



ONTWERPVERANTWOORDING
KORTE LIJST OPLOSSINGSRICHTINGEN
MIRT-VERKENNING
MULTIMODALE KNOOP EINDHOVEN

definitief

Movares Daalseplein
100 3511 SX Utrecht
The Netherlands + 31
(0) 30 265 5555
info@movares.nl
<mailto:info@movares.nl>

KCAP
Piekstraat 27 3071 EL
Rotterdam The
Netherlands + 31 (0)
10 7890 300
rotterdam@kcap.eu
<mailto:rotterdam@kcap.eu>

Team V Asterweg 15L
1031 HL Amsterdam
The Netherlands + 31

Mövares KCAP ARCHITECTURE

DRAFT RESOLUTION SHORT LIST OF SOLUTIONS MIRT DECLARATION MULTIMODAL KUTTON EINDHOVEN

Version:
2.0 (1 October 2024)

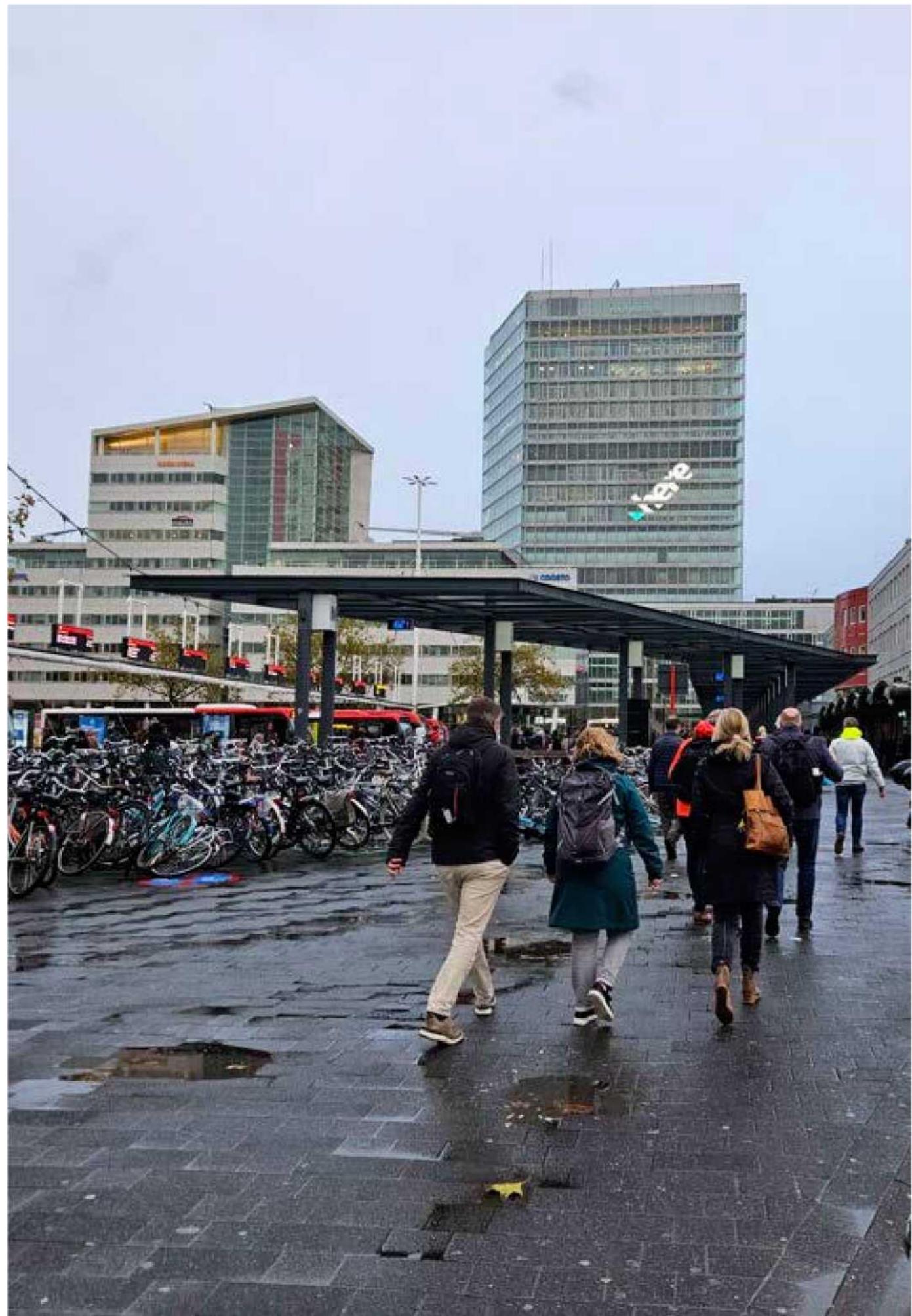
Authorisation sheet

Control and release

	Name	Accept	Date
Prepared by	ARD Jan Wolters, Mariette Kooren, Edwin Meegens		1-10-2024
Checked by	Frank Werner, Jeroen van Schooten, Jason David	V	1-10-2024
Disclosed by	Richard Savenije	V	1-10-2024

Version history

	Name	Date	Short explanation
Q0.1	Draft justification short list of solutions (draft)	2-7-2024	Draft version for review
v1.0	Draft justification short list of solutions (final)	5-9-2024	Project team review processed. Final version
v2.0	Draft justification short list of solutions (final 2th version)	1-10-2024	Project team review processed. Final 2th version



Project team MMK on site visit in Eindhoven (2-11-2023)

CONTENTS

Mo vare s KCAP ARCHITECTURE	1
Authorisation sheet	2
“Draft justification short list of solutions for the Eindhoven Multimodal Knoop”	6
Building blocks for the solutions	9
Large (construction) stones	9
Other building blocks	9
Principles for the resolution of problems	11
Development Vision Fellenoord	11
Main objectives Assessment framework MMK	19
Framework Spatial Quality OV-Knoop Eindhoven	19
Working optimally	19
DV button	19
K * alitel1 and verblndingc n in da apenbare space	19
Cluster 6 Property Declaration	20
4. OVERVIEW OF SOLUTIONS	25
FAMILIES	25
4. OVERVIEW OF SOLUTIONS	29
DIFFERENCES FROM THE LONG LIST	29
4. OVERVIEW OF SOLUTIONS	30
DISTINCTIVE ELEMENTS	30
Model 0 +	30
Template 1	30
Model 2	30
Model 11	30
Model 15	30
Model 0 +	35
Underground bus station (level -1/2) at Necker coil	35
RESOLUTION DIRECTIONS	40
REAL ESTATE OPPORTUNITIES	40
Template 1	67
Underground bus station (level -1) at Necker coil (parallel)	67
10,6 JGG 33	83
Model 2	
Underground bus station (level -1) on Necker coil (square)	
MODEL 2 – COMPONENTS	64
Model 11	133
Multi-layer bus station (level -1 and + 1) entirely on Necker coil	133
Eindho ⁿ ven	80
+ KCAP +	80

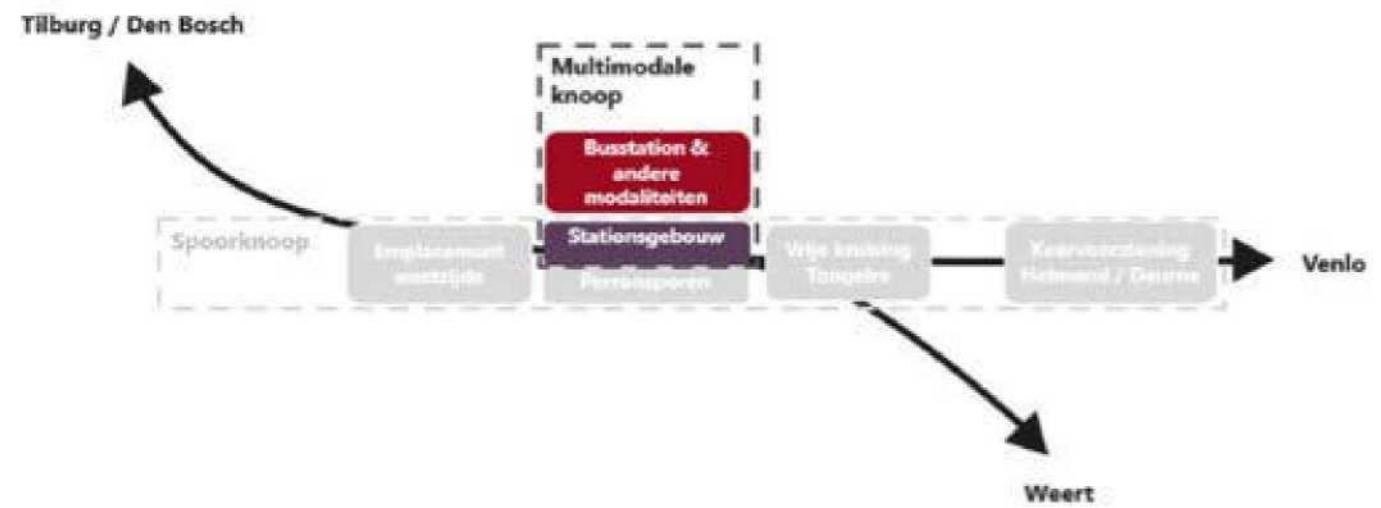
Model 15	165
Underground bus station (level 1) under Fellenoord and Necker coil	165
Final furnace	
MODELSLINGSRICHTI	96
15 – ONNDGER	96
Loopafstanden tussen INTE	96
Phasing – temporary sites	201
7. NOTICE OF CONCEPTANCE	202
MODEL 0 +/1/2/11 AND 15	202
Model 0 +/1/2/11 concept phasing	202
Model 15 concept phasing	202
Model 0 +	104
Model 11	104
Template 1	104
Model 15	104
MIRT-VERKENNING BOARD MMK EINDHOVEN	108
“Building book for the Multimodal Knoop Eindhoven”	112
Building blocks for the solutions	114
Large (construction) stones	114
Other building blocks	114
16.0 NAP	16
8.8 NAP	16
18.5 NAP	16
16.5 NAP	16
16.5 NAP	16
8.8 NAP	16
110	16
TEMPLATE TEMPLATE	117
0+ 1	117
MODEL MODEL	117
2 11 15	117
109003	24
171509	24
F	24
107899	24
Floor -1	24
30 entry stops, 4 exit stops	24
Floor -1	24
30 entry stops, 4 exit stops	24
MODEL 11	26
III IIIII	26

314133	29
77400	29
Floor -1	29
27 entry stops, 5 exit stops	29
£ £	126
o	126
£ £	126
o	126
4—	41
4 ♦	41
4 F	41
4 F	41
Station hall (train + bus)	44
Commerce	44
Information point	44
Logistics (warehouse) (of which 1 000 m ² on -1)	44
7 400 m ²	44
2 100 m ²	44
300 m ²	44
1 200 m ²	44

1.**2. ANNEX EXPENDITURE PAPER**

1. GENERAL PROVISIONS

"Draft justification short list of solutions for the Eindhoven Multimodal Knooppunt"



Coloured parts within dashed line: scope of the MMK MIRT Exploration



Cope area MMK in Fellenoord, Eindhoven

1.1 Purpose of document

For you, the draft account of the short list of worked out solutions for the MIRT Multimodal Knooppunt (MMK) reconnaissance in Eindhoven is available. This document is an annex to the Note from Shared Solutions (dated 20-6-2024 version C.2.0).

A general project introduction, explanation of the MIRT exploration and preliminary steps can be found in the above document Notitie van Kansrijk Ossolussingen (NKO). In addition, the NKO describes the assessment of the different solutions and which solutions will be further developed in the next phase of the MIRT exploration (assessment phase).

1.2 Finding solutions

There are several documents from the MIRT Exploration which form the basis for the worked out solutions:

- The adopted Action Plan (dated 27/09/2023, final) from the inception phase provides the framework for various documents that guide and flesh out the research and the development and evaluation of solutions.
- The Guidelines (dated 24/1/2024 version 1.0) set out various principles and specify them in more detail. It also defines a number of commonly used concepts.
- Sustainability ambition document (dated 6/3/2024 version 2.0), which gives effect to the sustainability objectives and in particular the priorities therein.
- Report on 0, including a long list (dated 11-6-2024 version 3.0), in which all the solutions envisaged (also known as a long list of solutions) were assessed and examined. This document contains the result of the first step of the step: sieve 0.
- The Functional Programme of Requirements (FPvE) drawn up during the analysis phase contains a complete set of wishes and requirements that a solution direction must meet to a greater or lesser extent. For the analysis phase and the NKO, we use a set of Topeisen (dated 27-08-2024, version 0.5) from the FPvE, which allows a verification to be carried out that is sufficient for the purposes of the NKO.
- The Building Book (dated 11-07-2024, version 1.0) contains a list of validated building blocks which are input for the development of solution directions. A plan and/or principle cross-section has been drawn up for each building block. The building manual serves as an annex to the draft statement of reasons for the short list of solutions. Input comes inter alia from the Mobility Report (dated 15/04/2024, version 1.0).

In addition, the larger urban planning framework for this study is determined by the 'Development Vision & Development Framework Fellenoord Internationale Knooppunt XL', developed by KCAP, Rebel, APPM, and Goudappel on behalf of the Municipality of Eindhoven and the Province of North Brabant in February 2021.

In addition, the OV-Knooppunt Eindhoven Regional Quality

Framework (dated 18-03-2024, final) was drawn up. This framework guides the integrated coherence, structure and spatial quality of the OV-Knooppunt, and serves as a qualitative assessment framework for the Q team.

In this process, the parties involved (Gemeente Eindhoven, the Province of Noord-Brabant, ProRail, Nederlandse Spoorwegen and Bureau Spoorbouwmeester) worked with a multidisciplinary team of advisors from Movares, KCAP and Team V. During the process, urban planning, mobility, feasibility and technical aspects relating to the development of the MMK and integration with the existing railway station and Cluster 6 were examined in full.

1.3 Level of detail

The development of the resolution directions includes a multi-level spot plan, a set of principle sections, a functional axonometry, explanatory diagrams and 3D impressions. All resolution directions comply with the Memorandum of Principles and, to a greater or lesser extent, with the Topeisen.

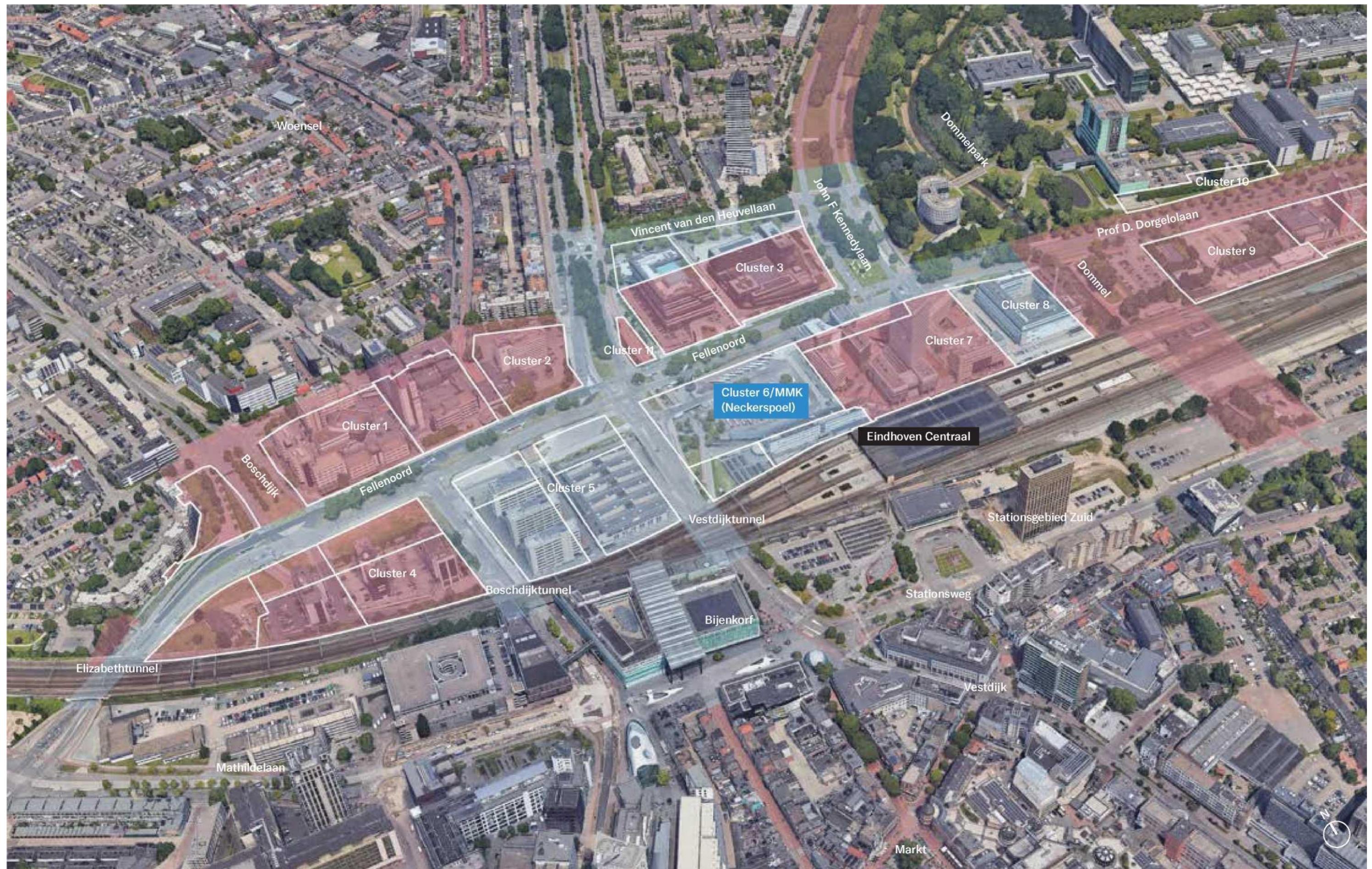
The resolution directions contain the building blocks contained in the Building Book developed in parallel, which is annexed to this document.

The level of detail of the solutions is such that they can be assessed in sieve 1 in order to identify the promising solutions. The assessment and description of the promising solutions is included in the Notion of Probable Solutions (NKO).

1.4 Structure of the judgment

This document is divided into the following sections: It begins in Chapter 2 with an explanation of the building blocks used to form the solutions. Chapter 3 below explains a series of urban planning principles that inform the models and their assessment.

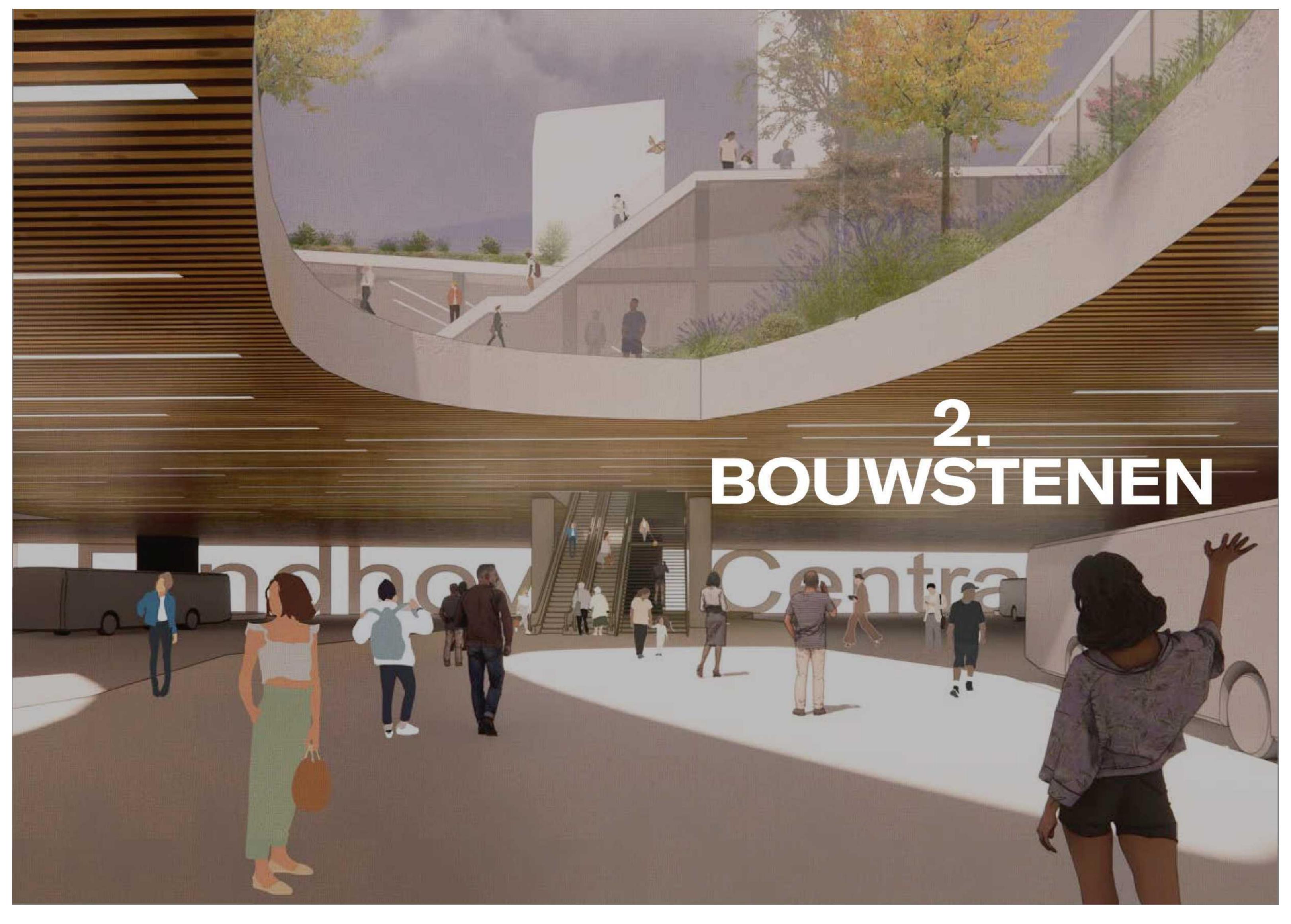
Chapter 4 gives an overview of the solutions that remain in the short list. Chapter 5 then presents and explains the solutions in turn. Chapter 6 deals with the verification of the top requirements, followed by Chapter 7 with a first draft main phase for the construction phase of the solutions. The document ends with a list of design risks per solution direction.



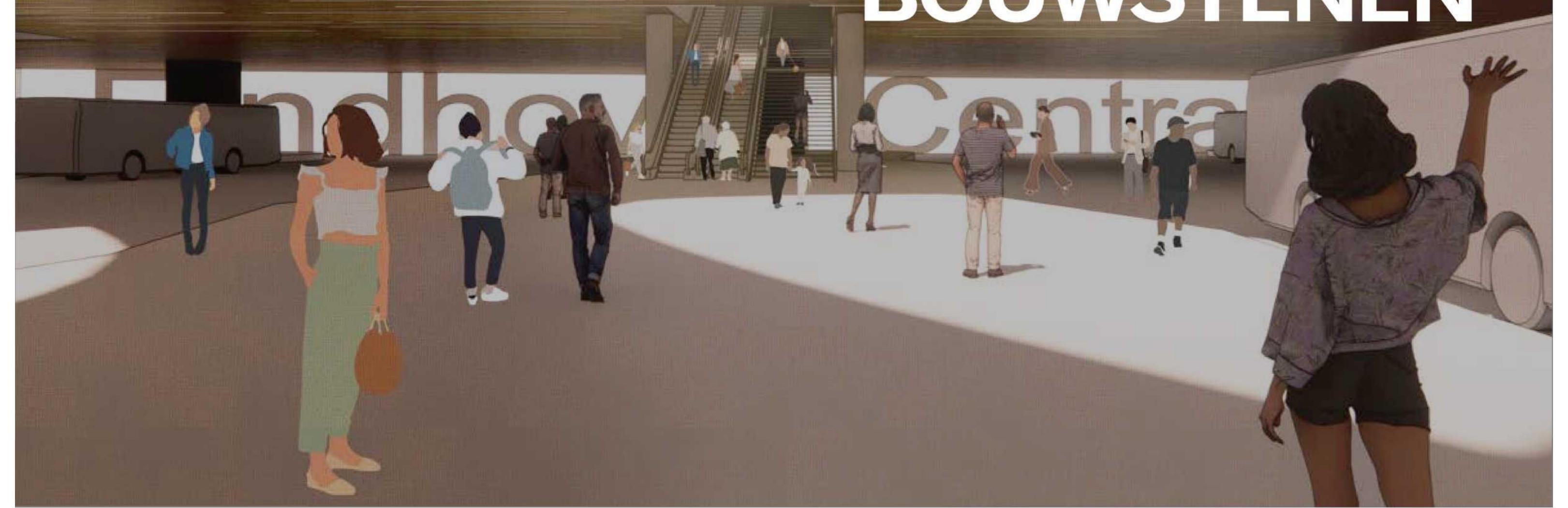
Overview of the development clusters of the Fellenoord area development and the scope area for the MMK

■ Sample area MMK in Fellenoord, Eindhoven

Other development clusters Fellenoord



2. BOUWSTENEN



2. BUILDING BLOCKS

12 MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V 13

Building blocks for the solutions

The Multimodal Knoop is made up of several components, known as building blocks. The resolution directions contain the building blocks contained in the Building Book developed in parallel, which is annexed to this document. The building blocks in accordance with the adopted Plan of Approach are as follows:

- Renewed bus station;
- Busbuffer (inc. office and drivers' room);
- Canal tunnels from Vestdijk, Boschdijk (South), Marshal of Montgomerylaan, Professor Dr. Dorgelolaan and optional Elisabeth Tunnel;
- Bicycle parking;
- K & R and taxi facilities, (loading and parking) facilities in favour of shared mobility;
- New Nordic station (receiving area and transfer room – train and bus, whether combined or not), including connection to public space;
- Future Station Commercial Needs;
- Logistical facilities for station and station facilities;
- Structural facilities at the bus station for above-ground real estate (to be taken after sieve 1);
- Location for international buses;
- Location for train replacement transport;
- Provisions for transfer between all the above provisions;
- Future development of the interdistrict connection via the Vestdijk (to be taken after sieve 1).

Large (construction) stones

Some building blocks require a lot of space and are therefore decisive for the solution directions, these building blocks are referred to as the major building blocks. The main building blocks are the bus station, bus buffer, bicycle parking and station hall. The commercial and information point building blocks are part of the station hall. The large building blocks may differ in shape and dimensions depending on the design chosen for the building block. These are therefore described in the next chapter, specifically for each model.

Other building blocks

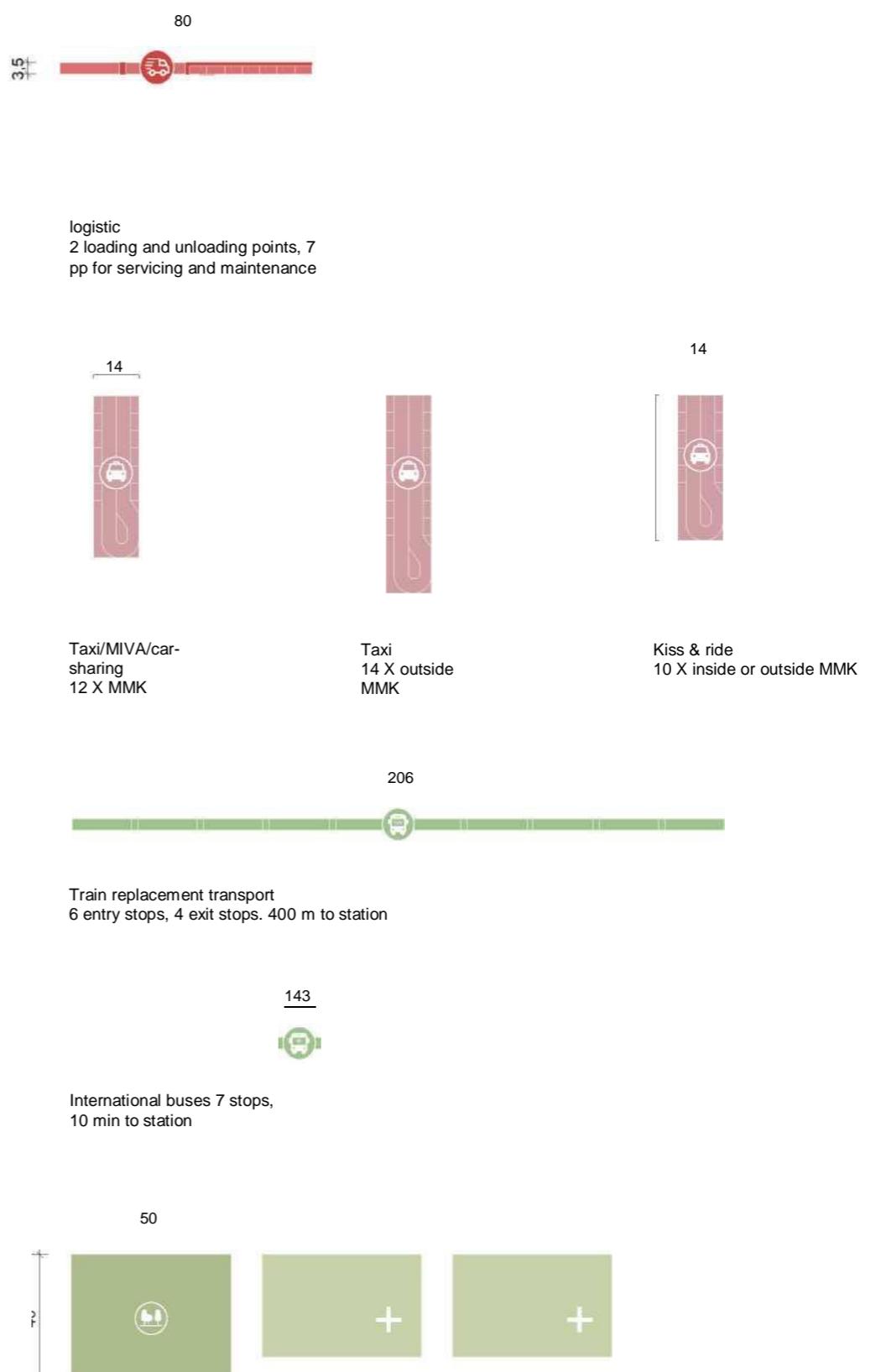
The next page gives an overview of the possible shapes and dimensions of the other (smaller) building blocks. The building blocks included in the short list are presented below in a legend applicable to the pictures in the resolution directions. Disclaimer: not all building blocks, especially the smaller ones, have been developed yet, e.g. energy storage, water supply, toilets, cables and pipes. These will be addressed in the follow-up phase.

Major building blocks

- | | |
|--|--|
| | Bus station + Bus tunnels and tours to the bus station |
| | Business buffer including office and drivers' area |
| | Bicycle parking (light orange is possible extension) |
| | Station hall: transfer room/Reception area |
| | Commercial (part of station hall) |
| | Information point (part of station hall) |

Other building blocks

- | | |
|--|---------------------------------------|
| | Logistics room |
| | K + R, taxi and shared transport |
| | Train replacement + International bus |



Green (MMK provides space for green in the subsoil)
2 400 m² compensation existing green
+ 1 X 1 600 m² minimum ambition (-10 % existing paving)
+ 2 X 1 600 m² maximum ambition (-20 % existing paving)
Ambition is 1 500 mm. Minimum is 500 mm for green



3. RUIMTELIJKE KADERS

3. SPATIAL FRAMEWORKS

16 MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V 17

Principles for the resolution of problems

The Fellenoord Development Vision, together with the MMK Assessment Framework and the Eindhoven Urban Quality Framework, form important starting points for the urban planning of Cluster 6 and the MMK. This chapter summarises the principles underlying these documents. These provide input for the resolution directions and their assessment.

Development Vision Fellenoord

The Fellenoord Development Vision sets out 5 main principles for the development of the Fellenoord district and the North station area, including the MMK. These principles are as follows:

1. A district for all:
Fellenoord is changing from an area where you work to an area you like. A place where it is beautiful for everyone. The focus is on meeting people. With, for example, room for manoeuvre for children, healthcare and education. But also sufficient and accessible accommodation for all target groups. And shops where you can make everyday shopping or eat a snack. This can be achieved if everyone who wants to do so can also participate and participate. Only then will it really become a neighbourhood for everyone.
2. Maximum green:
Trees, small patches, green facades, green roofs and more space for nature development near the Dommel. Fellenoord becomes a green oasis in the heart of the city.
3. A Stadsboulevard:
Today, Fellenoord is a zone through which to pass quickly. It will soon be a place to walk, accompany and stay. A vibrant area where everything can be seen and experienced, cars still drive, but less than today.
4. The connected city:
Rail and Fellenoord themselves are major barriers. There will be more connections and existing ones will be improved. From Fellenoord, you easily move yourself towards other fun places, such as the centre, the Kruisstraat/Woenselse Markt area or the Dommel.
5. Towards a multimodal node:
Fellenoord is fully prepared for the future. A future characterised, among other things, by more transport movements with good and

sustainable (public) transport, shared mobility and smart systems to make the transition as pleasant as possible. An underground bus station is the starting point.

The development of Fellenoord, including the MMK and Cluster 6, will play an important role in Eindhoven's metropolitan green structure. The Fellenoord as a green urban boulevard, together with the planned rail-side roof park, will form a green connection between the Anthony of Leeuwenhoeklaanpark, the Wielewaal on the west side and the Dommel valley on the east side.

The new North Station Square helps to bridge these two ecological lines. Therefore, the design of this public space should emphasise its lush, green character. The size and scale of the square should also be of a certain size to ensure a green character and quality of stay. At the same time, the square and connecting routes must be primarily for the pedestrian, motorised traffic is banned and there is an optimal wayfinding to the (bus) station.

As the open space is limited, the buildings around the square are given accessible green terraces and roofs, with recreational functions, water collection and ecological purposes. In addition, the roof of the northern station hall should be accessible and integrate the roof park, so that it acts as the landing point of this raised green line.

The connection to the Eindhoven TU on the east side via the diagonal is an important route to which the MMK has to connect. On the west side, the route to Cluster 5 will become very important in the future to connect the different clusters through a dwindling environment.

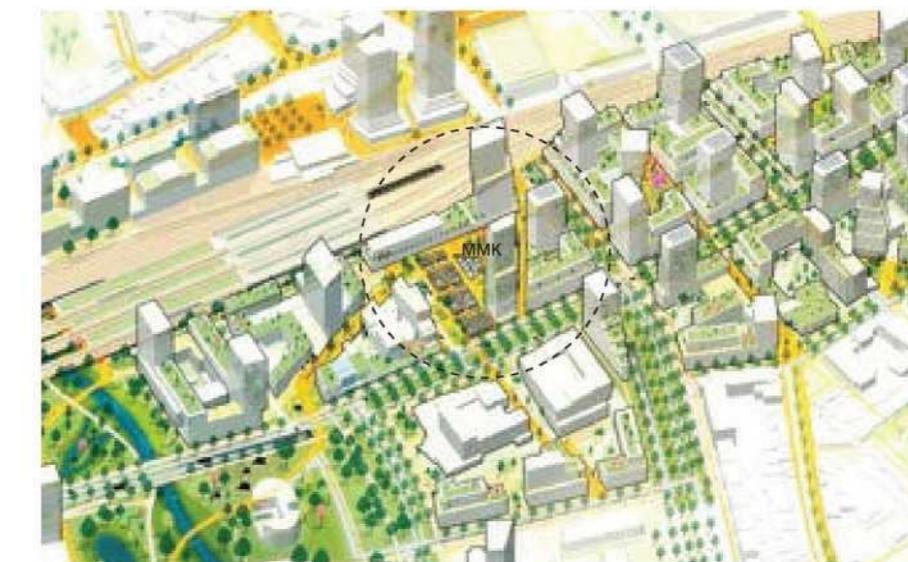
The Fellenoord will become an important green link in the future as an urban boulevard with four tree rows and a wadizone and wide cycle paths and pedestrian paths. The buildings are very close to the Fellenoord, and it is important that the station is also clearly visible from the Fellenoord.



Major loops projected on the Fellenoord planning map



Translation of the Development Vision Fellenoord:
the important loops and green structures with MMK's position as a central hub in Eindhoven's network



Picture from the Development Vision Fellenoord with the Multimodal Knooppunt at the centre

Main objectives Assessment framework MMK

The objectives of the MMK Assessment Framework are to ensure that the MMK and Cluster 6 are transformed into a high-quality node that is attractive and alluring, socially and economically thriving and well integrated in the wider context of the city, in strong coherence with the area development of Fellenoord. Emphasis is placed on the qualities of public space and the potential for real estate development.

The objectives of the Action Plan and the Assessment Framework are set out below. These will guide the development of the solutions.

1. Expanding MMK's capacity

- accommodating the envisaged growth in the number of travellers, in order to keep the region well connected, at a time when large-scale urbanisation is taking place;
- resolving the current capacity and safety bottleneck at Neckert Bus Station, enabling the growth and healthy operation of the bus network;
- provide sufficient and good quality parking space for bicycles;
- proper integration of the other functions of the knot, such as taxi, K & R, shared mobility, logistics and commercialisation;
- provide sufficient transfer capacity to facilitate all walking flows.

Creation of a high quality node

- achieving a reliable functioning public transport node;
- to achieve an image appropriate to the international character and as a gateway for the Brainport, including through a high-performance station building;
- creation of an OV button which eagles and functions as a unit in which all functions have a logical place;
- provide a simple findable and high-quality switch between the different modes of train, bus, (partial) car, (partial) bicycle, etc.;
- creating attractive and socially safe accommodation, waiting and walking areas for (transferring) travellers;
- improve the spatial quality of the bud, inter alia by respecting and, where possible, strengthening the cultural heritage of the 'new' and by continuing the design values of the existing national monument to the same level of quality.

Improve coherence with other spatial developments and challenges in the city:

- improving the connection to the existing city and the development of the area, inter alia by improving the routes for pedestrians and cyclists (clear, safe and attractive) and a good connection for the bus from the DevelopelazZuidwest;
- achieving a good balance between the physical and operational space of the railway on the one hand and the planned urbanisation on the other;
- providing space for real estate development in the targeted locations;
- improve the spatial quality of the area on the northern side of the public transport node, through a well-recognisable and high-quality station building and public space.

Contributing to the sustainability objectives:

- achieving an appropriate contribution to sustainability objectives
- focal points:
 - materials
 - Water
 - energy
 - well-being and health:Dutch: welzijn en gezondheid

Framework Spatial Quality OV-Knoop Eindhoven

The Eindhoven Urban Quality Framework (KRK) provides input for the urban development of the OV node, which has a strong link with the area development of Cluster 6. The statements and principles of the CRC are set out below.

1. Eindhoven identity

Cluster 6 offers plenty of space and potential to become a vibrant city district in the heart of both the city and Brainport. Due to the central point in an innovation ecosystem of campuses and innovative activity, Eindhoven's station area can become its business card in which Eindhoven's DNA is expressed in different ways. The ambition is to translate the various local and regional qualities into unique living, working and living environments that balance commercial and social programmes.

Main header:

Developing an integral node with Eindhoven DNA forming the programme

Assumption: Beating heart of the city

A lively place in the city, active 24/7, offering places for different audiences, functions and events.

Assessment criteria:

- Providing space for diverse local, regional and international audiences
- Provide space for special (top) facilities where technology, design and knowledge merge
- The cluster has the character of a fully-fledged city centre, designed with the human dimension

Assumption: Eindhovense identity with international allure

The station area has a sustainable, innovative and high-quality image that fits the unique characteristics of the site.

Assessment criteria:

- Architecture is in line with the (TDK) character and (cultural historical) values
- Building gets architectural quality in sustainable materialisation and granularity
- Exploit unique OV knob profile (relative to surrounding neighbourhoods)

Assumption: Connection between human beings and technology

The station area is the place where companies, students and residents can meet and learn from each other.

Assessment criteria:

- The (plint) programme is blended and invites interaction
- Address different target groups with social and commercial (TDK) functions

2. Optimum performance of OV-Knoop

For a public transport node that connects current and future local, regional and (inter) national networks, the functionality of the node plays a crucial role. In practical terms, this means that Cluster 6 should optimise the construction of a public transport terminal for various modes and associated networks. With the realisation of this user efficient, multimodal OV-Knoop, the mobility transition from car to public transport is being directly addressed, and cycling and walking are primary carriers. In addition to attractive and inclusive switching possibilities, passenger comfort and safety obviously also play an important role.

Main header:

Developing an optimal connection between the modalities, and between the multimodal public transport node and the urban fabric

Assumption: Pedestrian is central: passengers can switch between the different modes in a safe way.

Assessment criteria:

- Pedestrian main role; (motorised) traffic is banned
- Optimal design for wayfinding (also in conjunction with stacked programme)
- Travellers are minimally hampered by logistical flows

Assumption: High quality, safe and comfortable OV knob for all: a user-friendly and enjoyable place to come, stay and return.

Assessment criteria:

- Accessible and user-friendly for people with disabilities
- Ease of navigation OV button of course

Assumption: Welcoming and socially safe area of residence, both underground and above ground

Assumption: Space for tomorrow's travellers: a robust design that accommodates evolving traveller needs.

Assessment criteria:

- Adaptive design for the development of travel behaviour
- Anticipating long-term projections
- Flexibility to implement shared mobility

Assumption: Optimal articulation of modalities: switching shall be made as safe, efficient and comfortable as possible for passengers. Assessment criteria:

- Flexibility in the design of travel behaviour developments
- Optimal connection (distance, wayfinding and comfort) between different modes
- Lively residence gaps along the route between different modalities

Assumption: Station building marker: the station building is easily findable and marks the entrance to the public transport node.

Assessment criteria:

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 19

- Station building fits well with existing passage and station hall south
- Eindhovense identity is expressed by design
- Recognisability and visibility of public transport buttons, including in relation to other functions

3. Quality and connectivity in public spaces

Cluster 6 plays a fundamental role for the local, regional, (inter) national node, within the overall development of the Fellenoord area, and as the beating heart of the Brainport. The public space of Cluster 6 connects the node functions and connects to the urban fabric. In addition to the optimal integration of hub functions, the aim is to create an attractive residence environment for future residents, workers, travellers and visitors. Sustainability and circularity are important themes that feed into the design of these high-quality living and meeting places.

