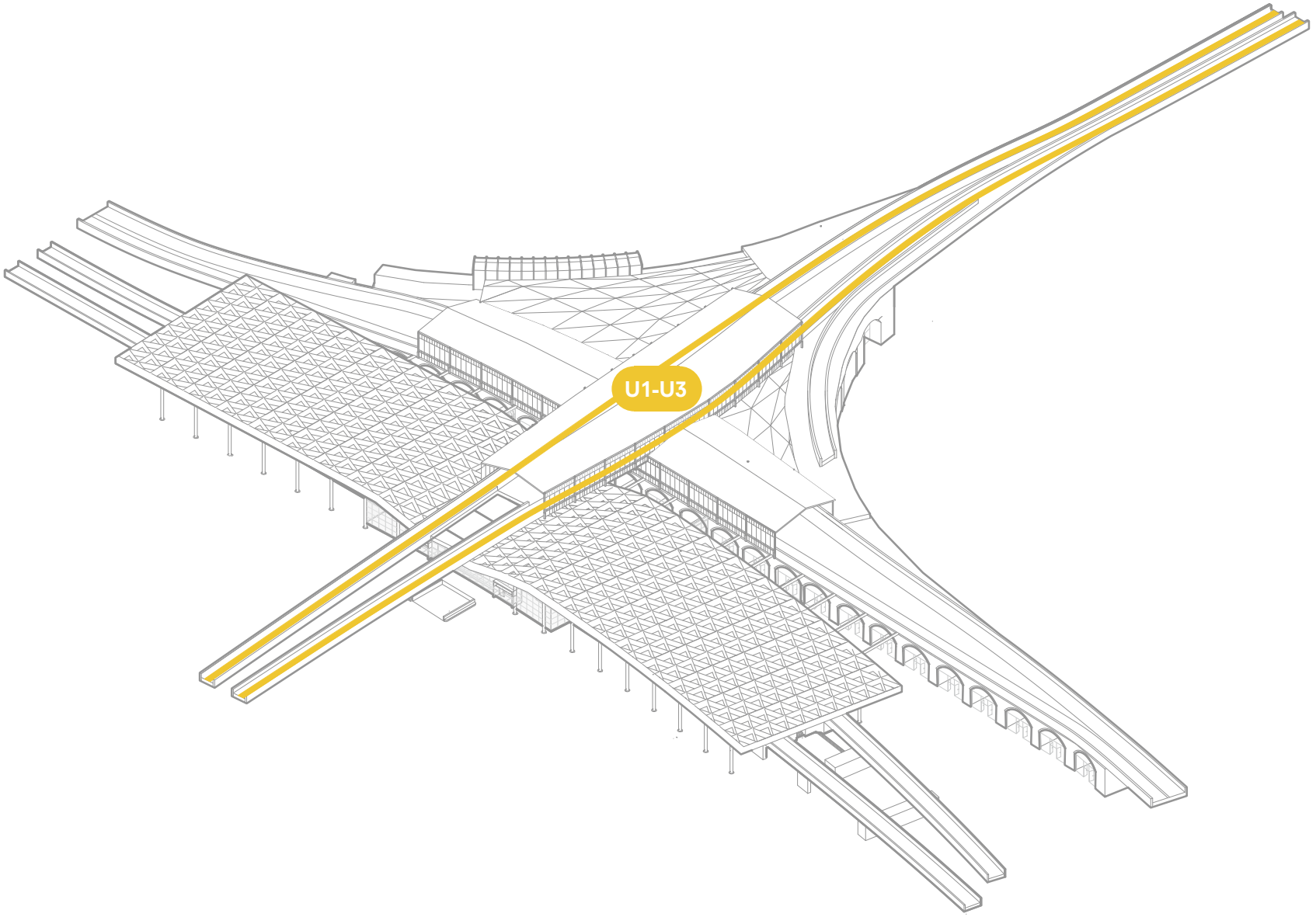


DESIGN

CONCEPT

TRANSFORMING THE EXISTING

FUNCTIONING

MATERIALITY

WALKTHROUGH



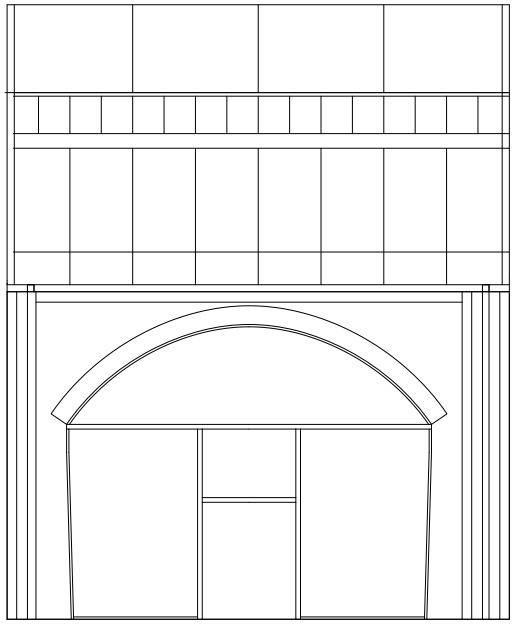
existing facade

FACADE

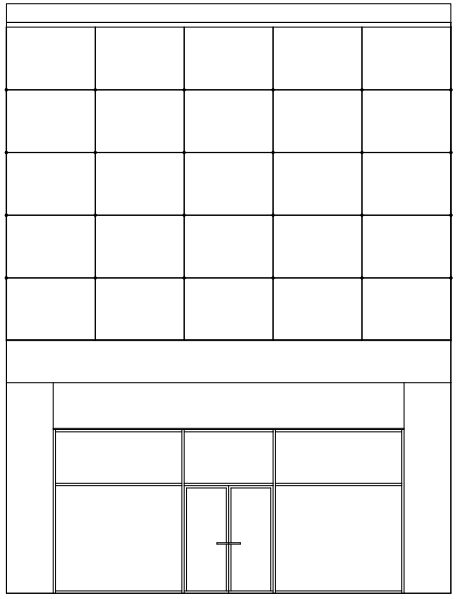
roof

platform house

station base



existing



new

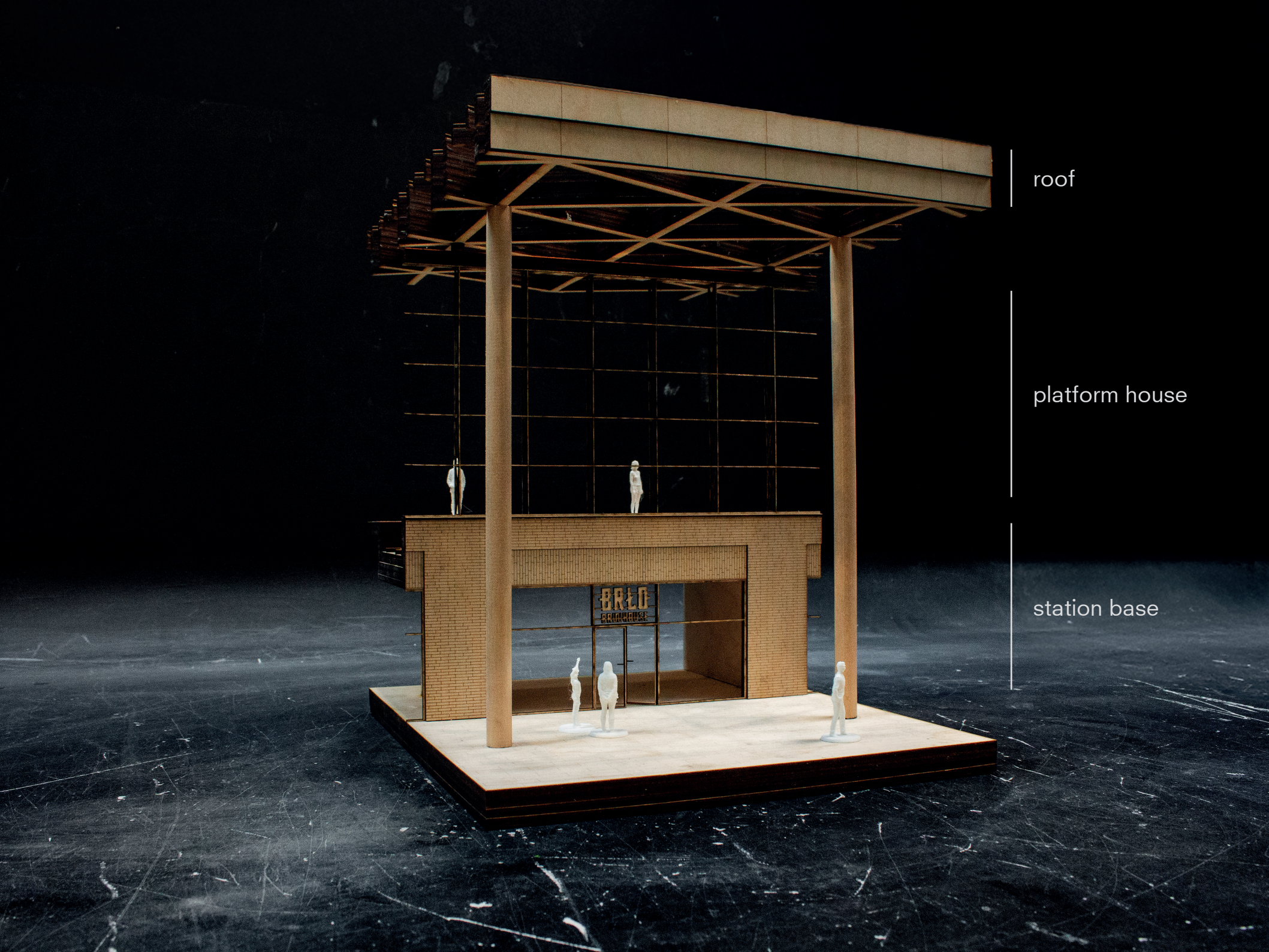
roof

platform house

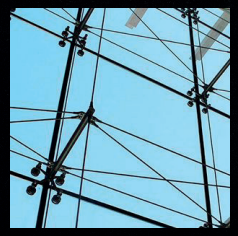
station base



new facade


roof
platform house
station base





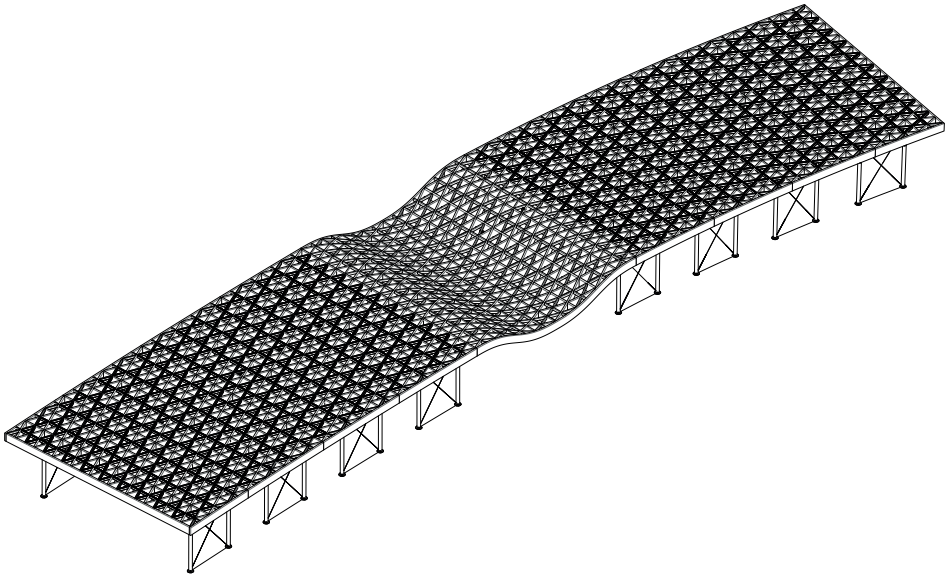


roof

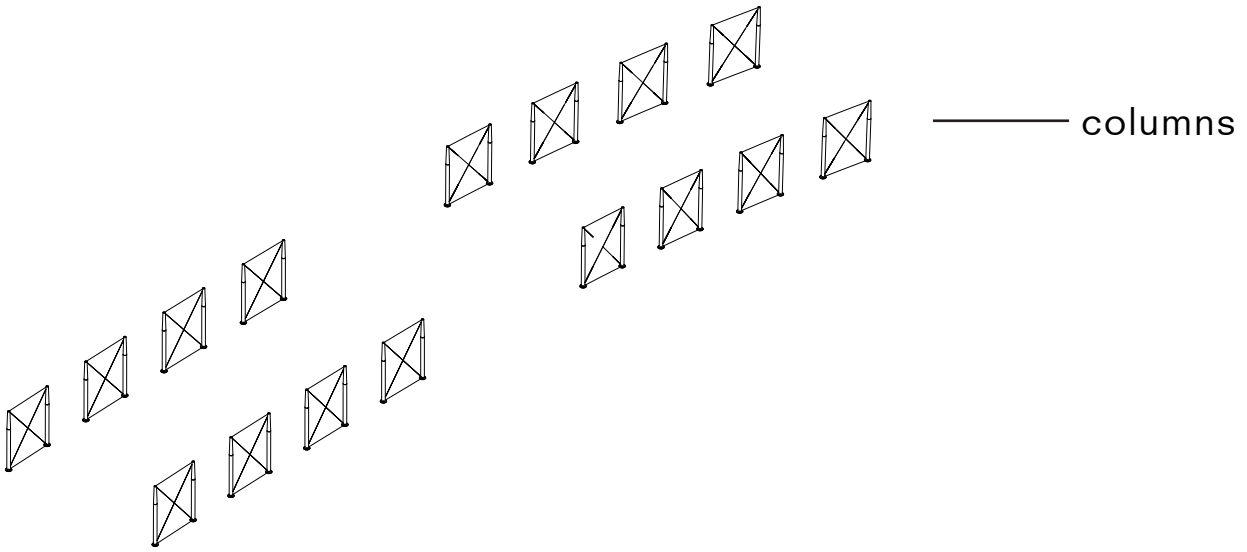
platform house

station base

STRUCTURE



STRUCTURE EXPLODED



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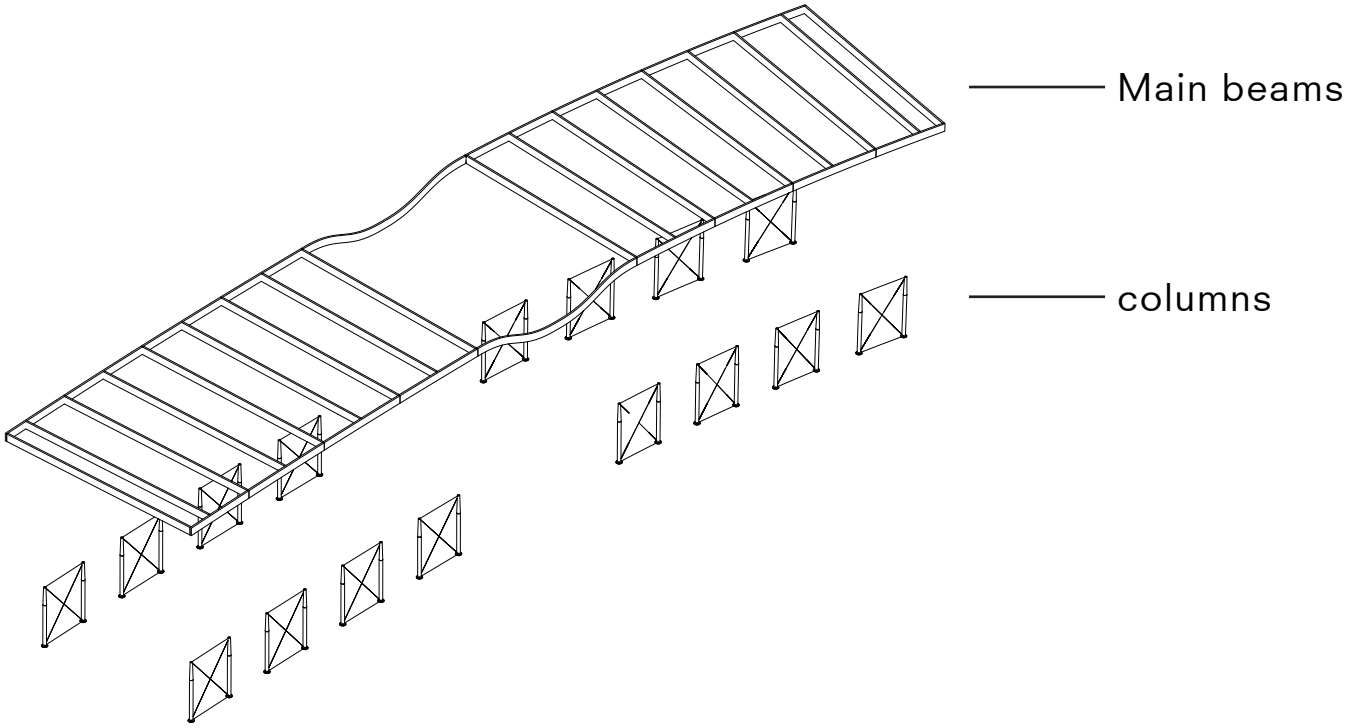

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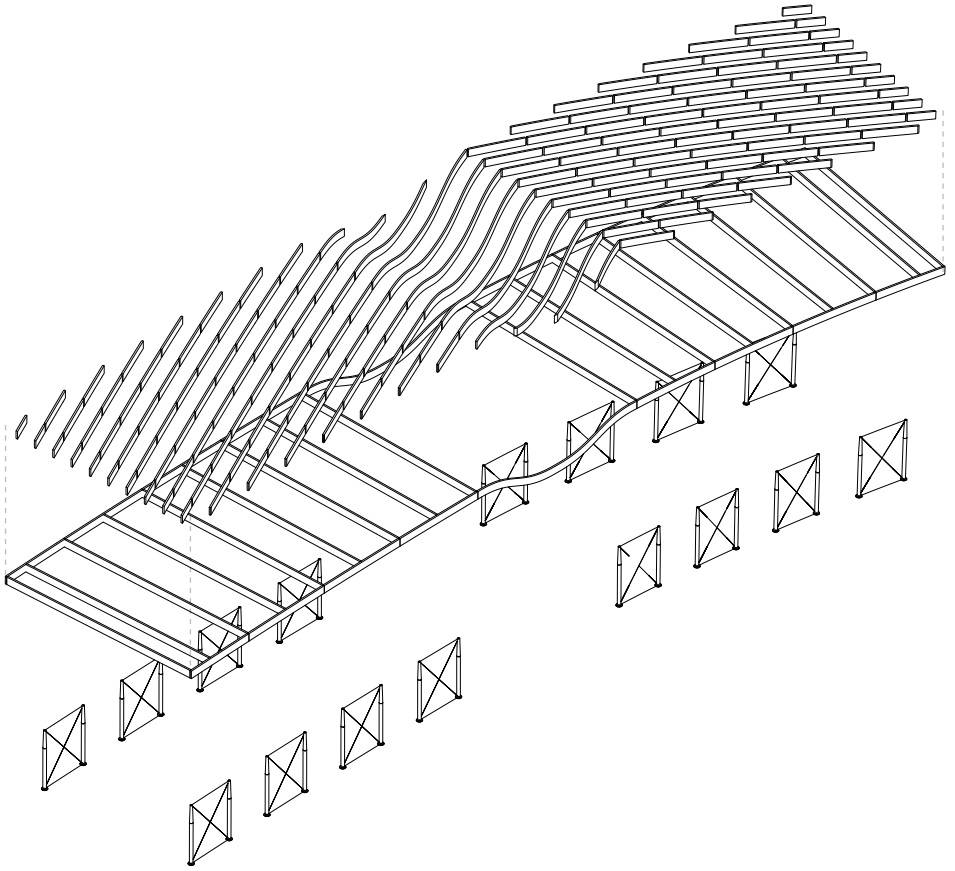

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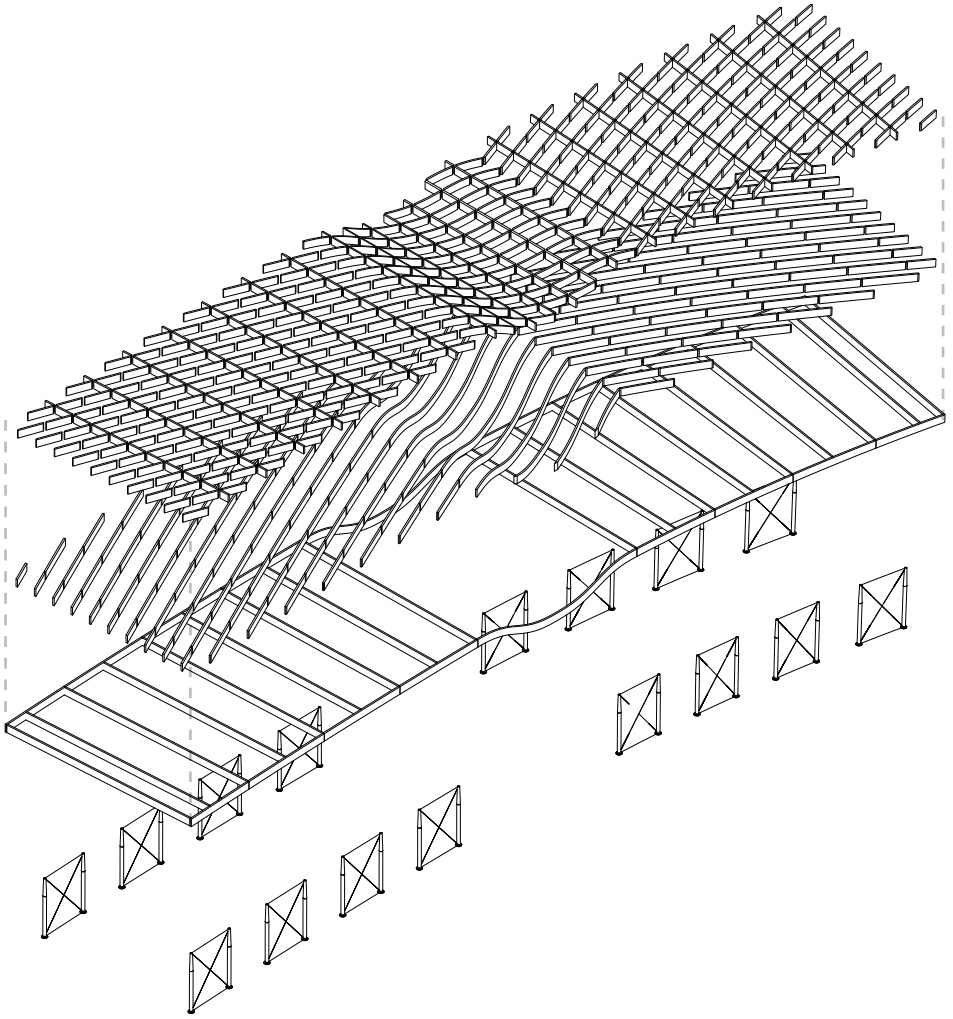

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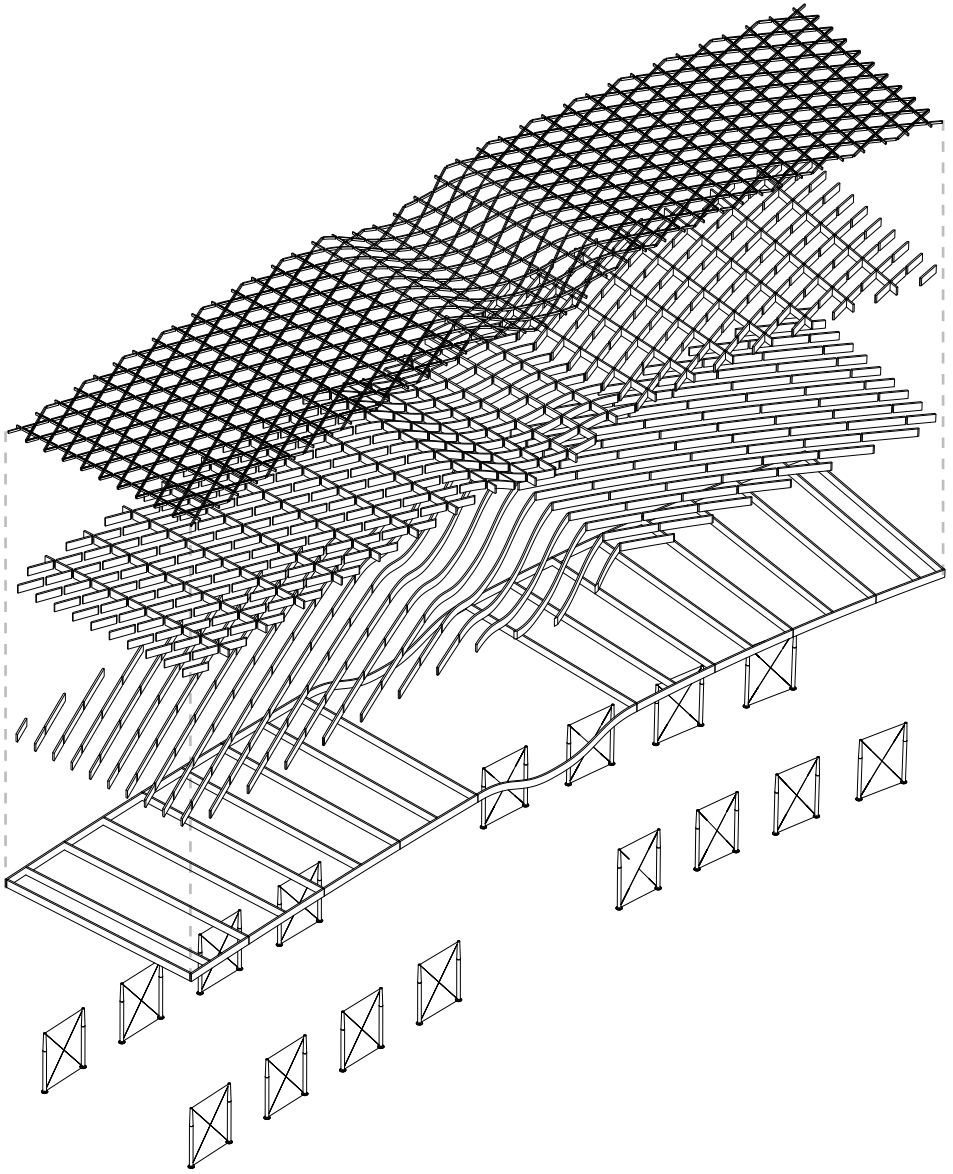

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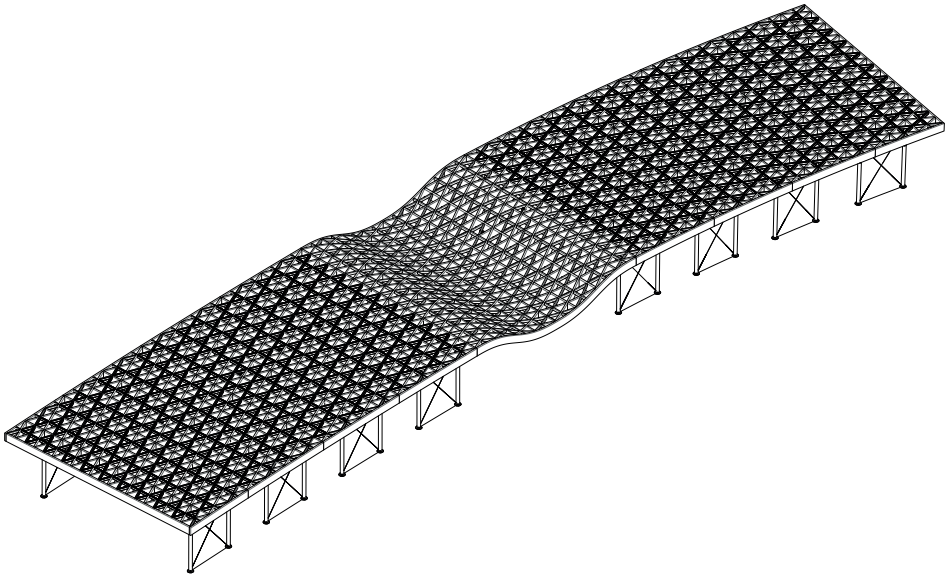
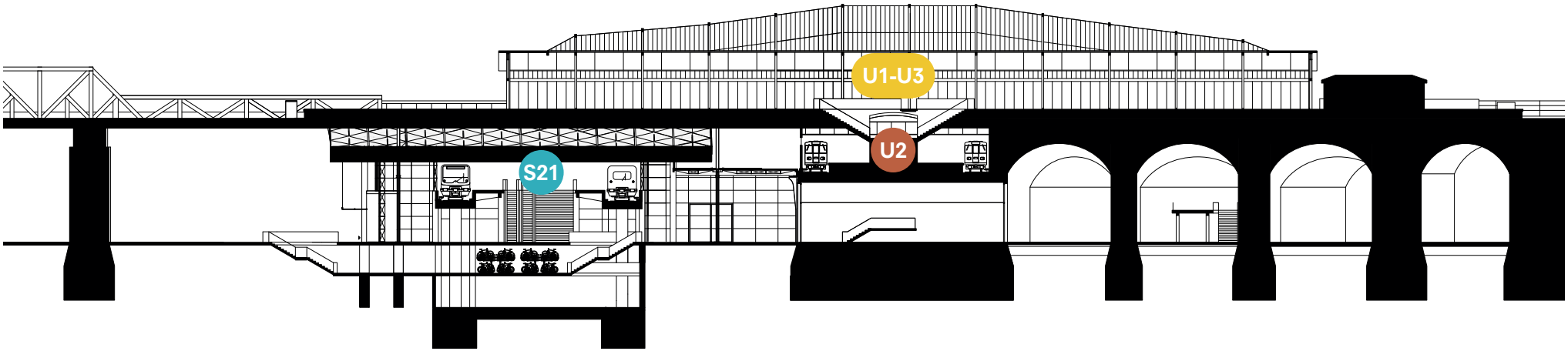
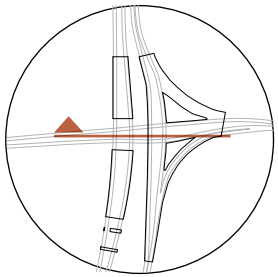


SECTION

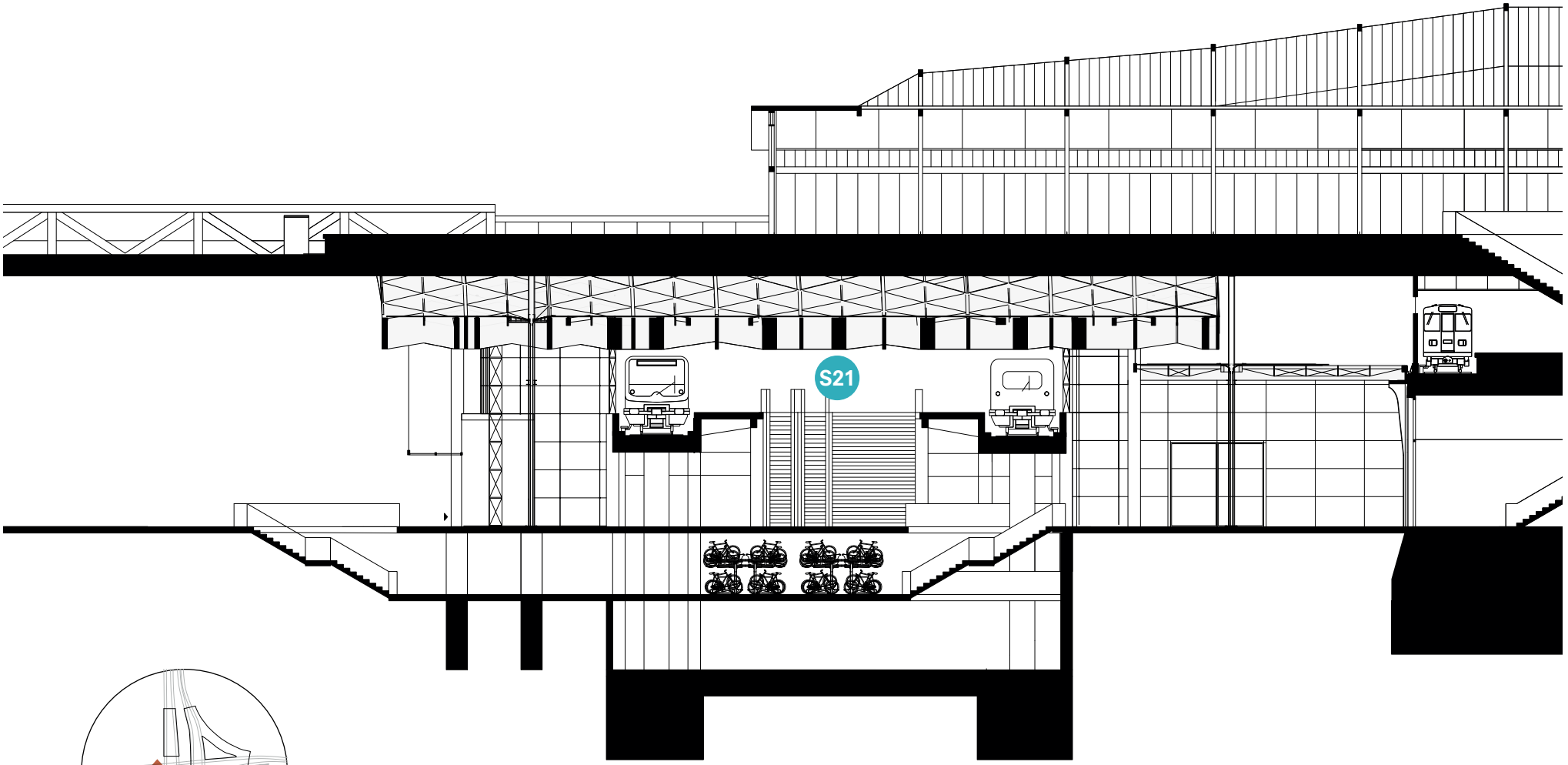


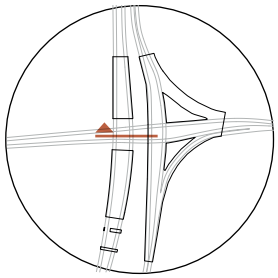
Park Am Gleisdreieck | Station extention | Passage | Existing station | Atriums | Expo Berlin