Main header:

Designing a future-proof node with international quality of life of all and of high quality, connected to the urban fabric

Baseline: Strengthening green structures and natural systems: connect to natural (green and water) systems while respecting the site

Assessment criteria:

- Connecting and enriching green structure
- Use of (ground) water structures
- Water and soil management programme

Assumption: Attractive area of residence: high quality residence and meeting place, with publicly accessible functions and where traffic is slowly prioritised

Assessment criteria:

- Inviting for accommodation and meeting, all days 24/7 of the year
- Designing traffic space as compact as possible for quality of stay
- Fit Sun-spot, minimise wind nuisance and high quality green conditions

Assumption: Resilient and sustainable: design of public space is rich in high-quality green and is in line with metropolitan green structure

Assessment criteria:

- Fit high quality green, based on sustainable planting plan
- Flexibility for climate change (temperature increases, etc.)
- Realising palpable green

Assumption: International allure: international outreach through high quality materialisation and unambiguous image quality

Assessment criteria:

- International projection appropriate to the Brainport
- Sufficient space for (inter) national passenger flows

4. Building quality

As a business card of the Brainport and an international entrance to the city, the achievement of high-quality buildings plays a fundamental role. The high quality concerns both the exterior and the interior, and both above and below ground. This means that the designs of the high-quality public transport functions and associated facilities are designed in conjunction with the mixed housing and work programme, as well as with the public space. In this way, the public transport button will be given an image that matches (inter) national ambitions, while at the same time offering pleasant accommodation and optimum functionality for users.

Main header:

Design of high quality buildings (exterior and interior, above and below ground) with unique programme mix adapted to the urban fabric

Baseline: Smart compaction: the large programme and diverse functions call for innovative integration solutions Assessment criteria:

- Programme mix appropriate to high-urban public transport knots
- The design offers scope for the future through smart functional stacking, double use and classification flexibility

Assumption: Synergies between public space, station and real estate: coherent and diverse programme (for different target groups) contributes to liveliness in public space Assessment criteria:

- Programme, public space and knobs (facilities) reinforce each other
- Double-high space plinths shall be as transparent as possible and shall seamlessly connect to the public space
- Users' perspective is central

Baseline: Connecting to urban network: construction and public space act as a prominent link within the urban fabric, connecting to networks of (slow) traffic and ecological structures

Assessment criteria:

- Logical connection between public transport node and surrounding structures
- Strengthen urban, historical and natural structures as much as possible
- Optimal connection of public space to its immediate surroundings

Hot > l < ie > pgaizeit

Wentite ^ WN Eindhoven

Beating dietad cabin

Eëidtawrn < e idenriwt ^ ei iwtémilionare ■ Hui

Connection tuiw-n < NRM and tectwirék

£fU ÜOrital

OTF knots for everyone

Space for da nizigerivn Morgan

Oppl'rmlie nnn > Fa'ting of niodil ■ teilen

Mirh > rat TI * d ^ n * j > eb "WW

I s lerkeei ^ !iitRL > r1d and

on IUEinitiiliik * akstMiwi

Attractive area of discomfort

^ crystalline and duu-mam

LME < iutioii-id * Jlura

5ftn MKilKhie"

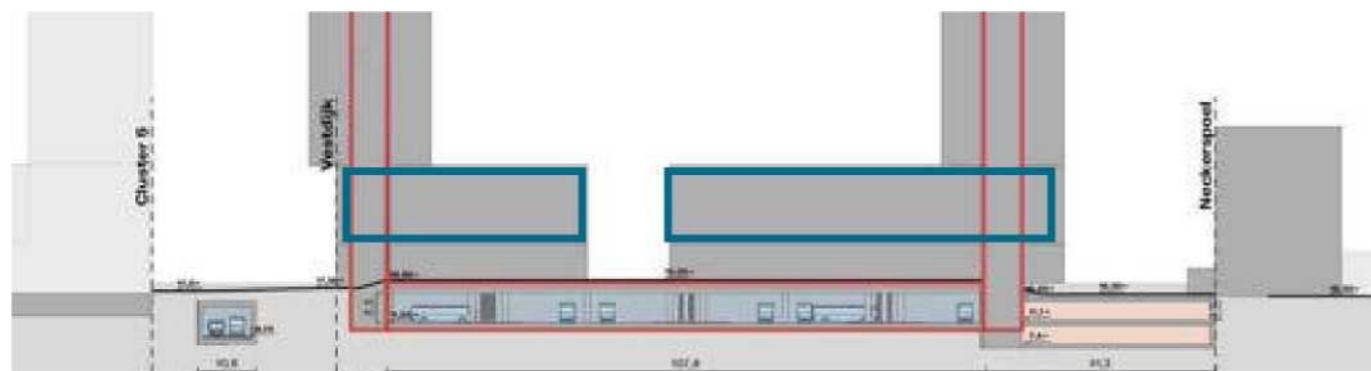
Synergy tuiwn or ^ NBU * niim', etnlion and T > Igori

AamhiPten pp ileelijk iw-twerk

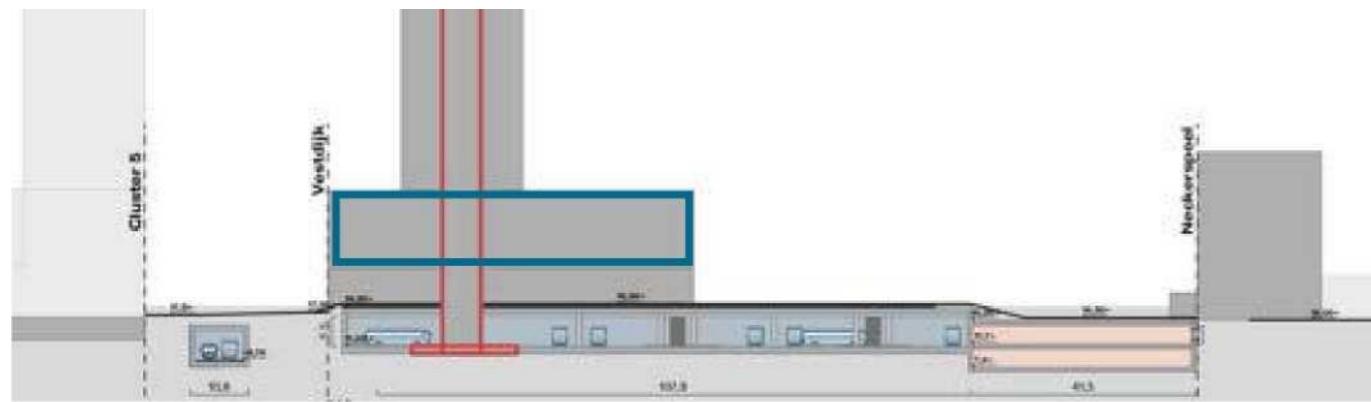
Karakter van vervoerend stationscentrum
Unieke profiel OV knoppen beschutten
Gemist (plint)programma
Geperceerde verbeter werkt gevonden
Verschillende navigatiemogelijkheden
Inspecties op progressieve lange termijn
Flexibiliteit schakelen
Herkomstgebied en achtertuin gebied
Vertigijn en achtertoegang 24/7
Betonbare groene realisaties
Internationale uitstraling, past bij Brainport
Bewerken (grond)unterstrukturen
Programma past bij hoogwaardige OV-knooppunt
Perspectief gebruiken stadscentraal
Betonbare structuren verstevigen

Kwidicit building

Summary of the framework for spatial quality of public transport knots in Eindhoven



Real estate option section with cores next to the bus station



Real estate option cross-section with cores through the bus station

Cluster 6 Property Declaration

As a result of the development of the Fellenoord area, there is a requirement of 85.000 m² of BVO for cluster 6 buildings. Of this, approximately 60.000 m² is intended for residential buildings and 12.500 m² for works and 12.500 m² for equipment. The property declaration does not fall within the scope of the MMK MIRT survey, but the study examines how property can be made possible (indicatively) on the MMK, so that in the parallel track for Cluster 6 it can be signed and counted towards the declaration. The effects in the Short List are therefore intended as an indicative representation of real estate options, but are not exhaustive. In the follow-up section, in cooperation with the Cluster 6 report, the optimal above-ground property performance is examined, as appropriate to the report for the MMK.

In general, there are three principles used in the Short List to construct real estate at the MMK. Real estate can be built

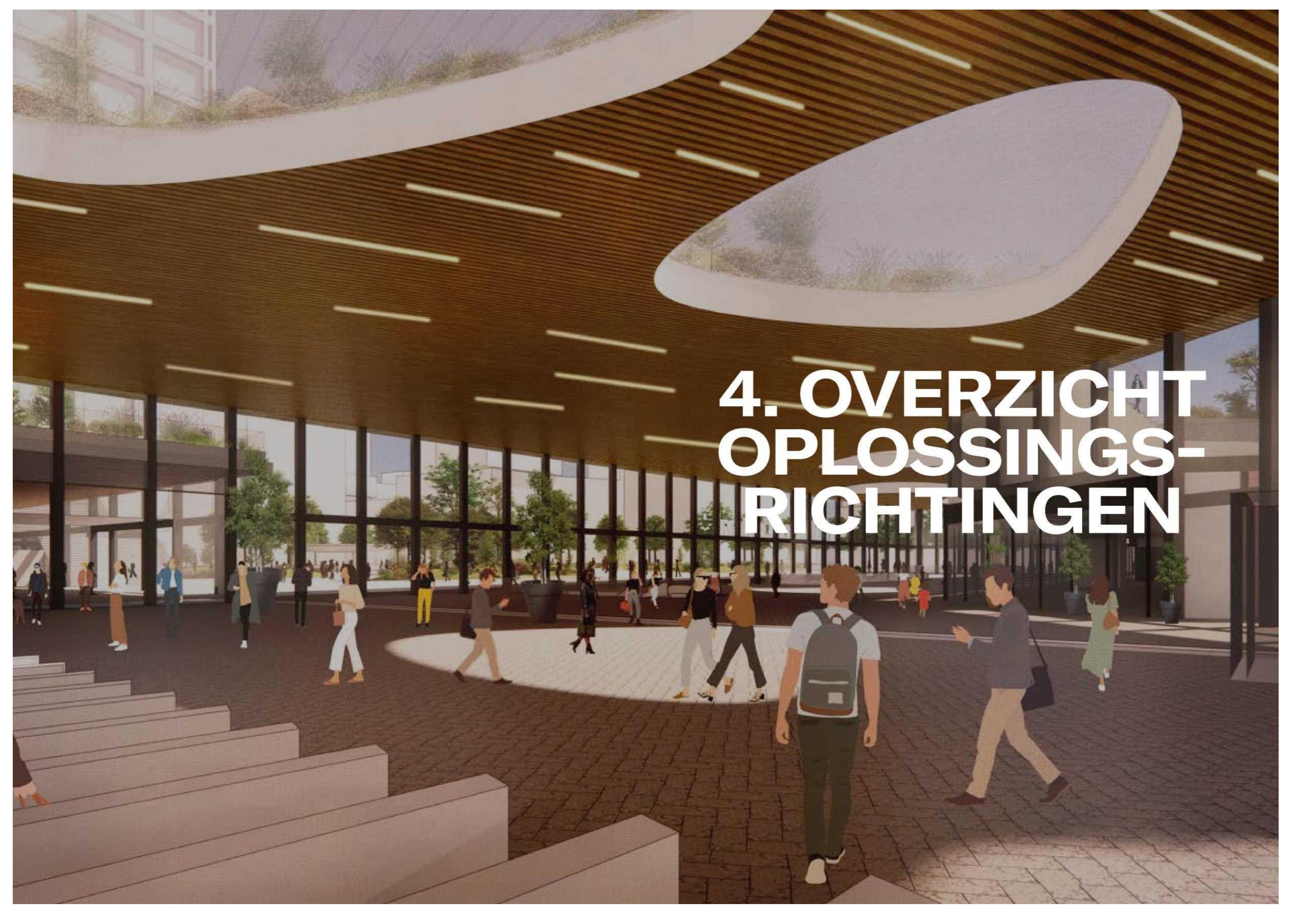
1. at bus station
 2. in a bicycle parking area
 3. in the open ground, whether or not partly on one of the building blocks.

Above are two options for real estate, one with real estate cores next to the bus station (in the open ground or on a bicycle park), the other with real estate cores through the bus station. In addition, the horizontal forces must be absorbed by a transitional structure in the shelf of the property and a façade structure may have to be incorporated into the façade of the property depending on its height.

Peak heights MMK

The figure above shows the current level of the MMK and some locations around it. Altitudes range from the entrance station at + 16 NAP, the station station station at + 15.2, the Kennedy Business Center at + 16.5, the lowest point of the current bus station at + 14.5 and the Fellenndo from + 16.5 east to + 18.5 west. The forklift tunnel connects to + 14.4 for the car and to approximately + 15.3 for the pedestrian interdistrict. The area within cluster 6 varies in altitude between + 16 (south-east side) and + 18 NAP (north-west side).

It is important to use these altitude indicators as a guide when developing the solutions in order to achieve the right transitions and connections.



4. OVERZICHT OPLOSSINGS- RICHTINGEN

4. OVERVIEW OF SOLUTIONS FAMILIES

24

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 25

Families of solutions

On the right, you can see an overview of all the solutions developed in the pre-exploration phases by previous consortia and in the MIRT exploration by the KCAP + Team V + Movares consortium. This total of 17 resolution directions is the long list of resolution directions. Report No 0 (dated 11/6/2024 version 3.0) describes how the long list was assessed in order to arrive at the short list of 5 solutions. These 5 solutions are further developed in the next chapter. These are the following models:

- Model 0 + (Half underground bus station)
- Model 1 (Underground bus station with extended station hall)
- Model 2 (Underground bus station with angle station)
- Model 11 (Bus building underground and above ground)
- Model 15 (underground bus station under Fellenoord)

Major building blocks	
	Bus station + Bus tunnels and tours to the bus station
	Business buffer including office and drivers' area
	Bicycle parking (light orange is possible extension)
	Station hall: transfer room/Reception area
	Commercial (part of station hall)
	Information point (part of station hall)

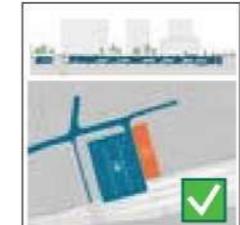
Other building blocks	
	Logistics room
	K + R, taxi and shared transport
	Train replacement + International bus

above ground/on mowing ground



MODEL 0 ABOVE GROUND

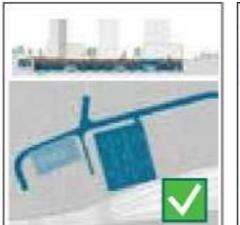
underground



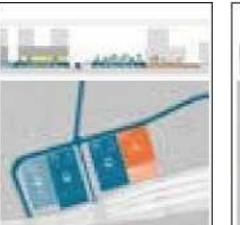
MODEL 0 + HALFVERDIEPT UNDERGROUND



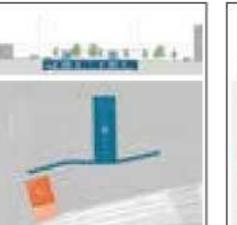
MODEL 1 PARALLEL UNDERGROUND



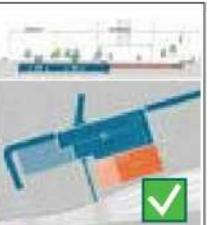
MODEL 2 UNDERGROUND SQUARE



MODEL 10 UNDERGROUND HALFVERDIEPT SPLIT

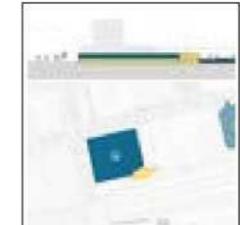


MODEL 12 KENNEDYLAAN UNDERGROUND



MODEL 15 FELLENOORD UNDERGROUND

lifted

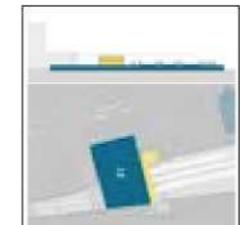


MODEL 3 UPDATED NECKERSPOEL

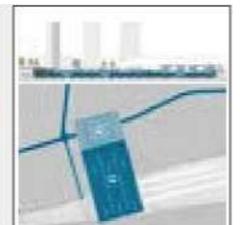


MODEL 7 RAISED TRACKSIDE

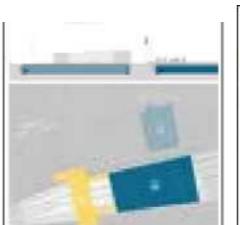
above or below the tracks



MODEL 4 UNDER THE TRACKS 1 LAYER



MODEL 5 UNDER THE TRACKS 1 LAYER



MODEL 6 UNDER THE TRACKS 1 LAYER



MODEL 8 ABOVE THE TRACKS ABOVE THE PASSAGE



MODEL 9 ABOVE TRACKS ABOVE PLATFORMS

stacked/multilayer



MODEL 11 MULTI-LAYER



MODEL 13 MULTI-LAYER KENNEDYLAAN



MODEL 14 MULTI-LAYER KPN-LOCATION

4. OVERVIEW OF SOLUTIONS²

DRAFT SHORT LIST DESCRIPTION

Model 0 + (Half underground bus station)

General description of the direction of solution This model includes a semi-underground fully covered bus station (level -1/2) on Necker coil, partly below the Fellenoord, less deep than models 1 and 2. The bus platforms are perpendicular to the track with a level difference of 3 metres towards the station pitch. Passengers can move up at either end of the platforms to the station hall (south side) or the Fellenoord (north side). Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The bike park is located underground next to the bus station (east side). The station hall is located partly above the bus station and partly above the bicycle hall. In addition to the bus station, functions such as an elevated station pitch and real estate (with cores next to the bus station) can be implemented. The bus station and bicycle park cover almost the entire cluster 6. The trackside roof park route ends in a solar meadow on the roof of the station hall, accessed via a staircase to the station square.

Planning map



Ground Floor



Underground level (-1)



Model 1 (Underground bus station with extended station hall)

General description of the solution direction This model includes a fully underground bus station (level -1) on Necker coil, partly below the Fellenoord, 2.5 m deeper than model 0 +, so that the transfer domain is level floors. Bus platforms are diametrically opposed to the track. Passengers can move up at either end of the platforms to the station hall (south side) or the Fellenoord (north side). Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The bike park is located underground next to the bus station (east side). The station hall is located partly above the bus station and partly above the bicycle hall. In addition to the bus station, functions such as a green station square and real estate (with cores next to the bus station) can be implemented. The bus station and bicycle park cover almost the entire cluster 6. The trackside roof park route ends in a solar meadow on the roof of the station hall, accessed via a staircase to the station square.

Model 2 (Underground bus station with angle station)

General description of the solution direction This model includes a fully underground bus station (level -1) on Necker coil, partly below the Fellenoord, 2.5 m deeper than model 0 +, so that the transfer domain is level floors. Bus platforms are diametrically opposed to the track. Passengers can move up at either end of the platforms to the station hall (south side) or the Fellenoord (north side). Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The bike park is located underground next to the bus station (east side). The station hall is located partly above the bus station and partly above the bicycle hall. In addition to the bus station, functions such as a green station square and real estate (with cores next to the bus station) can be implemented. The bus station and bicycle park cover almost the entire cluster 6. The trackside roof park route ends in a solar meadow on the roof of the station hall, accessed via a staircase to the station square.



Model 11 (Bus building underground and above ground)

This model includes a multi-layer bus station on Necker coil, spread over a three-storey building, with the bus platforms on level -1 and +1 and between them the transfer domain. At the top of the bus station is a large roof park. Bus platforms are transverse to the track, and passengers can drop or rise to the station hall at either end. Buses pass through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The main entrances to the bus station are located under a large station hole connected to the station hall. Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The bicycle parking area, next to the bus station, is underground (level -1) under the station square, with room for expansion. The station hall is located on the ground floor (level 0) between the two levels of the bus station. There is space for real estate on the bicycle park and at the bus station. The trackside roof park route ends in the park on the roof of the bus station, accessed via a staircase to the station square.

General description of the solution direction This model is because an underground, long stretched bus station (level -1) partly north of Necker coil and largely below Fellenoord. The bus station overlaps with the bus tunnel under the Fellenoord. Bus platforms extend to John F. Kennedylaan. The main entrances to the bus station are located under a large station hole connected to the station hall. Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The bicycle parking area, next to the bus station, is underground (level -1) under the station square, with room for expansion. The station hall is located on the ground floor (level 0) between the two levels of the bus station. There is space for real estate on the bicycle park and partly in the open field. The bus station will be equipped with a station square which, in this model, will form part of the public space framework. The track side roof park route can be accessed via a staircase towards the station square.



4. OVERVIEW OF SOLUTIONS

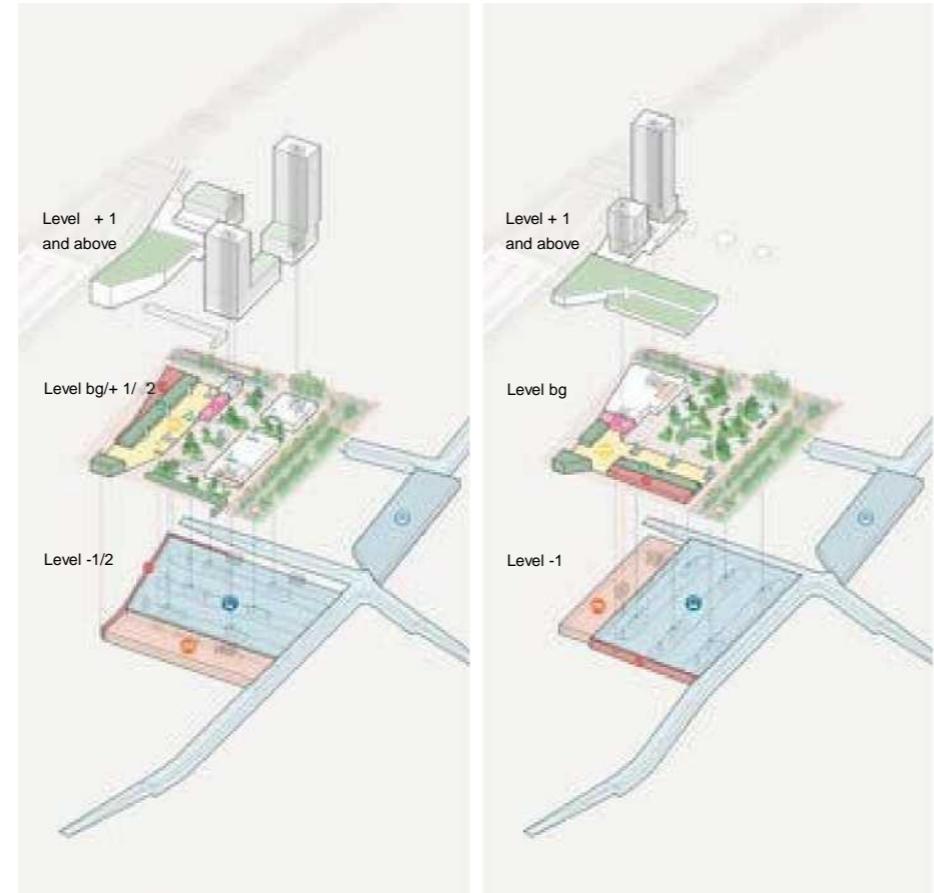
DIFFERENCES FROM THE LONG LIST

Differences from the long list The solutions on the short list have been further elaborated. On the right hand side is a global overview of the main differences that have arisen during the design process from the long list. These changes are explained in more detail by solution direction in the next section 5.

Model 0 + (Half underground bus station)

Differences from the Long List

- MMK now remains outside the SKE contour (as we know)
 - Bus station is 1.8 m deeper than before (floor level 11.2 NAP instead of 13.0 NAP); floor top 18.5 NAP (0.5 m deep).
 - Bus station continues below the Fellenoord, mowing field approximately 19.0 NAP (30 cm deeper) with 50 cm ground cover.
 - Northern carriageway is now integrated with bus station;
 - Busbuffer position now identical to model 2 (instead of Kennedylaan) and fully integrated with tunnel and lying under the Fellenoord thv cluster 5;
 - Billing platforms now have 30 + 4 stops instead of 30 + 6;
 - Logistics via -1 bus station, instead via the east side.
 - Transitional construction is also needed in this model to distribute horizontal forces, but this can only be done in the plint v/d buildings here;
 - In a strip of 7 m to the west and east of the bus station, buildings with cores can be built, whether or not in the bicycle park.
- Previously, this was also possible on the northern side along Fellenoord.



Template 1 (Underground bus station with extended station hall)

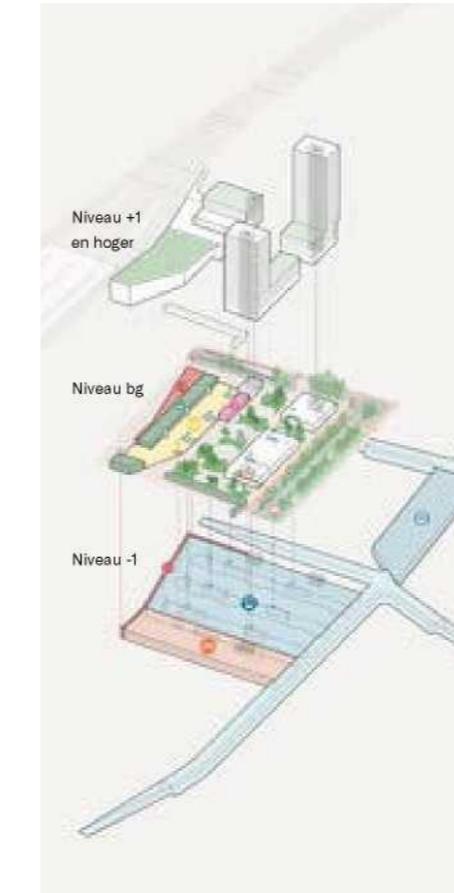
Differences from the Long List

- SKE: Bicycle parking has shifted, mostly from the SKE contour (small interface in the discharge angle)
- Bus station is 2.2 m higher than before (floor level 8.7 NAP instead of 6.5 NAP);
- Busbuffer position now the same as model 2 (instead immediately next to it under Fellenoord) and fully integrated with tunnel and lying under Fellenoord thv cluster 5;
- Bus platforms now 30 + 4 stops instead of 30 + 6;
- Northern and (partly) Western Tunnel part of bus station construction;
- Logistics via -1 bus station
- The position of the bust tunnel is more southern than in model 2: more space for full green in the frame
- Station hall now built against KBC including commercialisation and logistics/warehouse
- Route from TUE to city centre now passes through the station hall
- Other bus station connections now in public space
- Real estate now only on bicycle parking, independent of bus station.
- Property focal point within the 30 m contour of the track.

Model 2 (Underground bus station with angle station)

Differences from the Long List

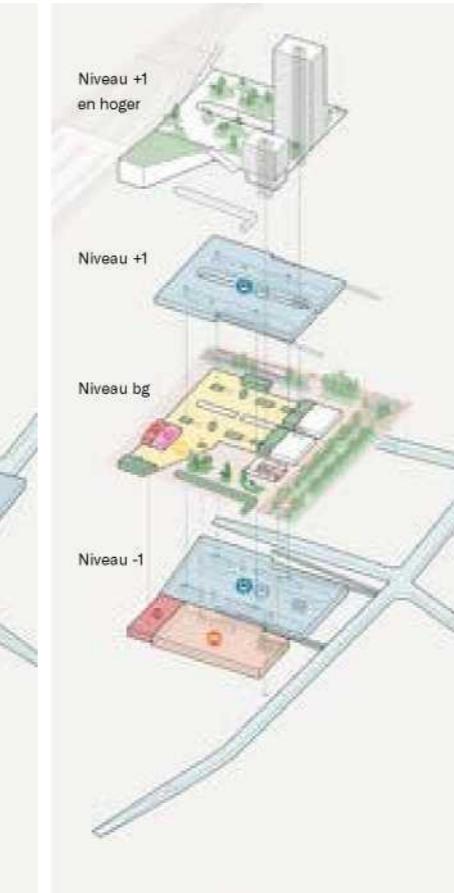
- MMK remains outside the SKE contour
- Bus station is 2.1 m higher (floor level 8.7 NAP instead of 6.6 NAP);
- Transitional structure no longer covering the entire width of a bus station, only on site;
- Real estate with cores next to the bus station instead of the bus station.
- Bicycle parking no longer in the changeover structure but next to the bus station;
- Northern carriageway now integrated with bus station;
- Busbuffer fully integrated with tunnel and lying under the Fellenoord, no longer interface with cluster 5;
- Bus platforms 30 + 4 stops instead of 30 + 6;
- Logistics via -1 bus station
- Two-tier bicycle parking as low as 1, but with shorter transfer times.
- Station hall now more prominent at the station square, real estate only integrated at the extreme west (public programme at the station hall only)
- MIVA, Taxi and K & R now in Fellenoord, rather than on top of the bus station
- Taxi booster stations now behind KPN rather than at the top of the bus station.



Model 11 (Bus building underground and above ground)

Differences from the Long List

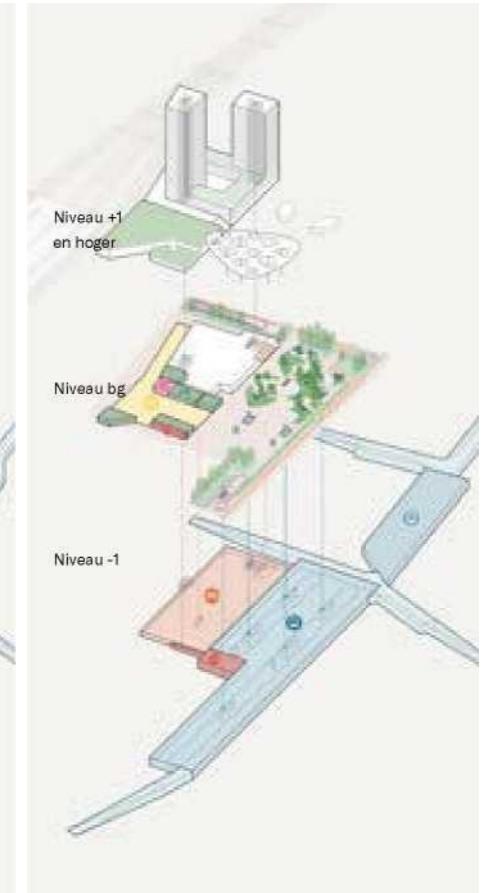
- Bus station now has sandwich model with transfer domain between bus floors in;
- Bus station is 4.5 m lower than before (floor level 8.5 NAP instead of 13.0 NAP);
- Now with bus tunnels in the frame instead of mowing field bus lanes: window level to be raised to 19.0 to 19.8 (or sacks to 15.2 level transfer hall)
- Real estate now also at bus station, located on green station roof park
- Billing platforms now have 32 flexible entry and exit stops, and to change/extend flexibly from -1 to 34 stops.
- Business buffer now fully integrated; Vide added for daylight entry in the receiving domain;
- Logistics via -1 bus station
- Bicycle parking now under station squares and partly under real estate;
- Hillsides now on the outside: active plinths focal point (only partially possible)
- On the station floor side, it is possible to zoom off commercially.



Model 15 (Underground bus station under Fellenoord)

Differences from the Long List

- The model remains even further outside SKE and more real estate is therefore possible in the open field.
- Bus station is now further east with a connection to TU Eindhoven, as deep as model 2 (floor level 8.7 NAP);
- Openings in profile Fellenoord (knep necessary)
- Bus station main connections positions now under awnings, disconnected from station hall
- Bus platforms now have 32 stops (of which 4 exit), but flexibly change/extend to 34 stops.
- Lane integrated into bus station
- Busbuffer under Fellenoord;
- Logistics via -1 bus station
- Bicycle parking 1 low, partially under real estate and partly under station hall;
- Real estate can now be developed partly in the open ground and partly on top of the bicycle parking area;
- The route from TUE to inner city and cluster 5 passes through the station hall, along the track and through the station square.
- Property focal point within the 30 m contour of the track.



4. OVERVIEW OF SOLUTIONS DISTINCTIVE ELEMENTS

Distinctive elements Right is a global overview of the main distinctive elements between the designs on the short list.

Model 0 +

Underground bus station (level -1/2) at Necker coil

Distinctive elements

- Angle positioning of bus platforms in relation to train inspire; as a result, station hall parallel to rail.
- Higher location of bus station;
- Increased height differences in mowing field station Square
- Higher location of bus station less land cover possible, including less fully-fledged green and water buffering capacity;
- Also higher location Fellenoord, with little ground cover – cables and pipes and fully-fledged green poorly adaptable;
- Altitude difference of approximately 3 m at the station hall between transfer train and bus, resulting in slightly longer transfer time;
- Bicycle parking over 2 layers, positioned perpendicular to the track with access from the Fellenoord;
- Real estate (public or private) possibly with cores next to the bus station at Fellenoord.
- Public property possible at the station hall with access to the Vestdijk Tunnel.
- Station floor interior, with a smaller address at Fellenoord.

Template 1

Underground bus station (level -1) at Necker coil (parallel)

Distinctive elements

- Billing platforms with parallel orientation: station hall in line with the station station station.
- The position of the bust tunnel is more southern than in model 2: more space for full green in the frame
- Bicycle parking over 2 layers, positioned parallel to the track with access from the Vestdijk Tunnel;
- The diagonal to the TU is crossed by the receiving domain. Alternatively, a hatch on the side of the diagonal may be used;
- Property (public or private) possibly on the bicycle park;
- Real estate trackside only;
- Stationspark (Station Square) located at the Fellenoord and Vestdijk Tunnel.

Model 2

Underground bus station (level -1) on Necker coil (square)

Distinctive elements

- Angle positioning of bus platforms in relation to train inspire; as a result, station hall parallel to rail.
- Bicycle parking over 2 layers, positioned perpendicular to the track with access from the Fellenoord;
- Real estate (public or private) possibly with cores next to the bus station at Fellenoord.
- Public property possible at the station hall with access to the Vestdijk Tunnel.
- Station floor interior, with a smaller address at Fellenoord.

Model 11

Multi-layer bus station (level -1 and +1) entirely on Necker coil

Distinctive elements

- Constructed variant for the bus station, spread over two layers and receiving domain between them;
- Bus station position is as far north as possible in relation to slopes. For the rest, the bust tunnels can move further south = favourable to the wadzone frame;
- Busbuffer is fully integrated into the bus station; as a result, there is substantially less concrete under mowing ground in the public space framework.
- Bicycle parking is more favourable dimensioned than in Model 2;
- Little active plinth at Fellenoord possible;
- The route to Cluster 5 will pass through the station hall/transfer domain;
- Station slate smaller than in other models;
- A large park is possible on the roof of the bus station;
- Only real estate on the Fellenoord is possible.

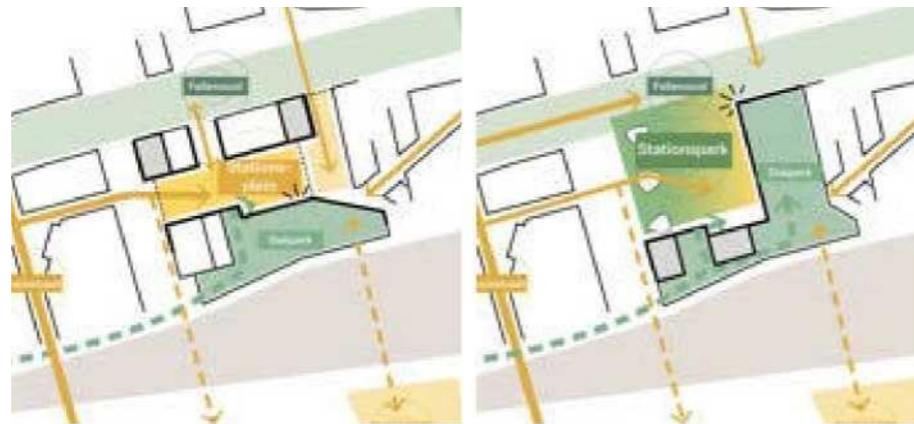
Model 15

Underground bus station (level 1) under Fellenoord and Necker coil

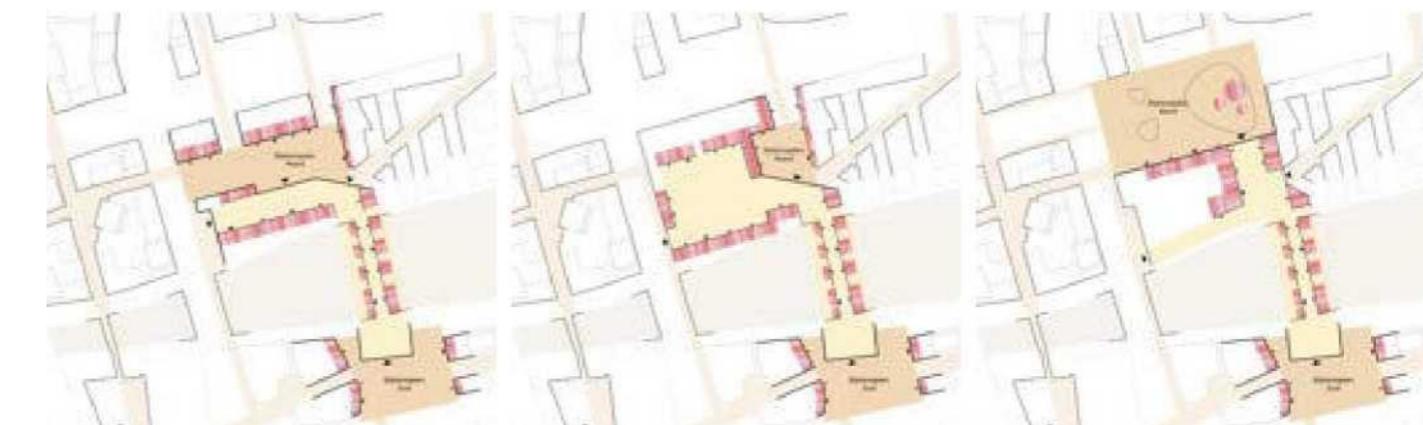
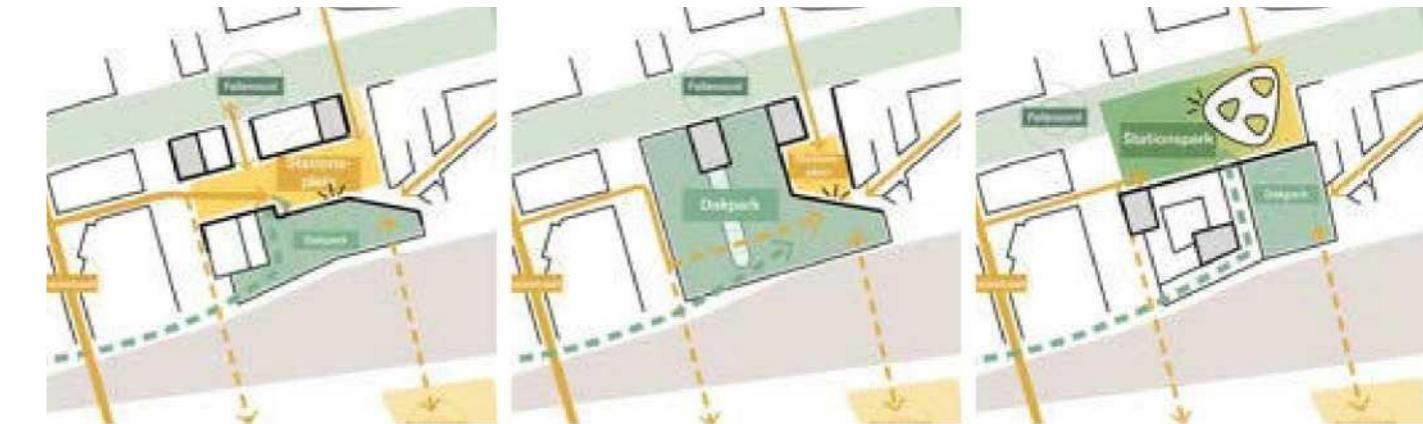
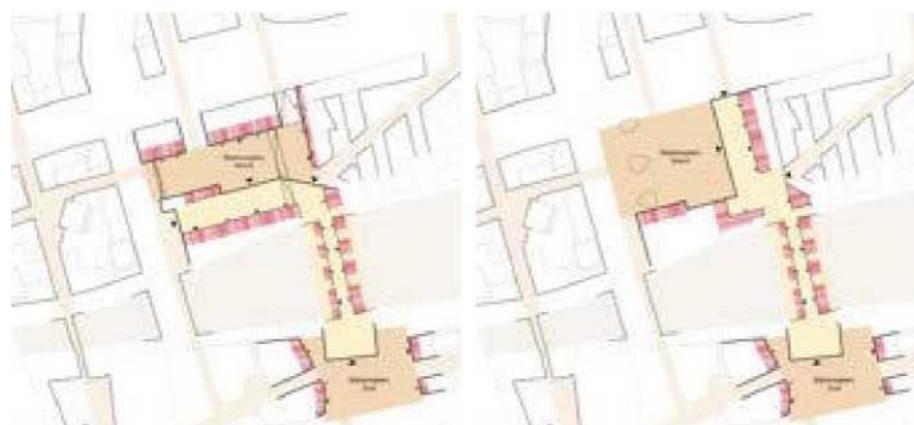
Distinctive elements

- Bus platforms further away from the station hall;
- Digestion pipe platforms positioned under an aperture;
- In the mowing field, space is needed in the public space framework for connecting pipe platforms.
- More real estate possibly independent of bus station and partly independent of bicycle parking;
- The diagonal to the TU is crossed by the receiving domain. Alternatively, a hatch on the side of the diagonal may be used;
- There is a connection along the track from the station hall to the interdistrict connection in the Vestdijk Tunnel.
- The station barrier is located at the Fellenoord and becomes part of the public space framework, making it necessary to cut off car traffic.