Section west-east - 1:200

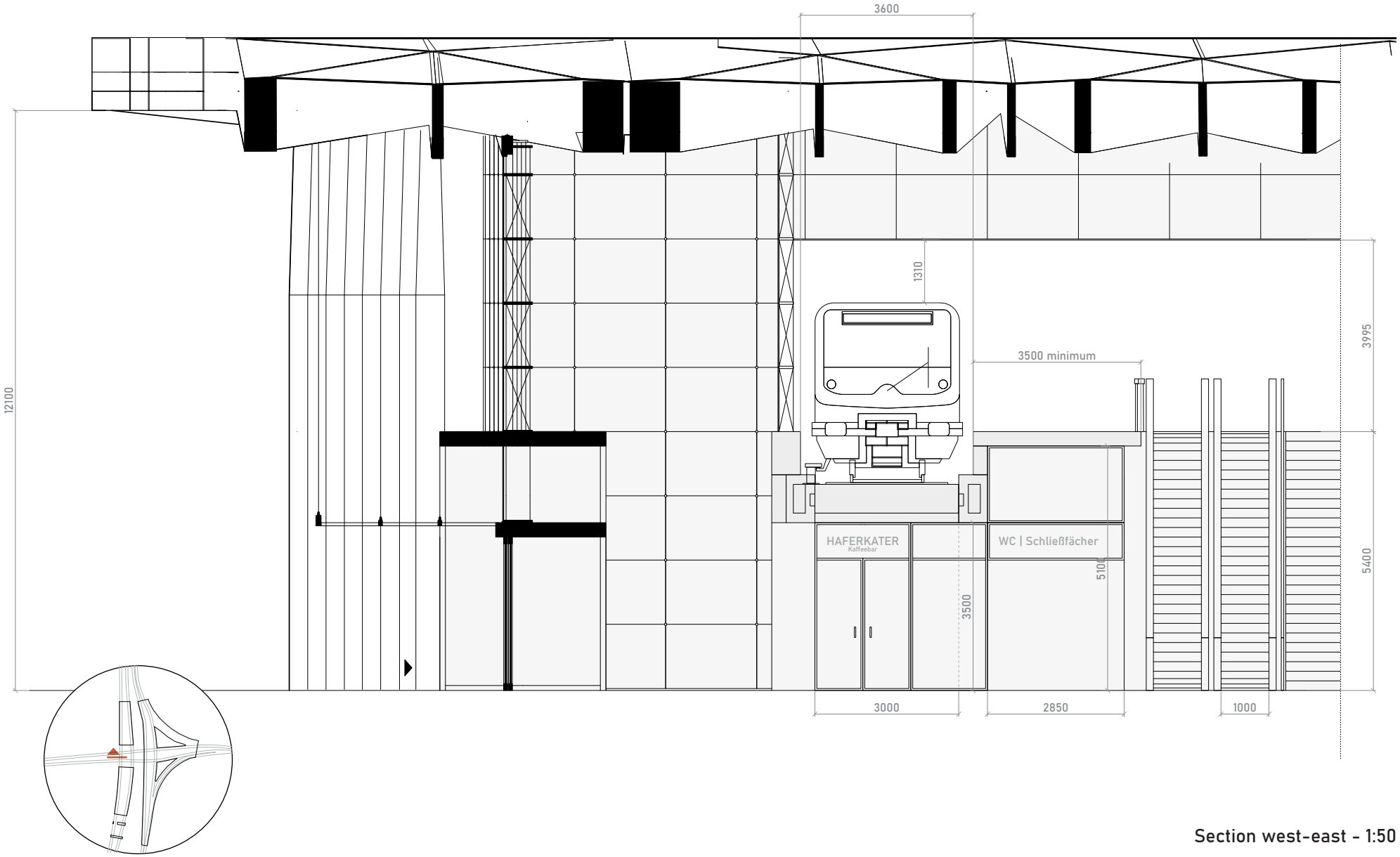
STATION HALL





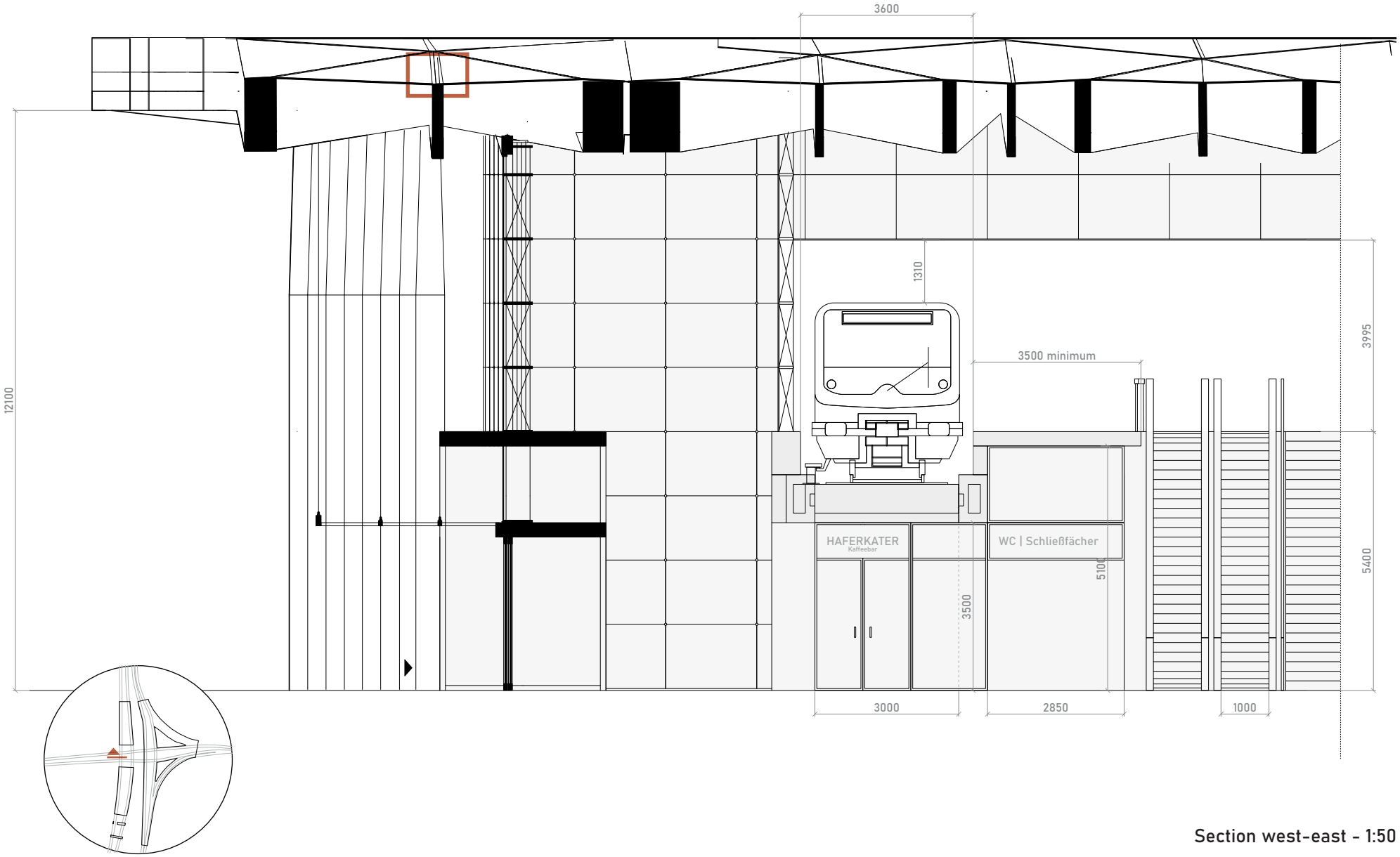
Section west-east - 1:100

STATION HALL



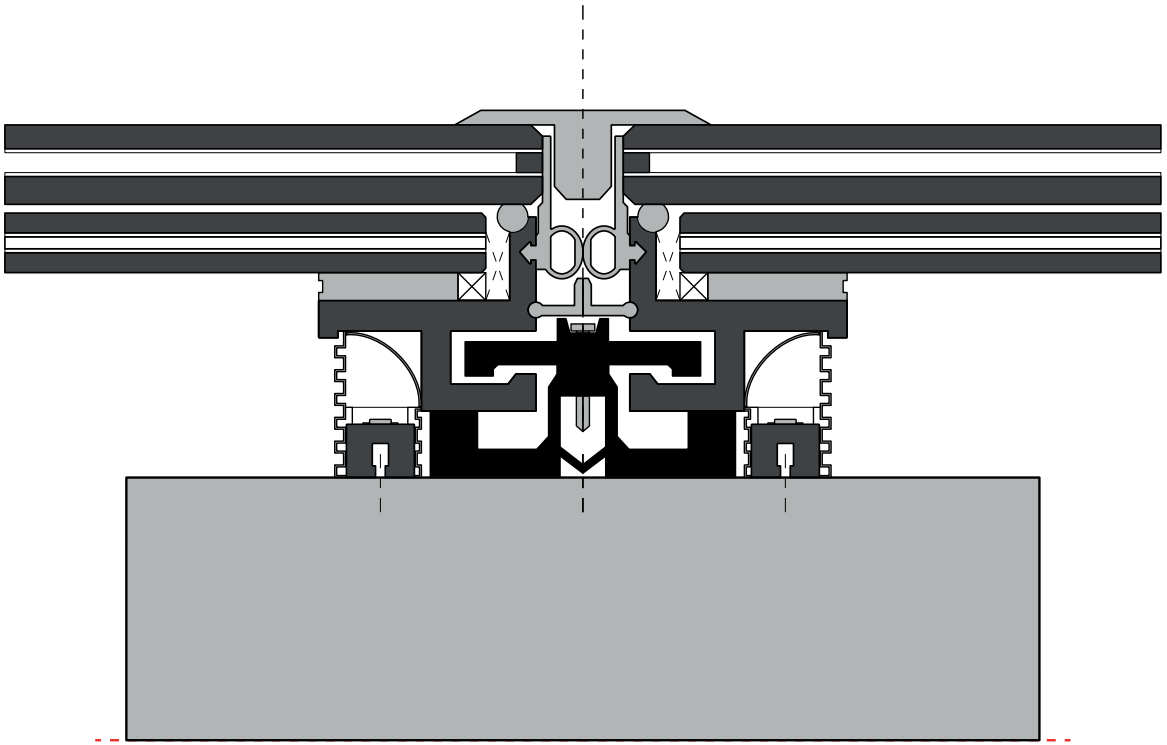
Section west-east - 1:50

STATION HALL



Section west-east - 1:50

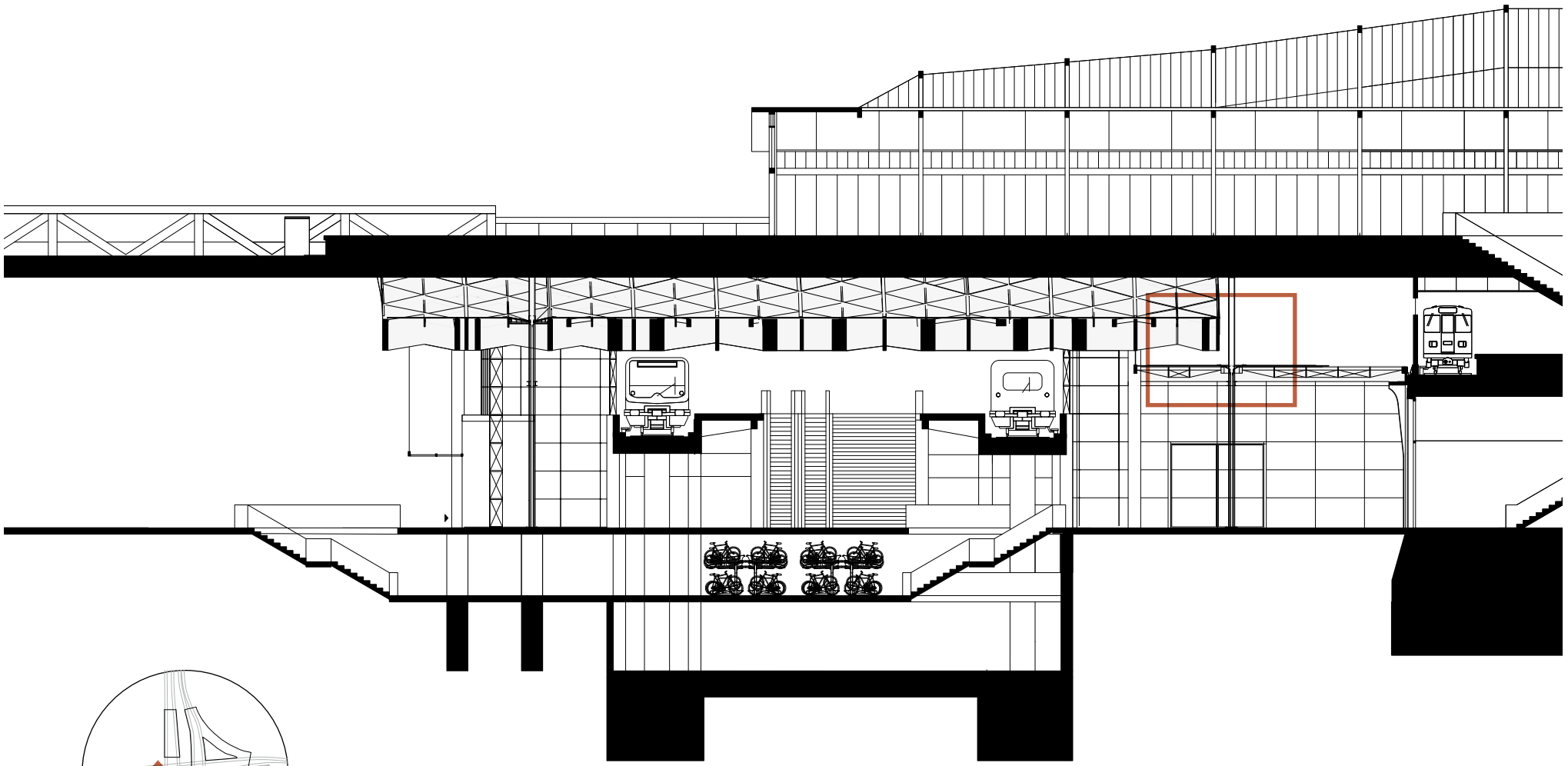
ROOF PANELING DETAIL

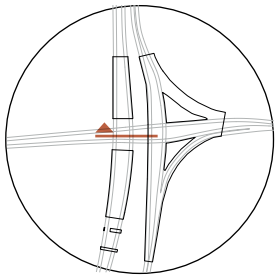


1. Structural silicone
2. Dry gasket layers water & air barrier
3. Glazing tape
4. Continuous alu, adapter bonded to IGU (insulated glass unit)
5. Integrated led facage lighting w/ reflector, alu, mount & housing
6. Toggle clamp
7. Continuous rubber gasket
8. Structral laminated beam 230mm x 500mm, clear coat

Roof paneling detail - 1:5

STRUCTURE

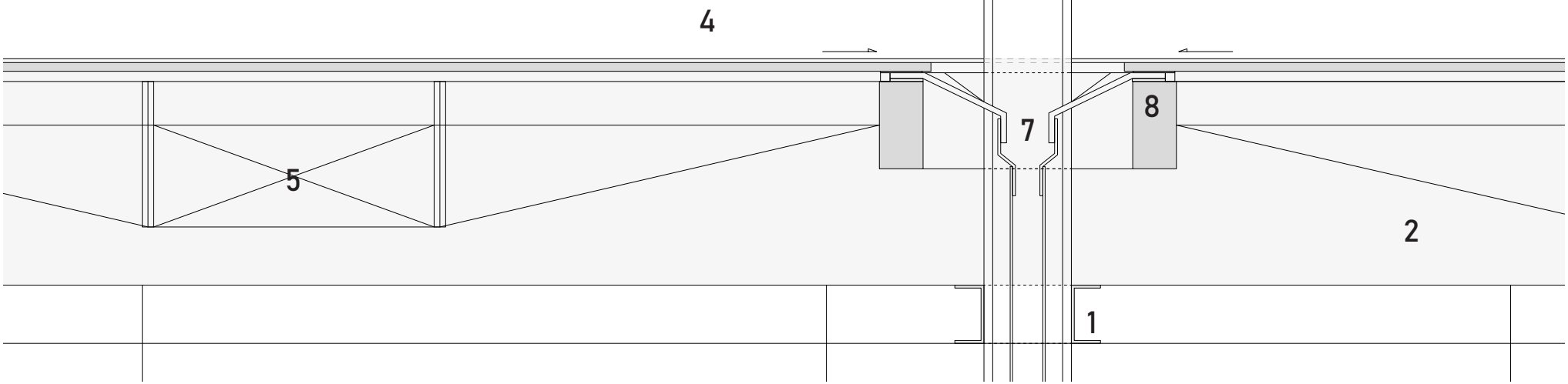




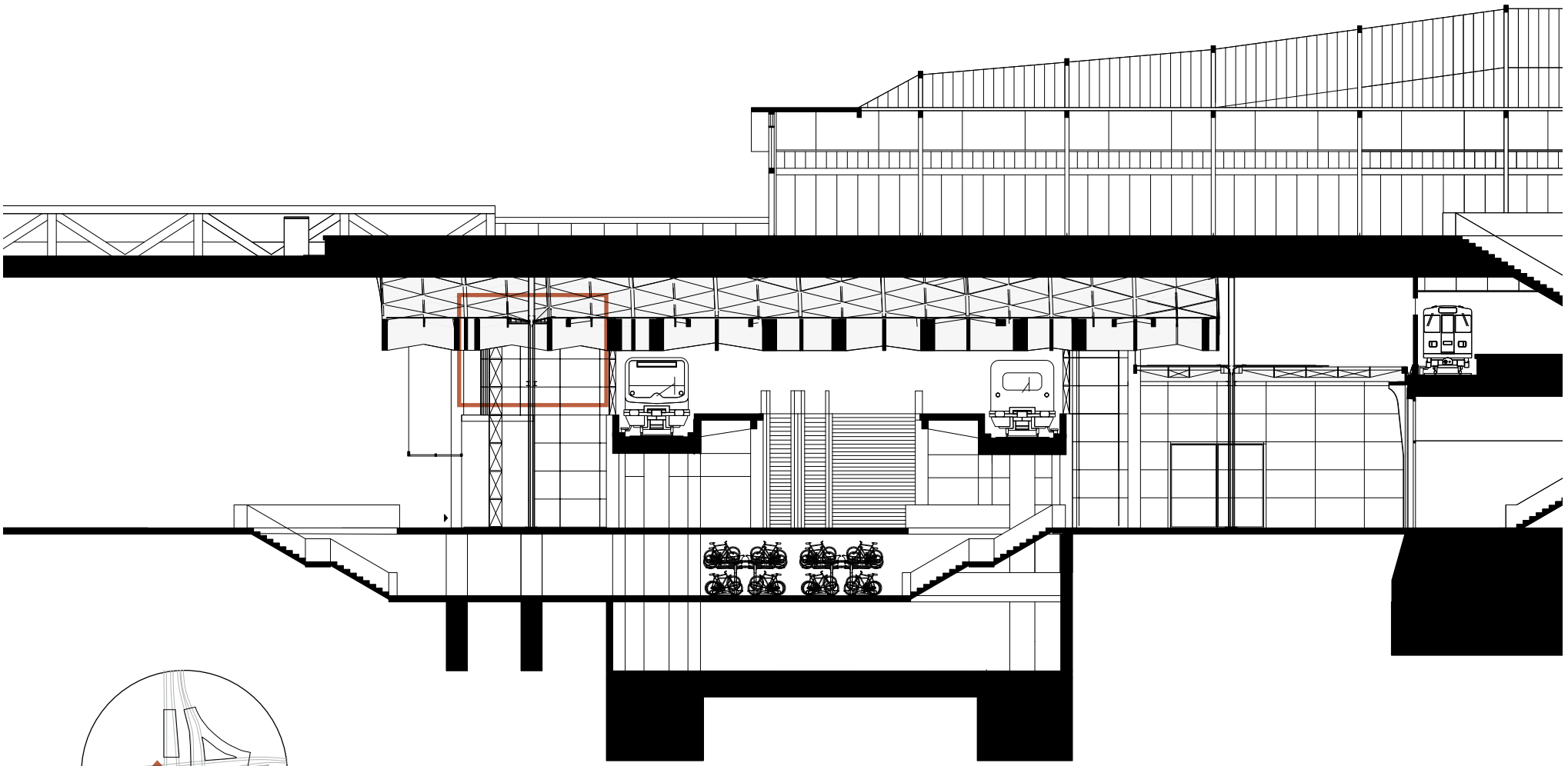
EXISTING STRUCTURE INTERSECTION

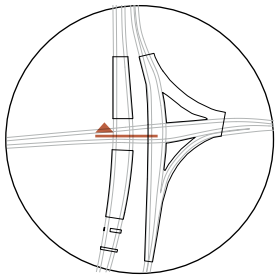


1. Existing steel column
2. Main laminated timber beam structure
3. Timber triangle roof structure
4. Glass roof panels
5. Steel sectional cable roof brace
6. Existing steel culomn foot
7. water drainage
8. Timber sub beam

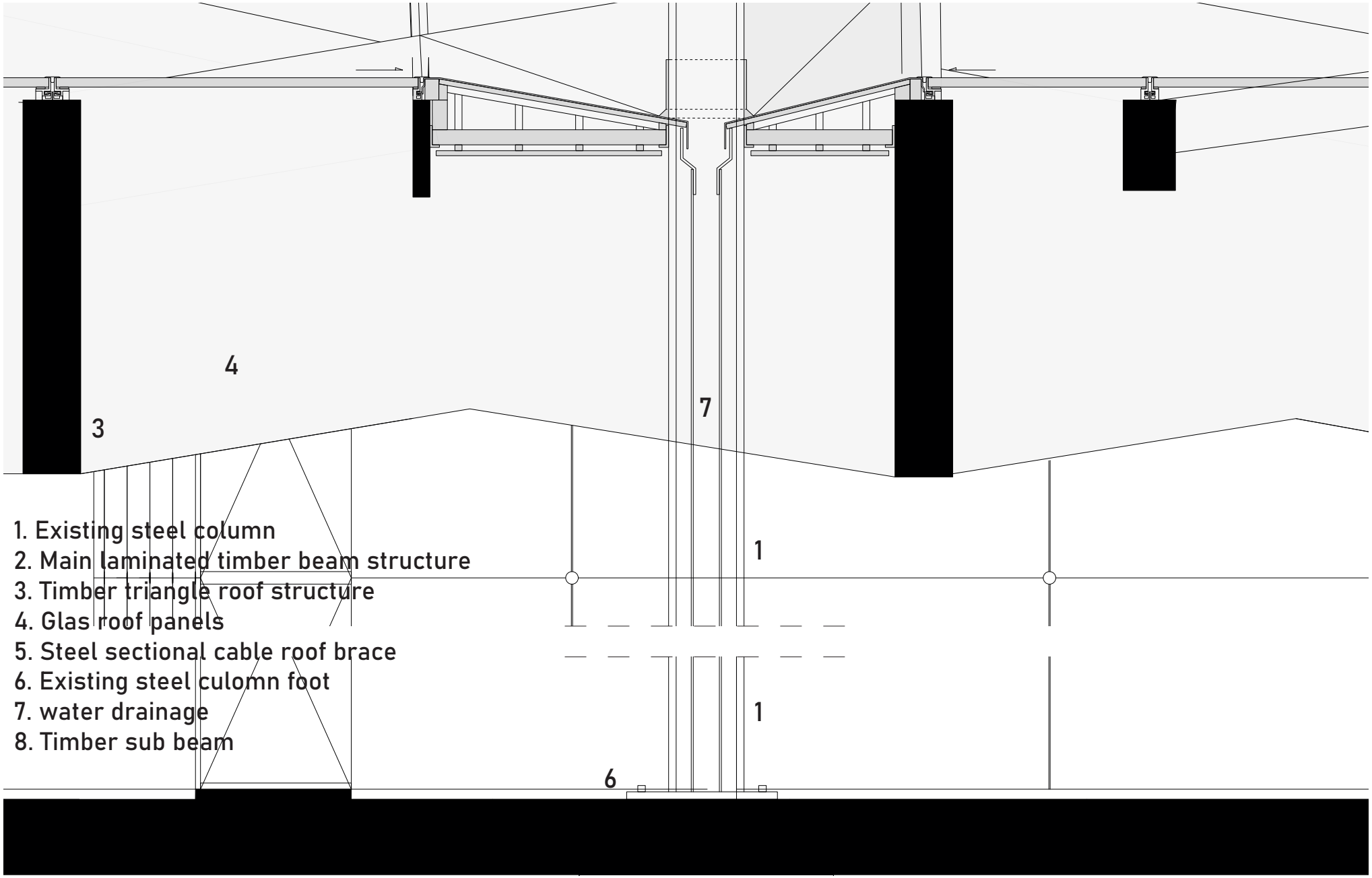


STRUCTURE





EXISTING STRUCTURE INTERSECTION



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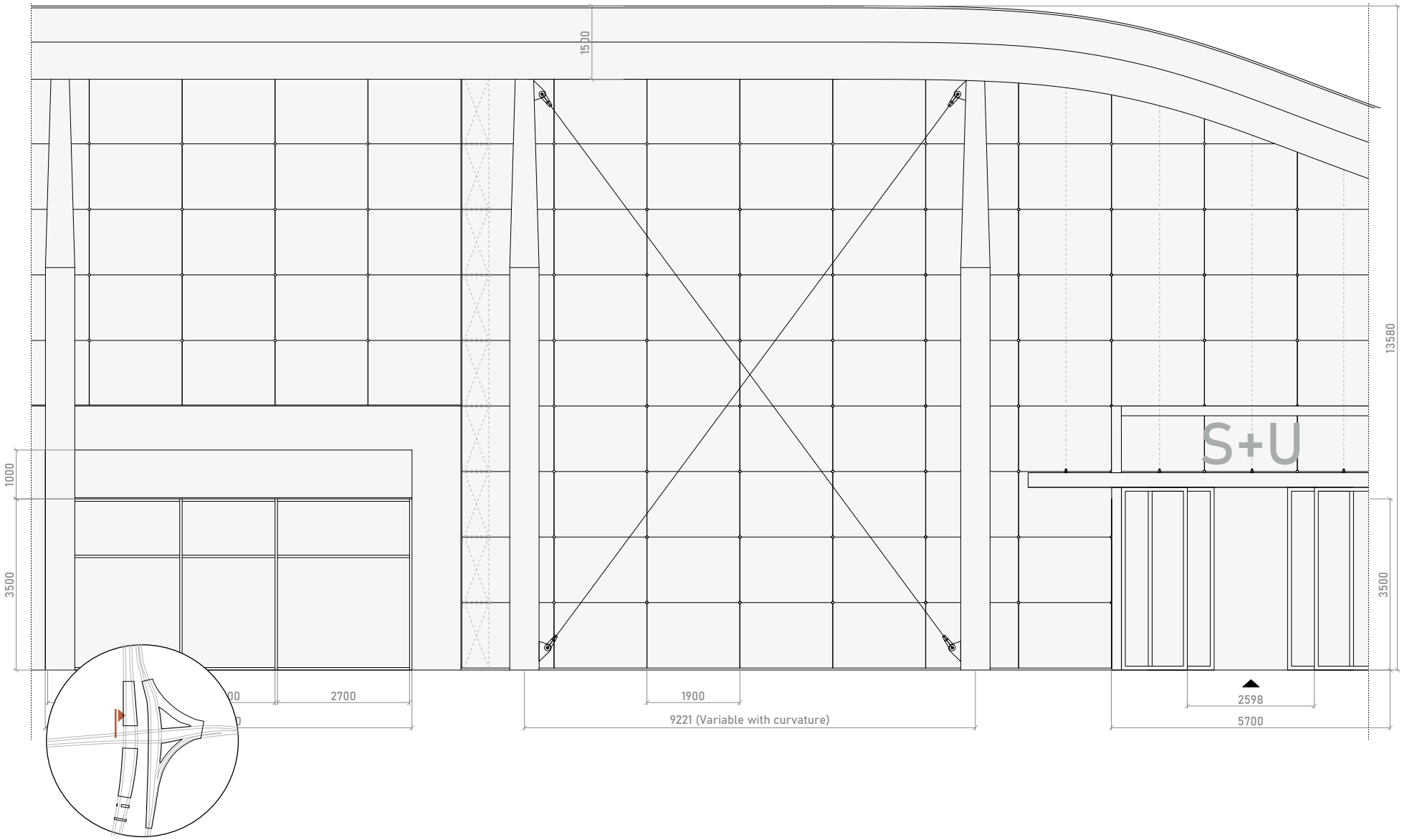
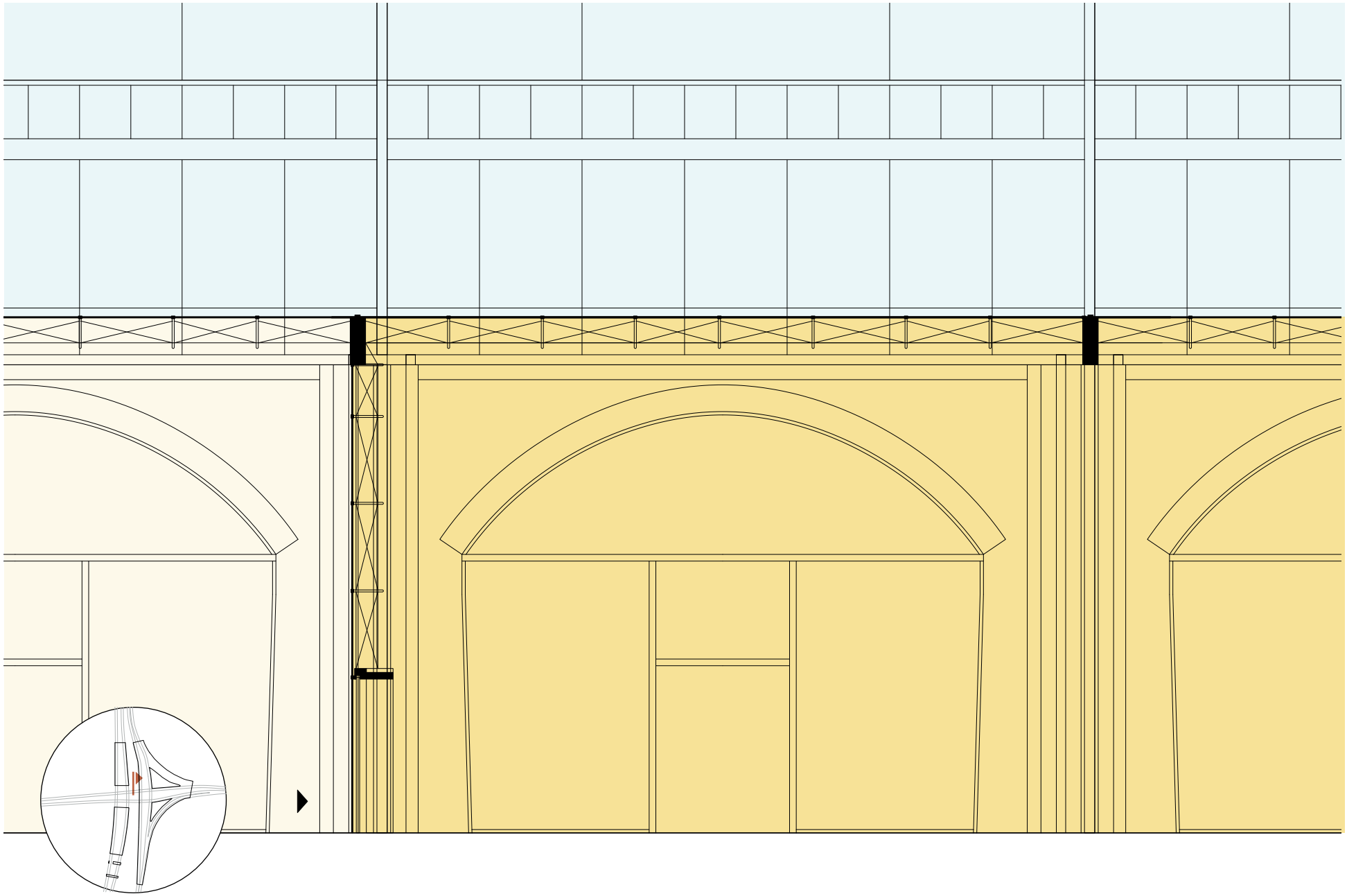
4. Glas roof panels
5. Steel sectional cable roof brace
6. Existing steel culomn foot
7. water drainage
8. Timber sub beam

STATION HALL ELEVATION



SHELTERED PASSAGE



DESIGN

CONCEPT

TRANSFORMING THE EXISTING

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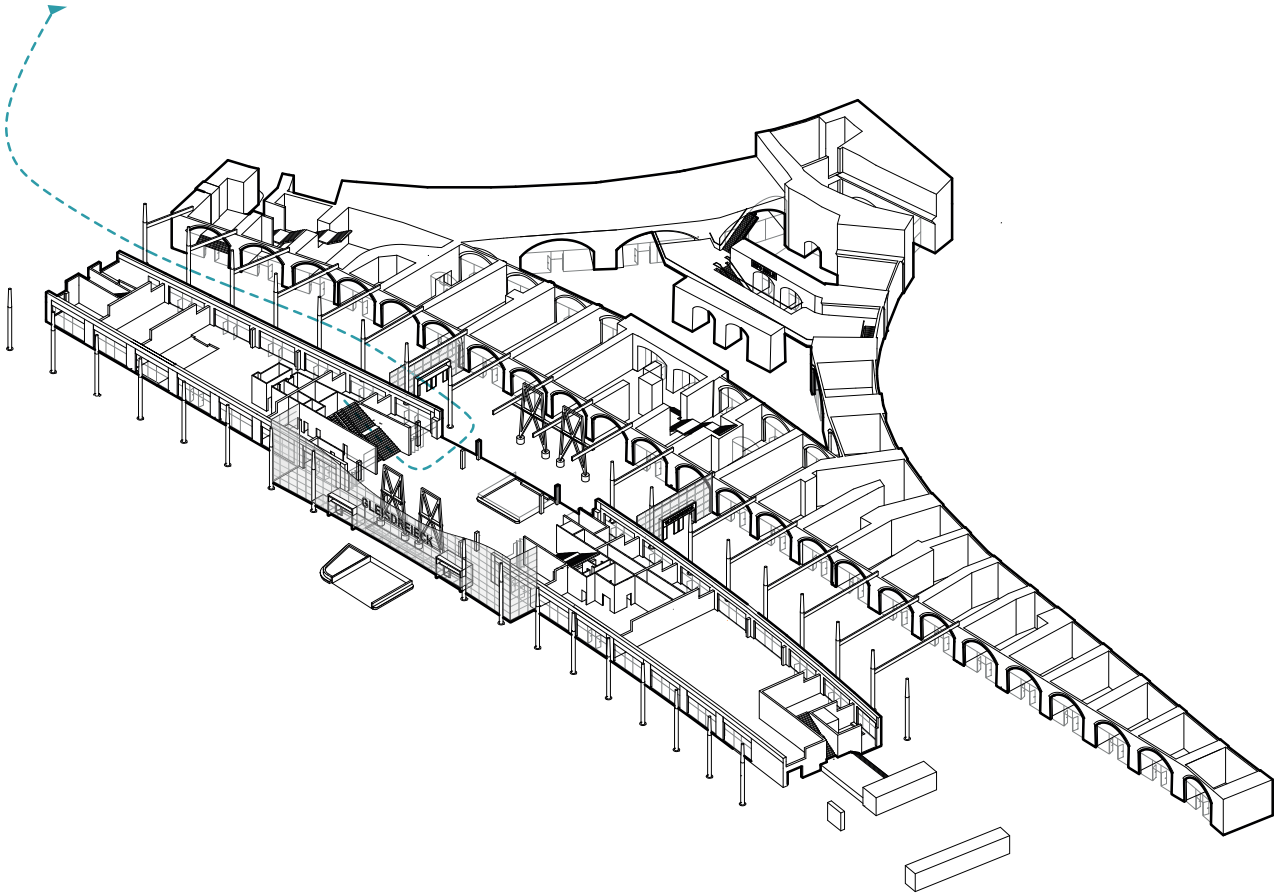
WALKTHROUGH