Urban planning



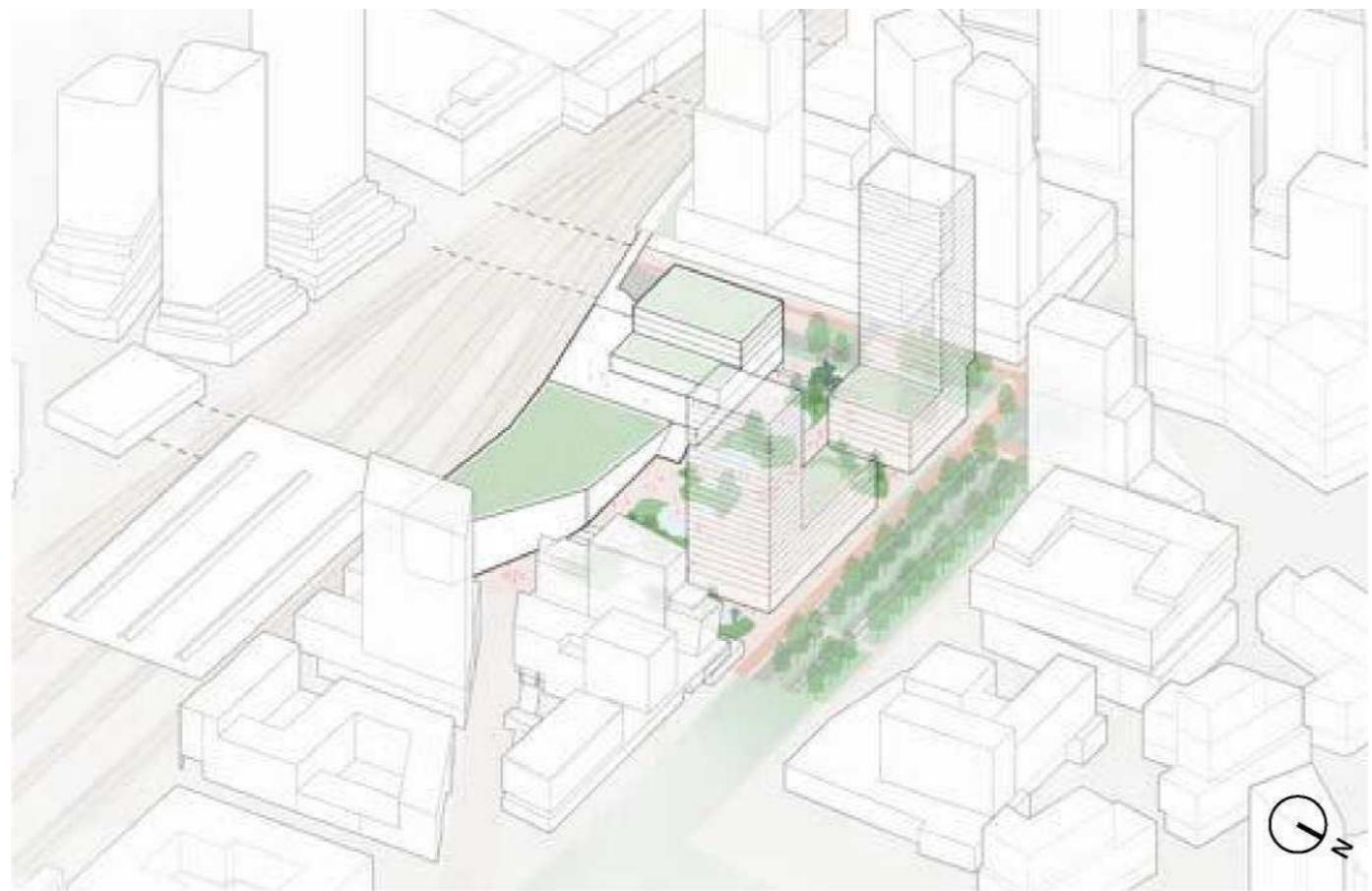
Passenger domain activation and plinth programme





5. TOELICHTING DISSOLVING SINGSRICHTINGEN

RESOLUTION DIRECTIONS MODEL 0 +



Axonometry seen from the east

Model 0 + Underground bus station (level -1/2) at Necker coil

General description of the direction of solution

This model includes a semi-underground fully covered bus station (level -1/2) on Necker coil, partly below the Fellenoord, less deep than models 1 and 2. The bus platforms are perpendicular to the track with a level difference of 3 metres towards the station pitch. Passengers can move up at either end of the platforms to the station hall (south side) or the Fellenoord (north side). Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord.

The bike park is located underground next to the bus station (east side). The

station hall is located partly above the bus station and partly above the bicycle hall. In addition to the bus station, functions such as an elevated station pitch and real estate (with cores next to the bus station) can be implemented. The bus station and bicycle park cover almost the entire cluster 6. The trackside roof park route ends in a solar meadow on the roof of the station hall, accessed via a staircase to the station square.

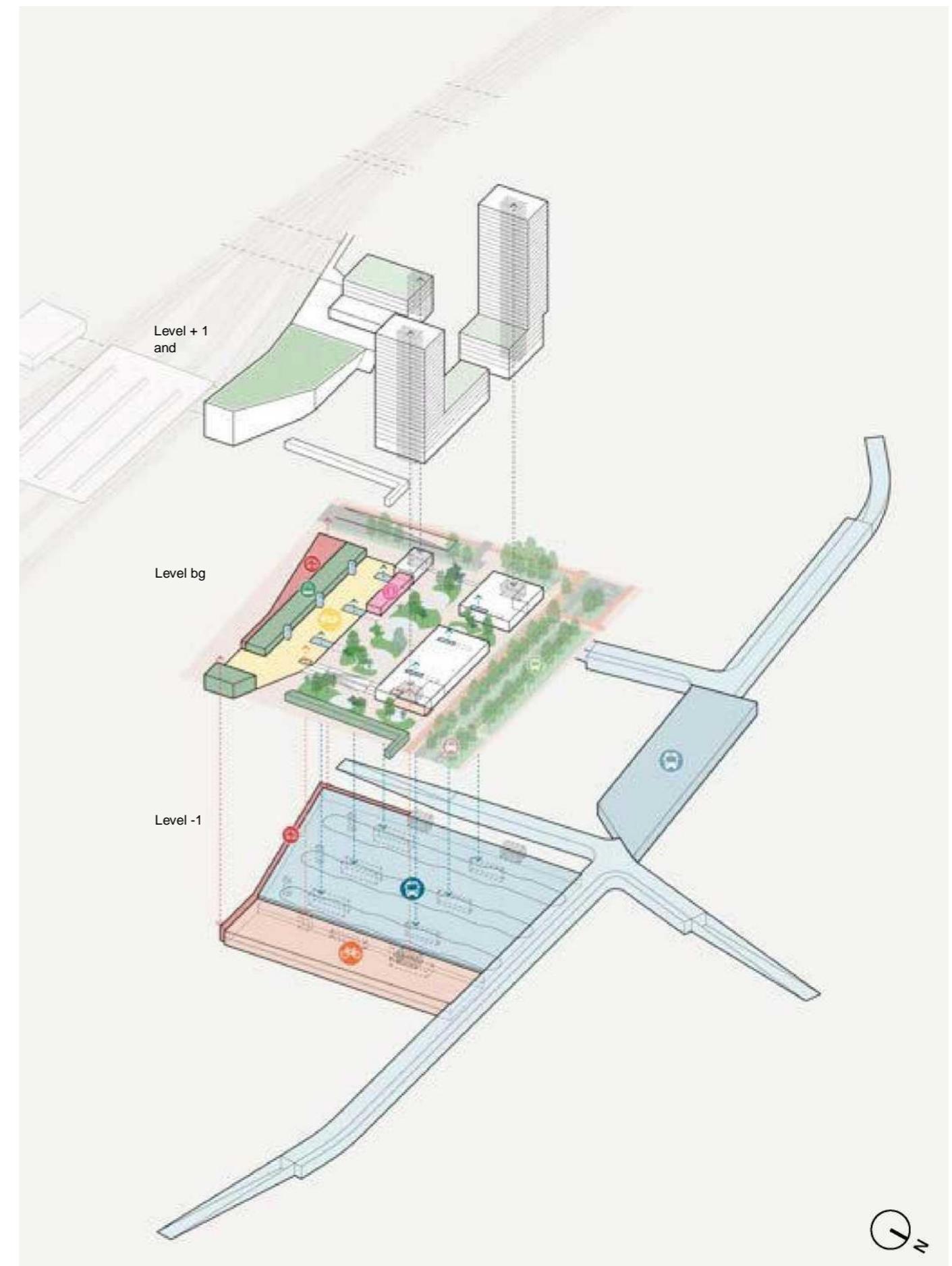
Distinctive elements

- Angle positioning of bus platforms in relation to train inspire; as a result, station hall parallel to rail.
- Higher location of bus station;
- Increased height differences at mowing ground station pitch
- Higher location of bus station reduces ground coverage possible, including less fully-fledged green and water buffering capacity;
- Also higher location Fellenoord, with little ground cover – cables and pipes and fully-fledged green poorly adaptable;

Global areas of building blocks	m
Length of tunnels/speeds other than ramp in metres	750 55
Length of ramps in metres	0
	m ²
Tunnel speed surface	7.000
Tunnel area -1 (including structural outer wall)	11.000
Bus station surface – 1 (including structural outer wall)	17.700
Bus buffer surface (including structural outer wall)	5.850
Bicycle parking area (per layer – x2)	5.300
Green mowing area	3.000
Surface solidified	5.700
Station green roof area (station hall) ***	3.500
Energy roof area (station hall)	1.500
Building area cluster 6 (footprint, not MMK)	5.700
Area of buildings cluster 6 (indicative CSR)	51.000
Station hall area (transfer room)	3.550
Station area (commercial)	1.640
Logistics area (warehouse)	600

RESOLUTION DIRECTIONS MODEL 0 +

Altitude difference of approximately 3 m at the station hall between transfer train and bus, resulting in slightly longer transfer time;
Bicycle parking over 2 layers, positioned perpendicular to the track with access from the Fellenoord;
Real estate (public or private) possibly with cores next to the bus station at Fellenoord.
Public property possible at the station hall with access to the Vestdijk Tunnel.
Station floor interior, with a smaller address at Fellenoord.



Functional axonometry seen from the east of the building blocks (oa bus station, bus buffer, bicycle parking, station hall and connecting tunnels)

RESOLUTION DIRECTIONS MODEL 0 +

37

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

37



Aerial view from the south

RESOLUTION DIRECTIONS

MODEL 0 +

38

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

39



Plan map top view
Differences from the Long List

1. SKE contour and MMK: The MMK now remains outside the SKE contour. This means that there is space for a northern side platform for SKE. If a different solution is chosen in the MIRT exploration SKE, more room may be left for MMK. This mainly allows for smaller building blocks such as logistics and technical rooms for the bus station.

2. Bus station height: Bus station is 1.8 m deeper than before (floor level 11.2 NAP instead of 13.0 NAP); floor top 18.5 NAP (0.5 m deep). Bus station continues below the Fellenoord, mowing field approximately 19.0 NAP (30 cm deeper) with 50 cm ground cover. This is for the following reason:

- Space is reserved within the design for increased clearance height (5.5 m instead of 5.2 m) and thicker floors (1.2 m instead of 70 cm, plus 60 cm of cross-members). This makes the bus station a total of 1.4 m higher as a building block.
- At the same time, the top of the floor is laid down half a metre deep so that there is more space for ground cover on the roof. Overall, it is 30 cm lower than before. The soil cover is not sufficient for large water buffering capacity, and trees can only be accommodated if hills are used.

3. Real estate opportunities: The property with cores is still located next to the bus station (one of which is adjacent to the station hall) and possibly in the bicycle park. No more cool can be made at the Fellenoord ivm the larger size of the bus station.

Transitional construction is also needed in this model to distribute horizontal forces, but this can only be done here in the shelf of the buildings;

4. Integrated carriageway: The northern carriageway of the bus tunnel is now integrated with the bus station. This offers advantages in terms of space and is necessary because of the extension of the bus station to include, inter alia, 25 m stops and safety regulations requiring longer intermediate lengths between stops.

5. Reclassification of bus platforms: The number of bus platforms is now 30 + 4 stops instead of 30 + 6. The 30 entry stops are divided into three island platforms instead of four, which makes space for bicycle parking next to the

scale 1: 2000

bus station. As a result of the new distribution and additional safety requirements, the bus station is extended by 30 metres and thus crosses under the Fellenoord, in combination with the integrated lane of the bus tunnel. Due to the lack of depth, there is hardly any possibility of ground cover on top of the bus station in the Fellenoord. This has an impact on the green image of the boulevard.

6. Busbuffer: The bus buffer is fully integrated with the tunnel and is located below the Fellenoord ipv on mowing ground in Kennedylaan.

7. Logistics: Logistics traffic for the station is routed through level -1 of the bus station, with a stall on the west side, in the same strip as where the cores of the property are positioned. This traffic runs alongside the bus transport through the tunnels and the bus station, and is connected via a corridor and lift to the station hall and the logistics warehouse behind the commercial areas.

8. Bicycle storage: There is still a bicycle park in two layers, but this is now partly below the Fellenoord in view of the capacity required. The lower layer is accessible with a tapis rotating to -2 and a drought rising to level -1.

9. Station hall: The station hall is wider and more prominent at the station gallery, with real estate only integrated at the extreme west. This property may be given a public function. The slatted line has been moved on the site side because the building blocks of transfer space and commercialisation have increased. In addition, there is a 16 m gap between the diagonal to the TUE and the KBC plinth.

10. MIVA, Taxi and K & R: These functions are now located in the Fellenoord instead of on top of the bus station, which separates these functions from the bicycle park and makes them less dependent on each other.

11. Taxi-buffer spots: The taxi buffer stations have now been placed behind KPN rather than on top of the bus station. These areas may be positioned further away from the MMK.



Ground floor level (station hall and commercial, green and real estate)

scale 1: 2000



Level -1 (bus station, bus buffer, bicycle parking and connecting tunnels)

scale 1: 2000

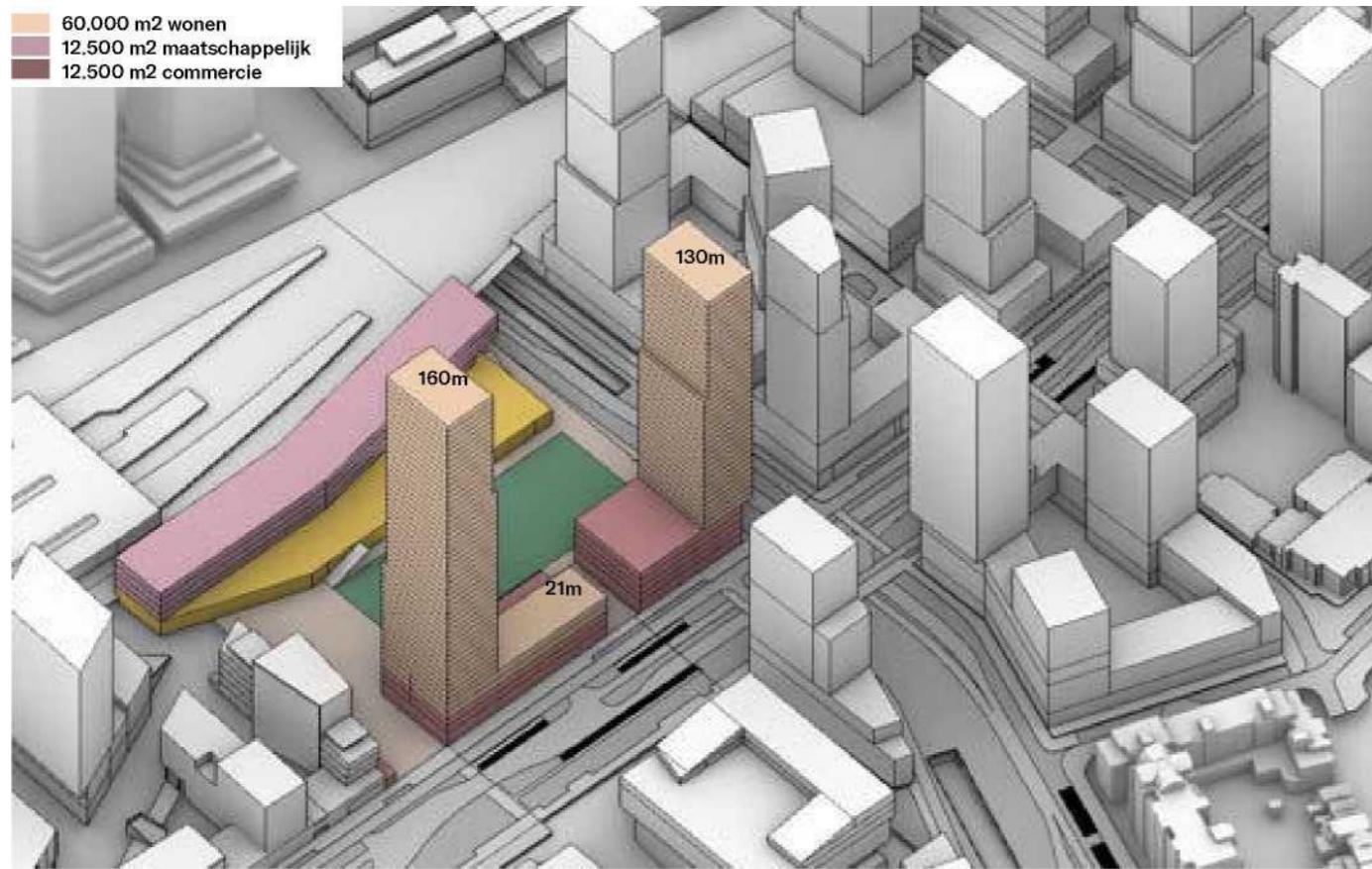
RESOLUTION DIRECTIONS REAL ESTATE OPPORTUNITIES

40

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

41



Axonometry with Indicative Test Volume Cluster 6 Option

Real estate opportunities

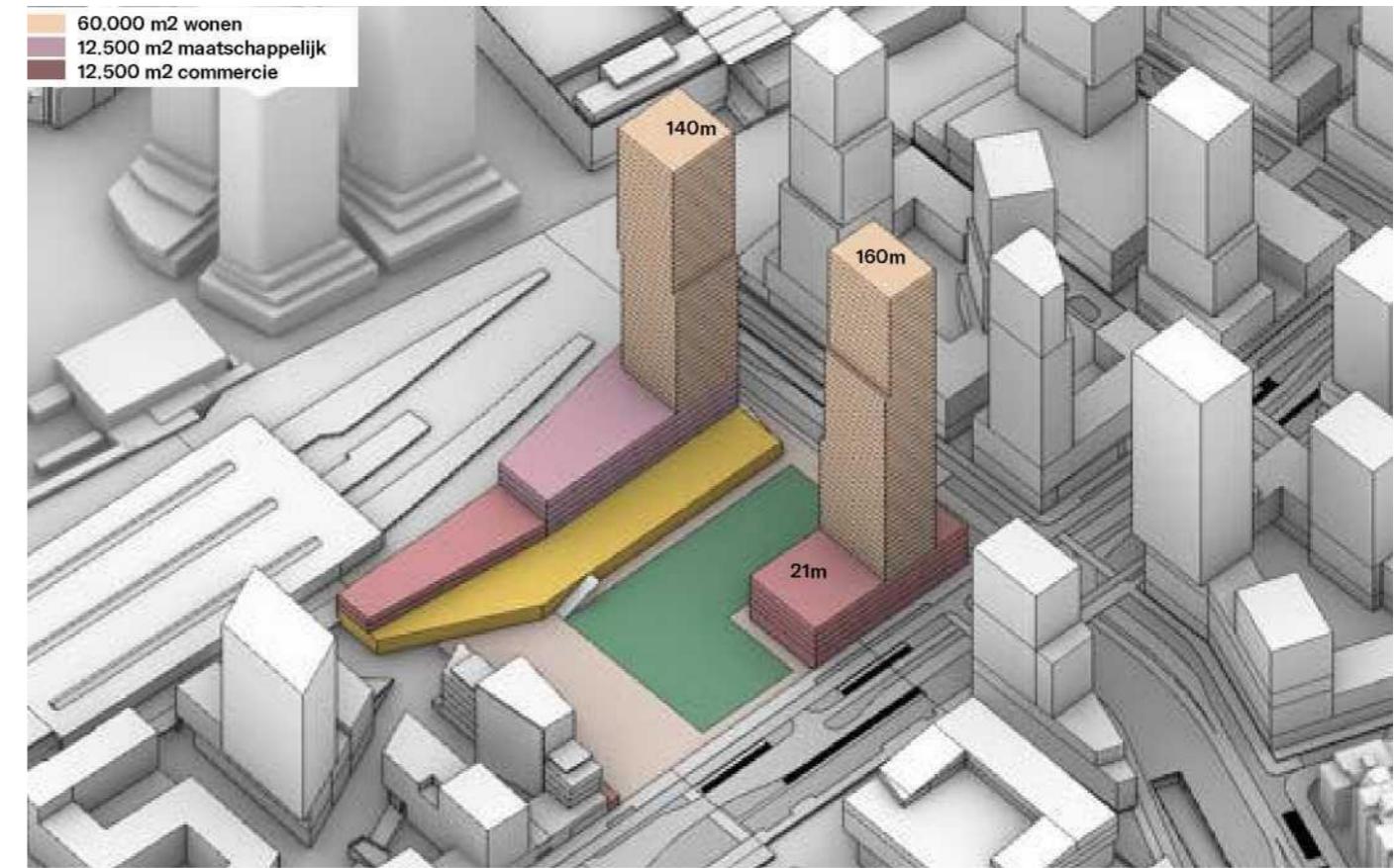
The real estate options for the solutions on the Short List show that several designs are still possible at this stage. It was deliberately chosen to show these differences in order to illustrate the range of options available and to reveal (some of) the design tasks for the exploratory phase. Indeed, there is not yet one leading design solution at this stage, but only evidence of possible design solutions.

Based on the development of the Fellenoord area, there is a requirement of 85.000 m² of BVO for the building inventory cluster 6. For model 0 + and 2, different options were explored for this property on or adjacent to the bus

station and the bicycle park. In addition to the bus station, functions such as a green station pitch and real estate can be implemented.

1. Station floor interior (approx. 7 000 m²) – real estate mainly at Fellenoord (applies to both models 0 + and 2)

Option 1 assumes a compact interior square of approximately 7.000 m² (for comparison: Southern station area receives a square of approximately 6.000 m²) behind a strip of buildings with real estate centres which are positioned next to the bus station and therefore the vertical load is less dependent on the construction of the bus station. In addition, the horizontal forces must be absorbed by a transitional structure in the shelf of the

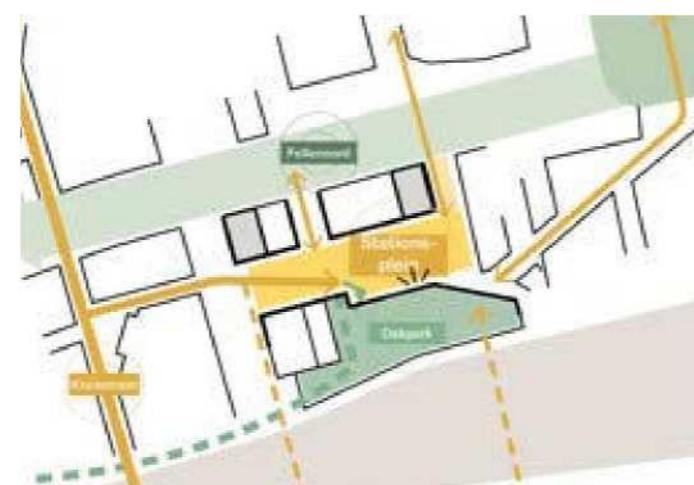


Axonometry with indicative volume cluster 6 option 2

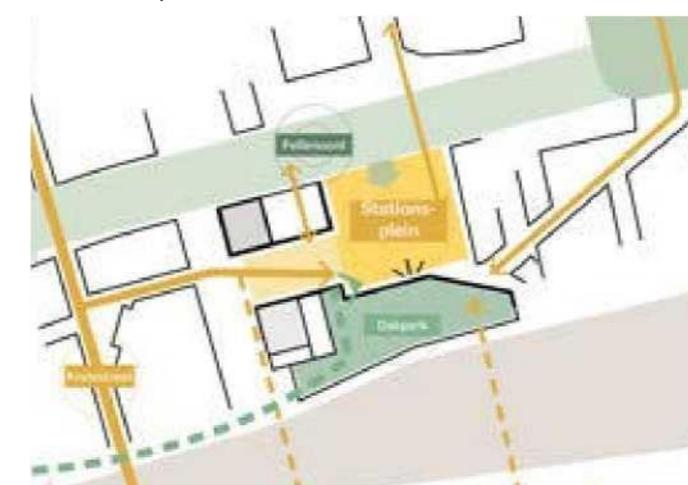
property. In theory, the desired volume for cluster 6 (85.000 m² of BVO) can be achieved, but this will become so dependent, complex and costly to develop that it is unlikely that these meters will be achieved with the requested programme mix.

The station square is green and plays an important role in the ecological connection between the future trackside roof park and Fellenoord, but also as an important residential gap between the clusters. The traffic and logistics functions have been resolved next to or under the square. Gaps are being made in the station square for light entry to the bus station so that the quality of stay at the underground level is increased.

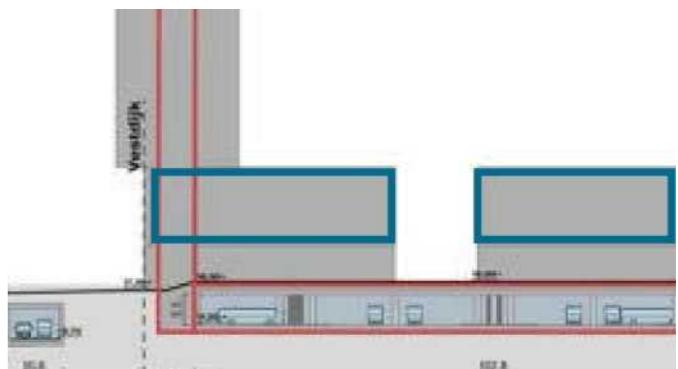
In this model, the square and the station building connect mainly the two east-west lines: KBC and the University towards East and the long line towards Clusters 4 and 5, the busiest routes now and in the future. In order to create an address at the Fellenoord for the station, the building edge is crossed at two points so that the station can be seen from the boulevard.



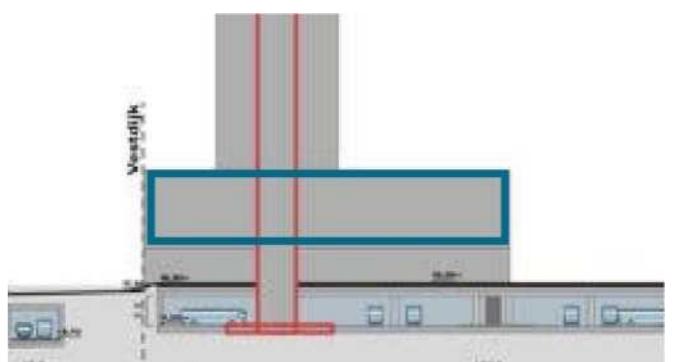
Town planning principle interior square



Town planning principle open square



Section of property option with cores next to the bus station



Cross-section of property option with cores through the bus

In the parallel track for Cluster 6, the size of the opening of the station square to Fellenoord is examined at a later stage in order to create sufficient visibility on the station.

2. Stationsplein at Fellenoord (approx. 9.000 m²) – real estate mainly at Vestdijk Tunnel
(applies to both model 0 + and model 2)

Option two assumes real estate mainly positioned at the Vestdijk Tunnel resulting in a larger station square of approximately 9.000 m² with a strong orientation towards the Fellenoord. At this stage, both options are still on the table. For this configuration, both technical principles to construct real estate (represented on the right) are possible. Both with cores through the bus station and with cores next to the bus station. The first is made possible by the application of a wider tube platform through which various cores can be placed. This provides at least a 7 m wider bus station and is therefore also a substantially more expensive option. In the context of overview and social safety on bus platforms, this variant is also less desirable.

RESOLUTION DIRECTIONS

MODEL 0 +

Real estate opportunities irrespectively of area development: As described on the previous page, in this model real estate is possible at the Fellenoord and/or at the Vestdijk Tunnel, depending on the choice of an interior square or open square. In both options there is a bandwidth of the BVO to real estate, which needs to be explored in more detail in the parallel section for Cluster 6.

A volume test was carried out at this stage. This makes it possible to say with a reasonable degree of certainty that the real estate shown is realistically feasible and feasible. In the developed variant there is room for approximately 50.000 m² of GFA property. At the very most, this can be extended to higher

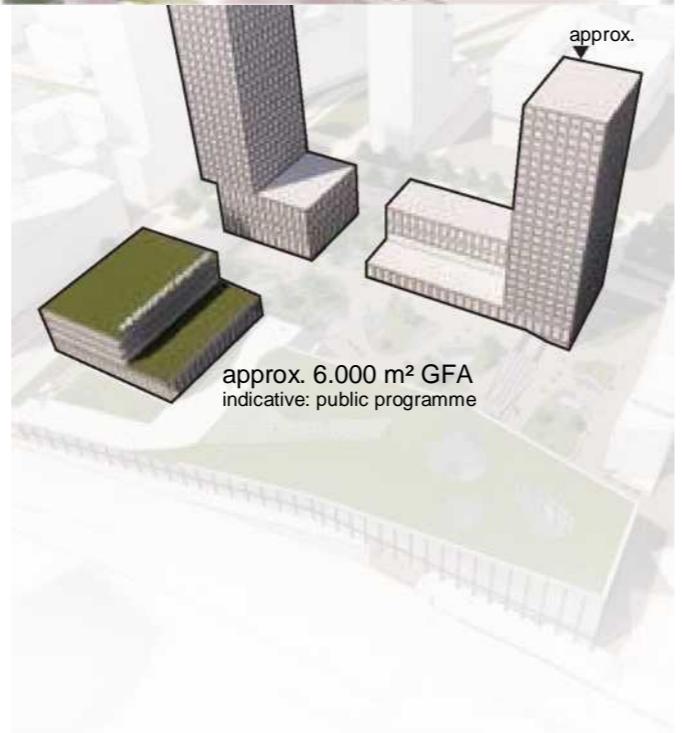


Aerial view from the north

towers in order to achieve the requested volume of 85.000 m² of GFA, but this is technically a very complex task and thus puts pressure on the affordability of the (potential) dwellings.

The research question for the remainder is what the choice of interior or exterior square means for the volume of real estate. In addition, there is a need to look more closely at the constructive possibilities around the bus station and bicycle parking and at the impact of high construction on the wind climate and reflection.

Routing: The route from TUE to inner city and cluster 5 passes through the station square. However, this connection is slightly more complicated in this model than in model 2, where it remains level floors, due to the difference in height on the square. In addition, there is the possibility to connect the station square via the station roof to the roof park (Highline) along the track. The connection from the station to the Fellenoord starts with two openings between the buildings at the Fellenoord, as shown on the previous page. However, this can also be done with the option of greater pledging to Fellenoord.



Real estate opportunities (indicative volume)



Openbare ruimte kaart



Activering van het ontvangst- en omgevingsdomein

RESOLUTION DIRECTIONS MODEL 0 +

44

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 45





View of the station and station square from the entrance from Fellenoord

RESOLUTION DIRECTIONS MODEL 0 +

48

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 49



View of the station square from the roof of the station hall



View from the bus platforms



TU Delft library references, public programme and park landscape combination

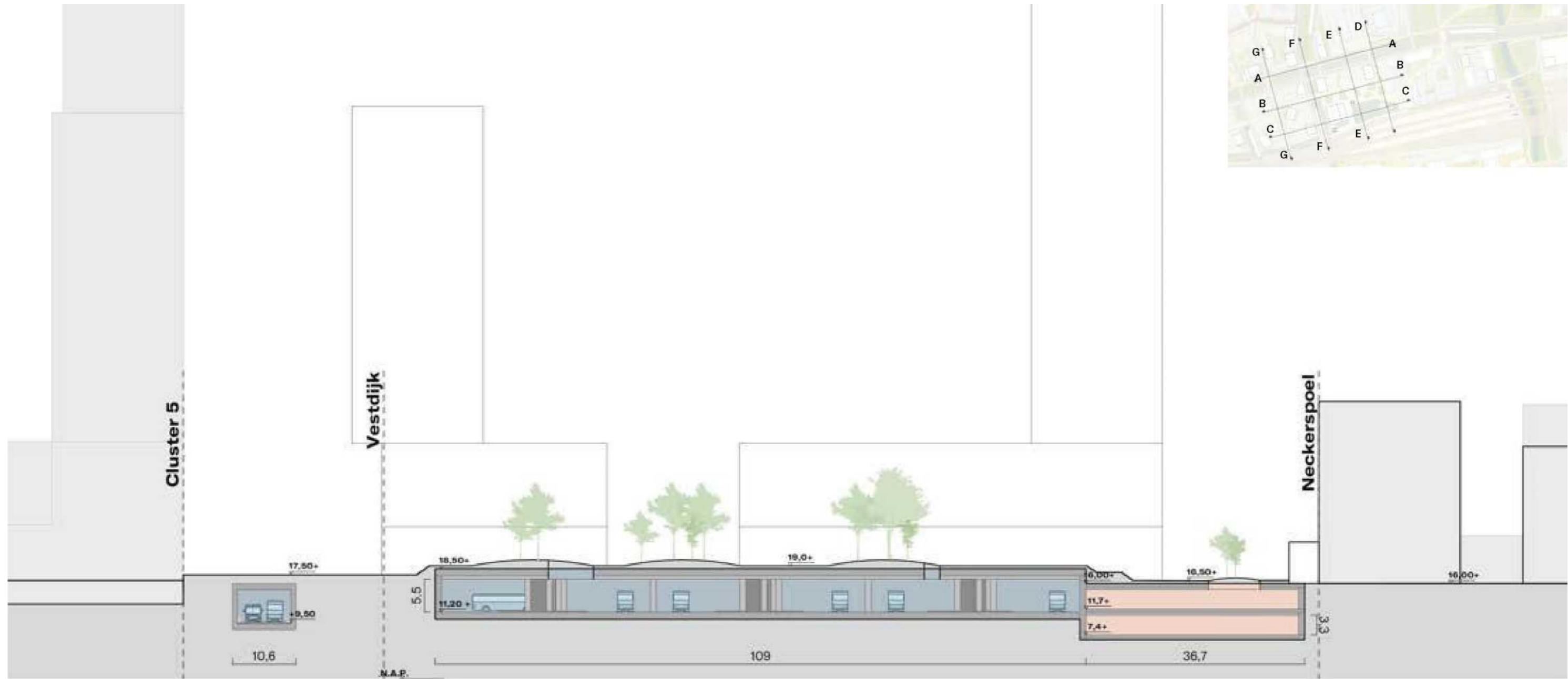


Stuttgart train station reference – daylight entrance



Stuttgart train station reference – daylight entrance

RESOLUTION DIRECTIONS MODEL 0 +



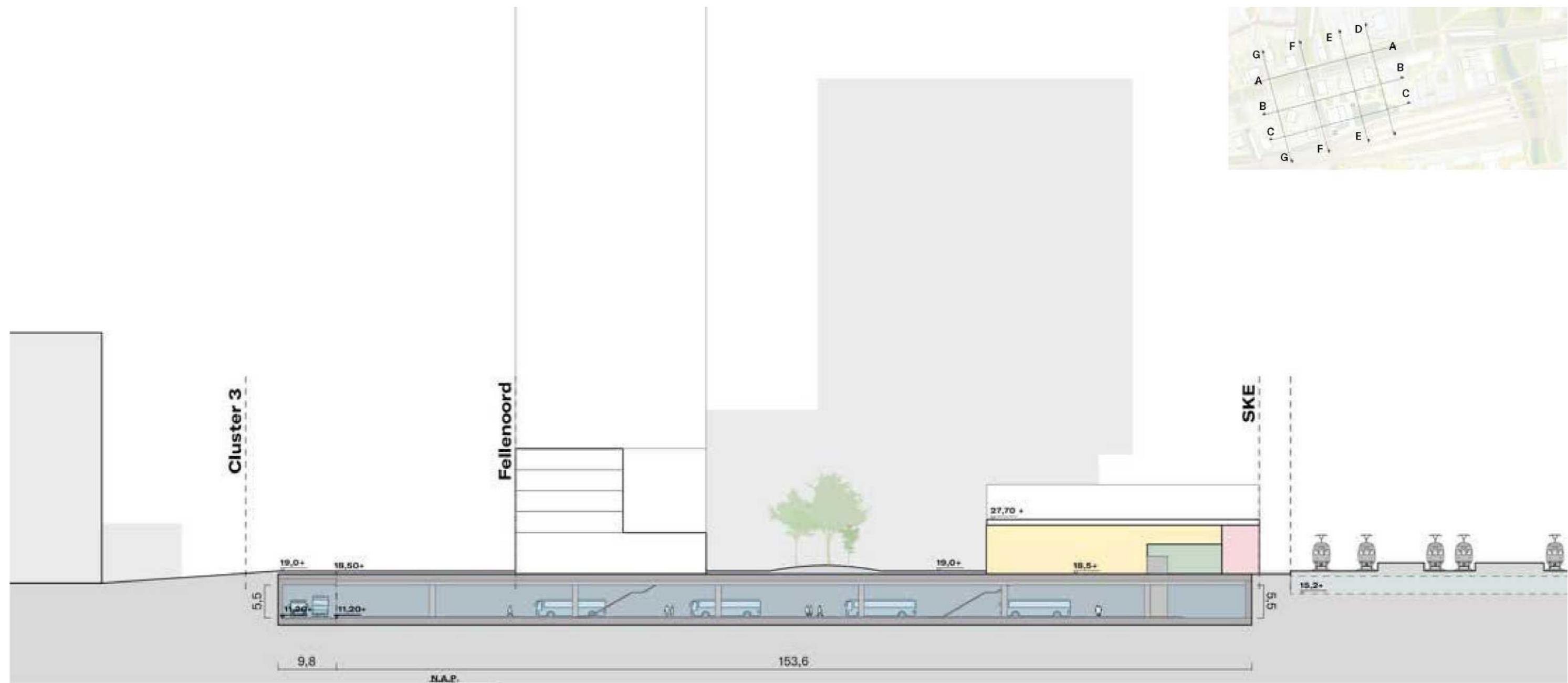
Stuttgart train station reference – daylight entrance



Reference Bratislava bus station – height and lighting

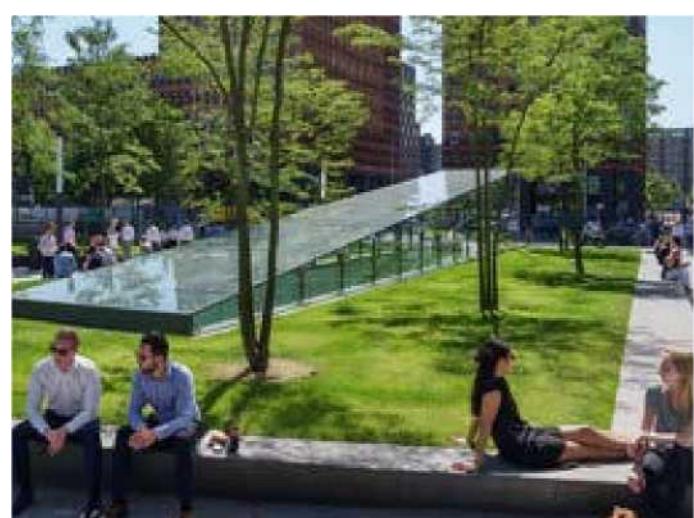


RESOLUTION DIRECTIONS MODEL 0 +



EE North-South section

scale 1: 750



References Mahlerplein Amsterdam and Kruisplein Rotterdam, green station squares on top of underground structures



Reference Europa Park Groningen



Reference Mahlerplein Amsterdam

RESOLUTION DIRECTIONS MODEL 0 +

54

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

55



View from the station hall to the station gallery and direction of the passengers' domain of the buses



View in the station hall at the level of the openings to the bus platforms



View inside the bicycle parking area from the staircases to the station hall



View of a bubble platform

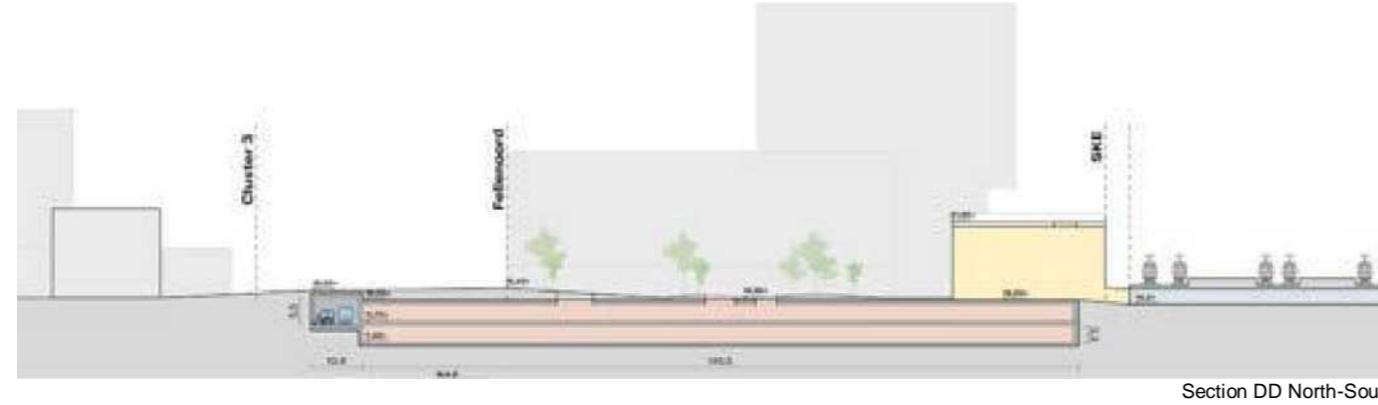
RESOLUTION DIRECTIONS MODEL 0 +

56

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 57



scale 1: 2500



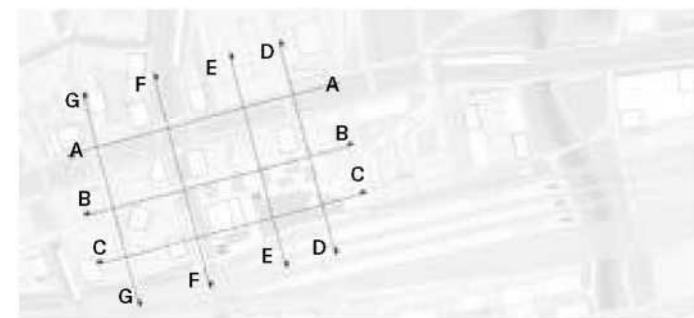
RESOLUTION DIRECTIONS MODEL 0 + SECTIONS