ITINERARY



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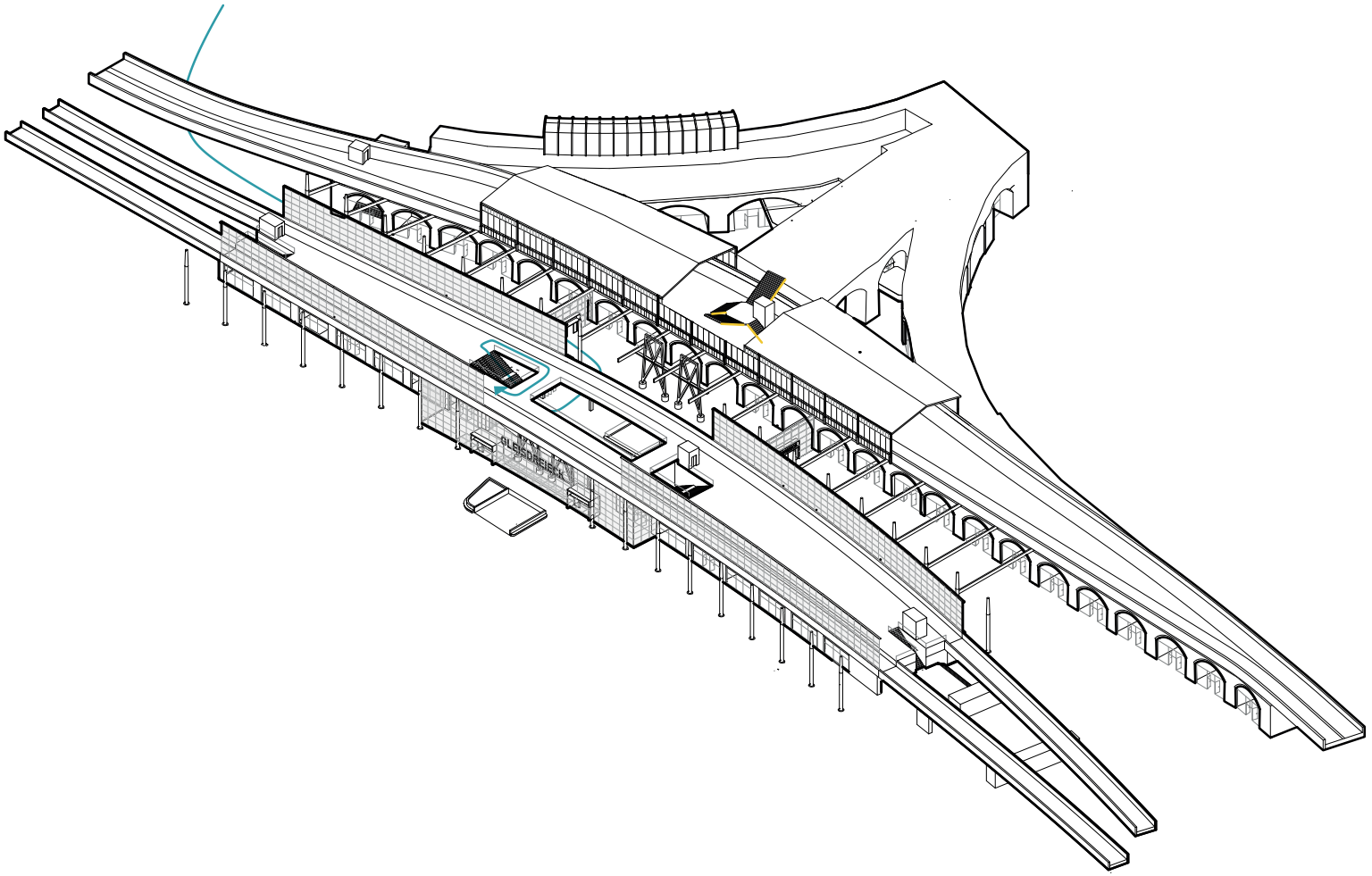
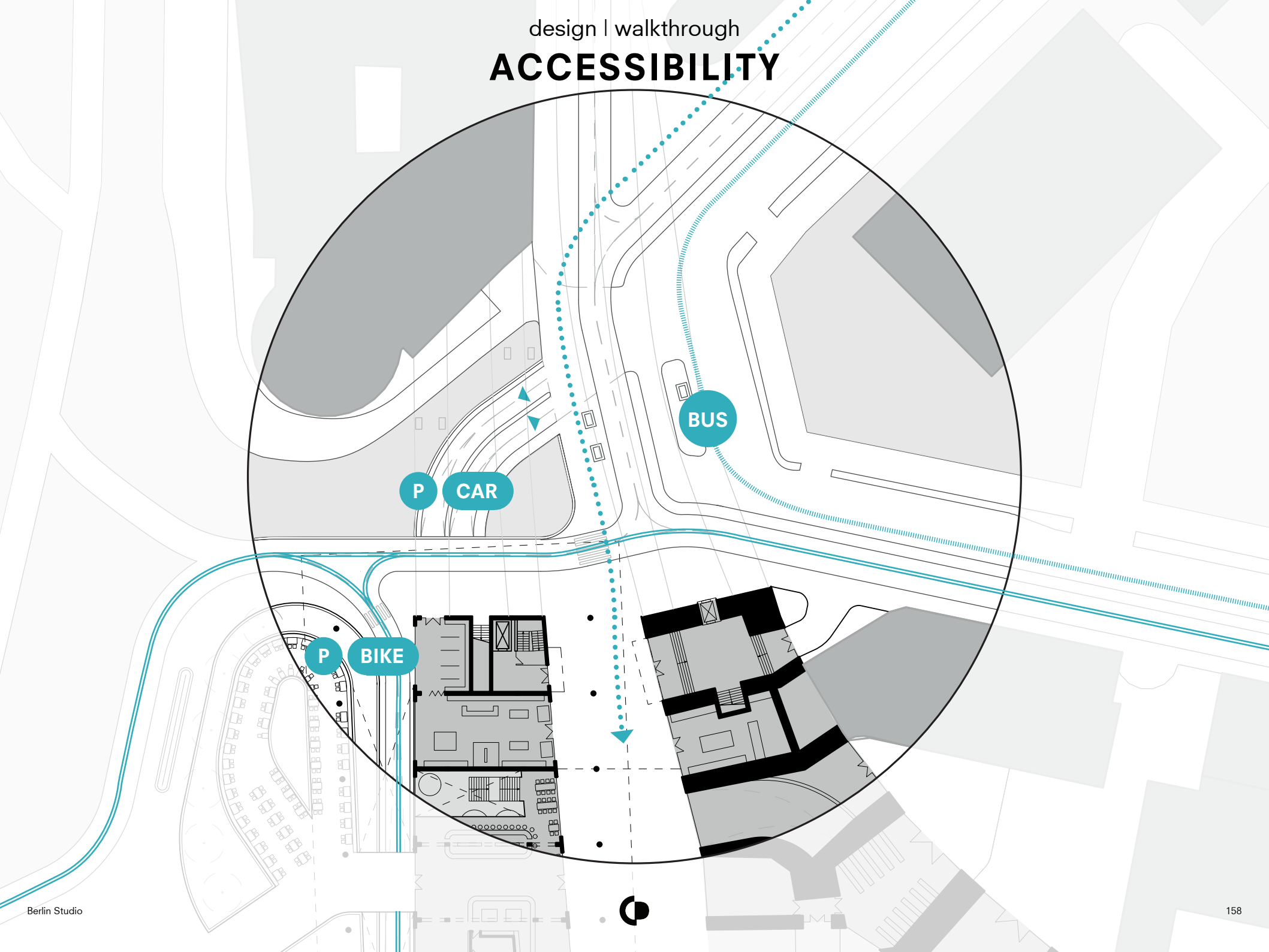


ACCESSIBILITY



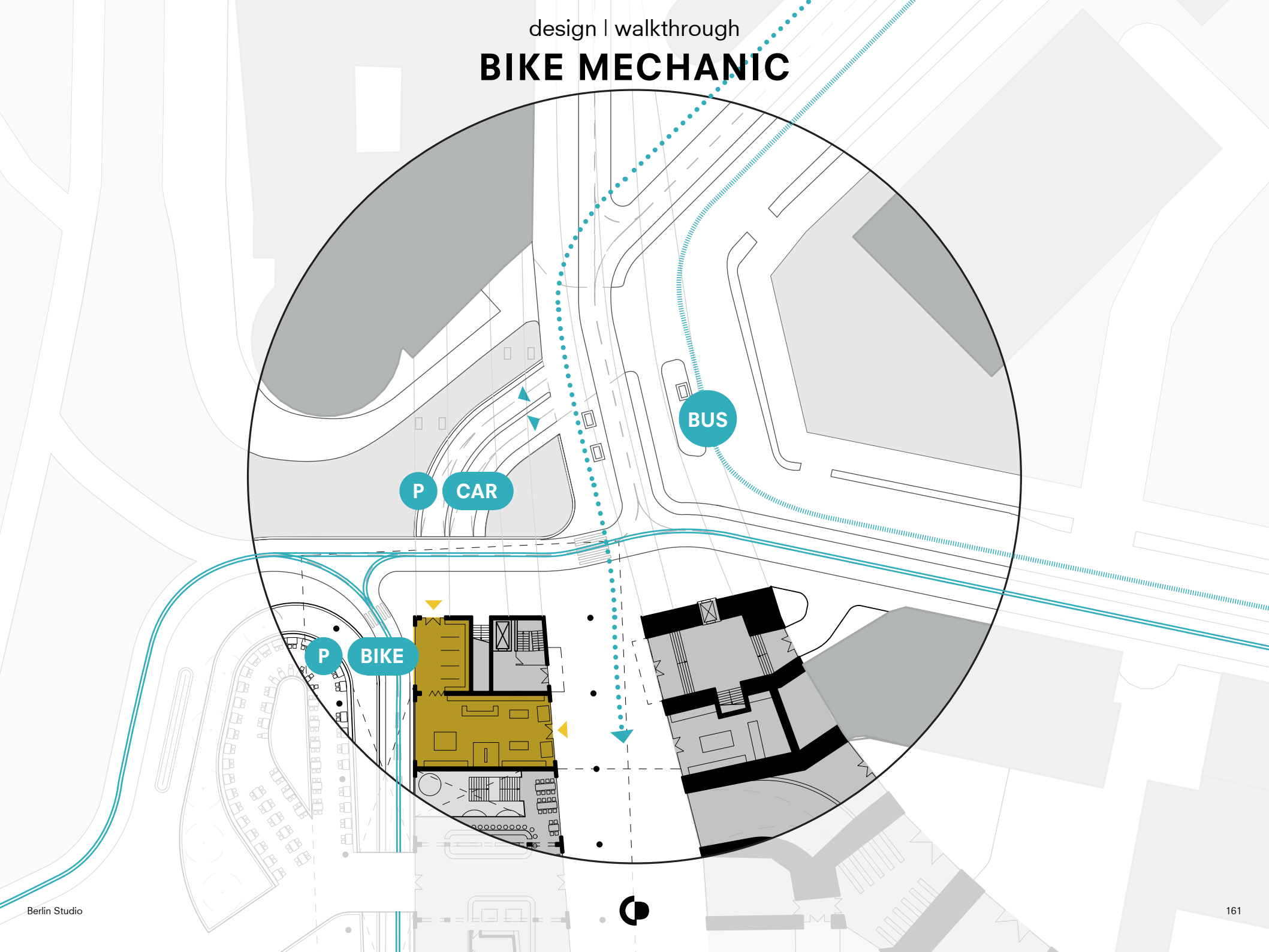


arriving at Gleisdreieck

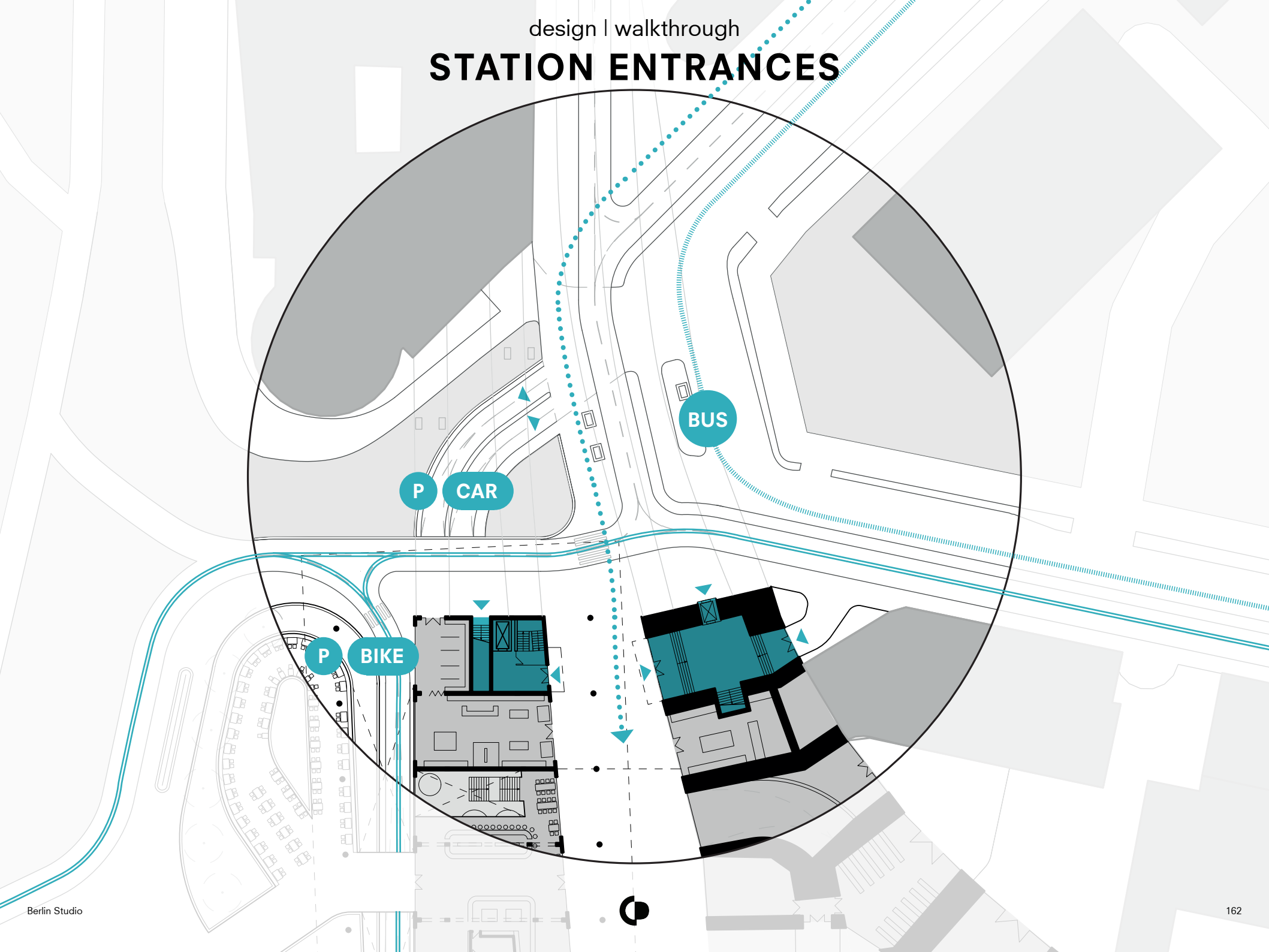


arriving at Gleisdreieck

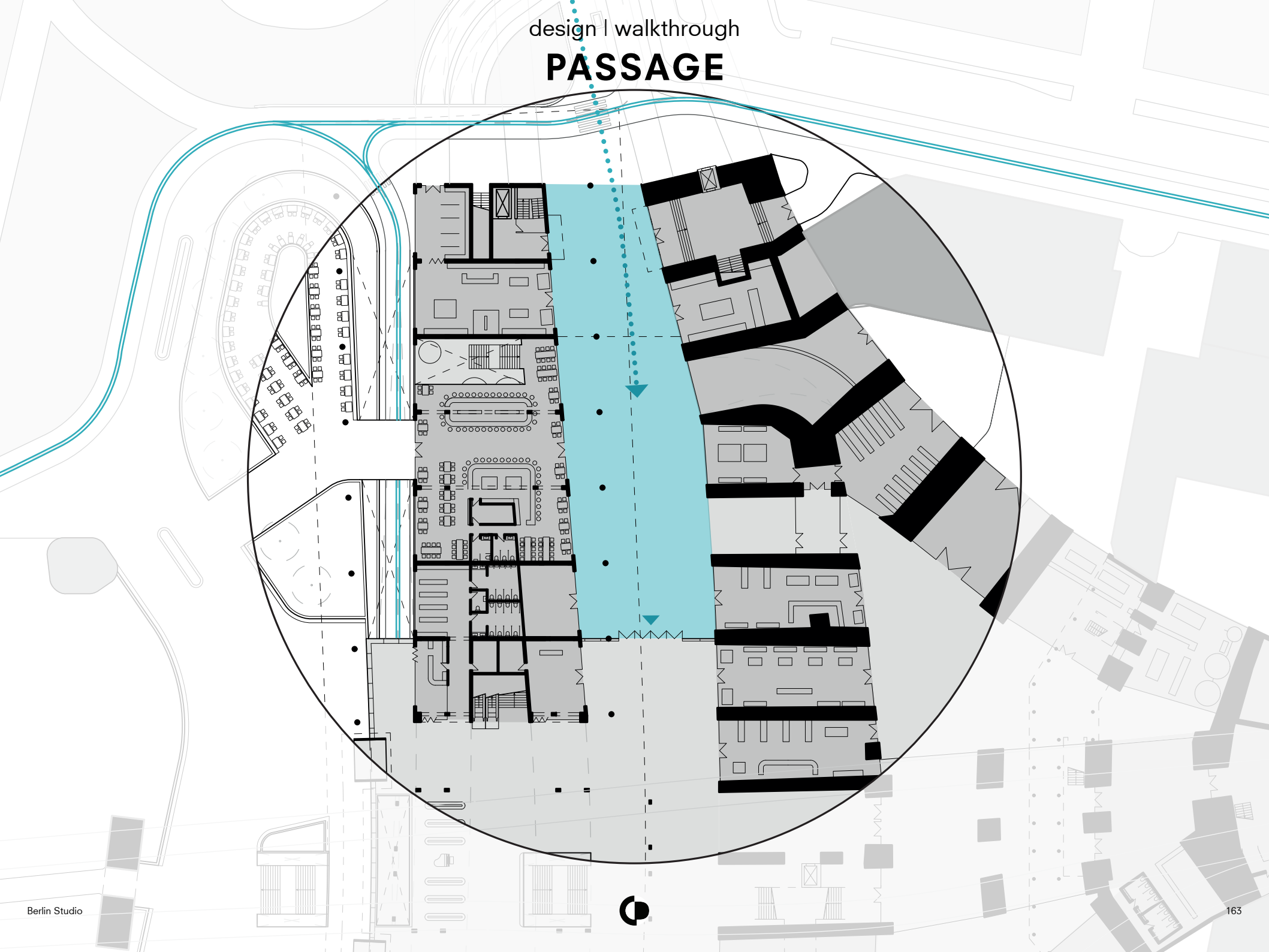
BIKE MECHANIC



STATION ENTRANCES



PASSAGE



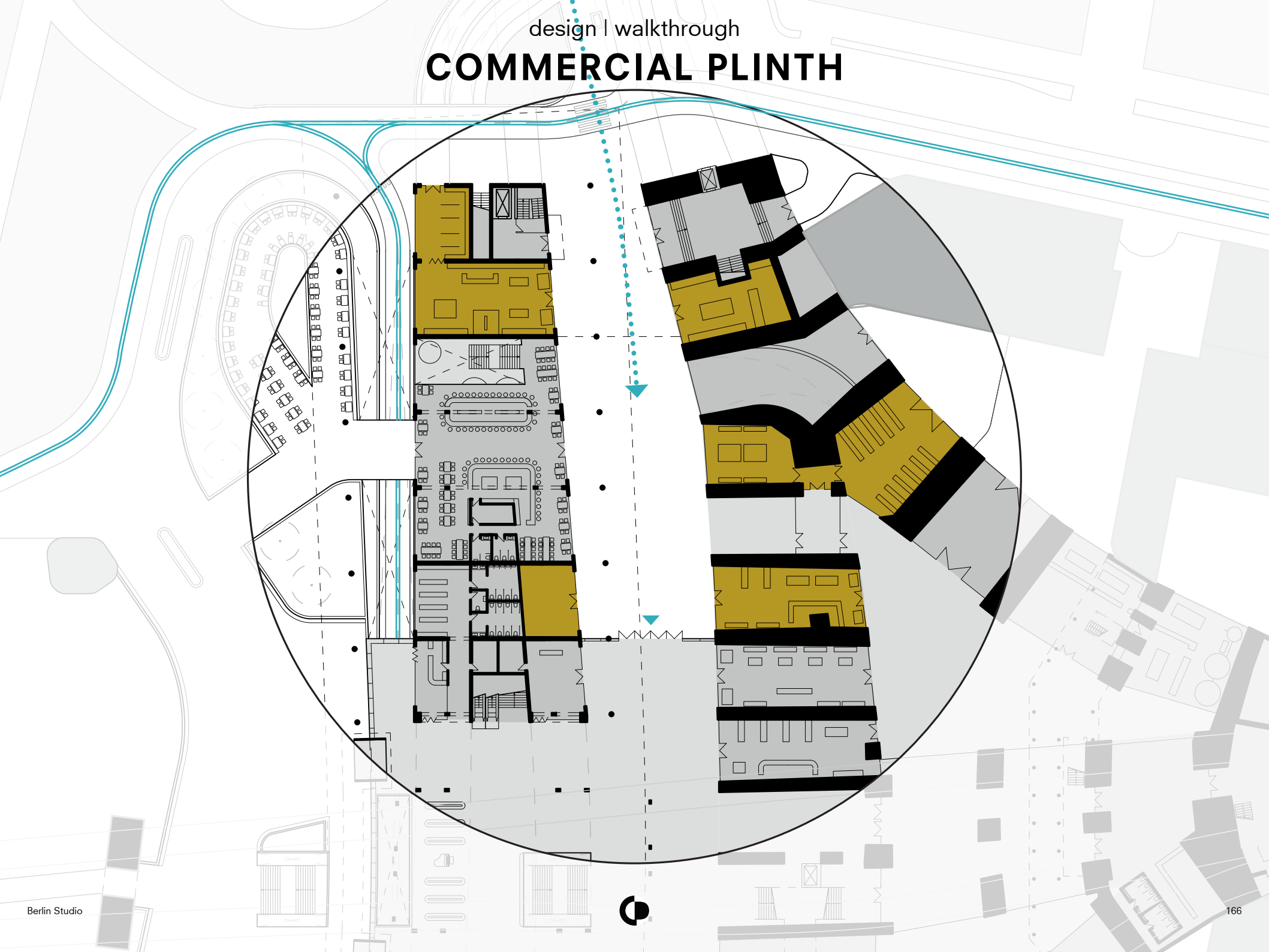


passage by day

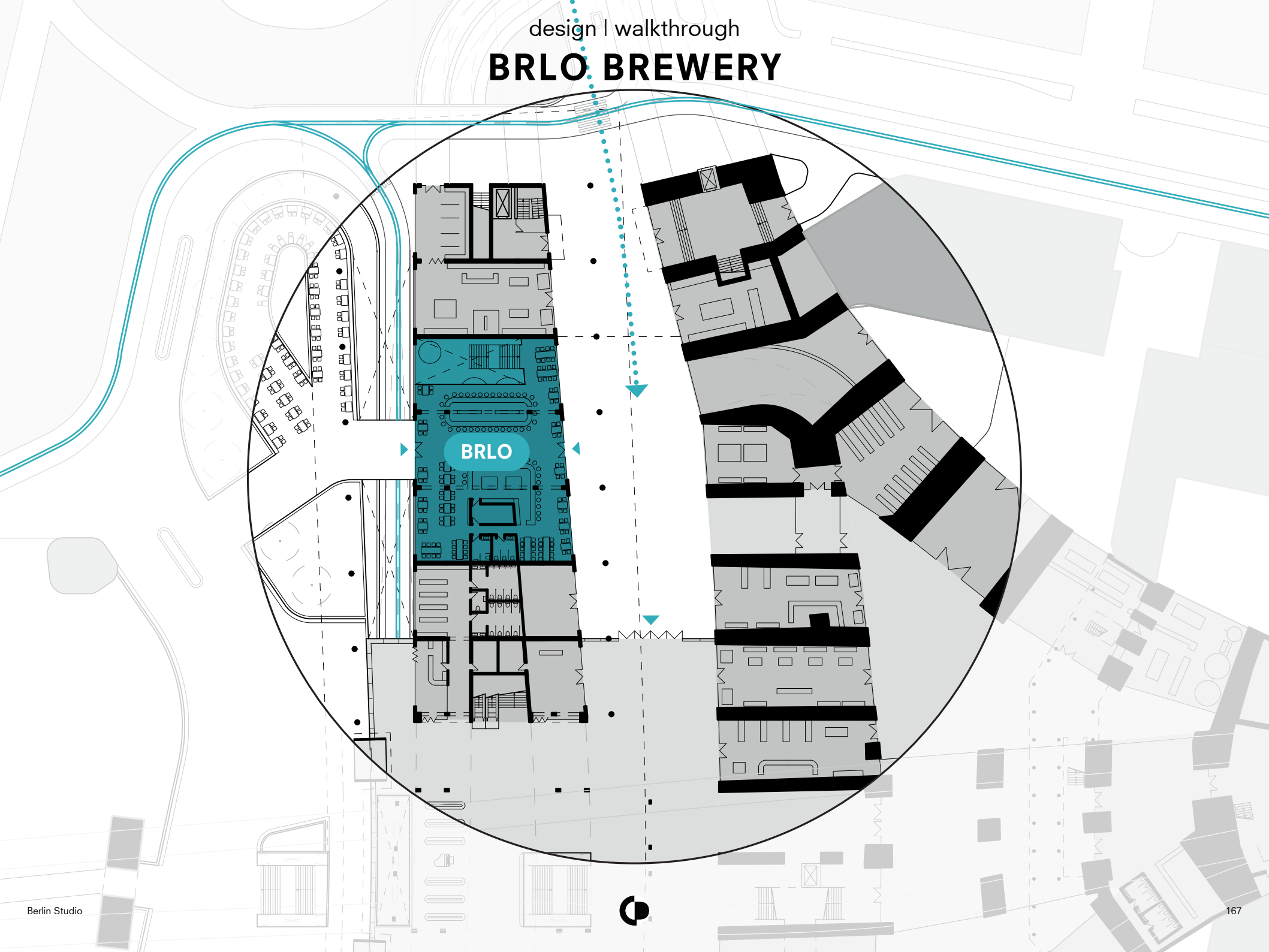


passage by night

COMMERCIAL PLINTH



BRLO BREWERY



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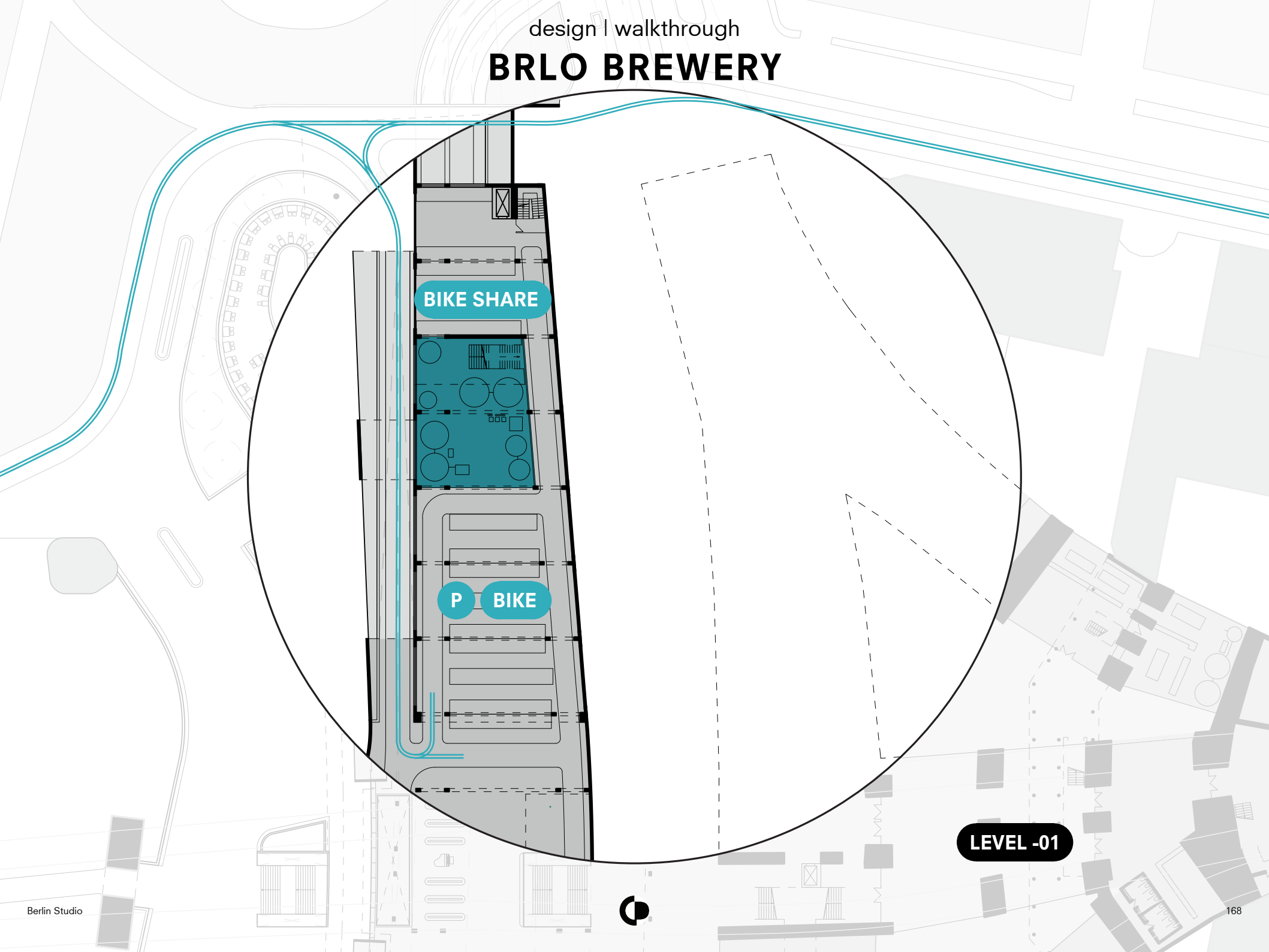
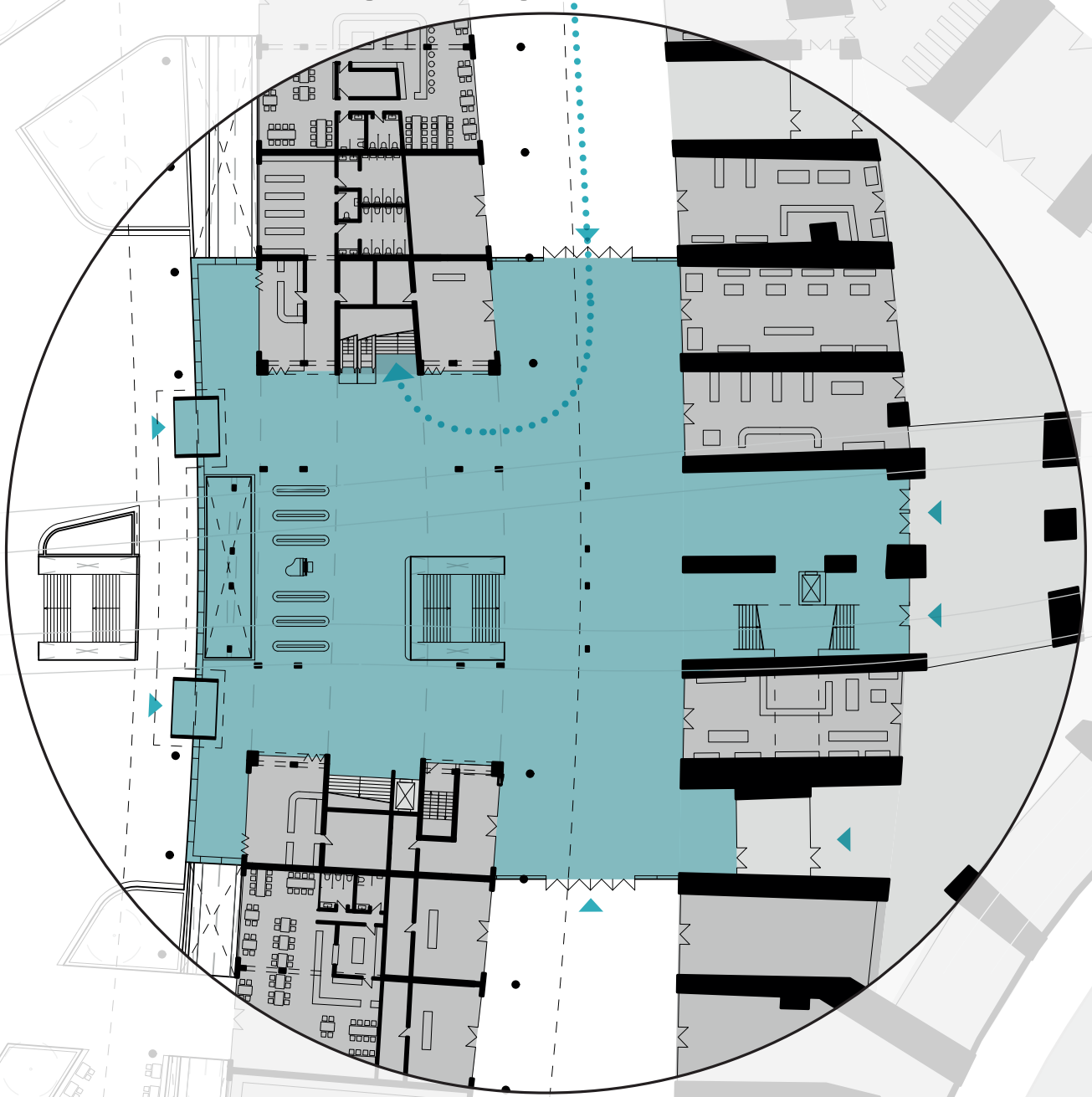