58

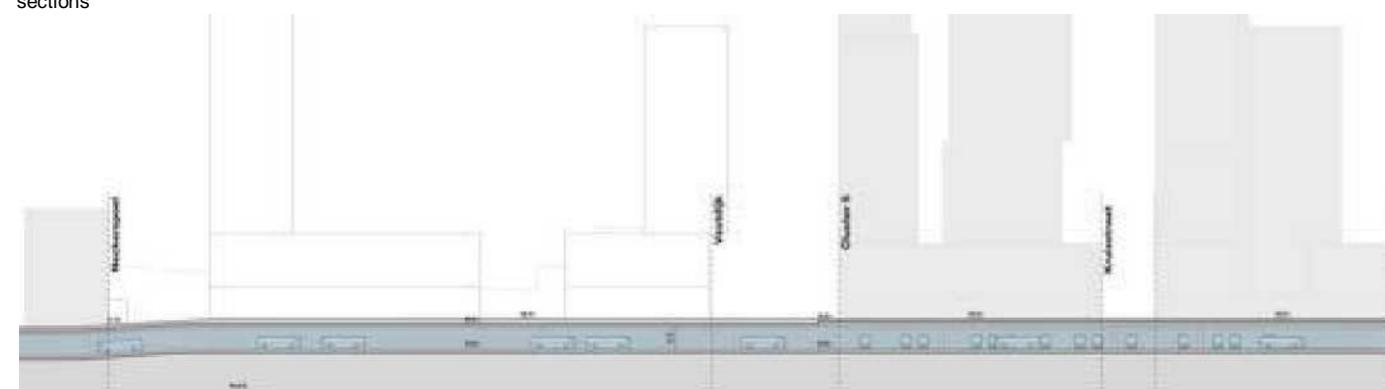
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

59

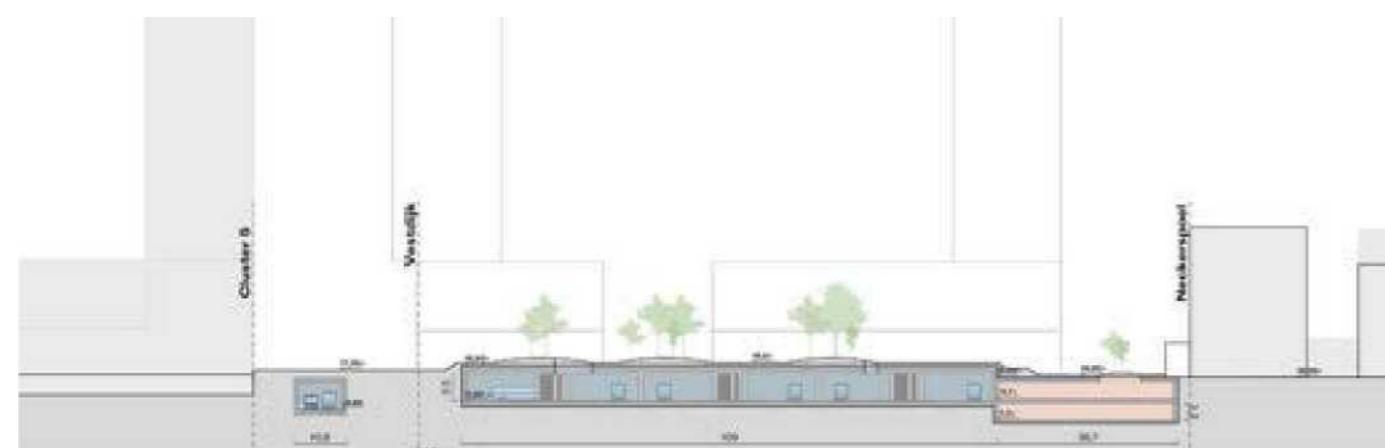


Cross-sections



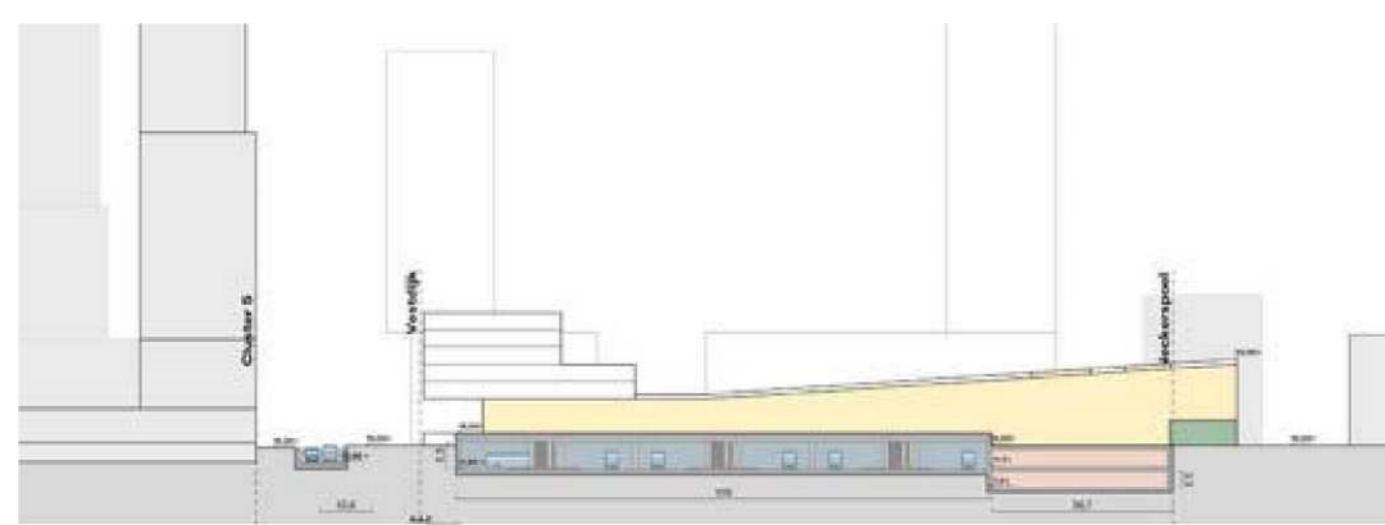
Section DD North-South

Section AA West East



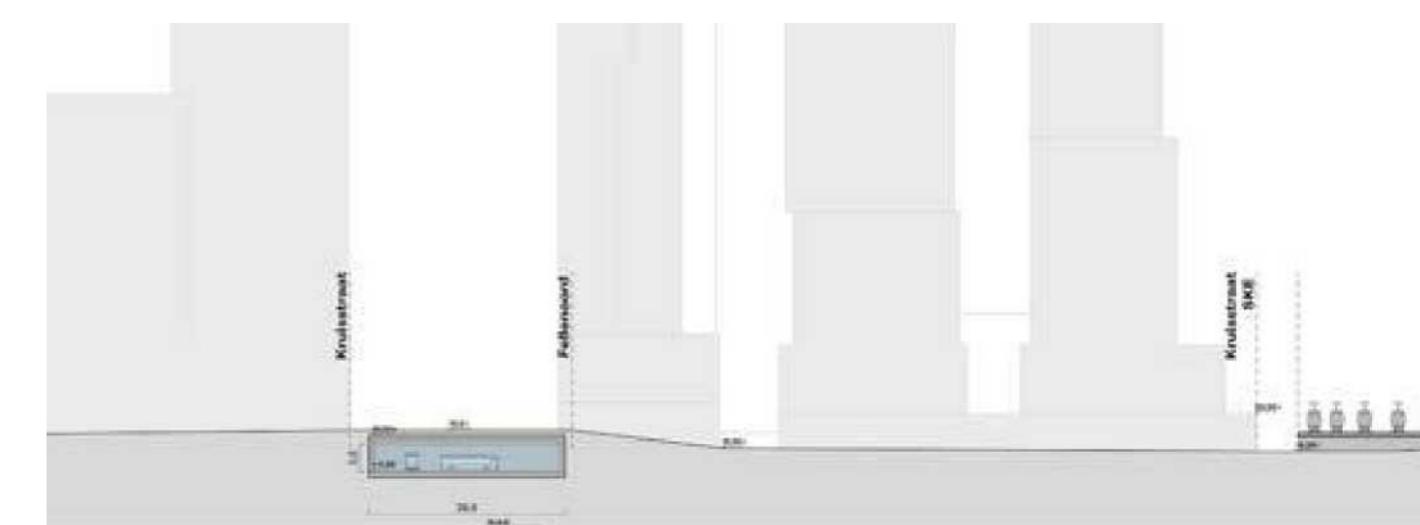
EE North-South section

Section BB West East



Diameter FF North-South

Section CC West East



GG North-South section

RESOLUTION DIRECTIONS MODEL 0 + MOBILITY

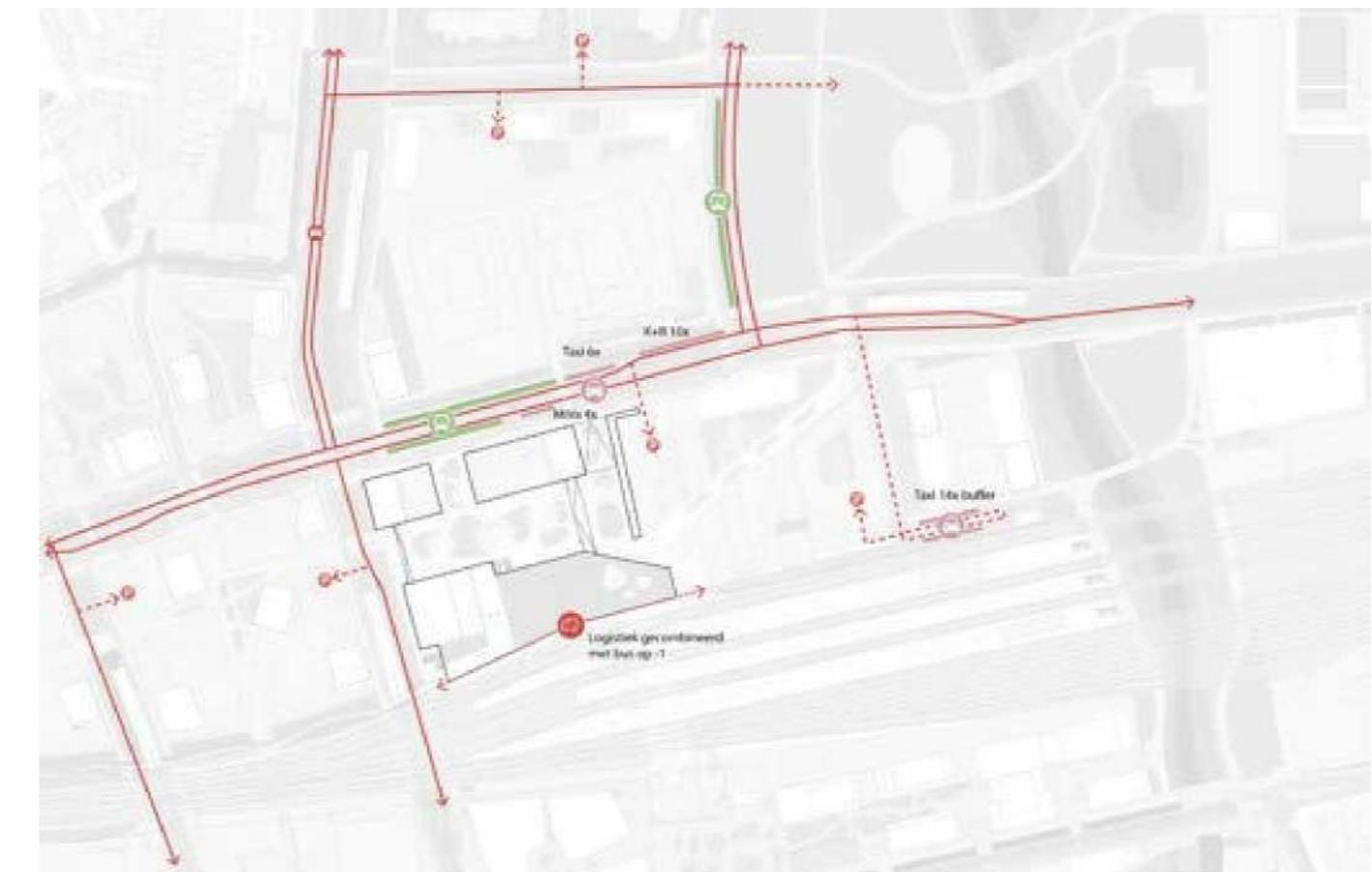
60

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V

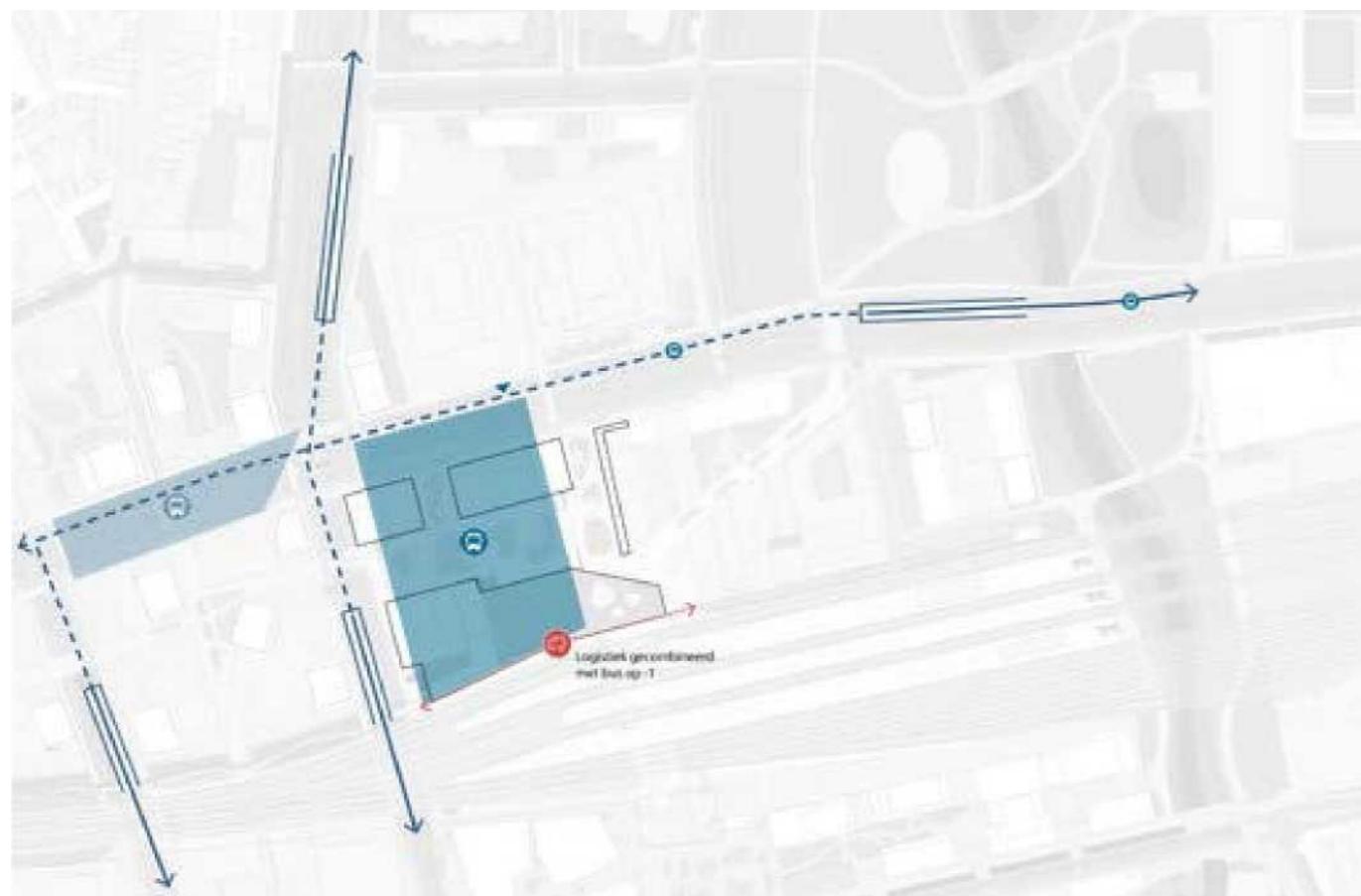
61



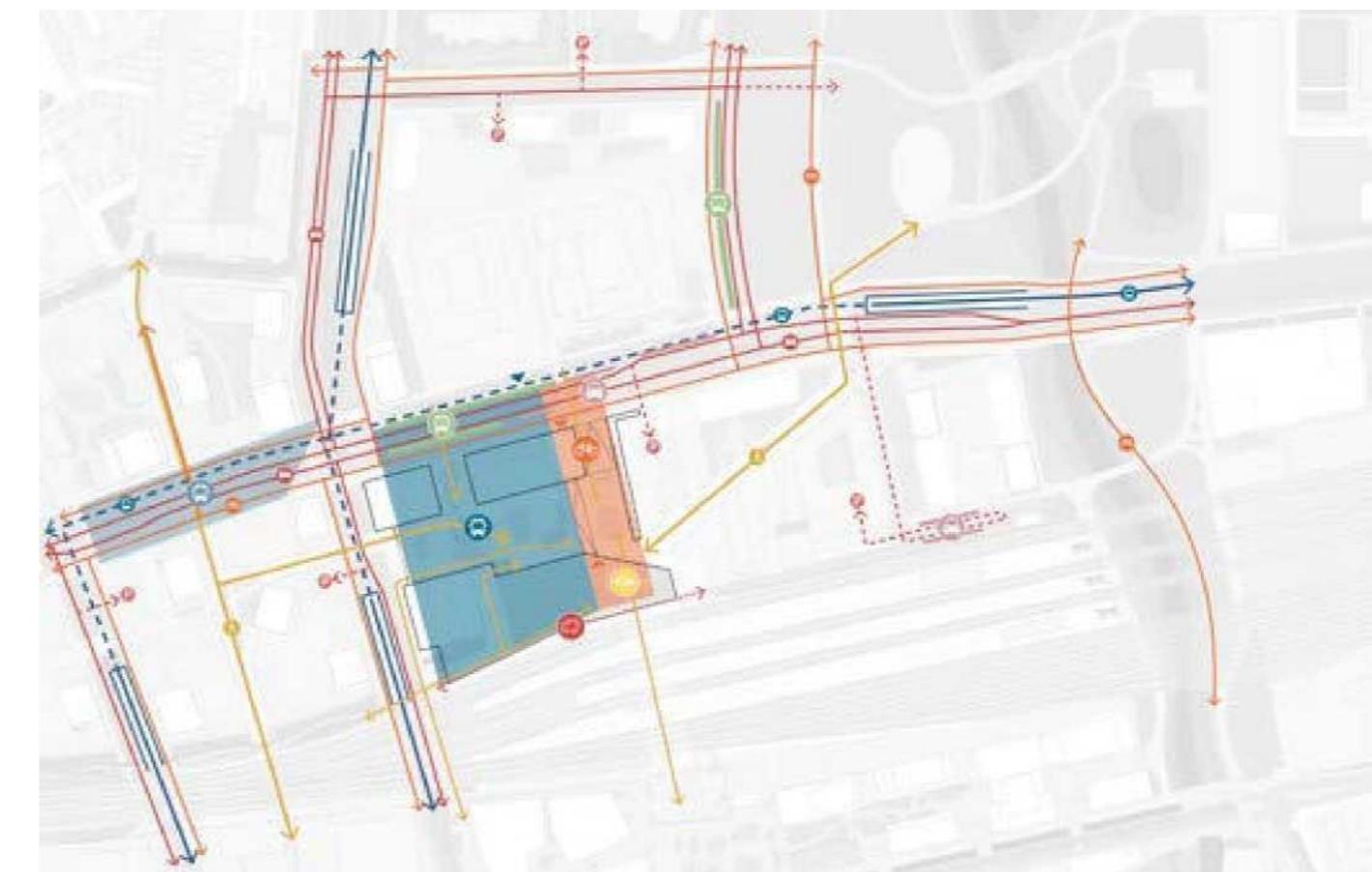
Pedestrian and bicycle routing



Routing k & r, taxi, TV, ib, car parking



Routing buses



Routing of total mobility

RESOLUTION DIRECTIONS MODEL 0 + COMPONENTS

62

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

63

RESOLUTION DIRECTIONS MODEL 0 + COMPONENTS

63

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

63



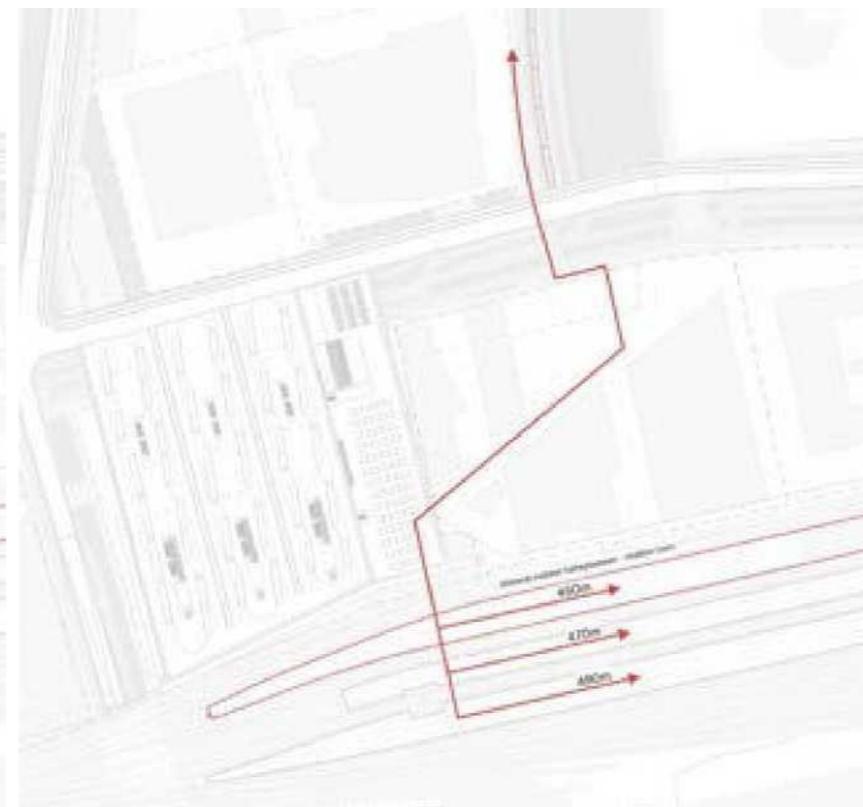
Number of stops and routing at bus station



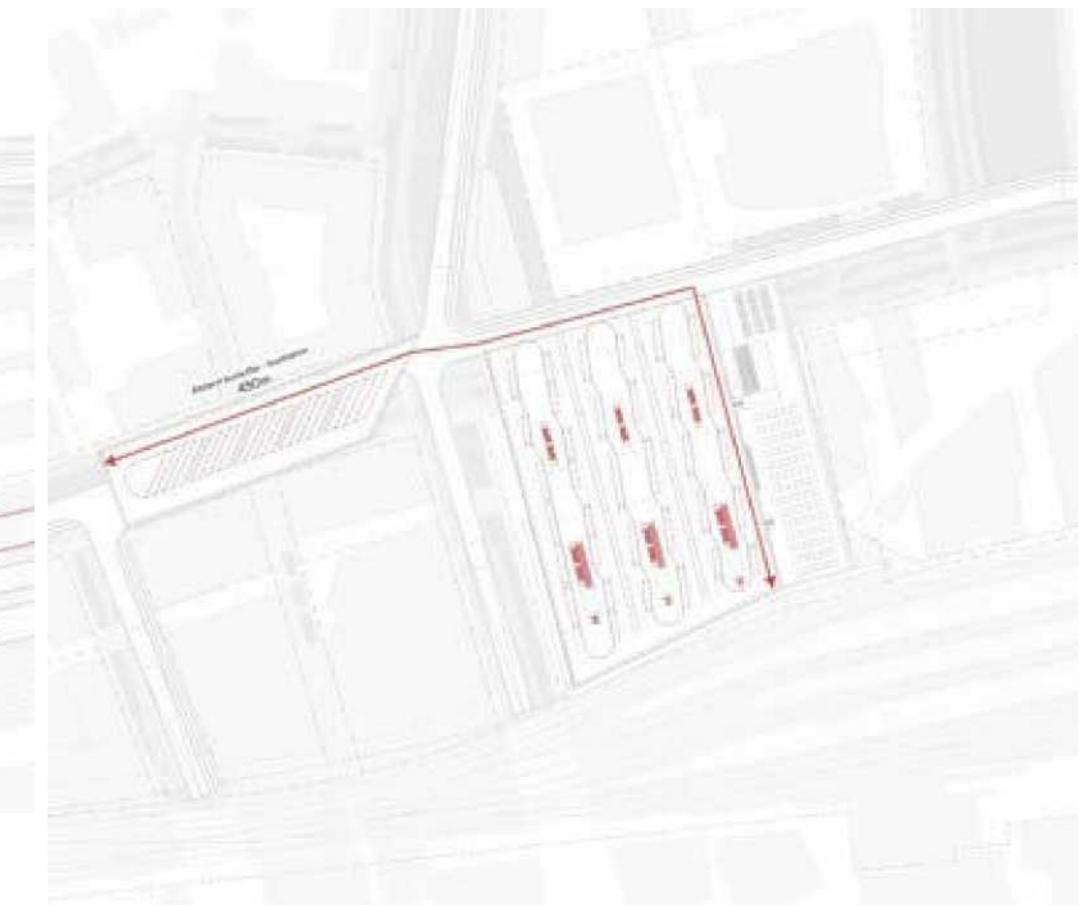
Green areas



Running distances between the centre of the train and the centre of the platform bus



Walking distances between International bus and train

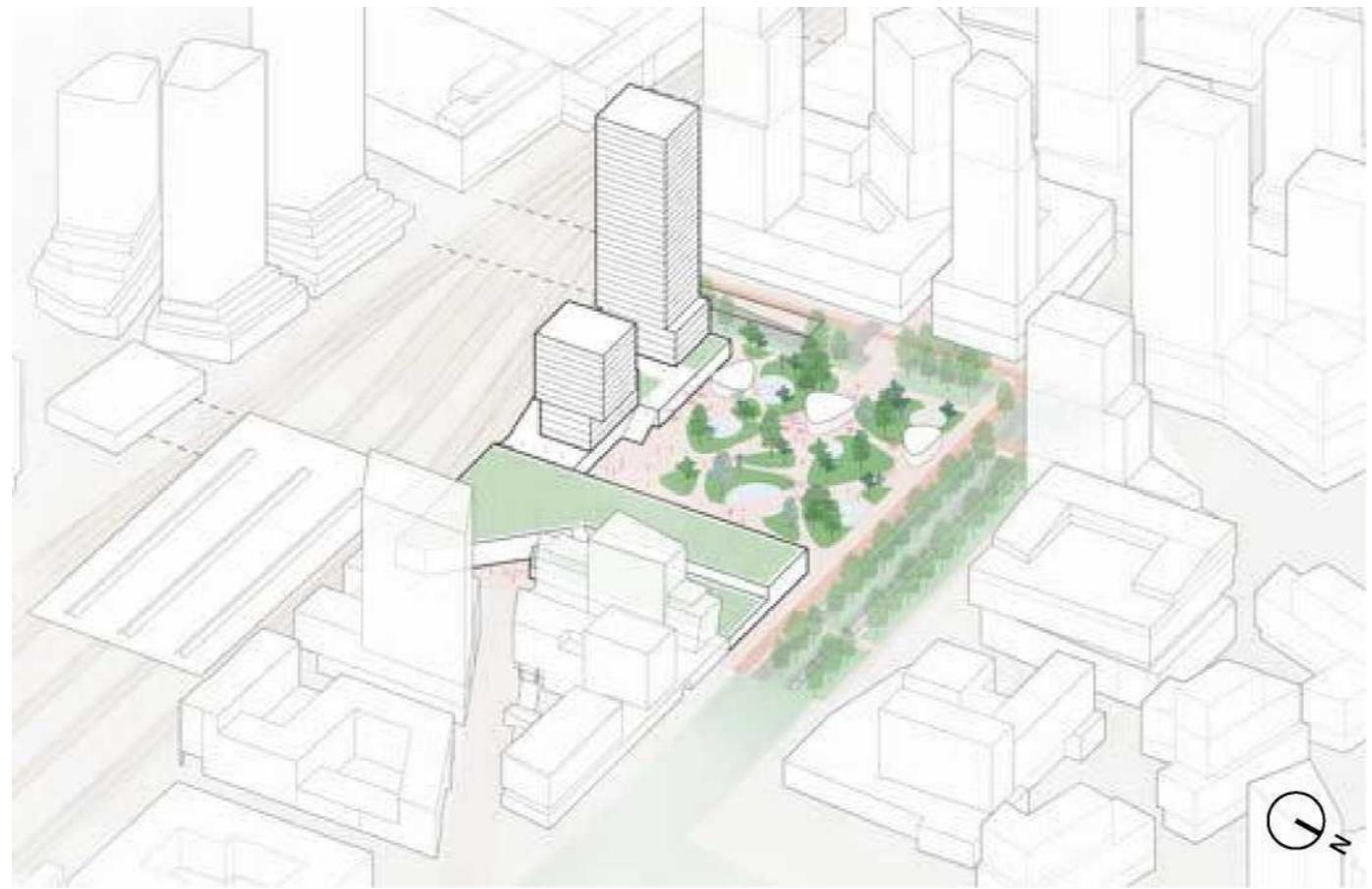


Distance between bus buffer and bus station

RESOLUTION DIRECTIONS MODEL 1

66

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 67



Axonometry

Template 1

Underground bus station (level -1) at Necker coil (parallel)

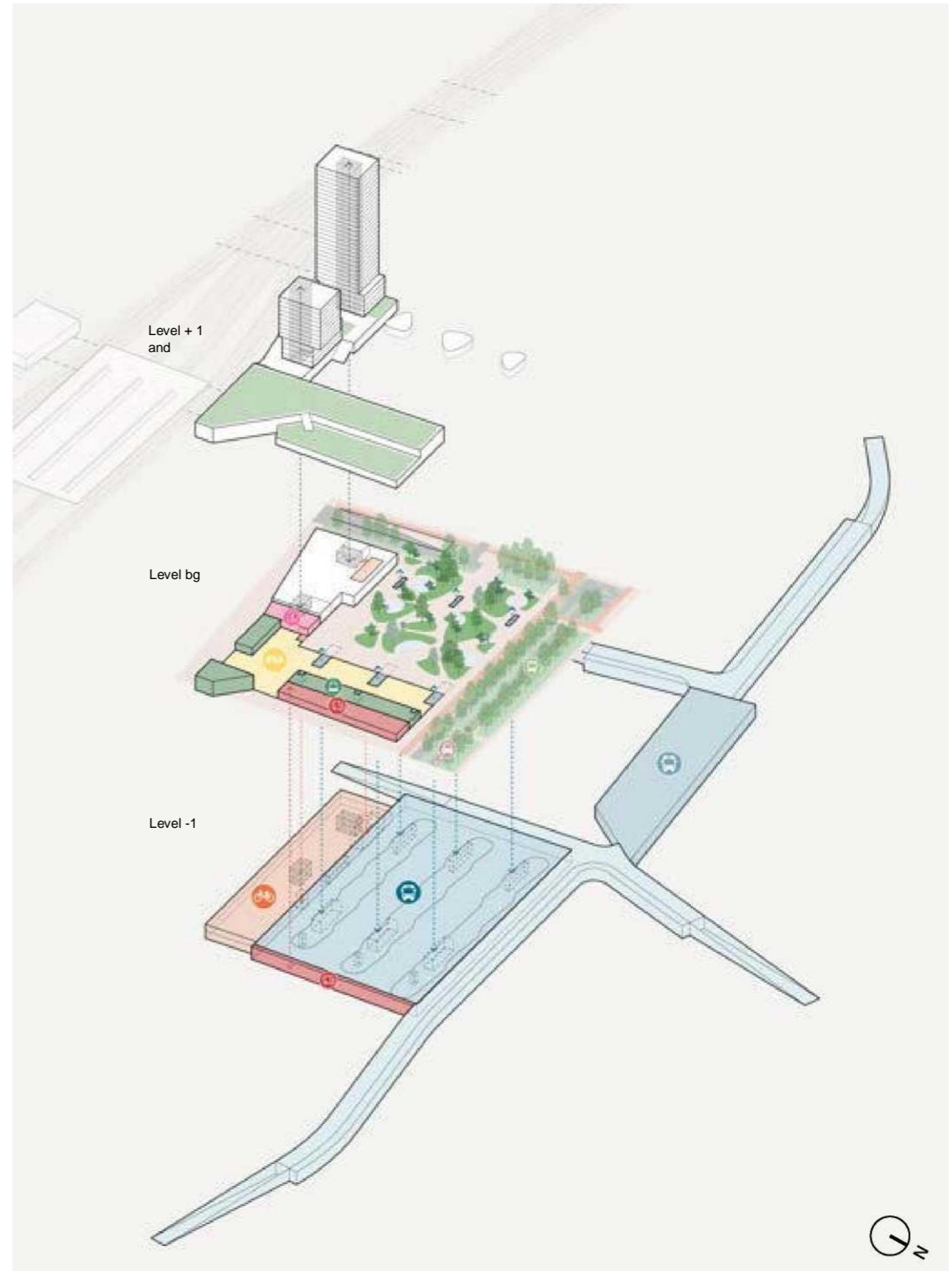
General description of the direction of solution

This model includes a fully underground bus station (level -1) on Necker coil, partly below the Fellenoord, 2.5 m deeper than model 0+, so that the transfer domain is level floors. The bus platforms are in the longitudinal direction of the track. Passengers can raise at the end of the platforms to the station hall on the east side of Cluster 6, which is positioned as an extension of the station wall, and on the west side to the Vestdijk Tunnel via the station hall. On top of the bus station, functions such as a highly greener station pitch/station park can be implemented. Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The bicycle park, with two floors, is located between the bus station and the rail. On top of the bicycle parking area there is potential for real estate development. The track side roof park route can be accessed via a staircase towards the station square.

Distinctive elements

- Billing platforms with parallel orientation: station hall in line with the station station station.
- The position of the bust tunnel is more southern than in model 2: more space for full green in the frame
- Bicycle parking over 2 layers, positioned parallel to the track with access from the Vestdijk Tunnel;
- The diagonal to the TU is crossed by the receiving domain. Alternatively, a hatch on the side of the diagonal may be used;
- Property (public or private) possibly on the bicycle park; Real estate trackside only; Stationspark (Station Square) located at the Fellenoord and Vestdijk Tunnel.

Global areas of building blocks	m ²
Length of tunnels/speeds other than ramp in metres	750 550
Length of ramps in metres	
Tunnel speed surface	7.000
Tunnel area -1 (including structural outer wall)	11.000
Bus station surface – 1 (including structural outer wall)	18.100
Bus buffer surface (including structural outer wall)	5.850
Bicycle parking area (per layer – x2)	5.000
Green mowing area	5.500
Surface solidified	4.000
Green roof area (station hall) ***	5.300
Energy roof area (station hall)	1.600
Area of buildings cluster 6 (no MMK)	3.000
Area of buildings cluster 6 (indicative CSR)	30.000
Station hall area (transfer room)	3.630
Station area (commercial)	1.600
Logistics area (warehouse)	580



Functional axonometry of the building blocks (oa bus station, bus buffer, bicycle parking, station hall and connecting tunnels)

SUGGESTED SOLUTIONS

MODEL 1

68

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V 69



Aerial view from the south

RESOLUTION DIRECTIONS

MODEL 1



Plan map top view
Differences from the Long List

1. SKE contour and MMK: The bicycle parking area has shifted and is now largely outside the SKE contour, with only a small interface at the discharge angle, which needs to be looked at in more detail in the subsequent phase.

2. Bus station height: The bus station is now 2.2 metres higher than before, with a floor level of 8,7 NAP instead of 6,5 NAP. This is due to several reasons:

- Fewer transitional constructions are required because in this model there is less or no real estate on top of the bus station, see real estate opportunities section.
- Space is reserved within the design for increased clearance height (5.5 m instead of 5.2 m) and thicker floors (1.2 m instead of 70 cm, plus 60 cm of cross-members). This makes the bus station a total of 1.4 m higher as a building block.

This, taken together, results in a higher location than before.

3. Bus buffer position: The bus buffer is now fully integrated with the tunnel and is below the Fellenoord, at cluster 5. This corresponds to the position in model 2, but unlike previous models, the bus buffer is now fully integrated into the infrastructure.

4. Billing platforms: The number of bus platforms has been adjusted to 30 + 4 stops instead of the previous 30 + 6. This is due to adaptation in the Topeisen. This number provides flexibility in the future capacity after 2040.

5. Bustunnel: In part, the northern and western bus tunnels are now part of the construction of the bus station. This makes space use more compact and reduces the need for dams.

6. Logistics: As in model 0 + and 2, logistics traffic is channelled through level -1 of the bus station. The logistics on the east side is linked to the station hall via a lift, which ensures an efficient flow of goods to the commercial areas above.

7. Bust tunnel position: The bust tunnel is more southerly in the profile of the Fellenoord, which frees up more space for full green space in the surrounding public space framework. This contributes to a greener and more attractive station area.

scale 1: 2000

8. Station hall and KBC: The station hall is now built against the KBC building, including commercial areas and a logistic corridor/warehouse. On the one hand, this gives an interface and, on the other hand, it resolves an urban sprawl because the KBC building does not currently have an active plinth on the west side.

9. TUE route to city centre: The route from the TU Eindhoven to the city centre now passes through the station hall, strengthening the connection between the university and the city centre and providing a more lively station environment.

10. Bus station connections: The remaining connections (other than in the station hall) on the west side of the bus station are now in the public space. The focus here is on good weather protection.

11. Real estate opportunities: The real estate is now developed only on top of the bicycle parking area and is independent of the bus station. This allows for a better separation of functions and more flexibility in real estate development. As a result, the total size of the property is reduced to approximately 30.000 m² bvo.



Ground floor level (station hall and commercial, green and real estate)

scale 1: 2000



Level -1 (bus station, bus buffer, bicycle parking and connecting tunnels)

scale 1: 2000

SUGGESTED SOLUTIONS

MODEL 1

72

MIRT

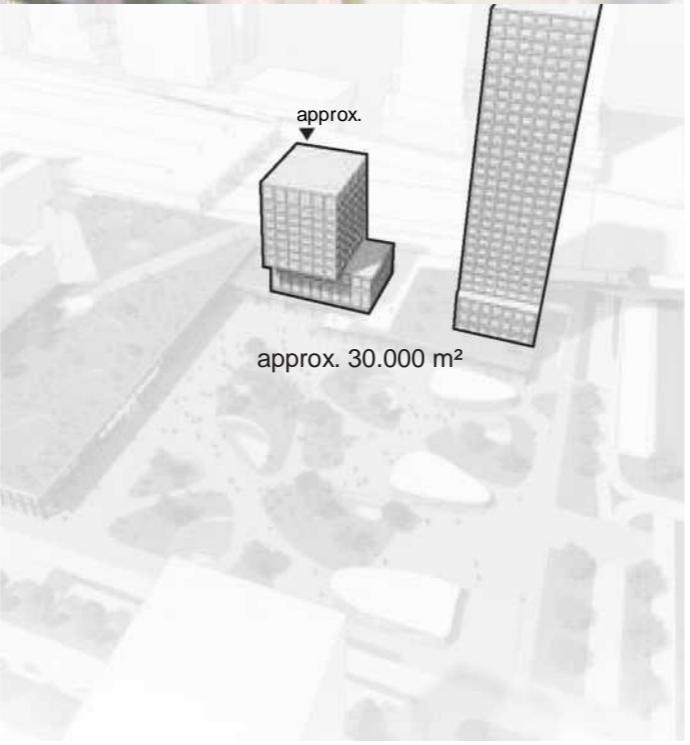
73

Real estate opportunities irrespectively of area development: For this model, a green station park at the Fellenoord has been chosen, with a station building situated with its face directly at the Fellenoord. This gives the station a prominent address at the boulevard. As a result, the property can be constructed at the top of the bicycle parking area along the track. A volume test was carried out at this stage. This makes it possible to say with a reasonable degree of certainty that the real estate shown is realistically feasible and feasible. In the developed variant there is room for approximately 30.000 m² of GFA property. In extreme cases, this can be extended to higher towers, but this is technically a very complex task and



Aerial view from the north thus puts pressure on the affordability of the (potential) dwellings. For the future, it is necessary to look more closely at the constructive challenges for real estate on top of the bicycle parking area and the impact of high construction on the wind climate and reflection on the station square.

Routing: The route from TUE to city centre and cluster 5 passes through the station hall and is a design challenge for the future. The route then passes through the green station park, which also serves as a park for the Fellenoord district. In addition, there is the possibility to connect the station square via the station roof to the roof park (Highline) along the track. The connection from the station to the Fellenoord is very prominent. The probability of an allure station at the Fellenoord is very present in this model.



Indicative real estate options (volume to be specified)



Openbare ruimte kaart



Activering van het ontvangst- en omgevingsdomein

SUGGESTED SOLUTIONS

MODEL 1

74

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V 75



Map of ground floor

scale 1: 1000

RESOLUTION DIRECTIONS MODEL 1

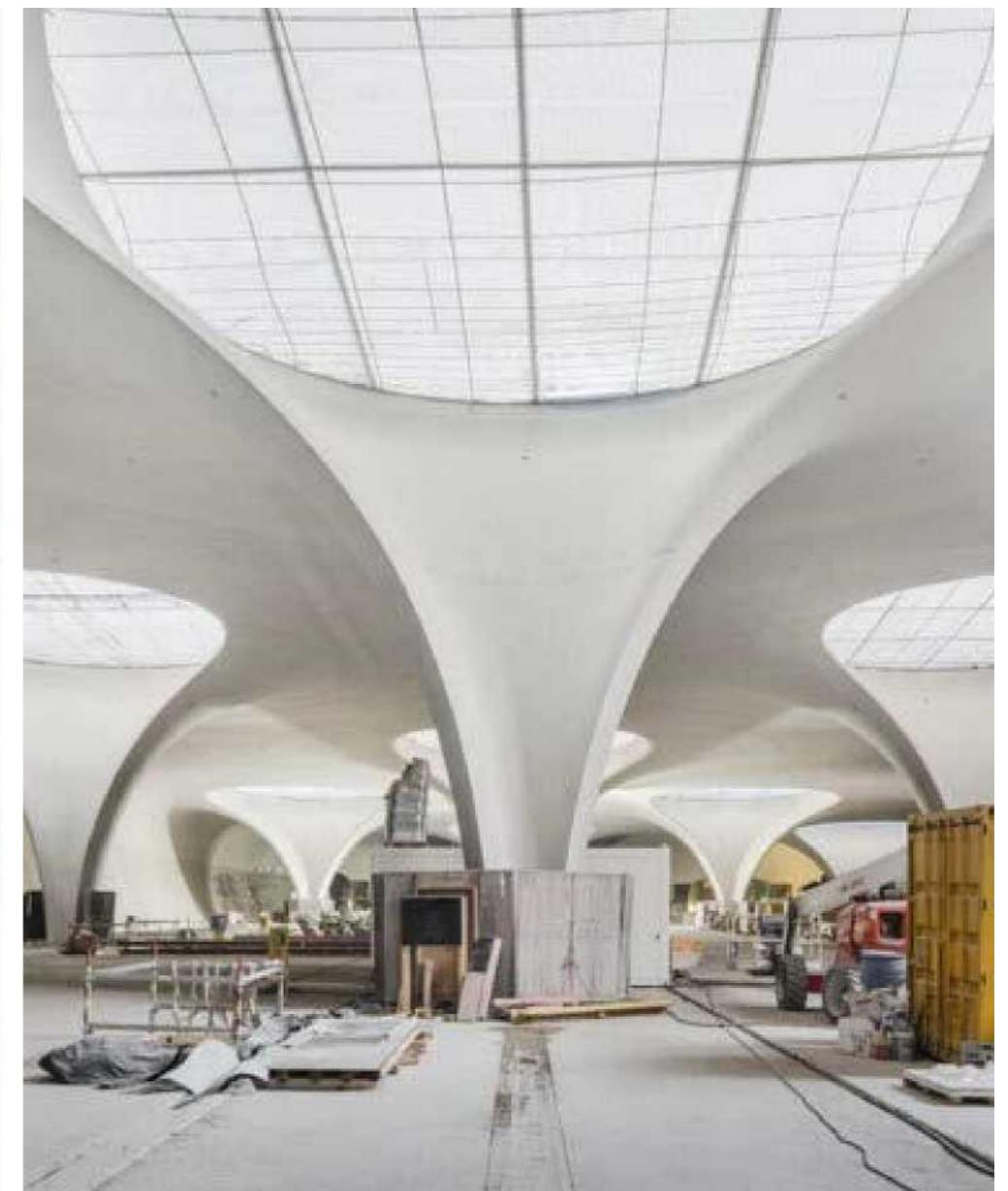


View of the station and station square from the entrance from Fellenoord

RESOLUTION DIRECTIONS MODEL 1



View of the station square from the roof park route on real estate development



Stuttgart train station reference – daylight entrance



TU Delft library references, public programme and park landscape combination

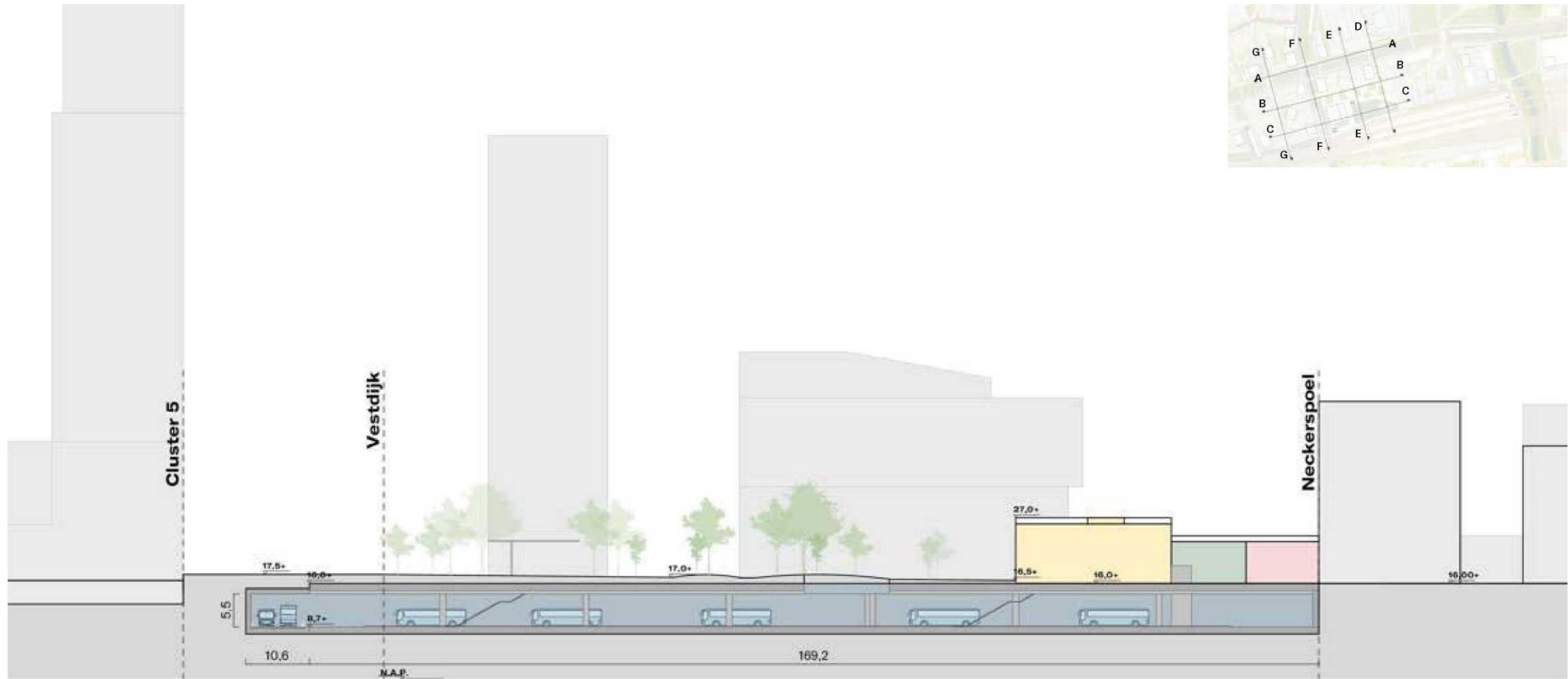


Reference Bratislava bus station – lighting



Stuttgart train station reference – daylight entrance

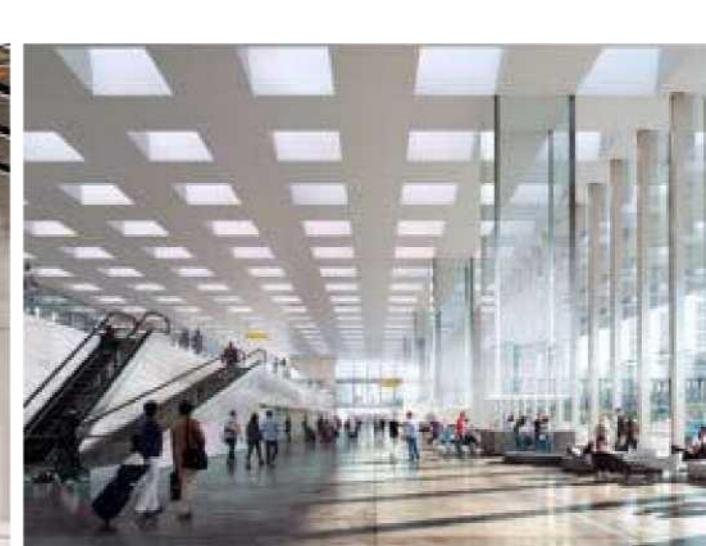
RESOLUTION DIRECTIONS MODEL 1



Stuttgart train station reference – daylight entrance



Reference Bratislava bus station – height and lighting

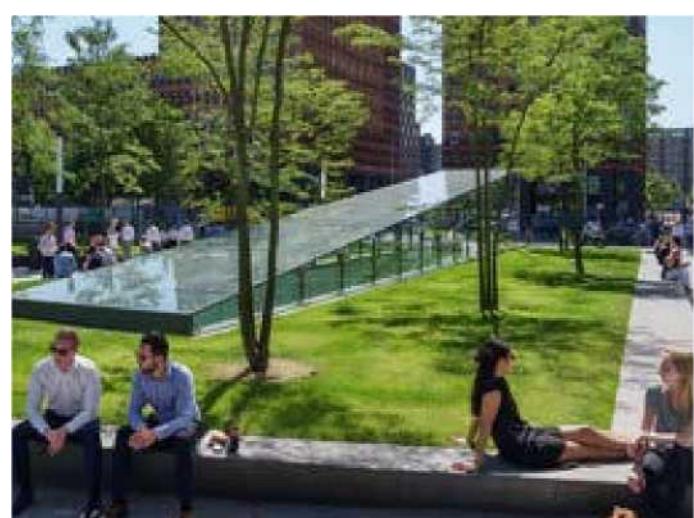
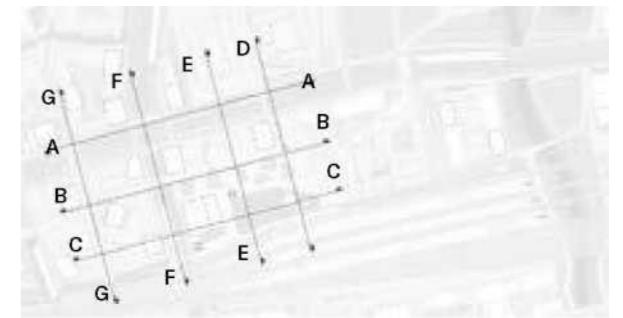


Reference Schiphol Terminal light and space in the hall (design Kaan)

RESOLUTION DIRECTIONS MODEL 1

82

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 83



References Mahlerplein Amsterdam and Kruisplein Rotterdam, green station squares on top of underground structures



Reference Europa Park Groningen



Reference Mahlerplein Amsterdam

RESOLUTION DIRECTIONS MODEL 1

84

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

85



View from the station hall to the station gallery and direction of the passengers' domain of the buses



View in the station hall at the level of the openings to the bus platforms



View from the roof park at the station hall and station park



View of a bubble platform

RESOLUTION DIRECTIONS MODEL 1

86

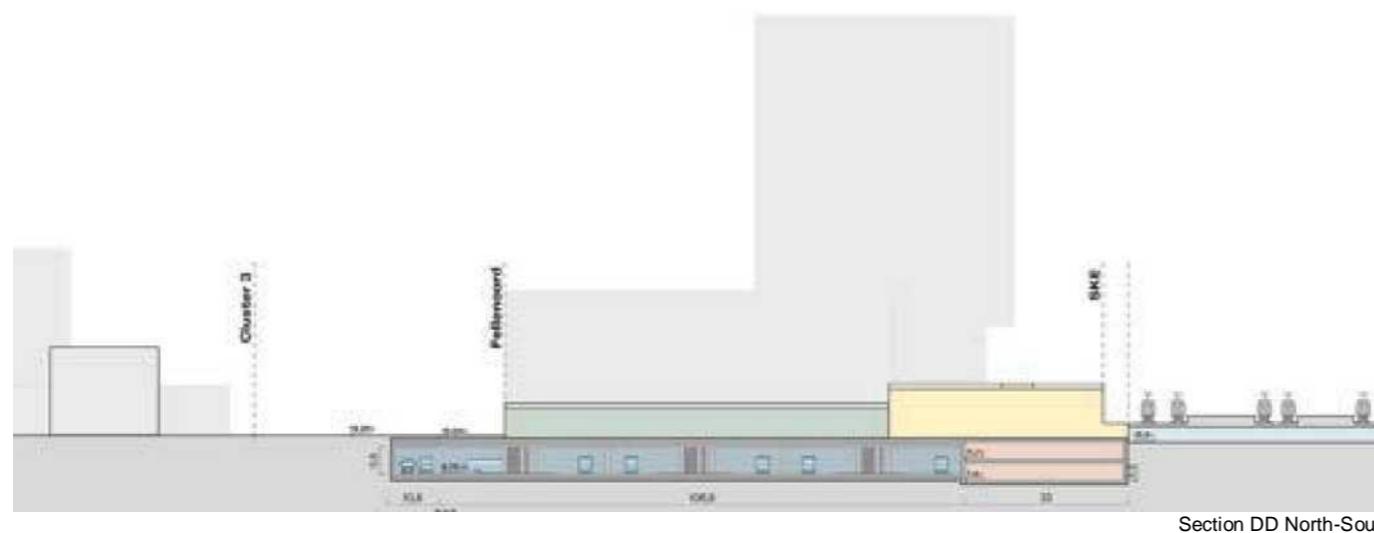
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

87



scale 1: 2500



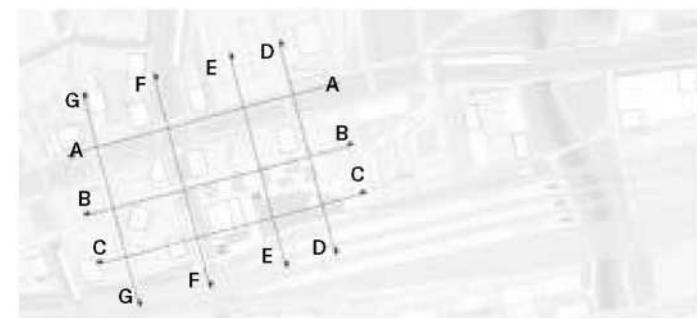
RESOLUTION DIRECTIONS MODEL 1 – SECTIONS

88

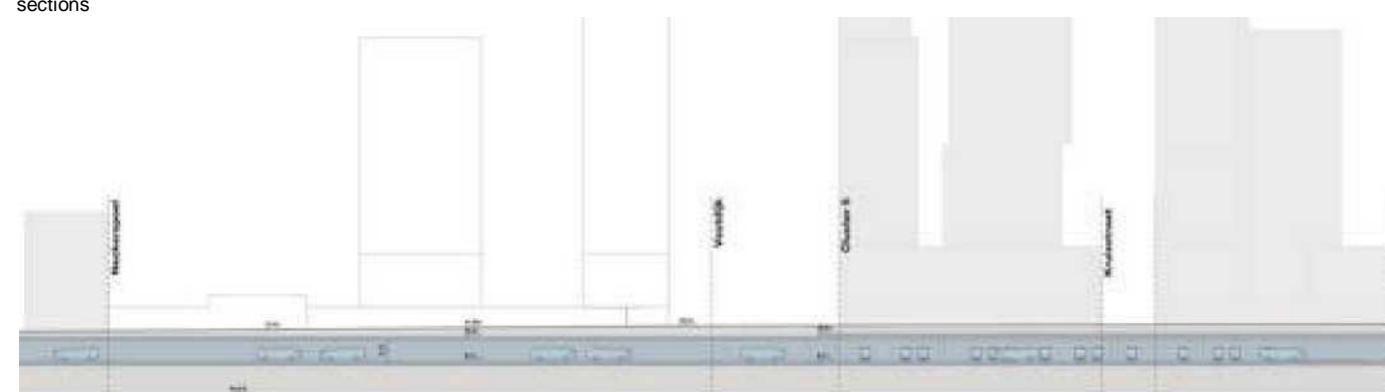
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

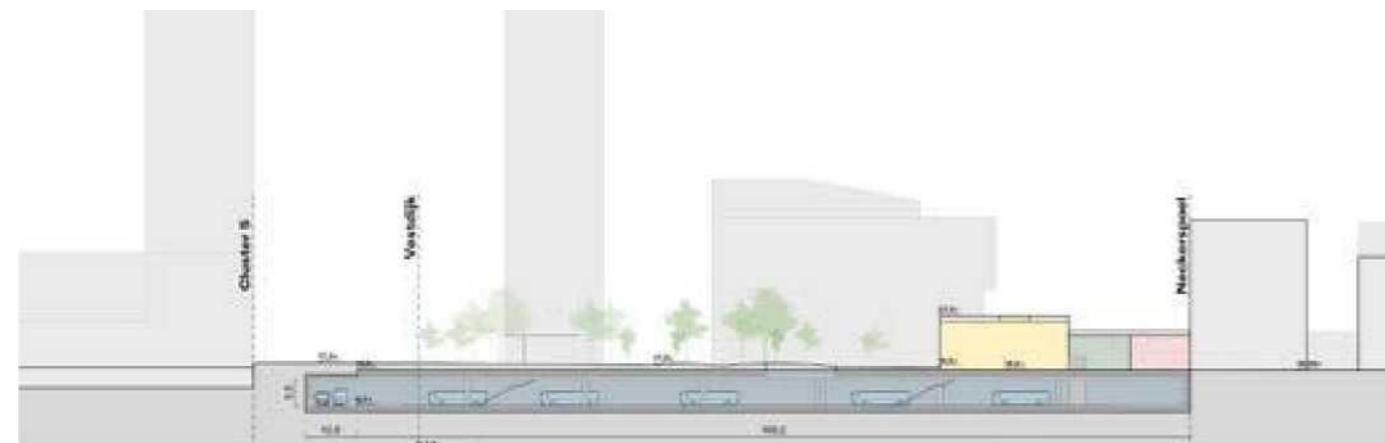
89



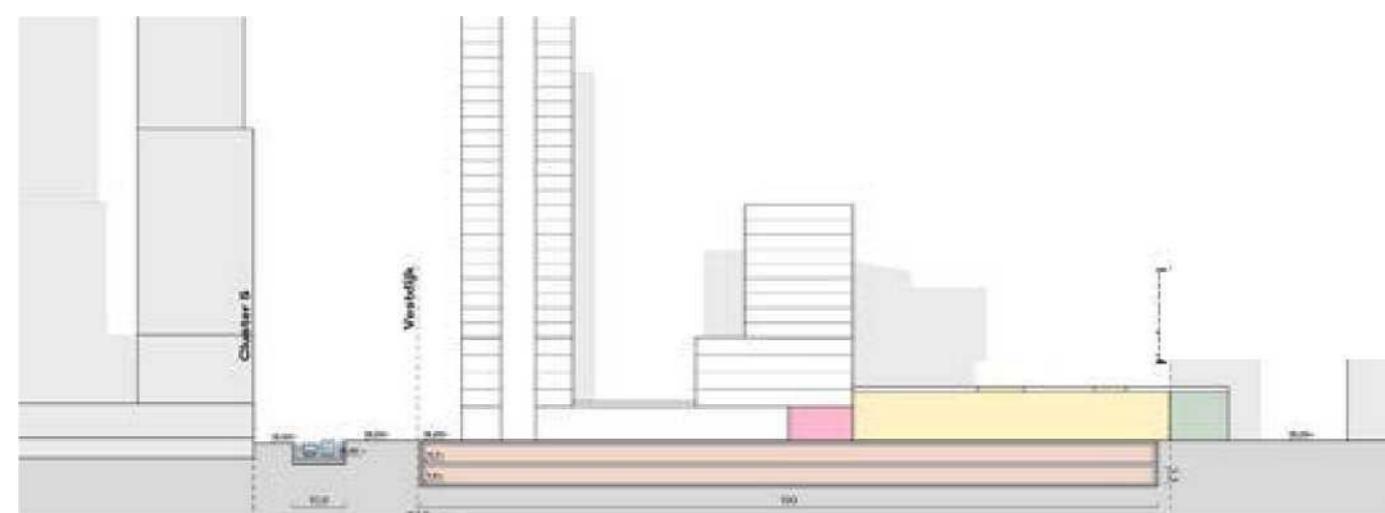
Cross-sections



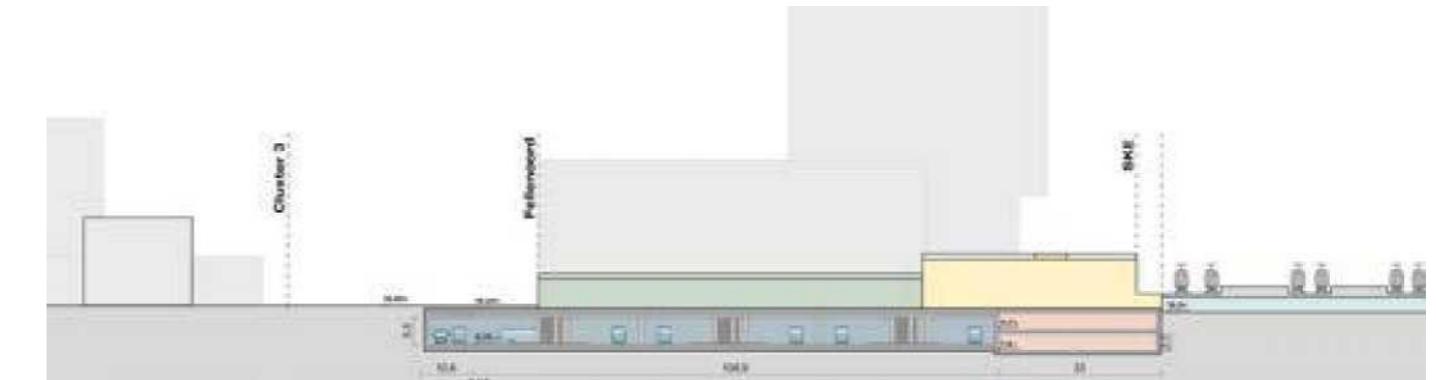
Doorsnede AA west-oost



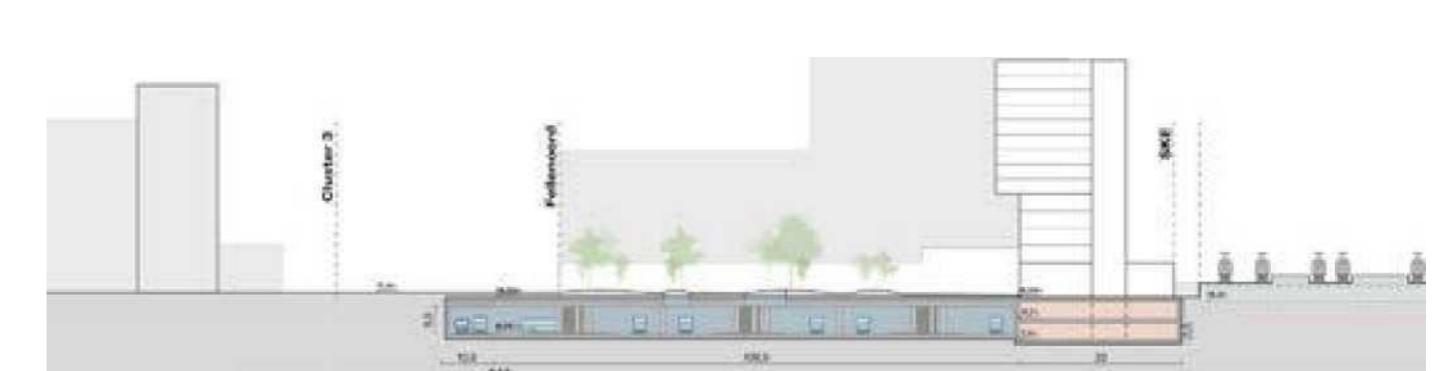
Section BB West East



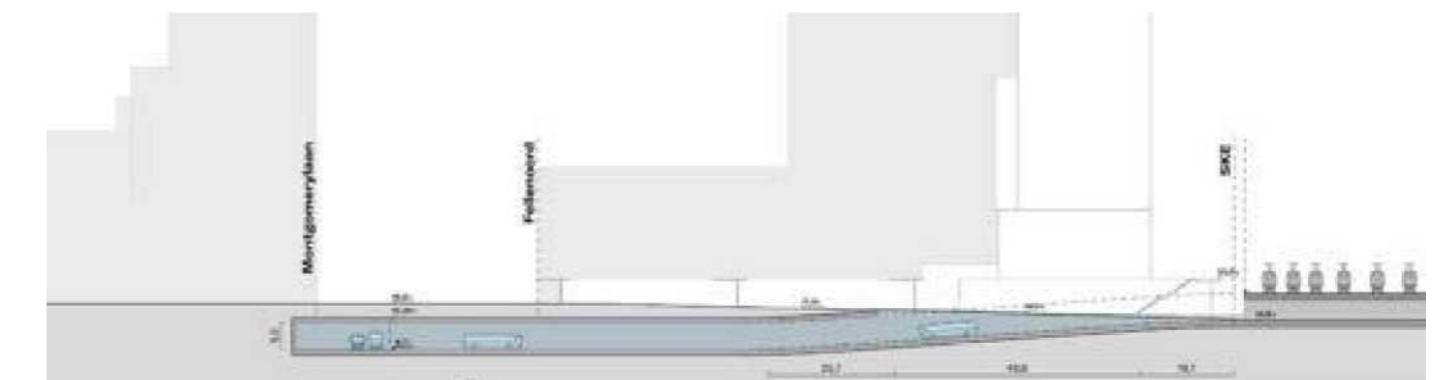
Section CC West East



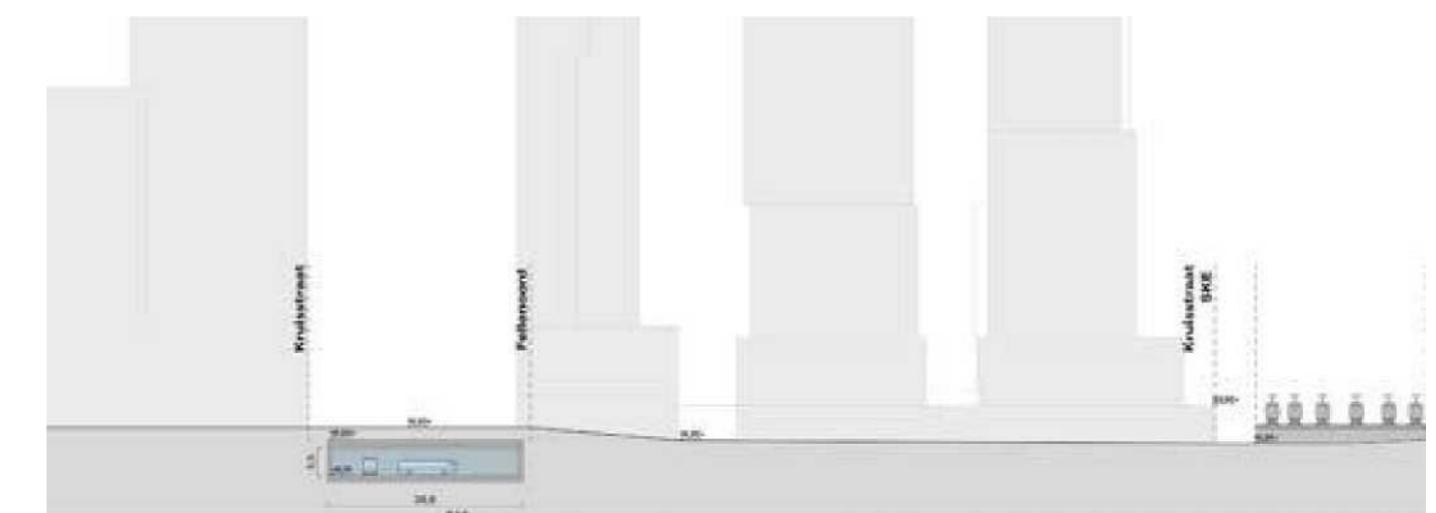
Section DD North-South



EE North-South section



Diameter FF North-South



GG North-South section

RESOLUTION DIRECTIONS MODEL 1 – MOBILITY

MIRT Exploration MMK, Eindhoven

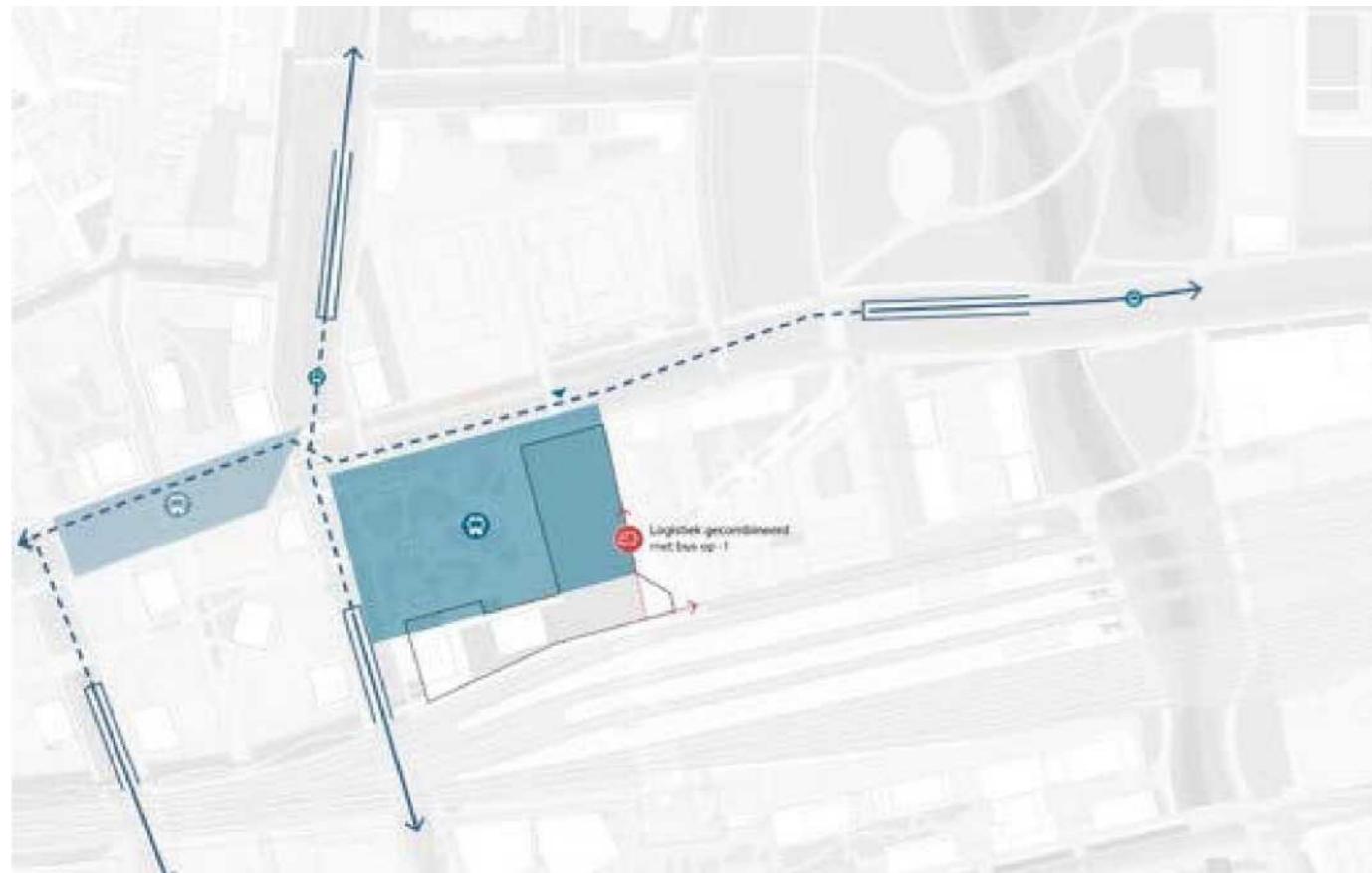
Movares + KCAP + Team V 91



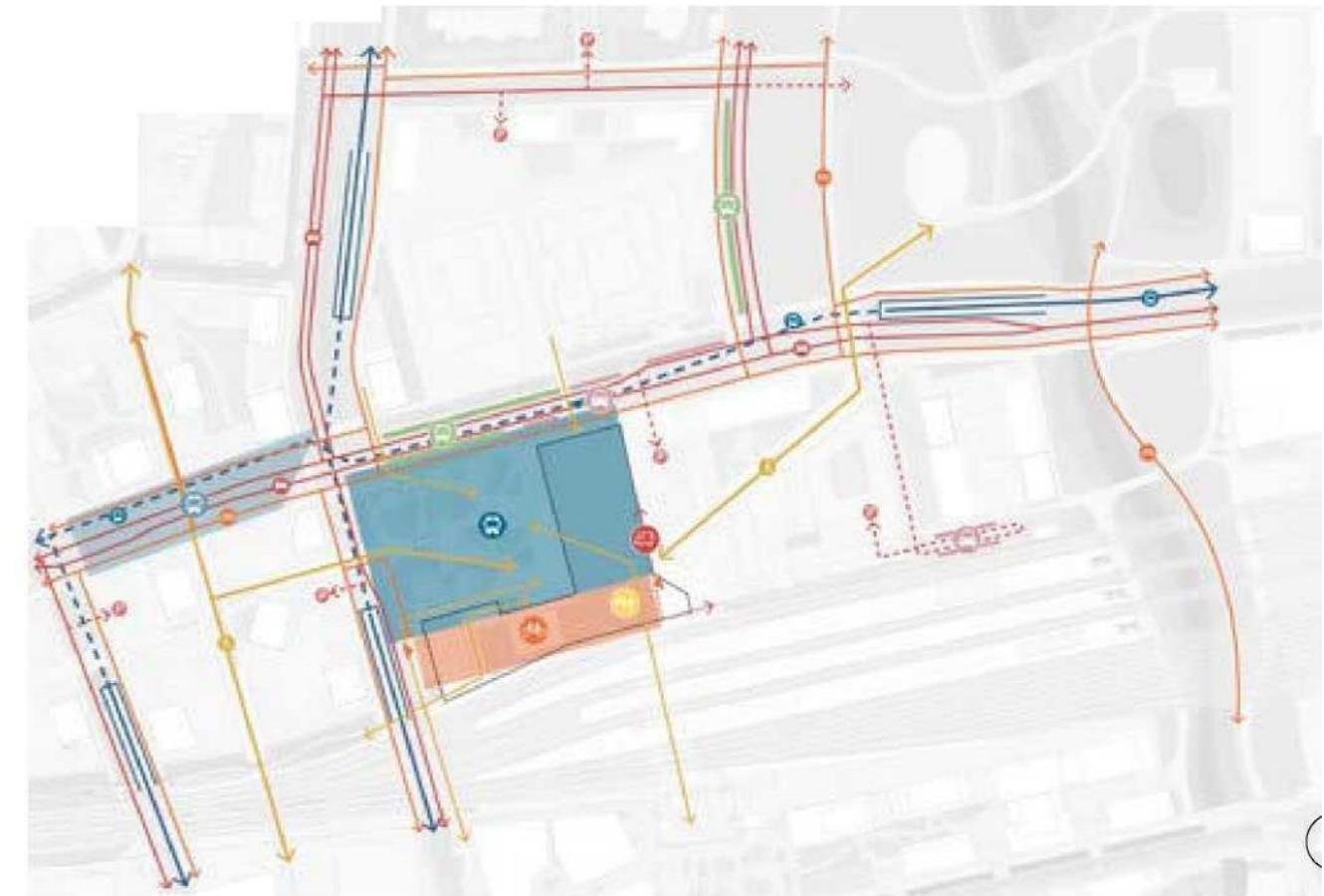
Pedestrian and bicycle routing



Routing k & r, taxi, TV, ib, car parking



Routing buses



R_Total mobility

RESOLUTION DIRECTIONS MODEL 1 – COMPONENTS



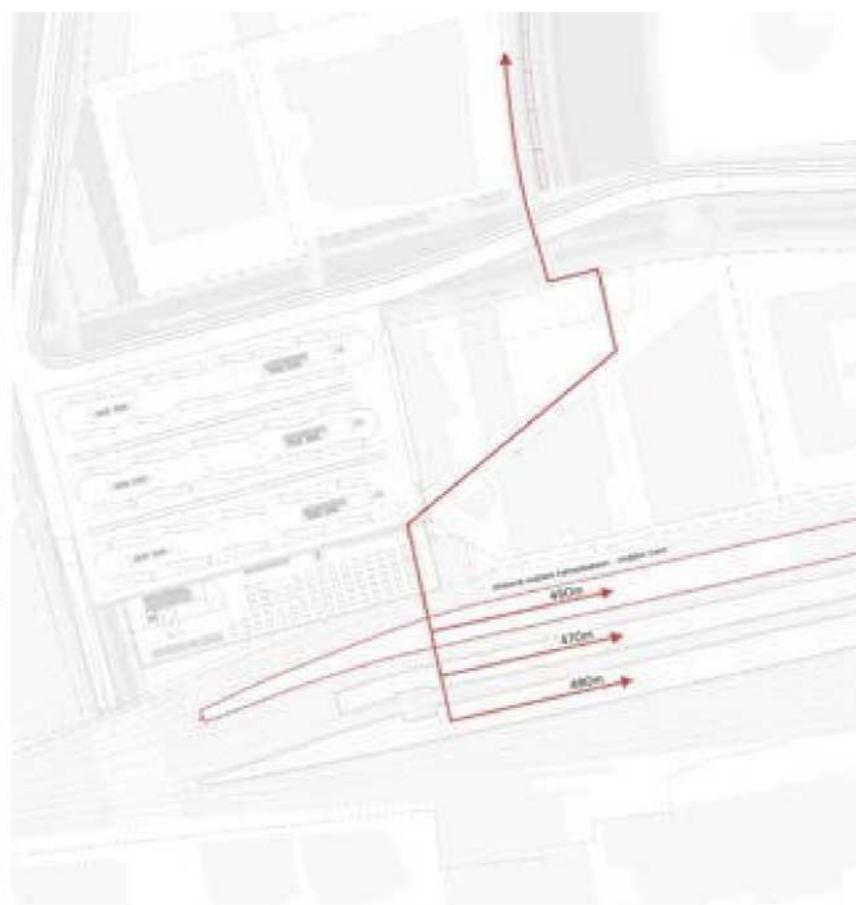
Number of stops and routing at bus station