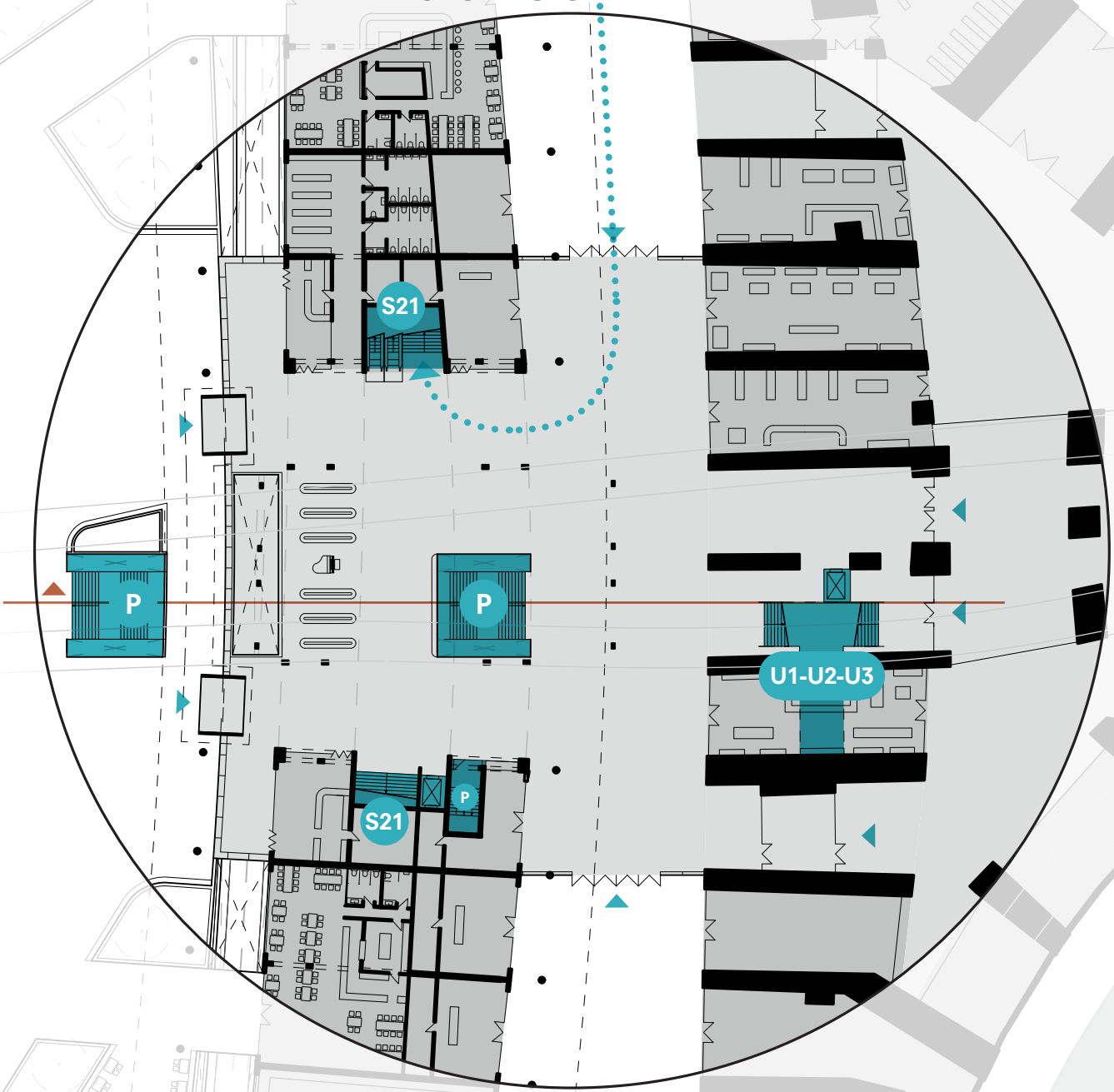
STATION HALL



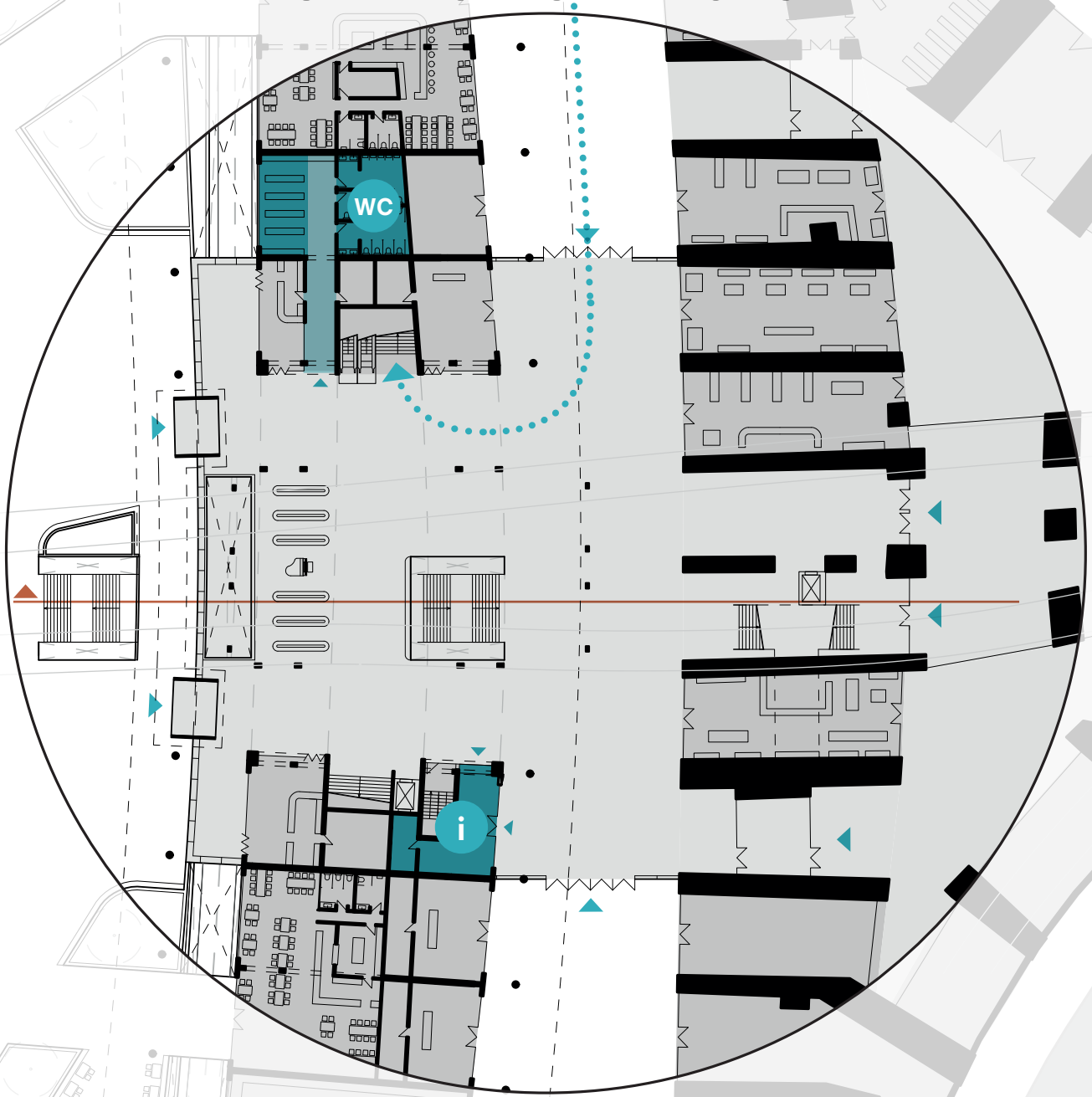


station hall

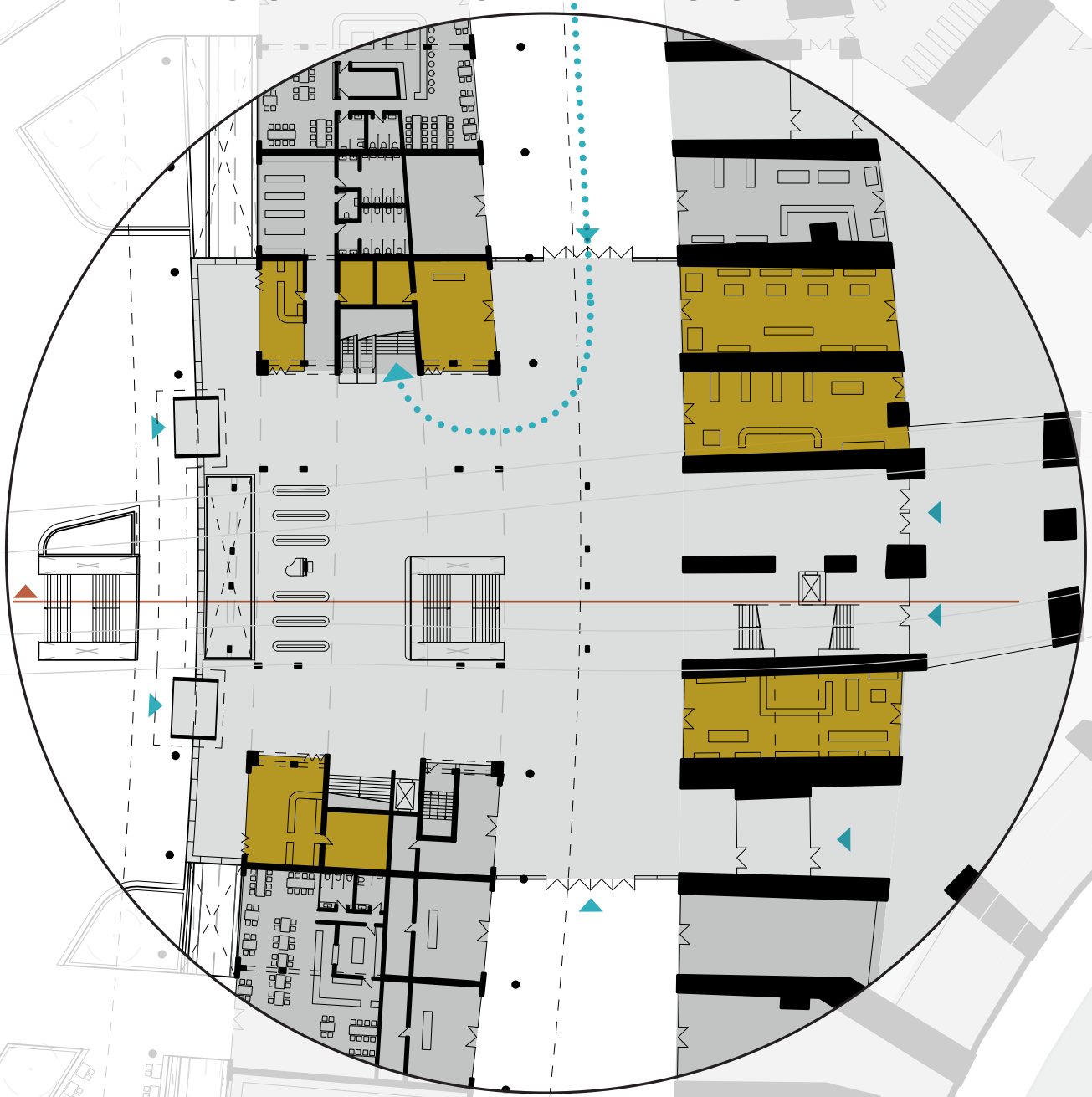
ACCESSIBILITY

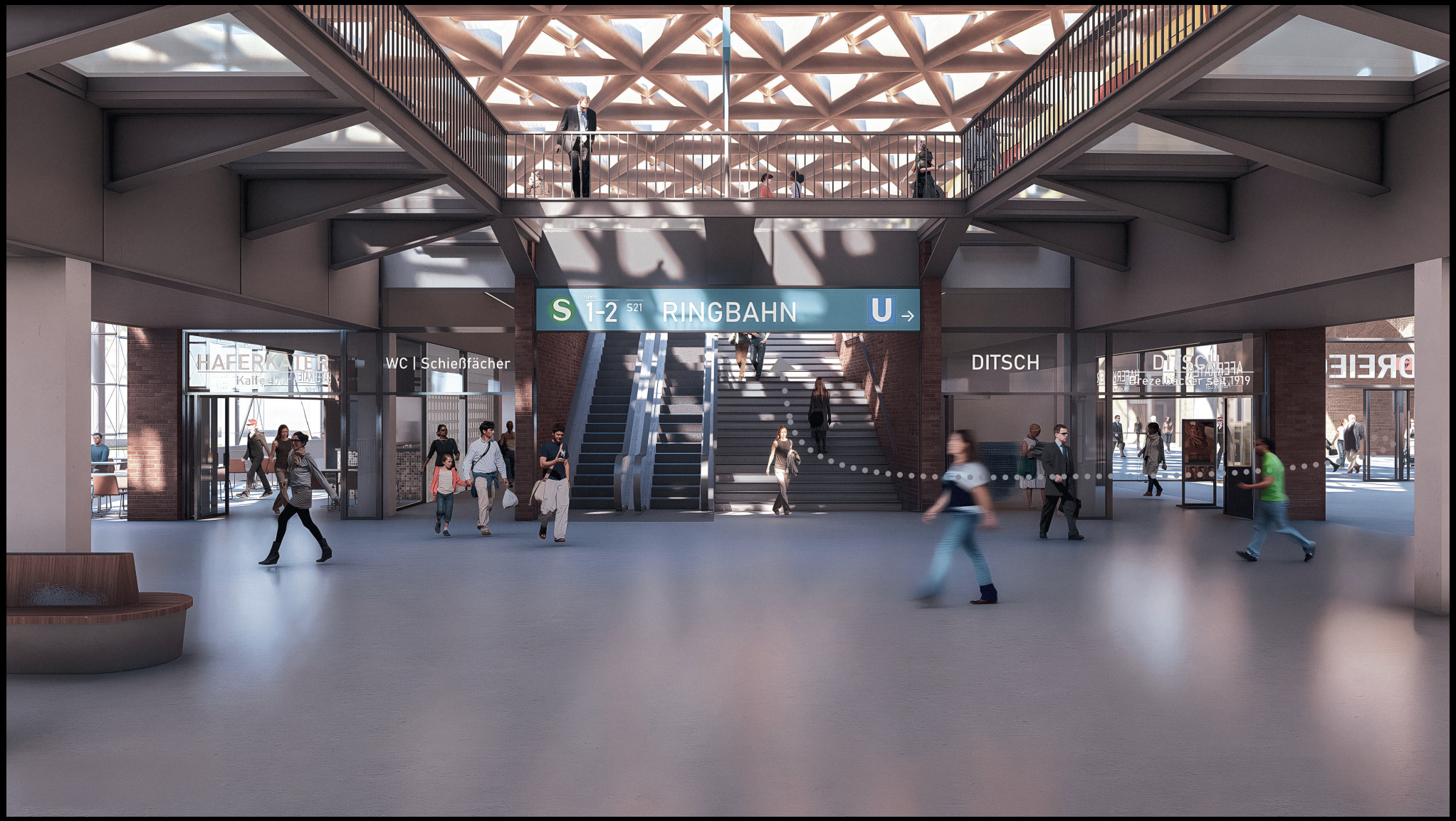


STATION SERVICES



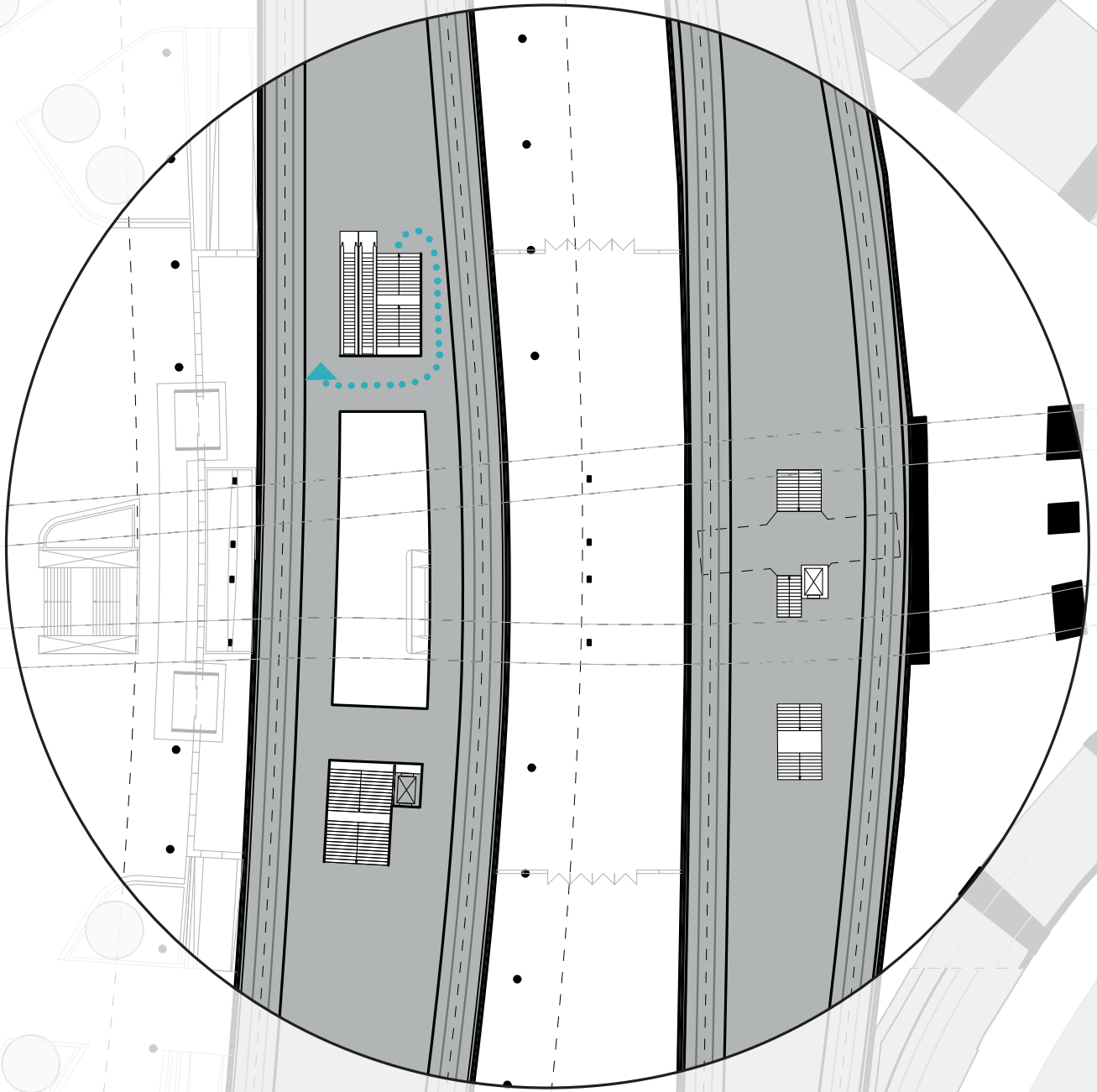
COMMERCIAL PROGRAM

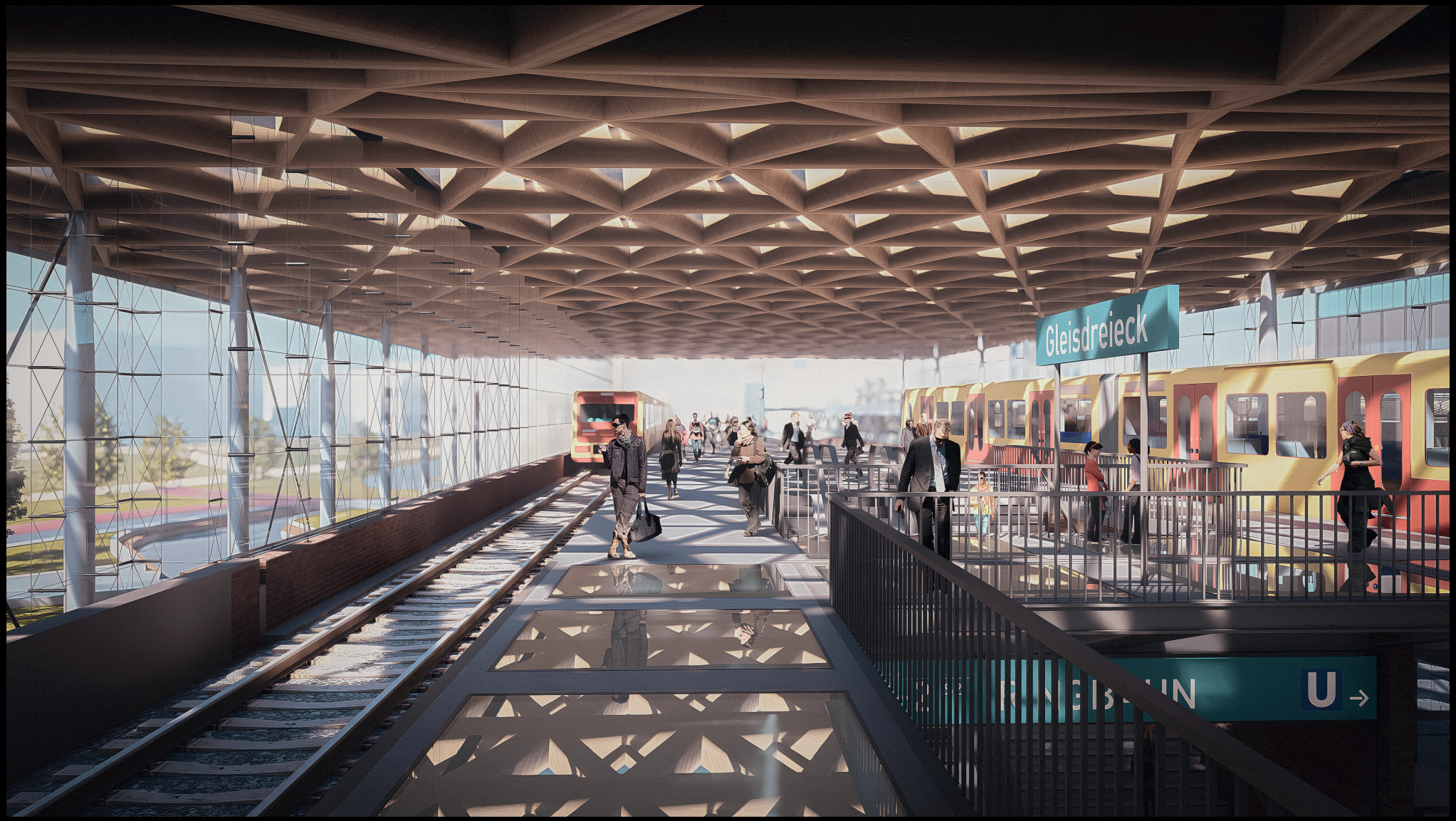




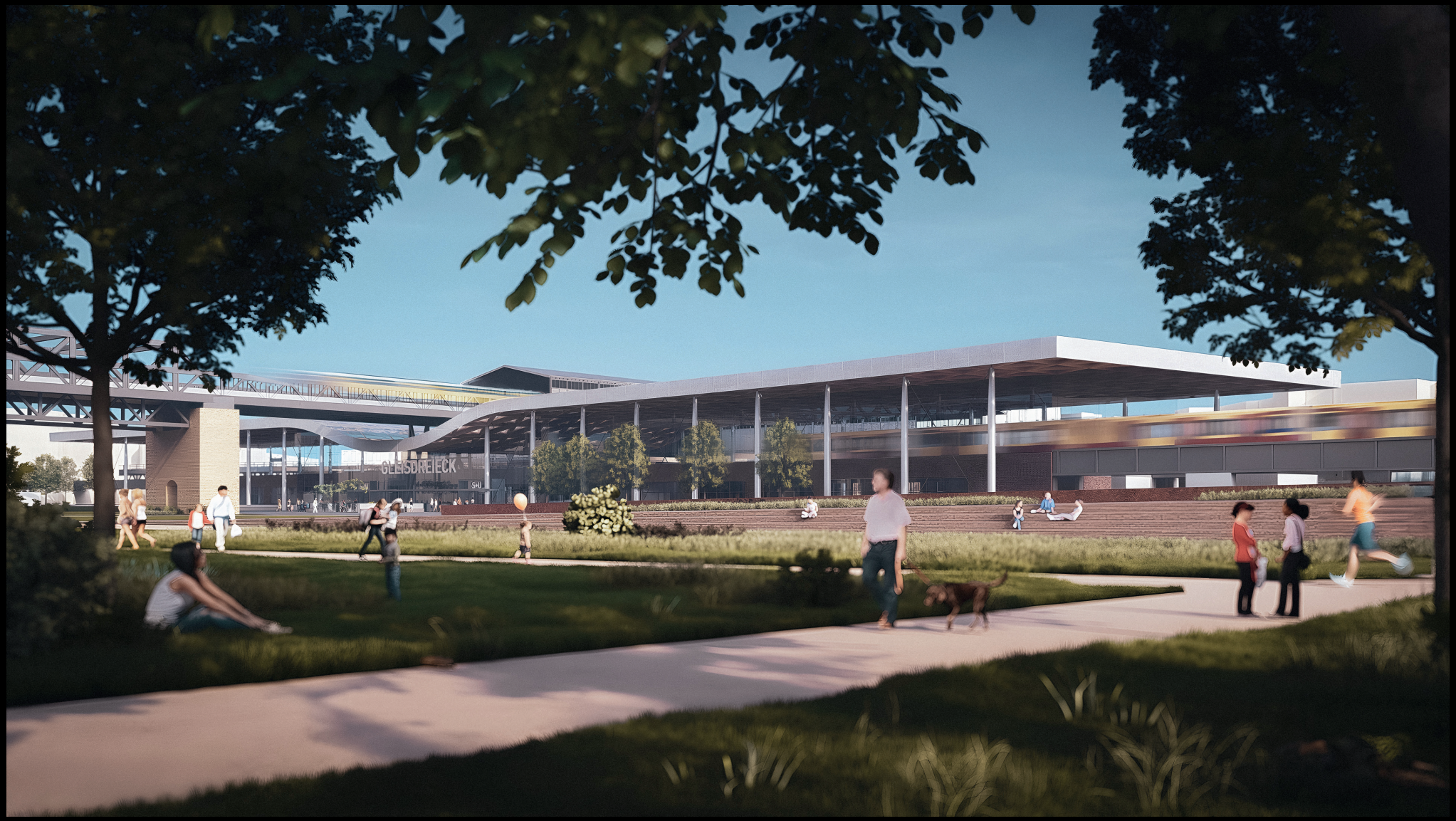
station services and commercial program

PLATFORM S21 & U2





S21 platform

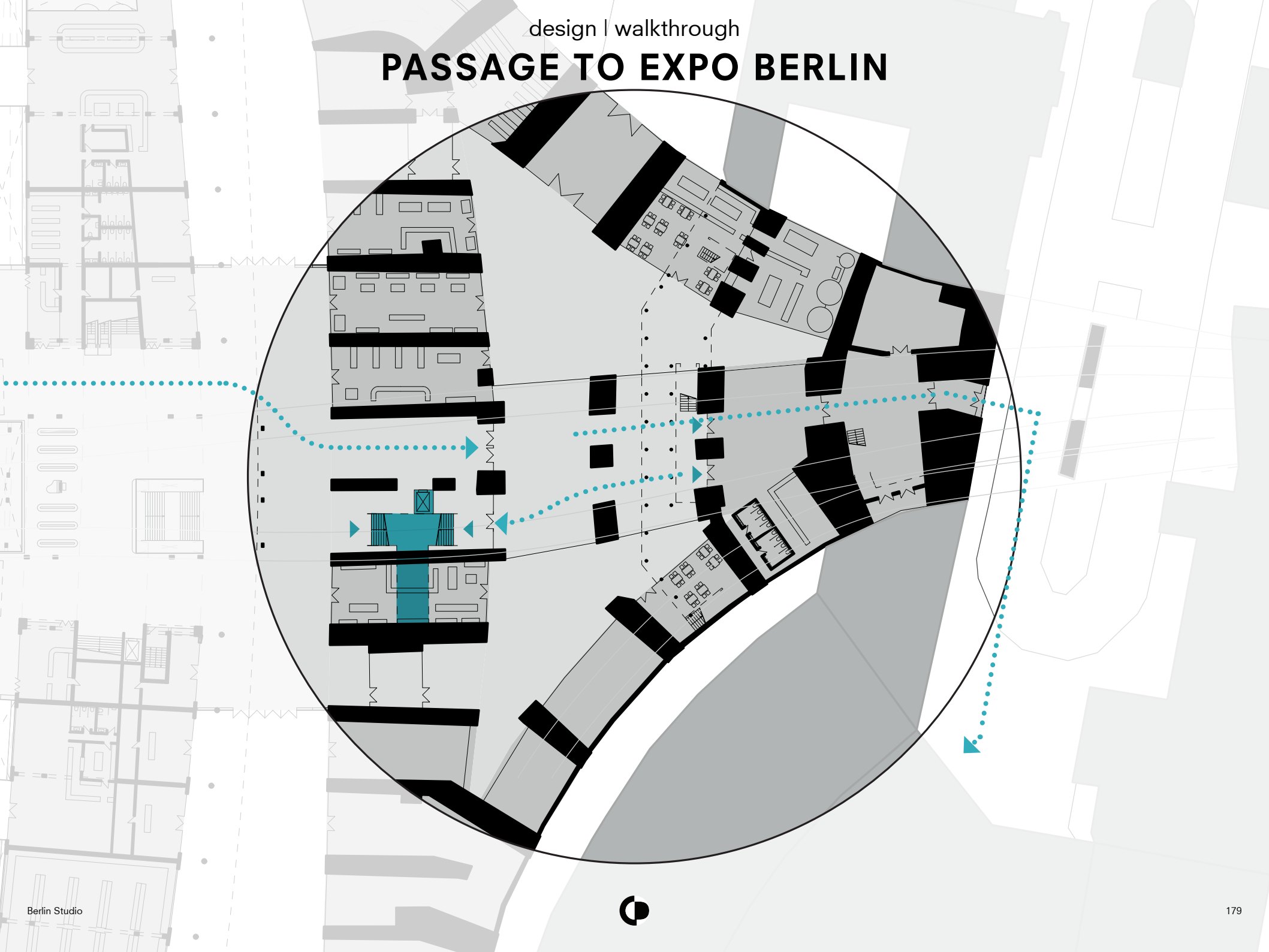


park arrival

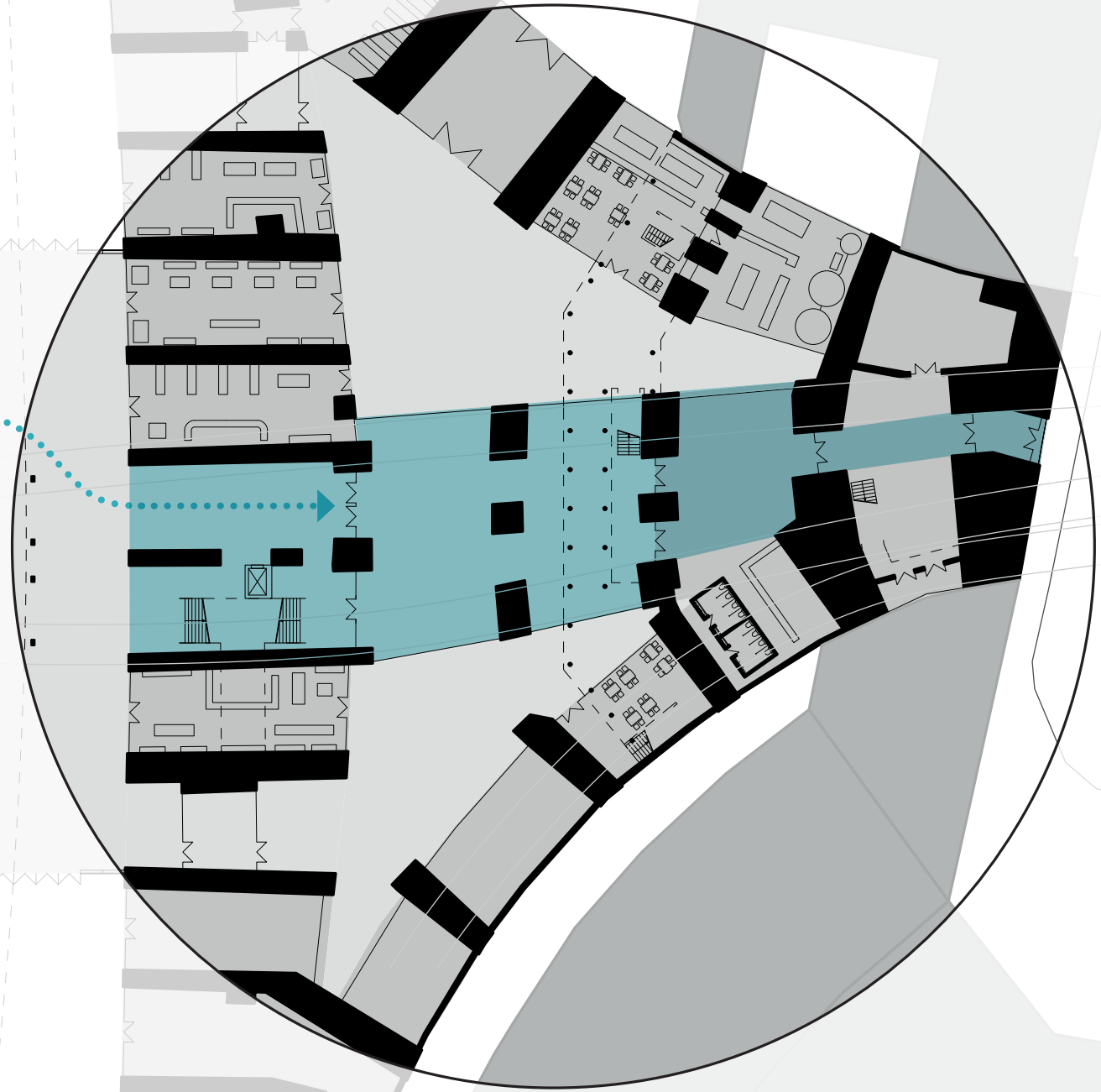


park entrance

PASSAGE TO EXPO BERLIN



PASSAGE TO EXPO BERLIN





visiting expo berlin



walking trough the atrium



walking trough the atrium

DESIGN BRIEF

PROPOSED DESIGN

CONCLUSIONS AND REFLECTIONS

PROBLEM STATEMENT

Berlins trainstations are ageing and no longer meet our current or future needs.

RESEARCH QUESTION

How can we foster future mobility in Berlin by adapting train stations to meet current and future needs?

AIM

I aim to create a new extention to the existing station that is both respectful of the past and responsive to the needs of the present and future.

© Image by Author

conclusions and reflections

STATION GLEISDREIECK

CONNECTION TO THE EXISTING

Responding to current cultural spaces and heritage design

PLANNING FOR FUTURE DEMANDS

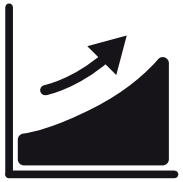
Reacting to developments and the growing population

INTERCONNECTIVITY OF PROGRAM

providing more users with more functions and simpler flows

conclusions and reflections

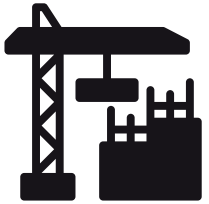
FOCUS POINTS



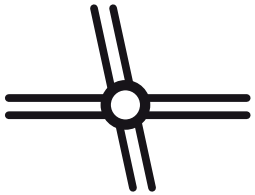
Future densification of Berlin



Planned North-South Line



Urbane Mitte development plan



Connecting regional S and U-Bahn station



Built for different users



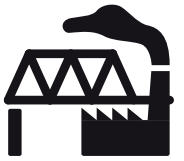
Additional program focus



Monumental station



Reviving rail



Industrial character



Thank you