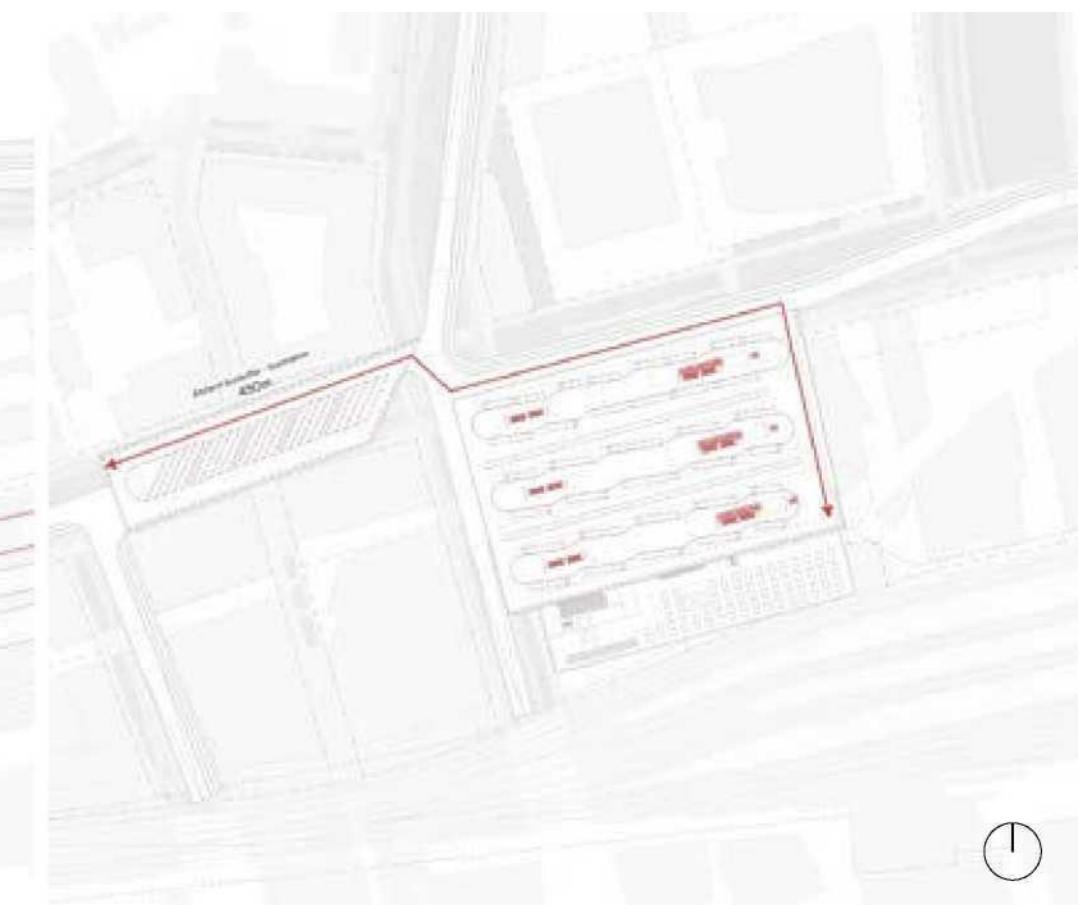
Green areas



Loopafstanden midden trein tot midden perron bus



Loopafstanden tussen Internationale bus en trein



Afstand tussen busbuffer en busstation



RESOLUTION DIRECTIONS MODEL 1

94

MIRT Exploration MMK, Eindhoven

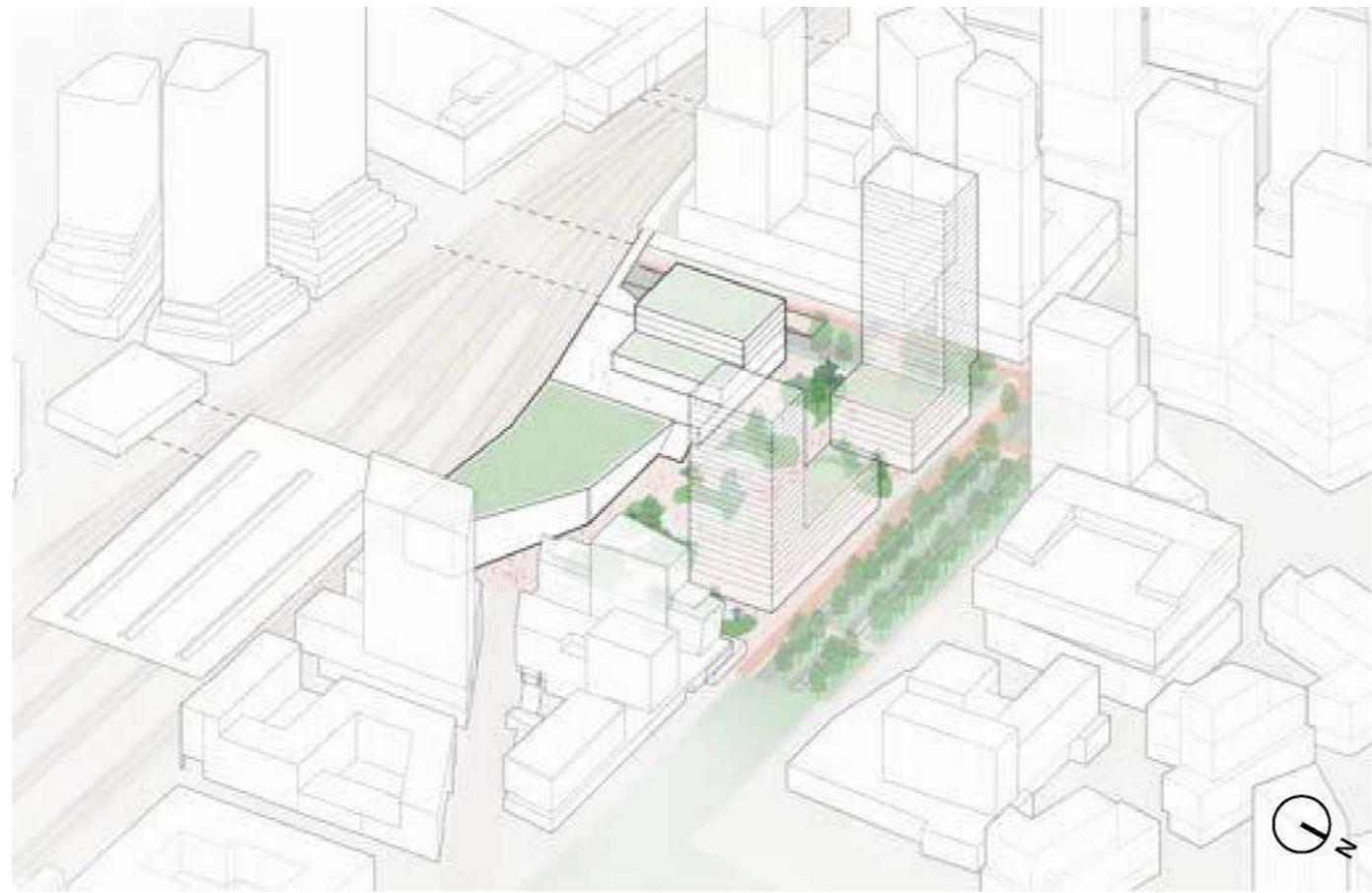
Movares + KCAP + Team V

95



View of bus station

RESOLUTION DIRECTIONS TEMPLATE 2



Axonometry

General description of the direction of solution

Model 2

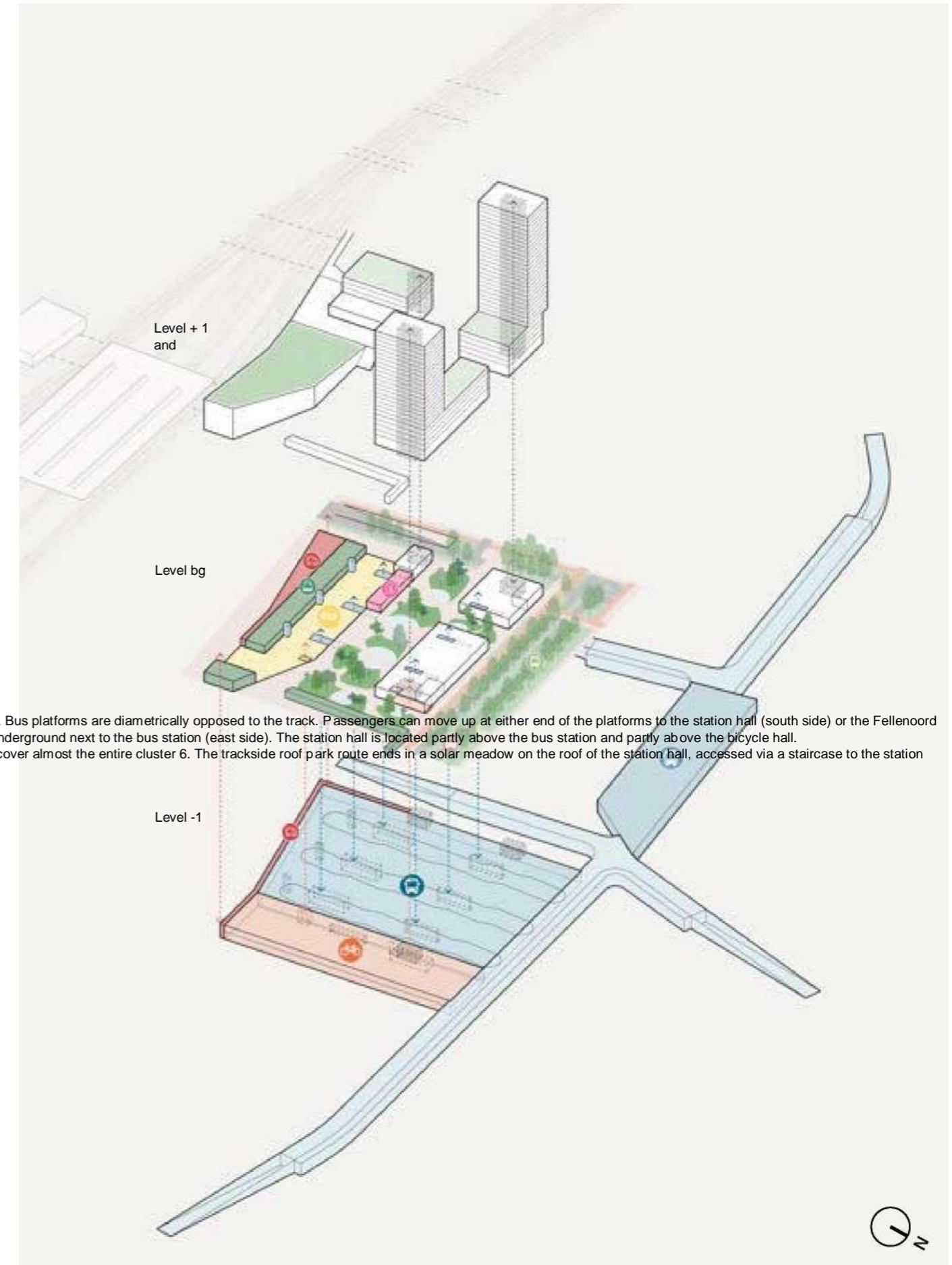
Underground bus station (level -1) on Necker coil (square)

This model includes a fully underground bus station (level -1) on Necker coil, partly below the Fellenoord, 2.5 m deeper than model 0 +, so that the transfer domain is level floors. Bus platforms are diametrically opposed to the track. Passengers can move up at either end of the platforms to the station hall (south side) or the Fellenoord (north side). Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The bike park is located underground next to the bus station (east side). The station hall is located partly above the bus station and partly above the bicycle hall. In addition to the bus station, functions such as a green station square and real estate (with cores next to the bus station) can be implemented. The bus station and bicycle park cover almost the entire cluster 6. The trackside roof park route ends in a solar meadow on the roof of the station hall, accessed via a staircase to the station square.

Distinctive elements

- Angle positioning of bus platforms in relation to train inspire; as a result, station hall parallel to rail.
- Bicycle parking over 2 layers, positioned perpendicular to the track with access from the Fellenoord.
- Real estate (public or private) possibly with cores next to the bus station at Fellenoord.
- Public property possible at the station hall with access to the Vestdijk Tunnel.
- Interior of the station, approximately 7.000 m², with a smaller address at the Fellenoord.

Global areas of building blocks	m
Length of tunnels/speeds other than ramp in metres	750 55
Length of ramps in metres	0
Tunnel speed surface	m ²
Tunnel area -1 (including structural outer wall)	7.000
Bus station surface – 1 (including structural outer wall)	11.000
Bus buffer surface (including structural outer wall)	17.700
Bicycle parking area (per layer – x2)	5.850
Green mowing area	5.300
Surface solidified	3.500
Green roof area (station hall) * * *	5.200
Energy roof area (station hall)	3.500
Area of buildings cluster 6 (no MMK)	1.500
Area of buildings cluster 6 (indicative CSR)	5.700
Station hall area (transfer room)	51.000
Station area (commercial)	3.550
Logistics area (warehouse)	1.640
	600



Functional axonometry of the building blocks (oa bus station, bus buffer, bicycle parking, station hall and connecting tunnels)

RESOLUTION DIRECTIONS

TEMPLATE 2

100

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 101



Aerial view from the south

RESOLUTION DIRECTIONS

TEMPLATE 2



Plan map top view
Differences from the Long List

1. SKE contour and MMK: The MMK now remains outside the SKE contour. This means that there is space for a northern side platform for SKE. If a different solution is chosen in the MIRT exploration SKE, more room may be left for MMK. This mainly allows for smaller building blocks such as logistics and technical rooms for the bus station.

2. Bus station height: The bus station is now 2.1 metres higher (floor level 8,7 NAP instead of 6,6 NAP). This is due to several reasons:

- The bicycle parking area is located next to the bus station instead of above it, which saves ground moving and requires less transitional constructions.
- Space is reserved within the design for increased clearance height (5.5 m instead of 5.2 m) and thicker floors (1.2 m instead of 70 cm, plus 60 cm of cross-members). This makes the bus station a total of 1.4 m higher as a building block.

3. Real estate opportunities: The property with cores is now adjacent (one of which is adjacent to the station hall) rather than on top of the bus station, significantly reducing the costs of transition constructions. A bicycle park in a transitional structure on top of the bus station would be difficult to understand due to the necessary columns and intersections.

4. Integrated carriageway: The northern carriageway of the bus tunnel is now integrated with the bus station. This offers advantages in terms of space and is necessary because of the extension of the bus station to include, inter alia, 25 m stops and safety regulations requiring longer intermediate lengths between stops.

5. Reclassification of bus platforms: The number of bus platforms is now 30 + 4 stops instead of 30 + 6. The 30 entry stops are divided into three island platforms instead of four, which makes space for bicycle parking next to the bus station. As a result of the new distribution and additional safety requirements, the bus station is extended by 30 metres and thus crosses under the Fellenoord, in combination with the integrated lane of the bus tunnel. Due to sufficient depth, there is sufficient possibility for ground cover on top of the bus station. The ground cover is gradually decreasing towards the station and KBC is increasing.

6. Busbuffer: The bus buffer is fully integrated with the tunnel and is located below the Fellenoord, so there is no longer any direct interface with the development of cluster 5. 20 buffer sites are planned.

7. Logistics: Logistics traffic for the station is routed through level -1 of the bus station, with a stall on the west side, in the same strip as where the cores of the property are positioned. This traffic runs alongside the bus transport through the tunnels and the bus station, and is connected via a corridor and lift to the station hall and the logistics warehouse behind the commercial areas.

8. Bicycle storage: There will be a bi-layer bicycle parking instead of a single layer, which will reduce the depth of the model. The lower layer is accessible with a tapis rotating to -2 and a drought rising to level -1.

9. Station hall: The station hall is wider and more prominent at the station gallery, with real estate only integrated at the extreme west. This property may be given a public function. The slatted line has been moved on the site side because the building blocks of transfer space and commercialisation have increased. In addition, there is a 16 m gap between the diagonal to the TUE and the KBC plinth.

10. MIVA, Taxi and K & R: These functions are now located in the Fellenoord instead of on top of the bus station, which separates these functions from the bicycle park and makes them less dependent on each other.

11. Taxi-buffer spots: The taxi buffer stations have now been placed behind KPN rather than on top of the bus station. These areas may be positioned further away from the MMK.



Ground floor level (station hall and commercial, green and real estate)

scale 1: 2000



Level -1 (bus station, bus buffer, bicycle parking and connecting tunnels)

scale 1: 2000

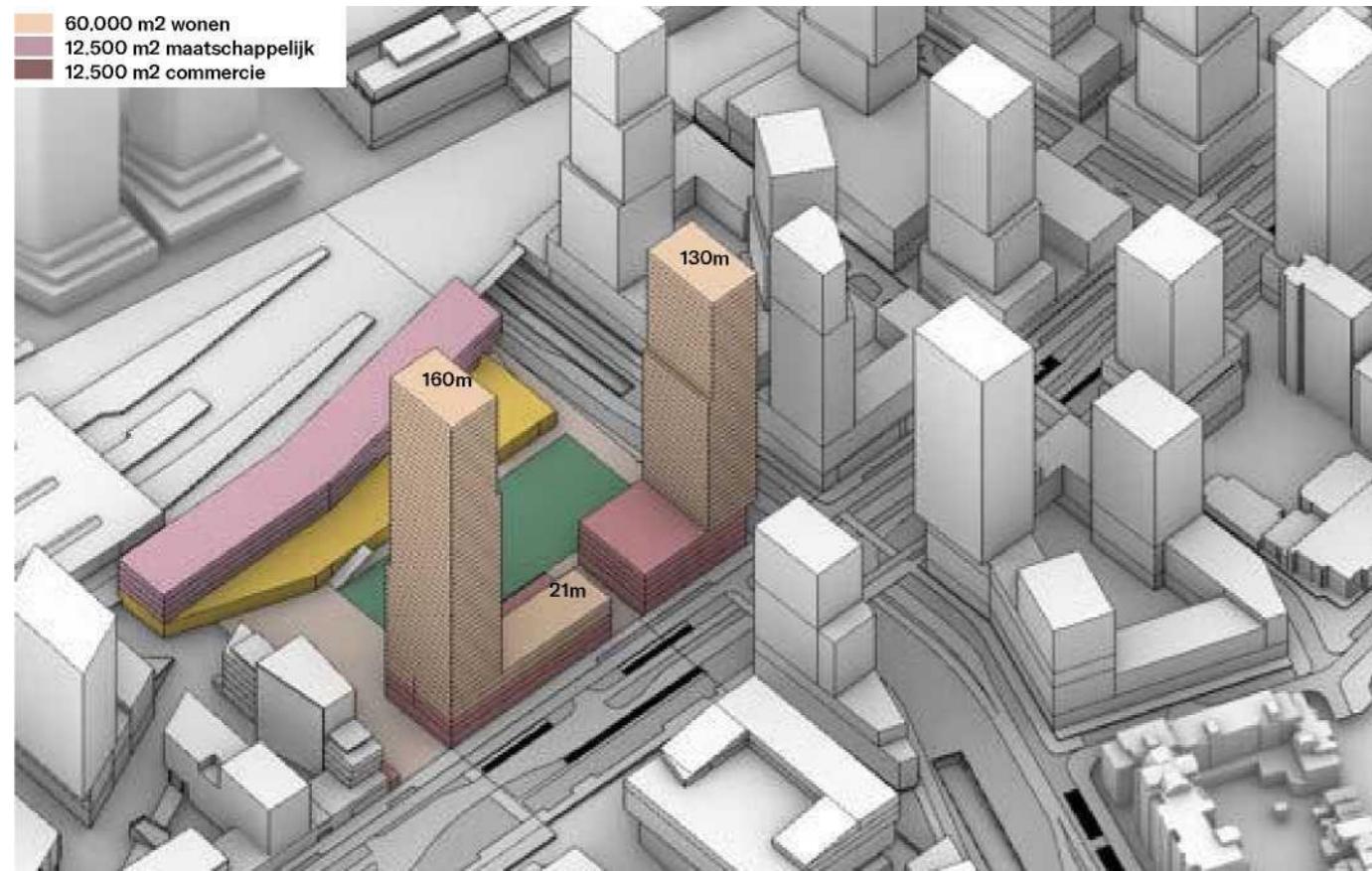
RESOLUTION DIRECTIONS REAL ESTATE OPPORTUNITIES

104

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

105



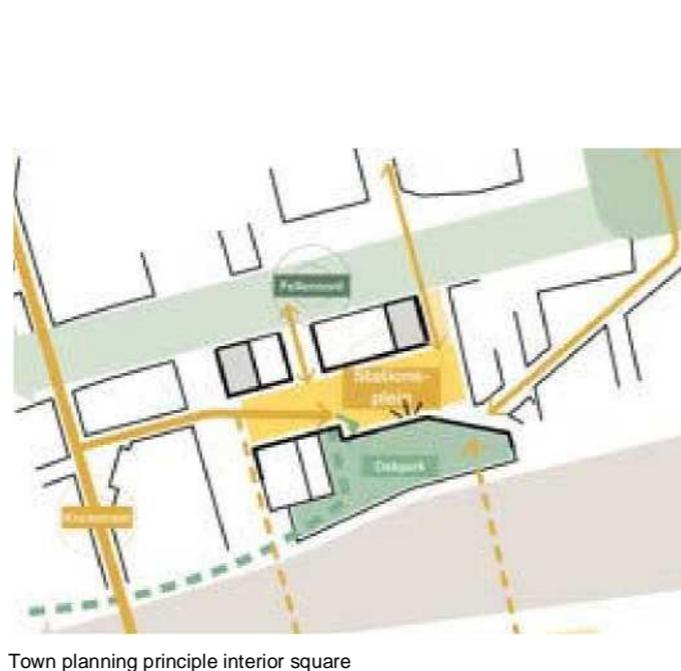
Axonometry with Indicative Test Volume Cluster 6 Option

Real estate opportunities

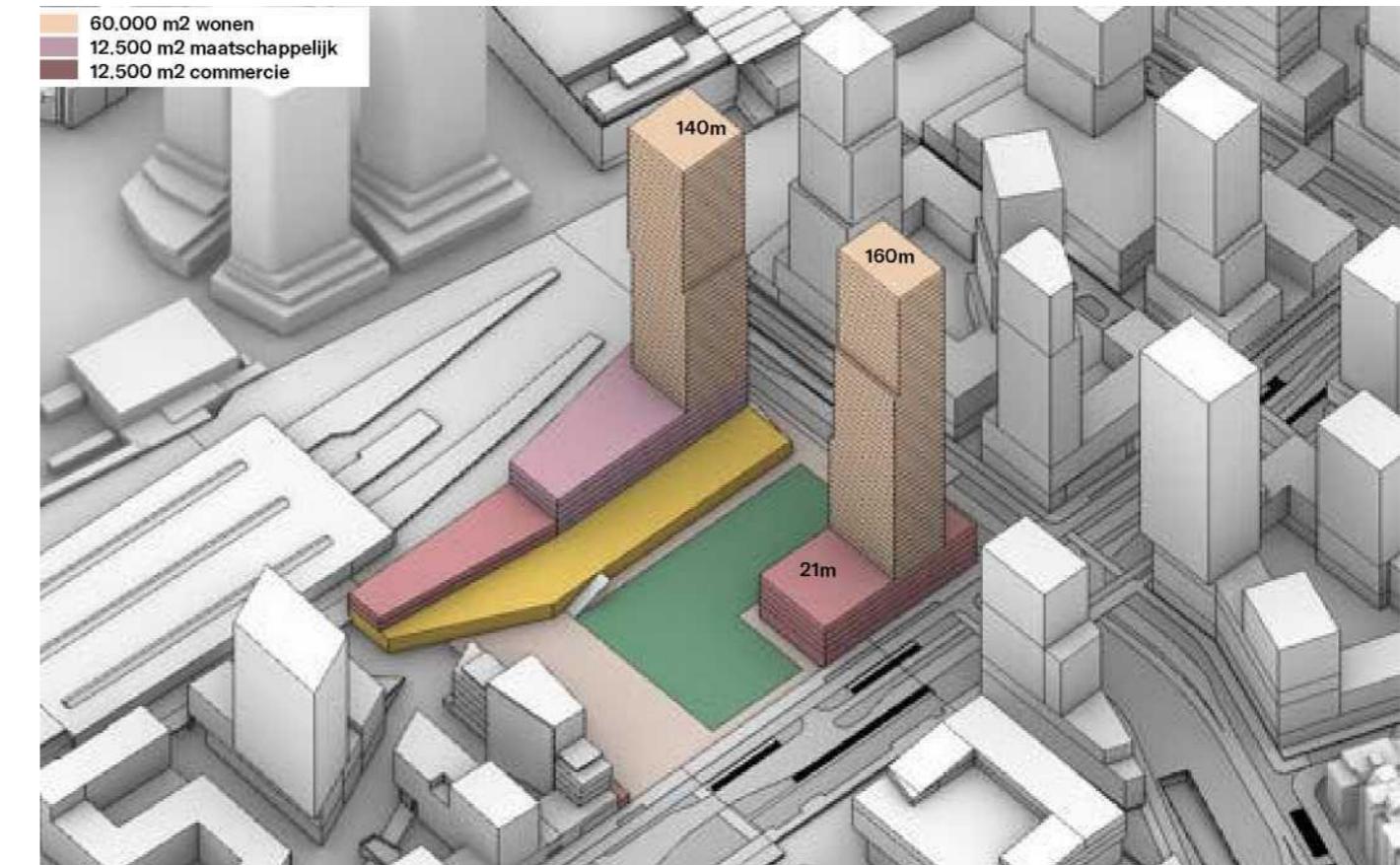
The real estate options for the solutions on the Short List show that several designs are still possible at this stage. It was deliberately chosen to show these differences in order to illustrate the range of options available and to reveal (some of) the design tasks for the exploratory phase. Indeed, there is not yet one leading design solution at this stage, but only evidence of possible design solutions.

Based on the development of the Fellenoord area, there is a requirement of 85,000 m² of BVO for the building inventory cluster 6. For model 0 + and 2, different options were explored for this property on or adjacent to the bus station and the bicycle park. In addition to the bus station, functions such as a green station pitch and real estate can be implemented.

1. Station floor interior (approx. 7 000 m²) – real estate mainly at Fellenoord (applies to both models 0 + and 2)
Option 1 assumes a compact interior square of approximately 7,000 m² (for comparison: Southern station area receives a square of approximately 6,000 m²) behind a strip of buildings with real estate centres which are positioned next to the bus station and therefore the vertical load is less dependent on the construction of the bus station. In addition, the horizontal forces must be absorbed by a transitional structure in the shelf of the property. In theory, the desired volume for cluster 6 (85,000 m² of BVO) can be achieved, but this will become so dependent, complex and costly to develop that it is unlikely that these meters will be achieved with the requested programme mix.



Town planning principle interior square



Axonometry with indicative volume cluster 6 option 2

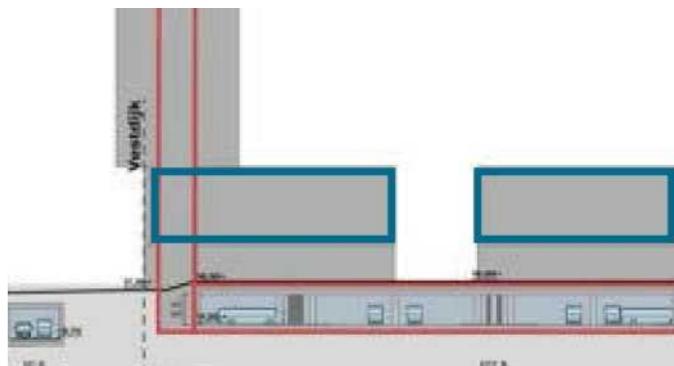
The station square is green and plays an important role in the ecological connection between the future trackside roof park and Fellenoord, but also as an important residential gap between the clusters. The traffic and logistics functions have been resolved next to or under the square. Holes are made in the station square for light entry to the bus station in order to increase the quality of stay at the underground level.

In this model, the square and the station building connect mainly the two east-west lines: KBC and the University towards East and the long line towards Clusters 4 and 5, the busiest routes now and in the future. In order to create an address at the Fellenoord for the station, the building edge is crossed at two points so that the station can be seen from the boulevard.

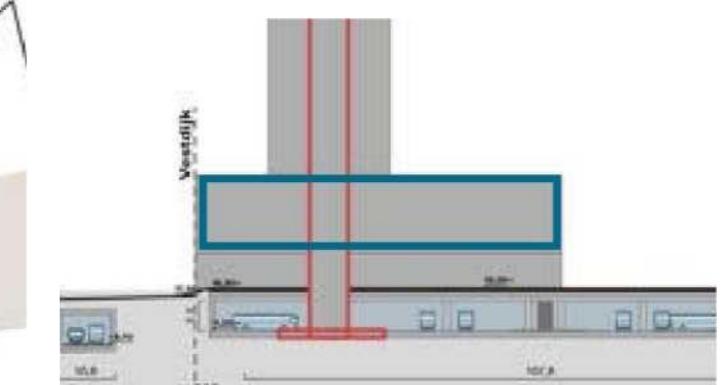
2. Stationsplein at Fellenoord (approx. 9,000 m²) – real estate mainly at



Town planning principle open square



Section of property option along with cores adjacent to the bus



Section of property option perpendicular to cores passing through the

RESOLUTION DIRECTIONS

REAL ESTATE OPPORTUNITIES

Vestdijk Tunnel
(applies to both model 0 + and model 2)

Option two assumes real estate mainly positioned at the Vestdijk Tunnel resulting in a larger station square of approximately 9.000 m² with a strong orientation towards the Fellenoord. At this stage, both options are still on the table. For this configuration, both technical principles to construct real estate (represented on the right) are possible. Both with cores through the bus station and with cores next to the bus station. The first is made possible by the application of a wider tube platform through which various cores can be placed. This provides at least a 7 m wider bus station and is therefore also a substantially more expensive option. In the context of overview and social safety on bus platforms, this variant is also less desirable.

RESOLUTION DIRECTIONS TEMPLATE 2

106

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

107



Aerial view from the north



1

Real estate opportunities irrespectively of area development: As described on the previous page, in this model real estate is possible at the Fellenoord and/or at the Vestdijk Tunnel, depending on the choice of an interior square or open square. In both options there is a bandwidth of the BVO to real estate, which needs to be explored in more detail in the parallel section for Cluster 6.

A volume test was carried out at this stage. This makes it possible to say with a reasonable degree of certainty that the real estate shown is realistically feasible and feasible. In the developed variant there is room for approximately 50.000 m² of GFA property. At the very most, this can be extended to higher towers in order to achieve the requested volume of 85.000 m² of GFA, but this is technically a very complex task and thus puts pressure on the affordability of the (potential) dwellings.

The research question for the remainder is what the choice of interior or exterior square means for the volume of real estate. In addition, there is a need to look more closely at the constructive possibilities around the bus station and bicycle parking and at the impact of high construction on the wind climate and reflection.

Routing: The route from TUE to inner city and cluster 5 passes through the station square. In addition, there is the possibility to connect the station square via the station roof to the roof park (Highline) along the track. The connection from the station to the Fellenoord starts with two openings between the buildings at the Fellenoord, as shown on the previous page. However, this can also be done with the option of greater pledging to Fellenoord.

RESOLUTION DIRECTIONS

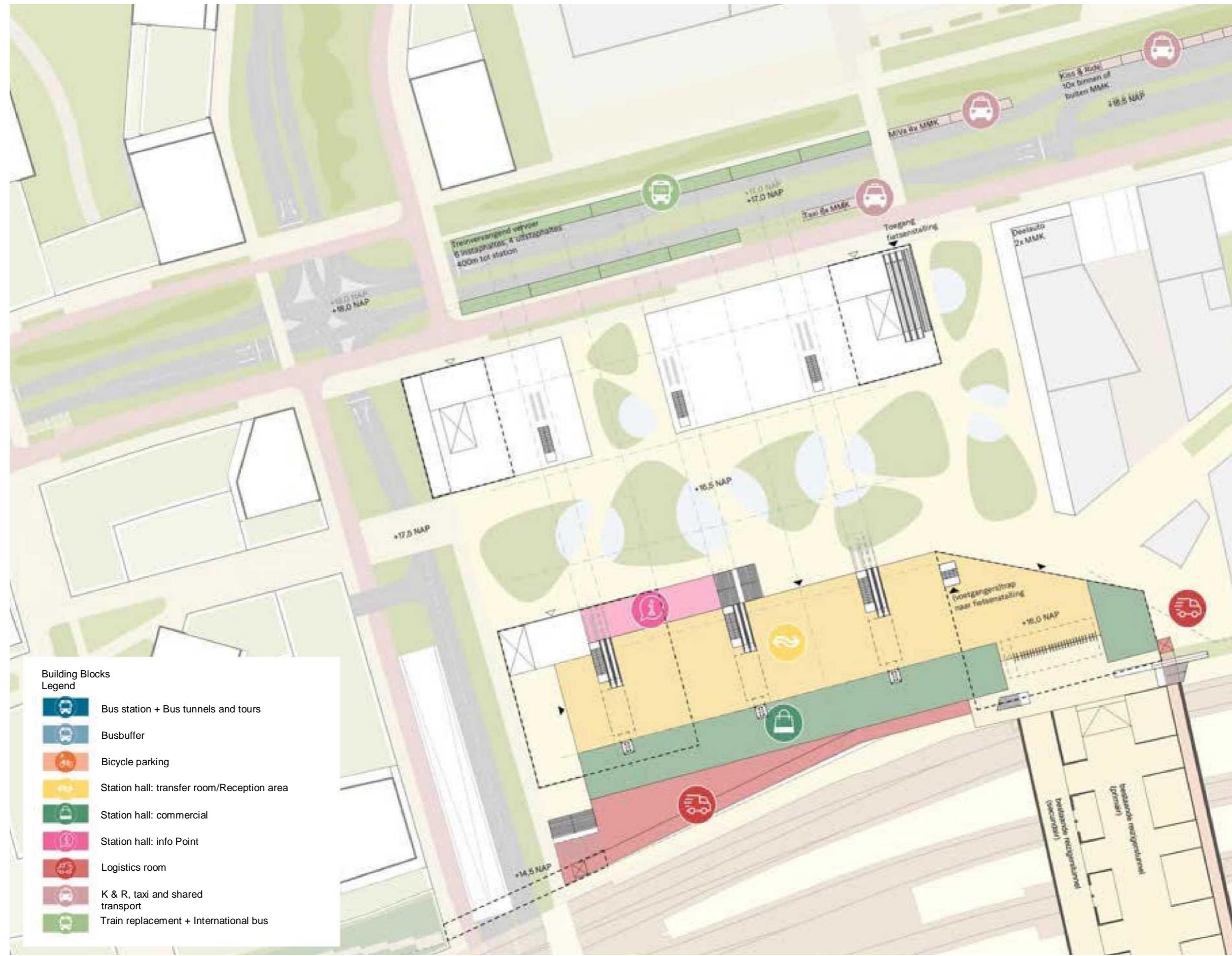
TEMPLATE 2

108

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

109



scale 1: 1000

RESOLUTION DIRECTIONS

TEMPLATE 2

110

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

111



View of the station and station square from the entrance from Fellenoord

FMI

RESOLUTION DIRECTIONS

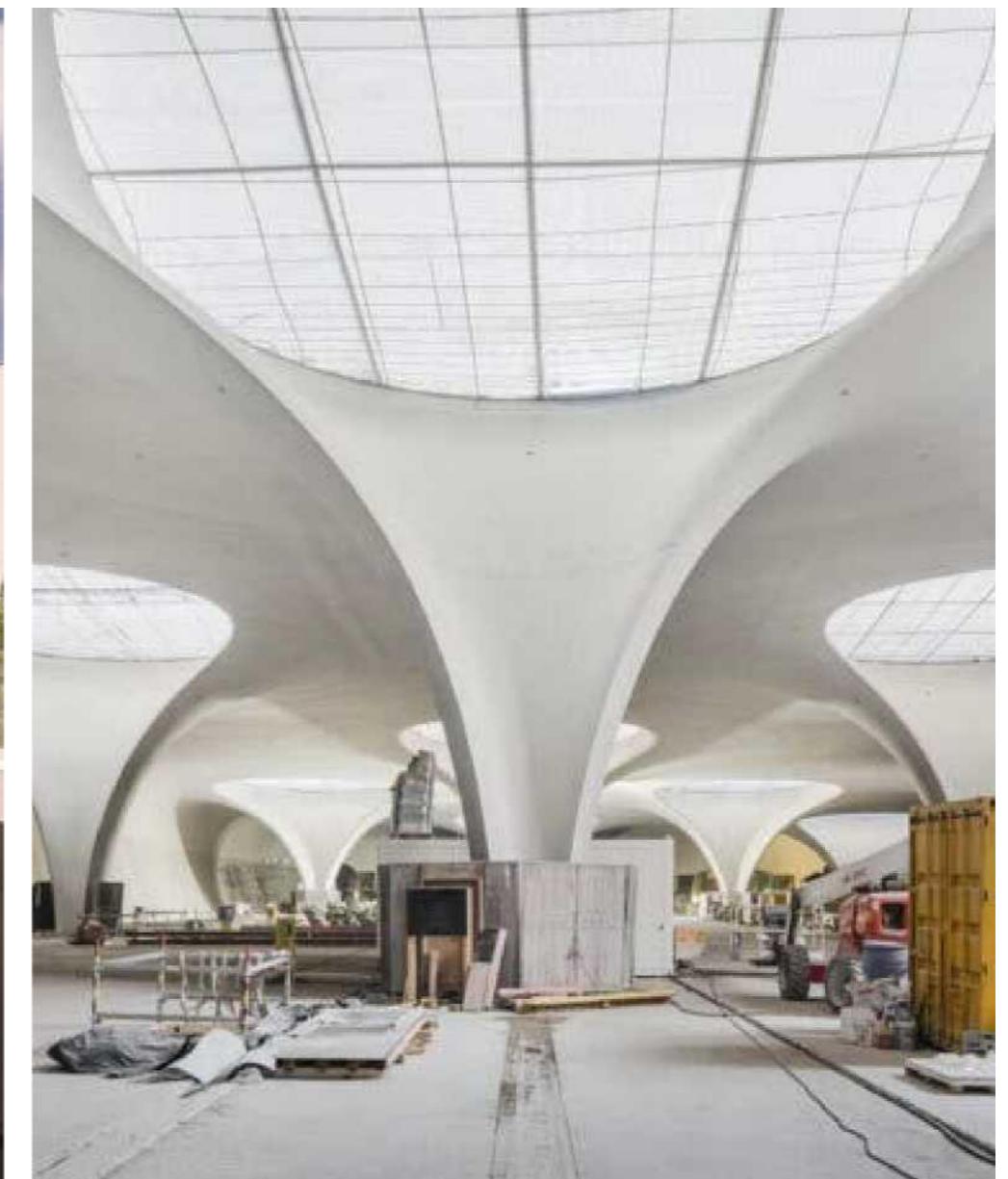
TEMPLATE 2

112

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 113



View of the station square from the roof of the station hall



Stuttgart train station reference – daylight entrance



TU Delft library references, public programme and park landscape combination



Reference Bratislava bus station – lighting



Stuttgart train station reference – daylight entrance

RESOLUTION DIRECTIONS

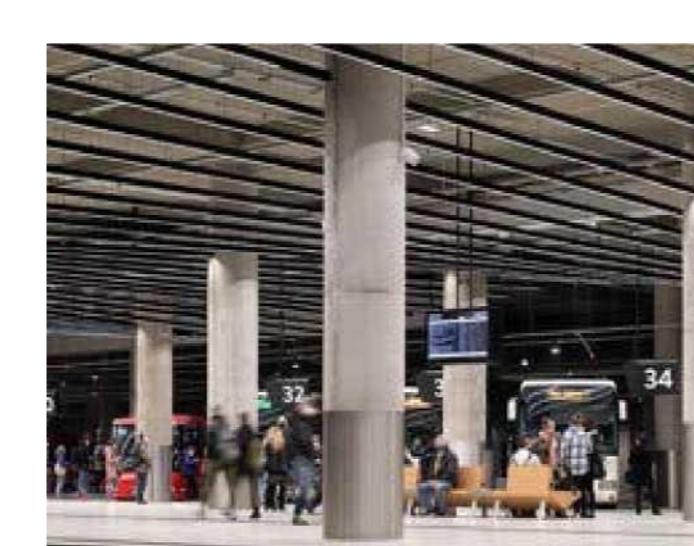
TEMPLATE 2

114

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 115



Stuttgart train station reference – daylight entrance



Reference Bratislava bus station – height and lighting



RESOLUTION DIRECTIONS

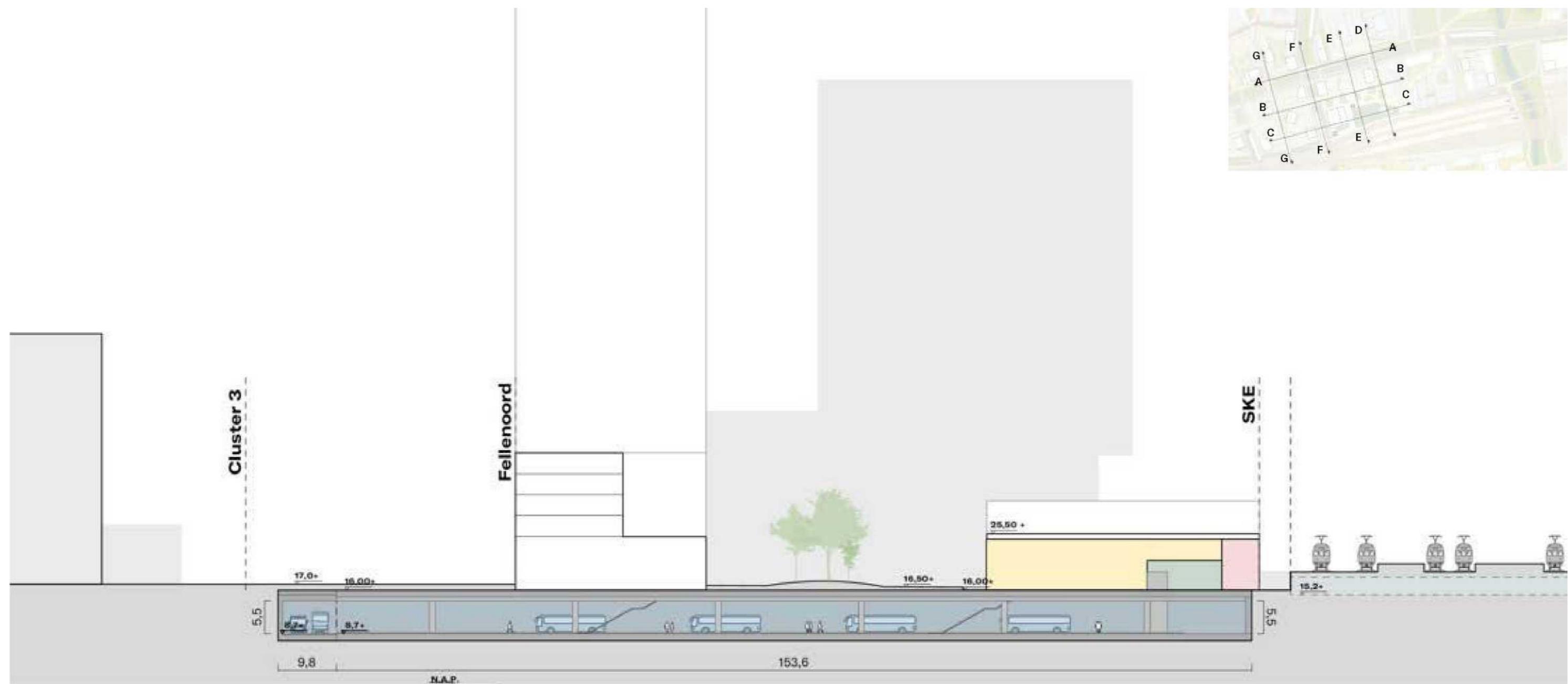
TEMPLATE 2

116

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

117



References Mahlerplein Amsterdam and Kruisplein Rotterdam, green station squares on top of underground structures



Reference Europa Park Groningen



Reference Mahlerplein Amsterdam

RESOLUTION DIRECTIONS

TEMPLATE 2

118

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 119



View from the station hall to the station gallery and direction of the passengers' domain of the buses



View in the station hall at the level of the openings to the bus platforms



View inside the bicycle parking area from the staircases to the station hall



View of a bubble platform

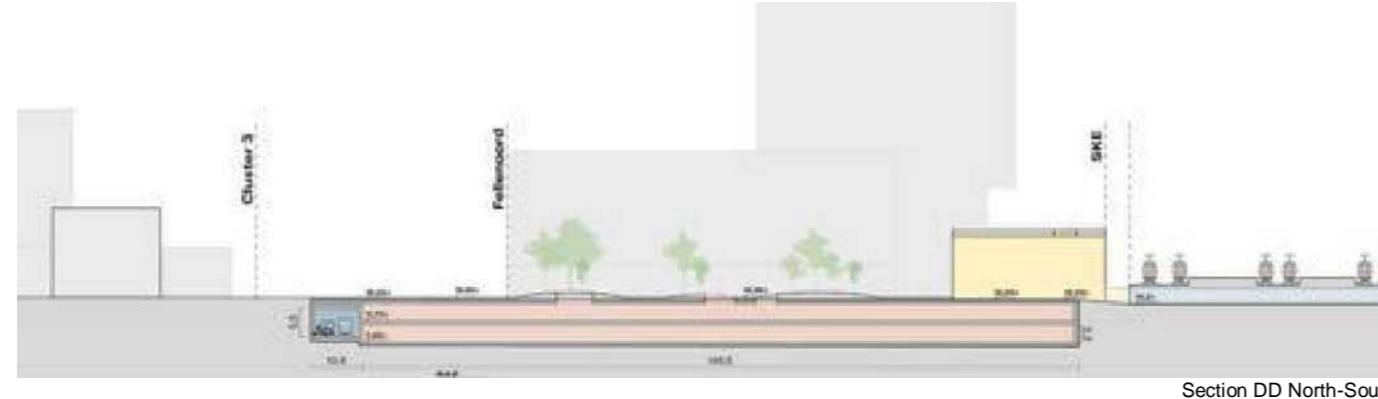
RESOLUTION DIRECTIONS TEMPLATE 2

120

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 121



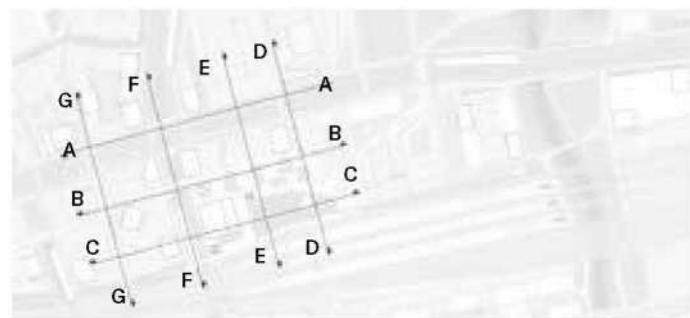
scale 1: 2500



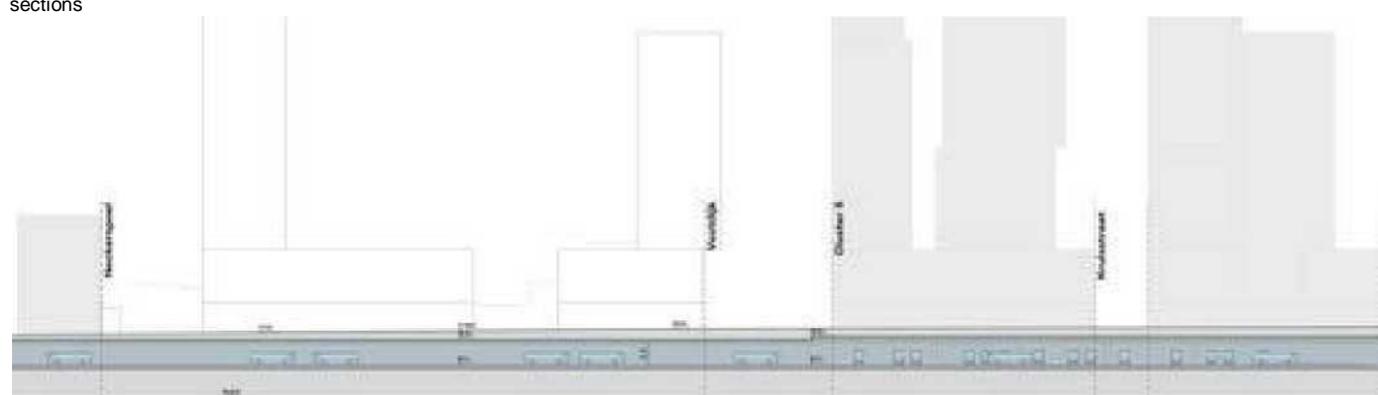
RESOLUTION DIRECTIONS MODEL 2 – SECTIONS

122

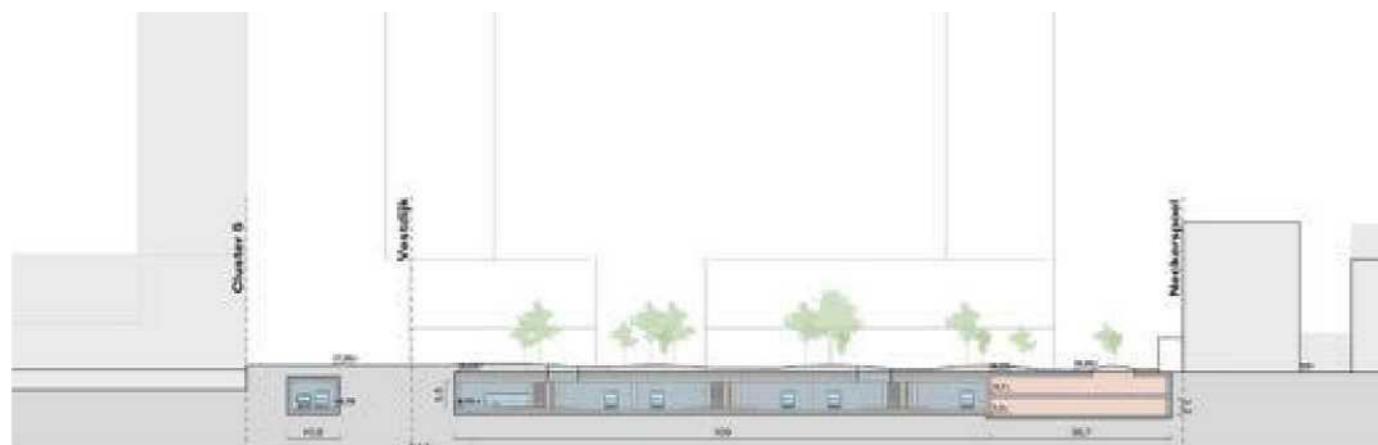
MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 123



Cross-sections



Section AA West East



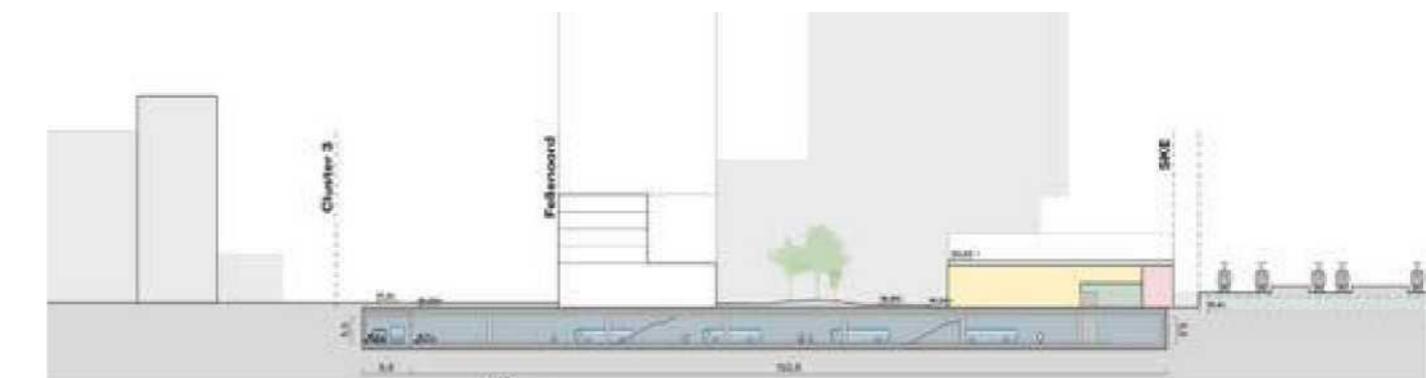
Section BB West East



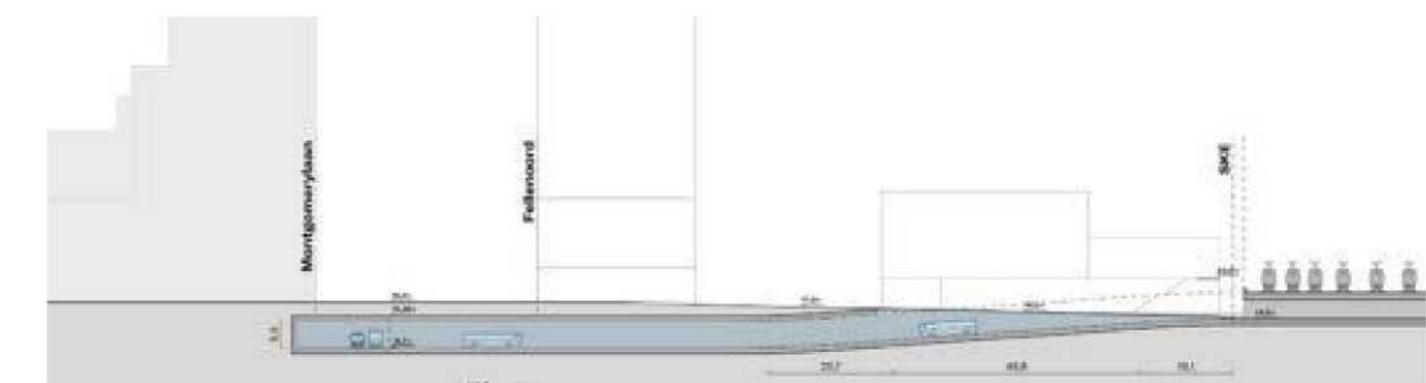
Section CC West East



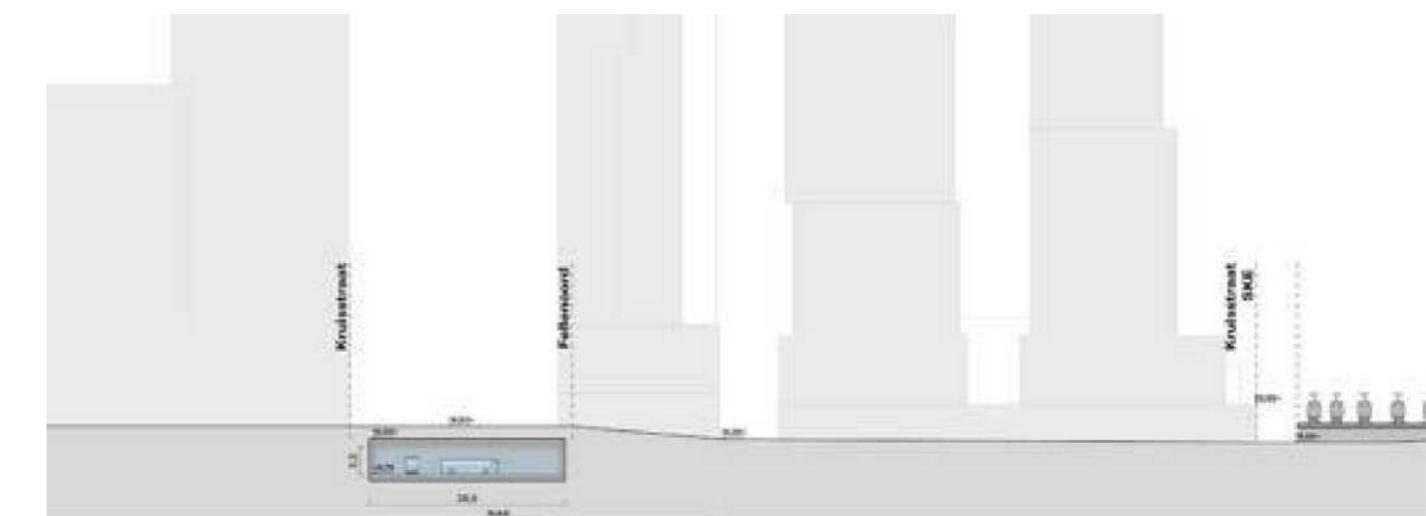
Section DD North-South



EE North-South section



Diameter FF North-South



GG North-South section

RESOLUTION DIRECTIONS MODEL 2 – MOBILITY

124

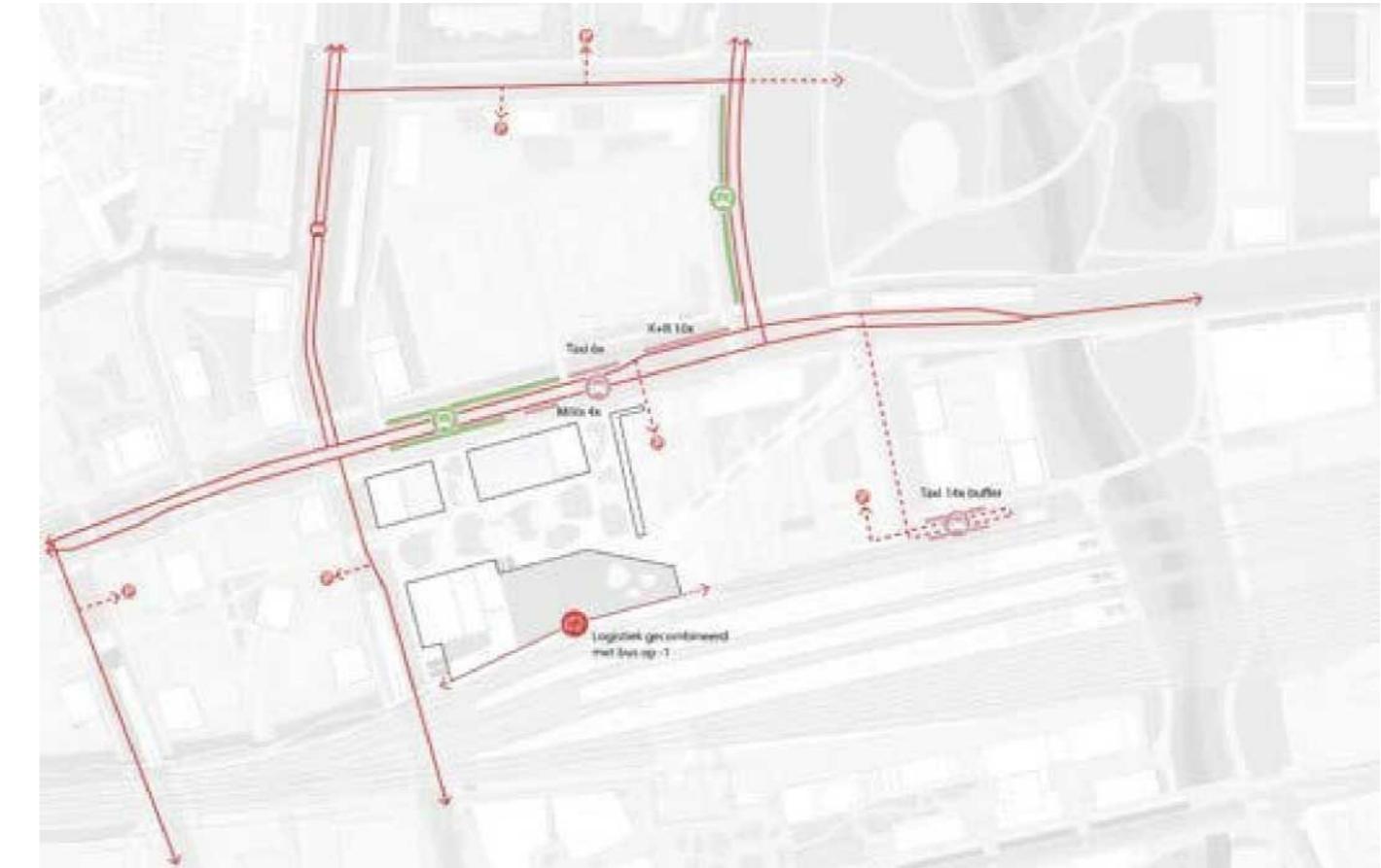
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

125



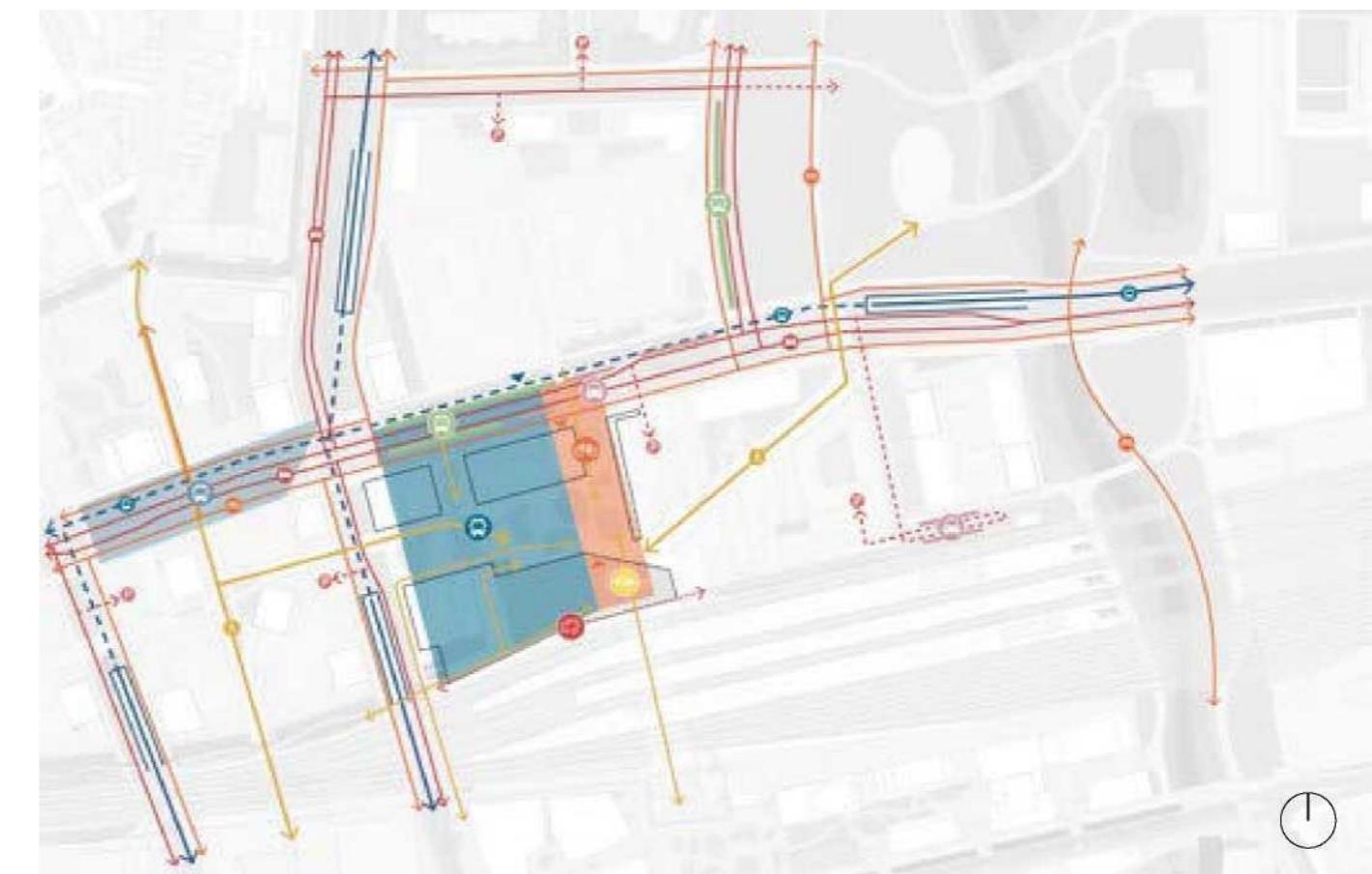
Pedestrian and bicycle routing



Routing k & r, taxi, TV, ib, car parking



Routing buses



Routing of total mobility

RESOLUTION DIRECTIONS¹²⁶

MODEL 2 – COMPONENTS

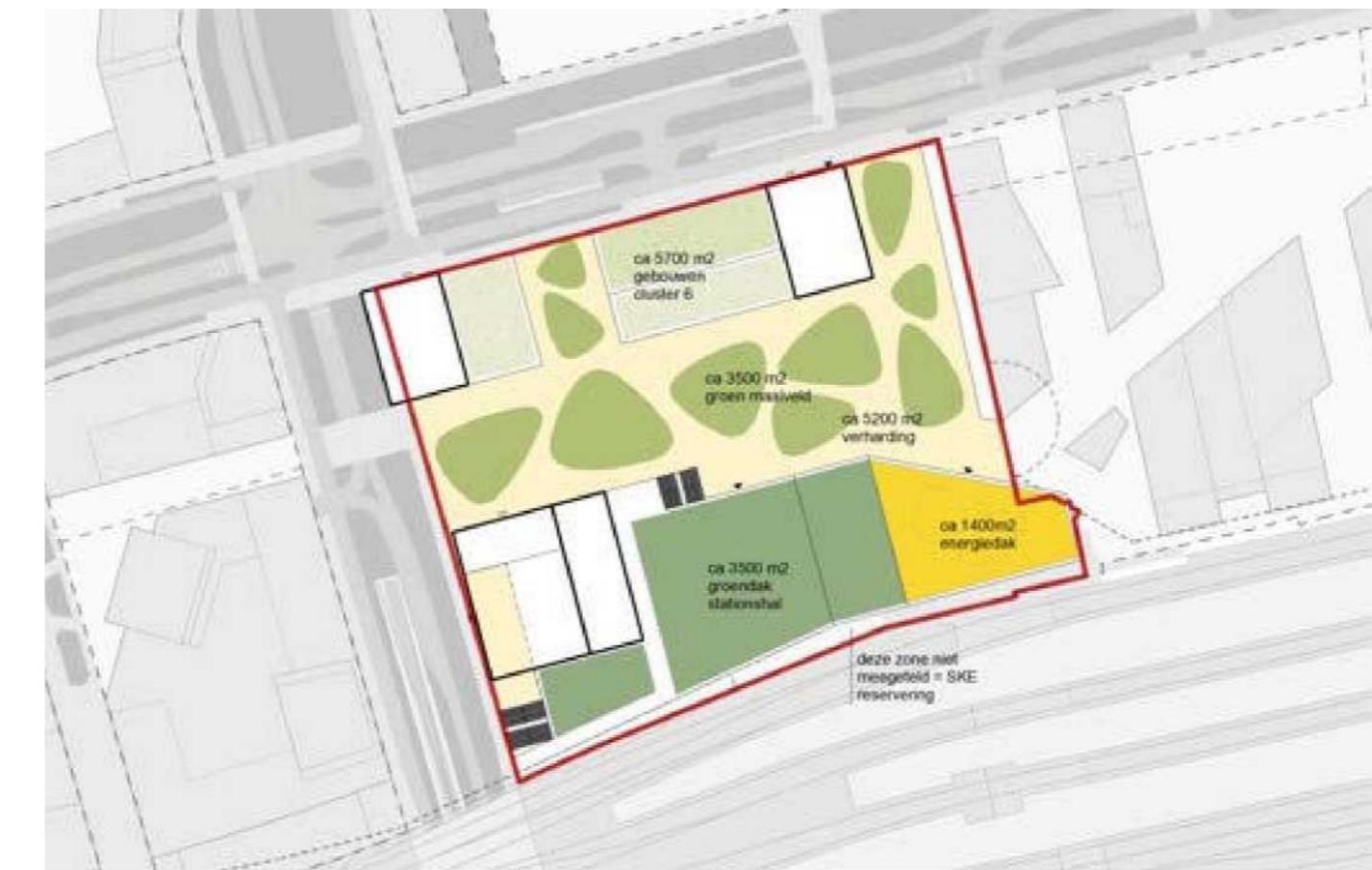
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

127



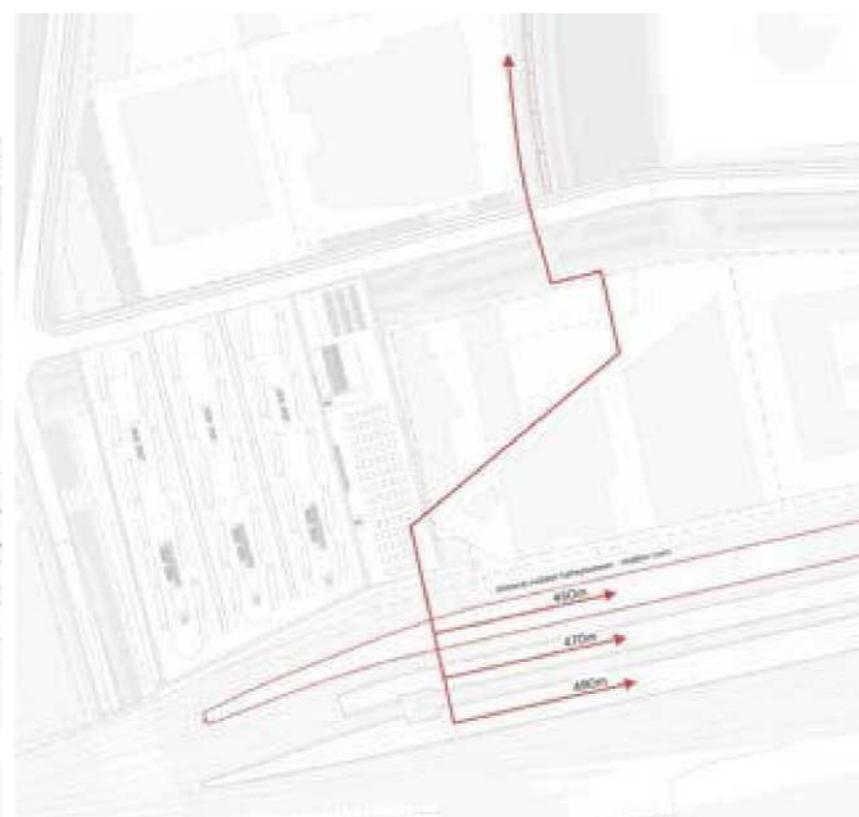
Number of stops and routing at bus station



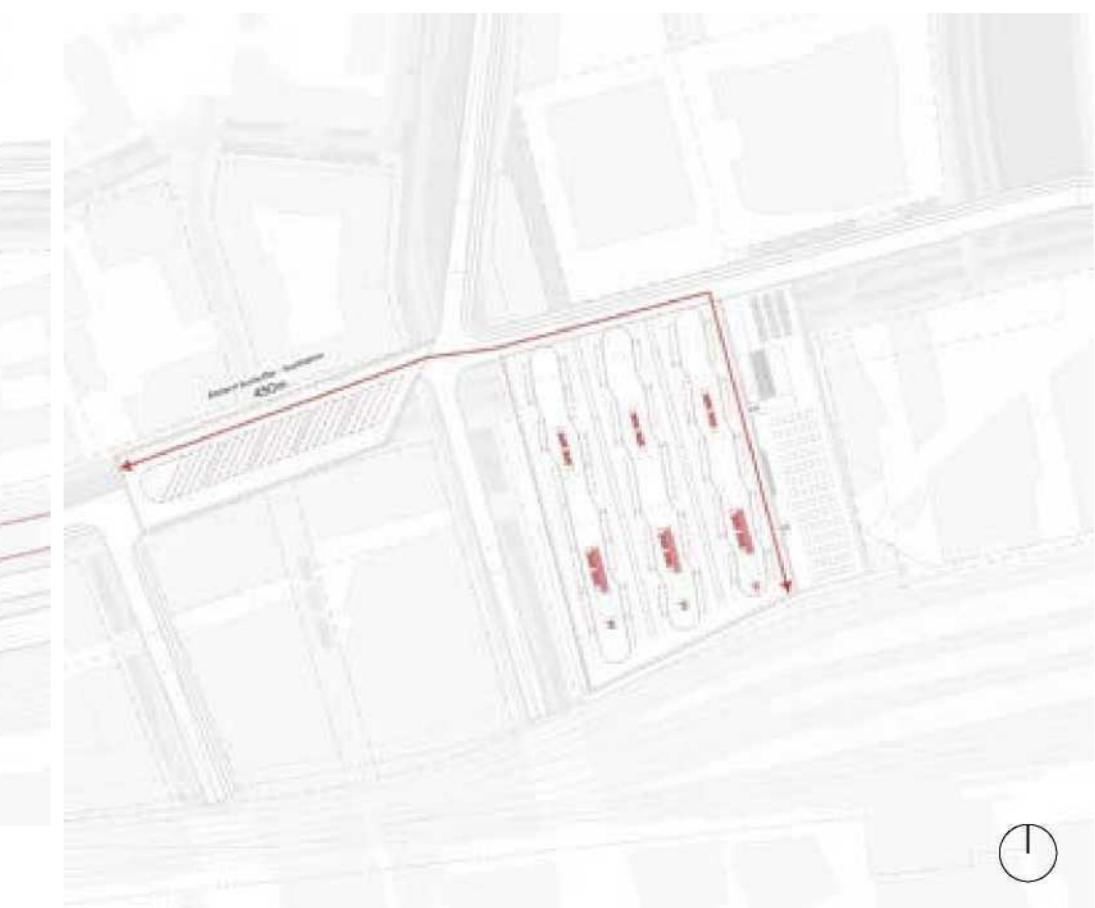
Green areas



Running distances between the centre of the train and the centre of the platform bus



Walking distances between International bus and train



Distance between bus buffer and bus station



RESOLUTION DIRECTIONS

TEMPLATE 2

128

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 129

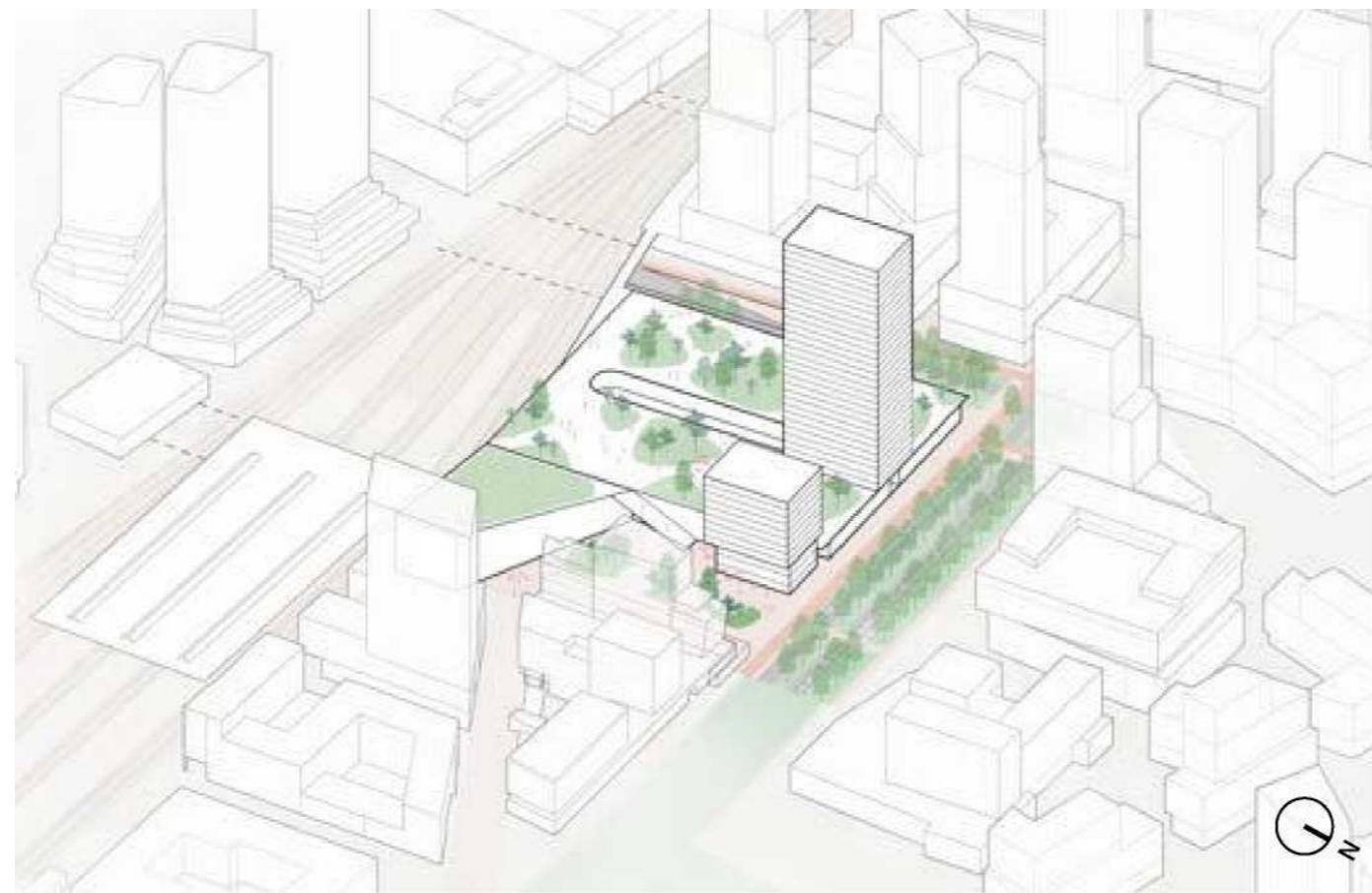


View of bus station

RESOLUTION DIRECTIONS MODEL 11

132

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 133



Axonometry

Model 11

Multi-layer bus station (level -1 and +1) entirely on Necker coil

General description of the direction of solution

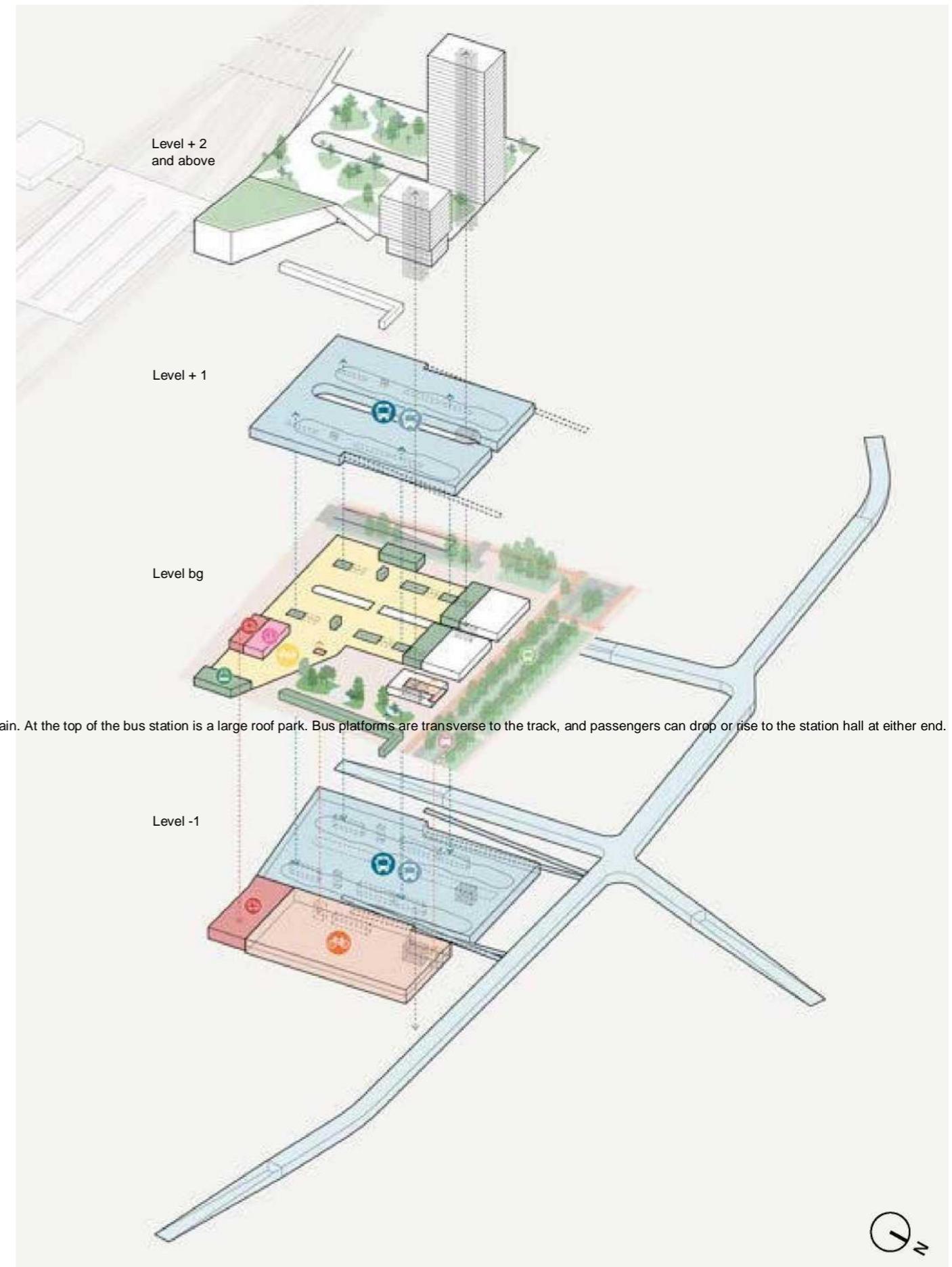
This model includes a multi-layered bus station on Necker coil, spread over a three-storey building, with the bus platforms on level -1 and +1 and between them the transfer domain. At the top of the bus station is a large roof park. Bus platforms are transverse to the track, and passengers can drop or rise to the station hall at either end. Buses pass through tunnels to and from the bus station, via a ramp to the different levels. The bus buffer is integrated into the bus station.

The bicycle parking area, next to the bus station, is underground (level -1) under the station square, with room for expansion. The station hall is located on the ground floor (level 0) between the two levels of the bus station. There is space for real estate on the bicycle park and at the bus station. The trackside roof park route ends in the park on the roof of the bus station, accessed via a staircase to the station square.

Distinctive elements

- Constructed variant for the bus station, spread over two layers and receiving domain between them;
- Bus station position is as far north as possible in relation to slopes. For the rest, the bust tunnels can move further south = favourable to the wadizone frame;
- Busbuffer is fully integrated into the bus station; as a result, there is substantially less concrete under mowing ground in the public space framework.
- Bicycle parking is more favourably dimensioned than in model 2;
- Low active plinth at Fellenoord possible;

Global areas of building blocks	m
Length of tunnels/speeds other than ramp in metres	750
Length of ramps in metres	550
	m ²
Tunnel speed surface	7.000
Tunnel area -1 (including structural outer wall)	14.000
Bus station surface – 1 (including structural outer wall)	13.300
Bus station surface + 1 (including structural outer wall)	12.800
Bus buffer surface (including structural outer wall)	Not
Bicycle parking area (per layer – x2)	5.700
Green mowing area	1.200
Surface solidified	2.750
Green roof area (station hall) * * *	11.000
Energy roof area (station hall)	2.000
Area of buildings cluster 6 (no MMK)	1.600
Area of buildings cluster 6 (indicative CSR)	38.000
Station hall area (transfer room)	8.500
Station area (commercial)	1.800
Logistics area (warehouse)	1.170



Functional axonometry of the building blocks (oa bus station, bus buffer, bicycle parking, station hall and connecting tunnels)

RESOLUTION DIRECTIONS MODEL 11

134

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 135



Aerial view from the south

RESOLUTION DIRECTIONS

MODEL 11

136

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

137



Plan map top view
Differences from the Long List

1. Bus station design:

The bus station is now designed as a sandwich model, with the transfer domain located between the bus floors. This design allows for an efficient layout and increases passenger comfort by always reducing/lifting only one staircase/lift, similar to the other models.

2. Bus station height: The bus station is now 4.5 metres lower than before, with a floor level of 8,5 NAP instead of 13,0 NAP. This reduction results from the application of the sandwich and at the same time ensures a good connection of the transfer domain to the rail passenger tunnel and the interdistrict connection in the Vestdijk tunnel.

3. Bustunnels in frame: The mowing bus lanes have been replaced by bus tunnels which are part of the framework. As a result, the window level must rise to an altitude of approximately 19,0 to 19,8 metres, or, on the contrary, drop to 15,2 metres in order to connect to the level of the transfer hall.

4. Real estate development: The property is now also located on top of the bus station and connected to a green station roof park. This offers the opportunity to make multifunctional use of the space (the roof park also for the residents) and to strengthen the spatial connection between the station and the surrounding area. In addition, the property may have an iconic effect.

5. Billing platforms: The number of bus platforms remains the same at 32 stops, but there is flexibility to change or extend it to 34 at level -1. This makes the bus station future-proof and adaptable to changing needs.

6. Busbuffer: The bus buffer is now fully integrated in the design, ensuring a more efficient use of space and a better flow of bus traffic.

7. Daylight entrance: A vide has been added for daylight entrance in the station reception domain. This improves the perception of space and improves the natural lighting in the station. A fish also makes it possible to ventilate the underground level naturally and takes fire safety into account.

8. Logistics: As in previous models, logistics traffic is managed via level -1 of the bus station. This logistic route is efficient and well connected to the commercial premises and the station square.

scale 1: 2000

9. Bicycle storage: The bicycle park is now located under the station pitch and partly under the property. This provides a logical and accessible location for cyclists in front of the station tree.

10. Bus ramps: The ramps are now located outside the station area. As a result, active plinths are only partially possible around the bus station.

11. Marketing on the station floor side: On the station square side, it is now possible to add commercial functions. This reinforces the vibrancy of the square.



Ground floor level (station hall and commercial, green and real estate)

scale 1: 2000



Level -1 (bus station, bus buffer, bicycle parking and connecting tunnels)

scale 1: 2000

RESOLUTION DIRECTIONS MODEL 11

138

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

139

Real estate opportunities irrespectively of area development: For this model, a green station park was chosen on top of the bus station, with a smaller station square on mowing ground, where the station building is located. The bus building located with its face directly on the Fellenoord is given a high architectural sound radiation due to its prominent presence on the boulevard.

The property is positioned on top of the bus station with an address on the boulevard. In the volume tested, a second smaller tower is placed next to the bus station, on the bicycle park. The choice of a second building at the Fellenoord is influenced by the fact that it creates more active plinth and liveliness. However, this gives the station a somewhat more hidden address to the boulevard. The other option is without a smaller tower and thus a more prominent square at Fellenoord.

It is reasonably certain that the real estate shown is realistically feasible and feasible. In the developed variant there is room for approximately 38.000 m² of GFA property. In extreme cases, this can be extended to higher towers, but this is technically a very complex task and thus puts pressure on the affordability of the

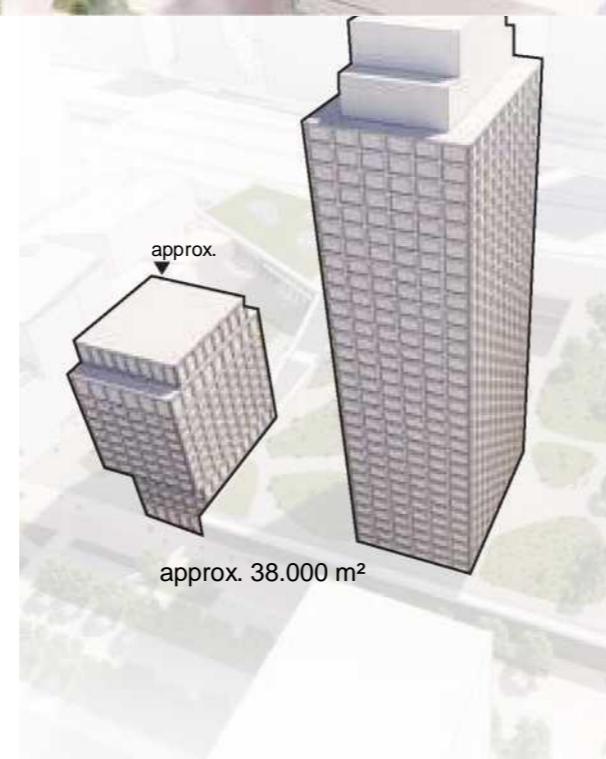


Aerial view from the north
(potential) dwellings.

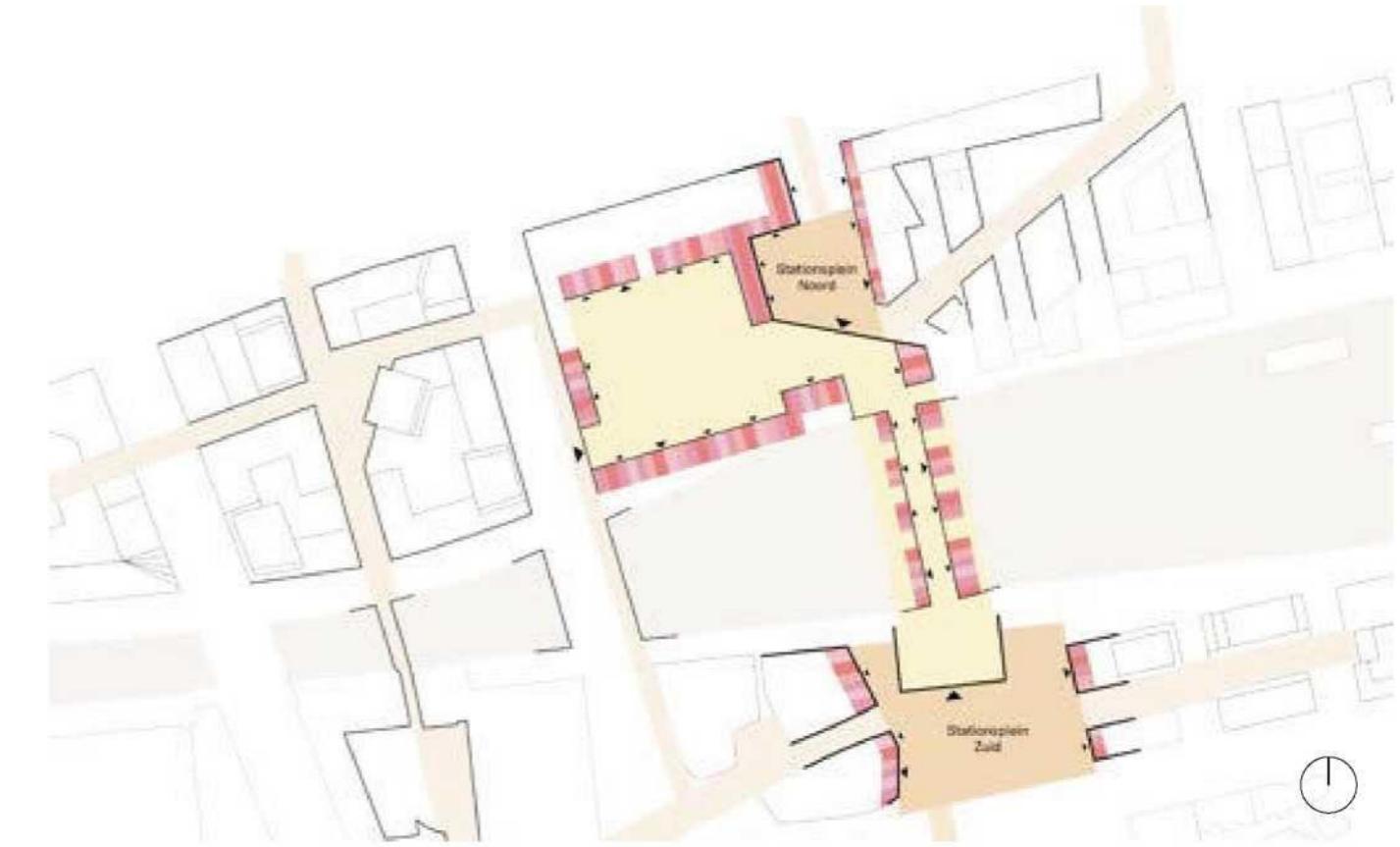
For the future, it is necessary to look more closely at the constructive challenges for real estate on top of the bicycle parking area and the impact of high construction on the wind climate and reflection on the station square.

Routing: The route from TUE to city centre and cluster 5 passes through the station hall and is a design challenge for the future.

In addition, there is the possibility to connect the station square via the roof park at the top of the bus station to the roof park (Highline) along the track. The connection from the station to the Fellenoord is less prominent due to the compact format of the station square. The possibility of an allure station at Fellenoord is very present in this model, provided that it is well developed.



Real estate opportunities (indicative volume)



Activering van het ontvangst- en omgevingsdomein

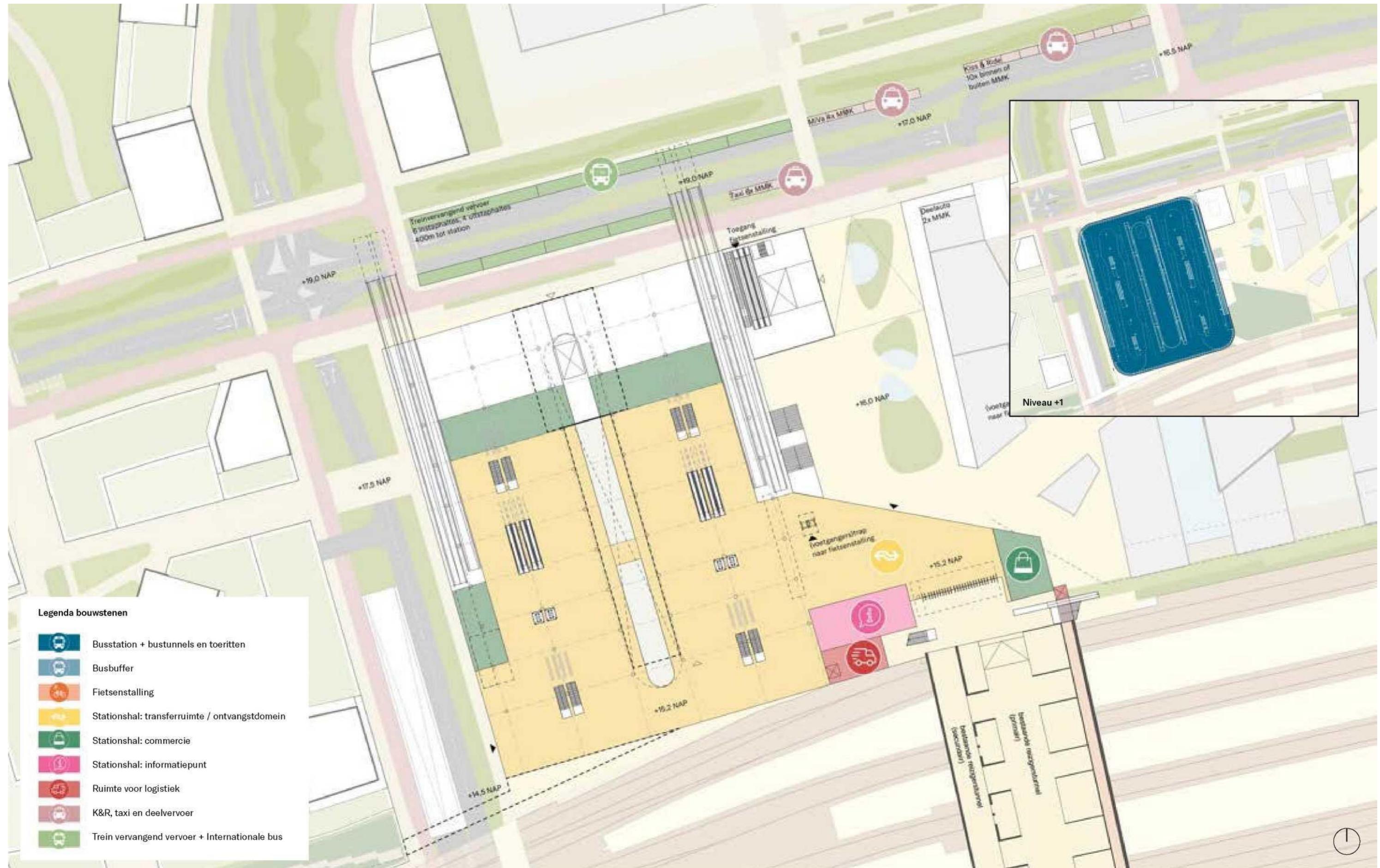
RESOLUTION DIRECTIONS MODEL 11

140

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

141



Map of ground floor

scale 1: 1000

RESOLUTION DIRECTIONS MODEL 11

142

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

143



View of the station and station square from the entrance from Fellenoord

RESOLUTION DIRECTIONS MODEL 11

144

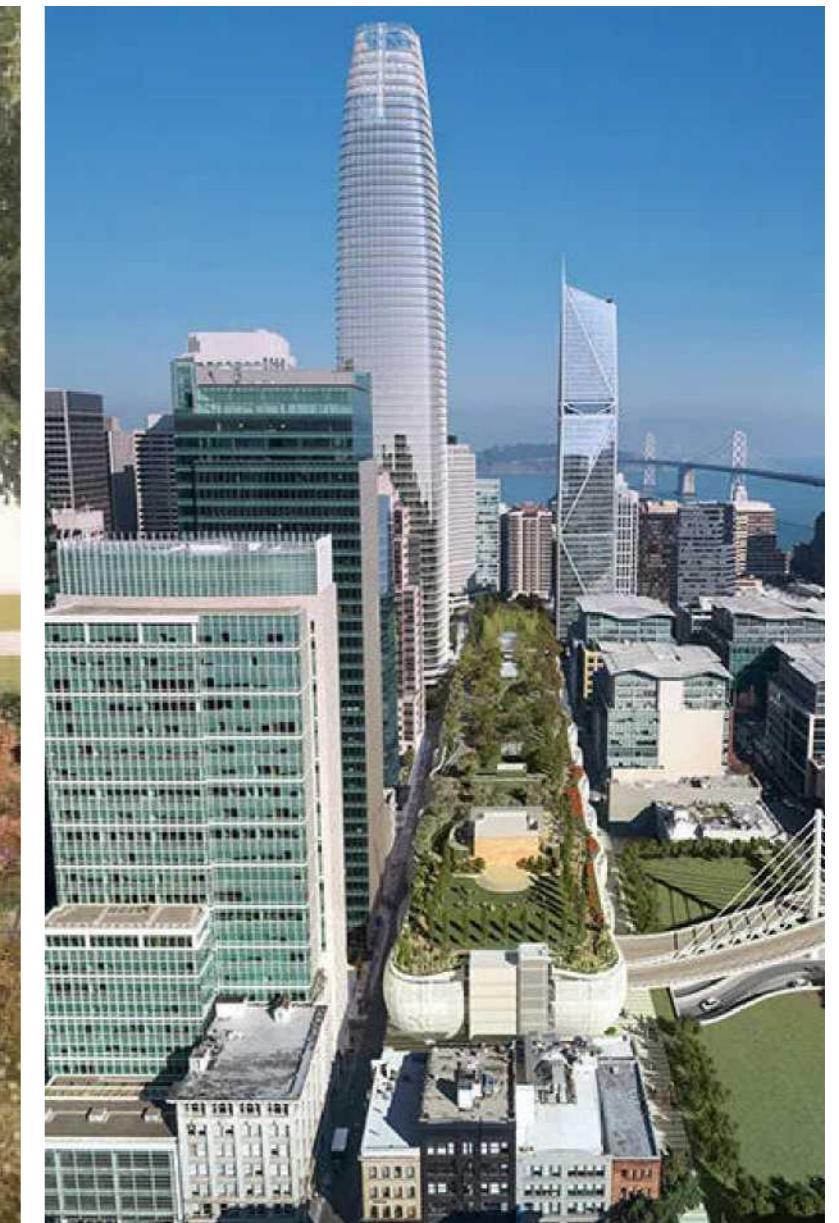
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

145



View of the roof park on top of the bus station



Reference San Francisco Salesforce Transit hub



Reference San Francisco Salesforce Transit hub (train station with bus station above it and roof park)



RESOLUTION DIRECTIONS MODEL 11

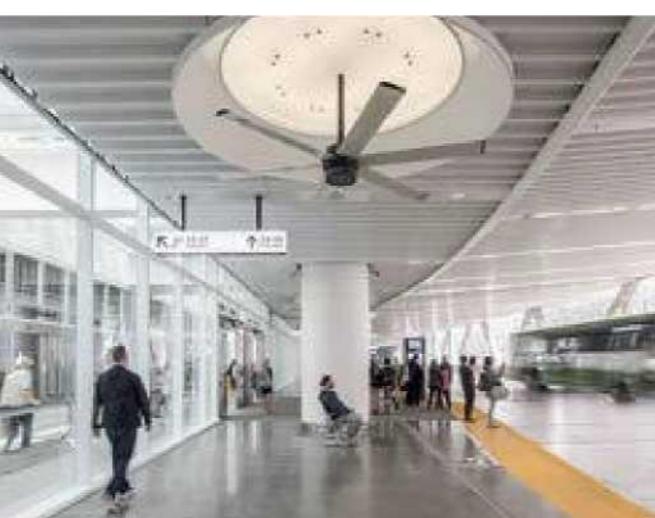
146

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 147



Section AA West East

scale 1: 750



Reference San Francisco Salesforce Transit hub (train station with bus station above it and roof park)

RESOLUTION DIRECTIONS MODEL 11

148

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

149



North – South section BB

scale 1: 750



Bratislava Bus Station/Shopping Mall



Bleiswijk Zoetermeer station (Team V)



RESOLUTION DIRECTIONS MODEL 11

150

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

151



View from the station hall to the station gallery and direction of the passengers' domain of the buses



View in the vide of the bus station



Visibility from the crossing Fellenoord – Fertiliser Tunnel



Visibility of the Station Place

RESOLUTION DIRECTIONS MODEL 11

152

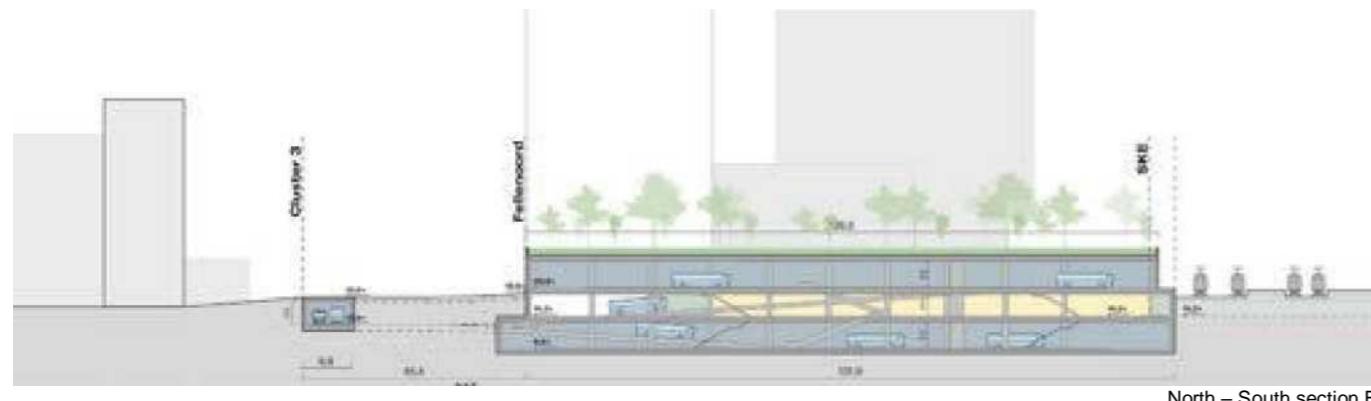
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

153



scale 1: 2500



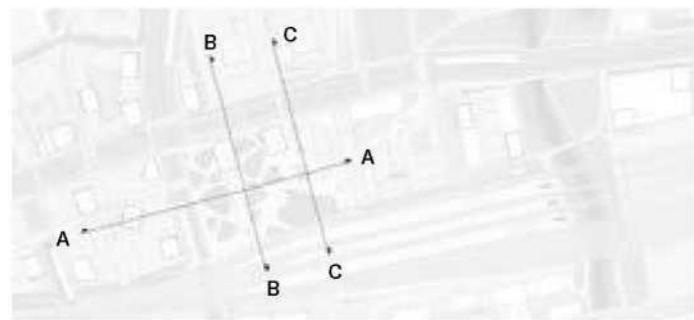
RESOLUTION DIRECTIONS MODEL 11 – SECTIONS

154

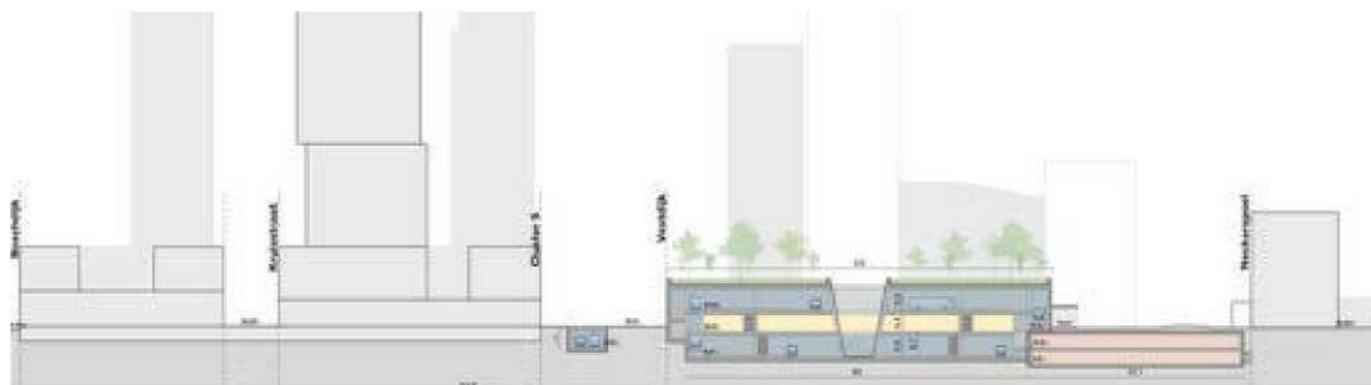
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

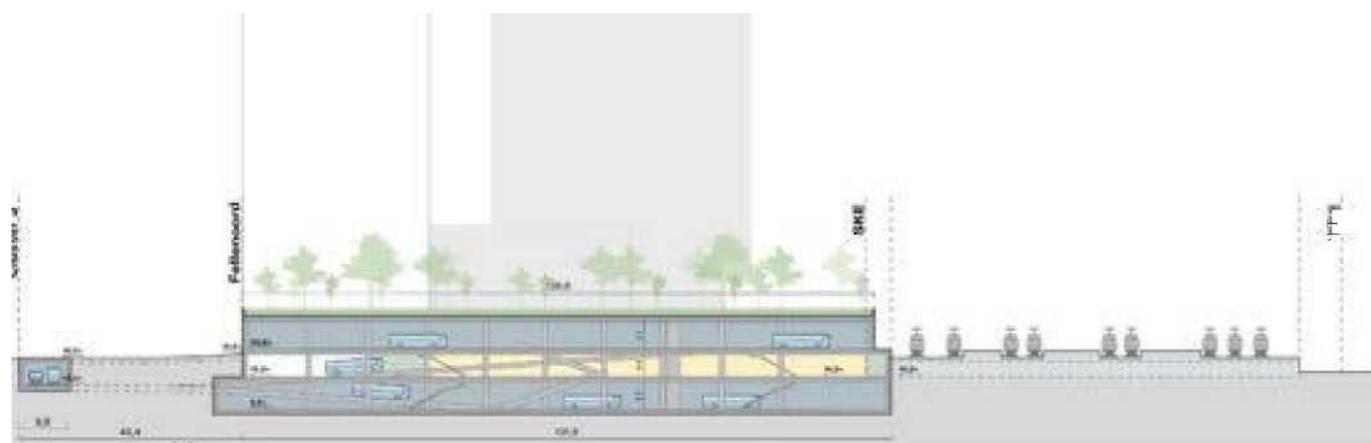
155



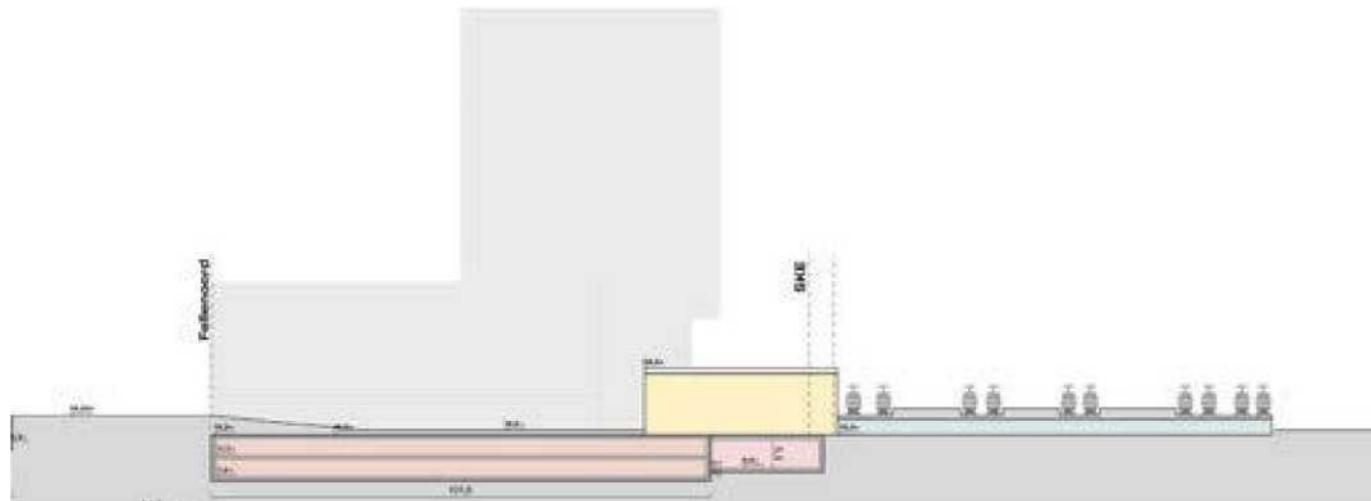
Cross-sections



Section AA West East



Section BB West East



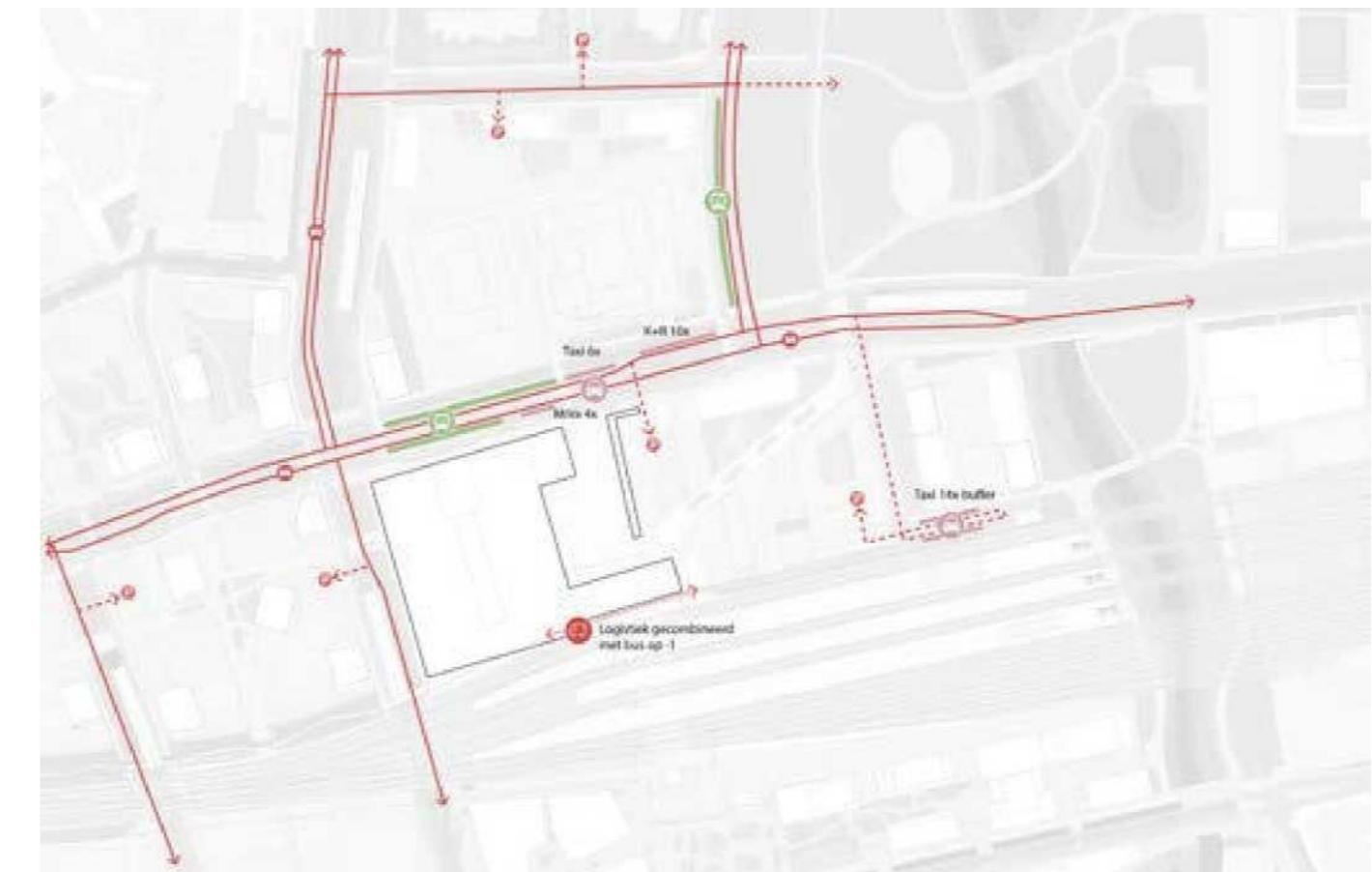
Section CC West East

RESOLUTION DIRECTIONS MODEL 11 – MOBILITY

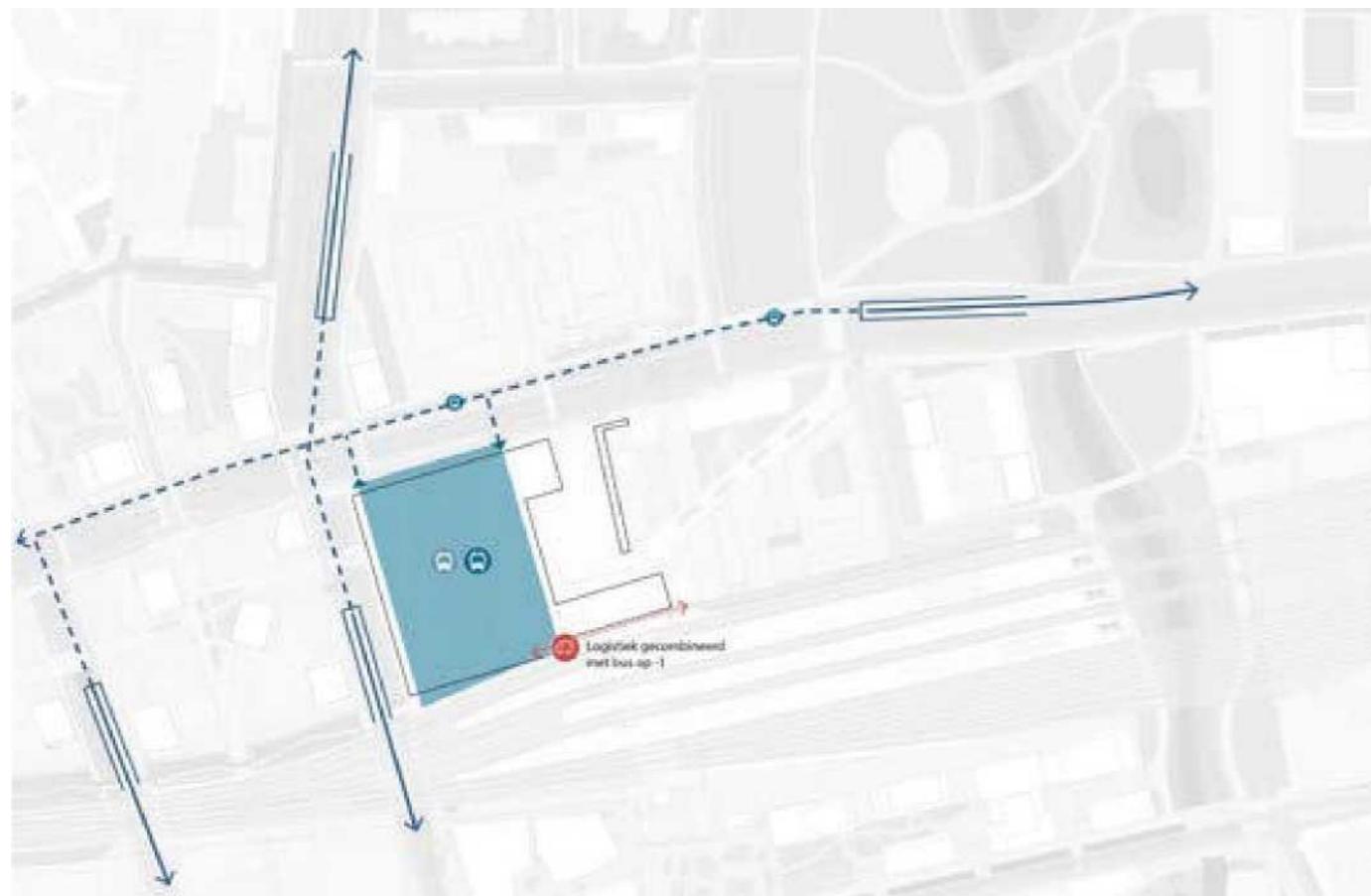
MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 157



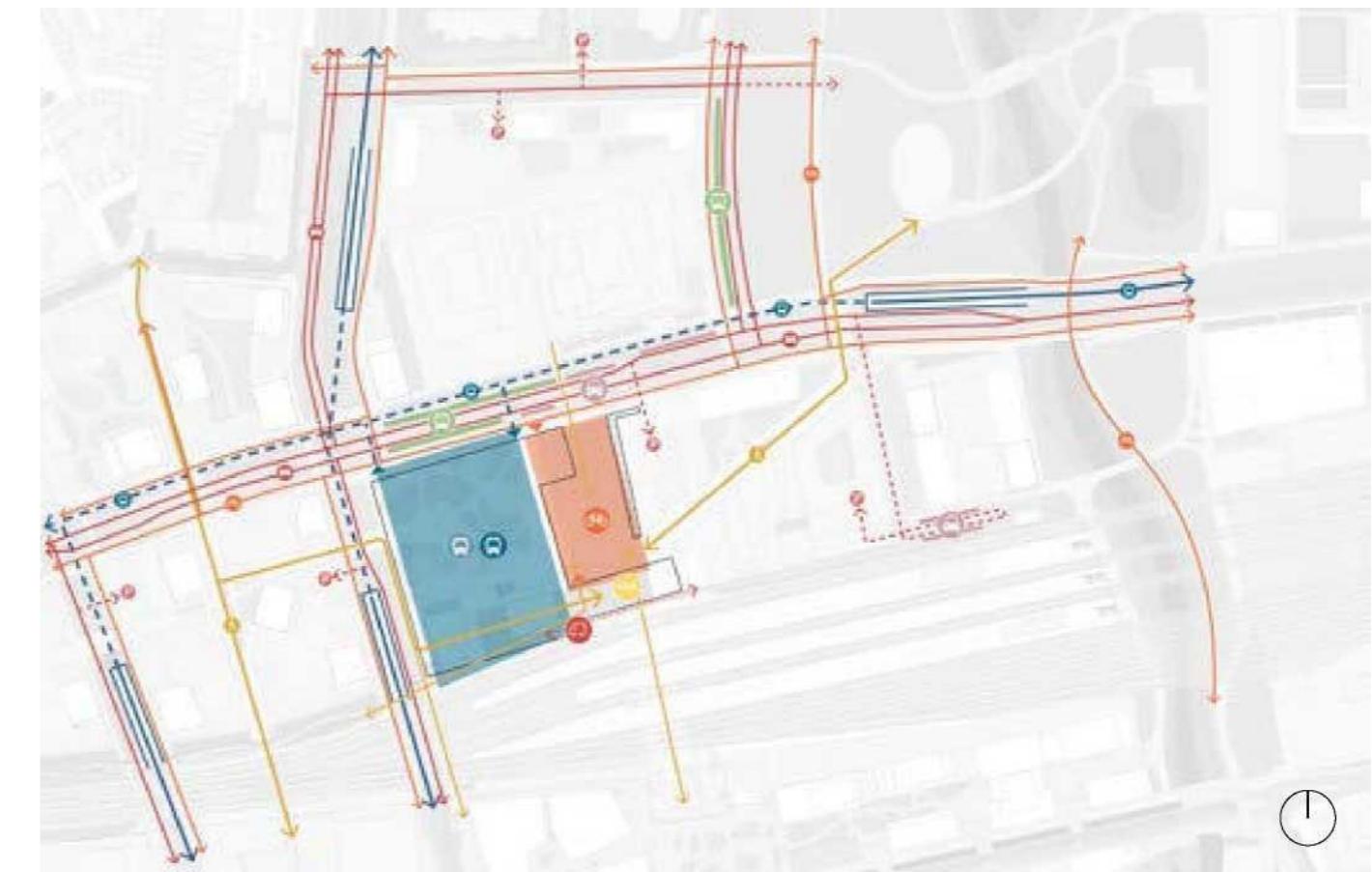
Pedestrian and bicycle routing



Routing k & r, taxi, TV, ib, car parking

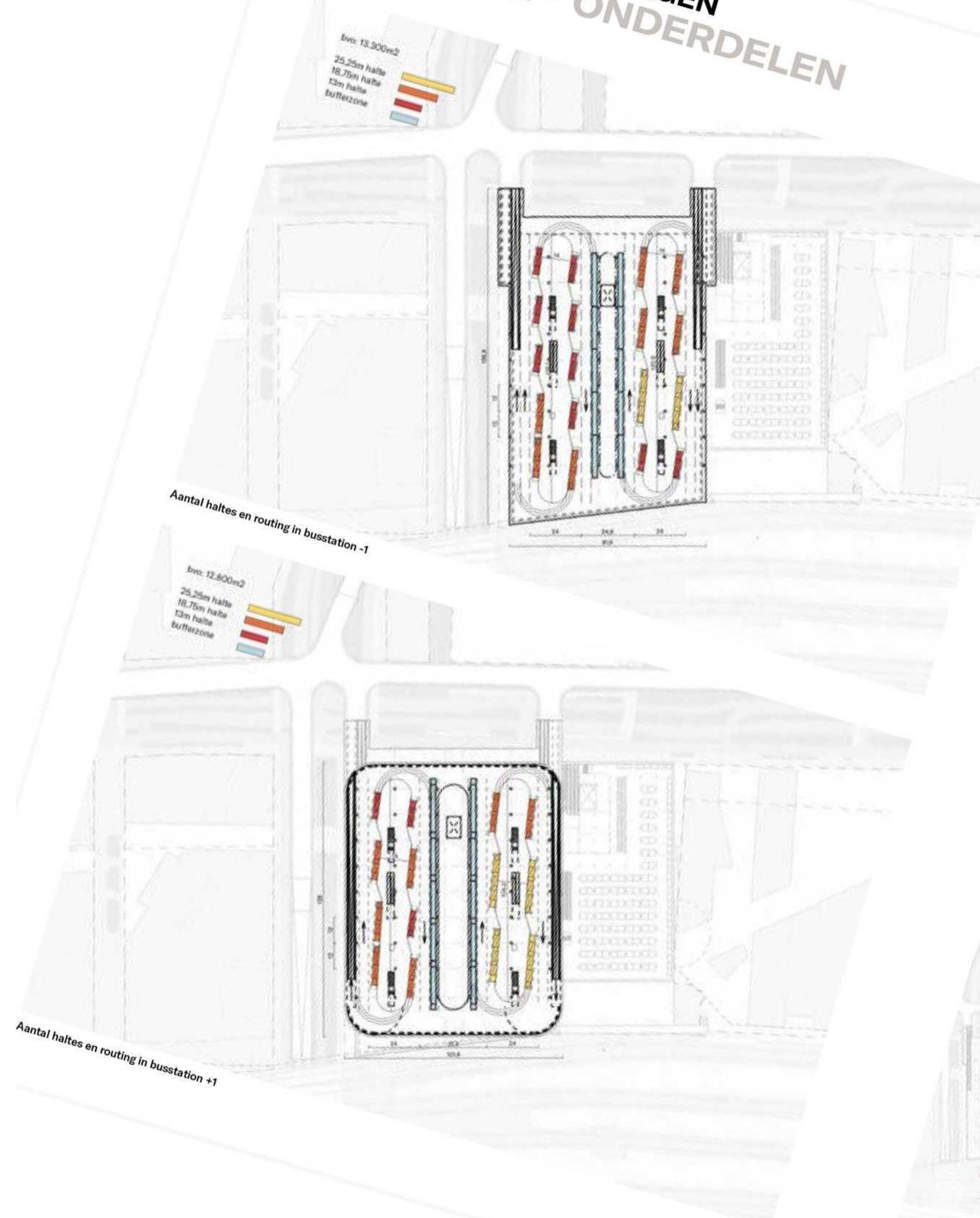


Routing buses



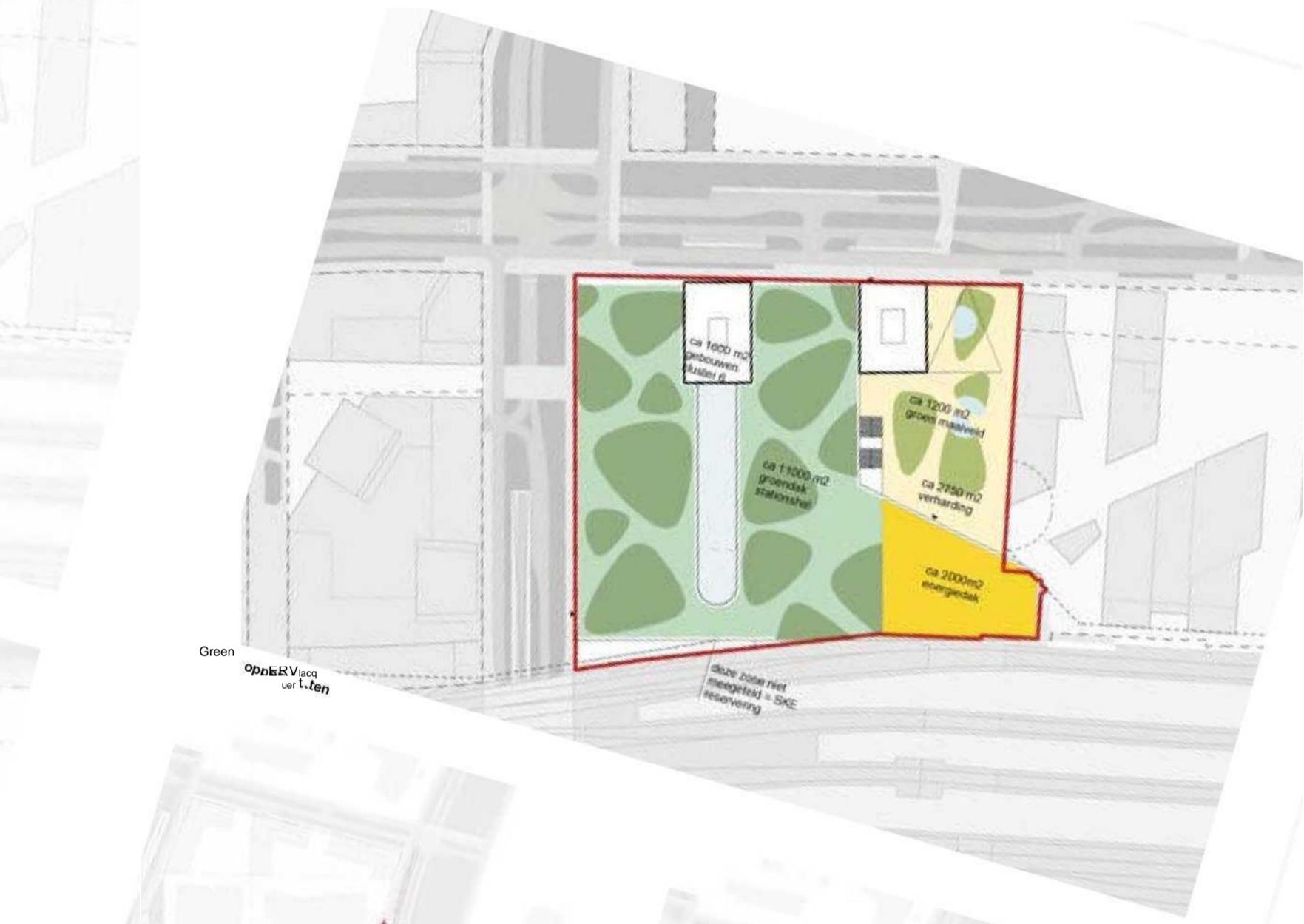
Routing of total mobility

OPLOSSINGSRICHTINGEN MODEL 11 - ONDERDELEN

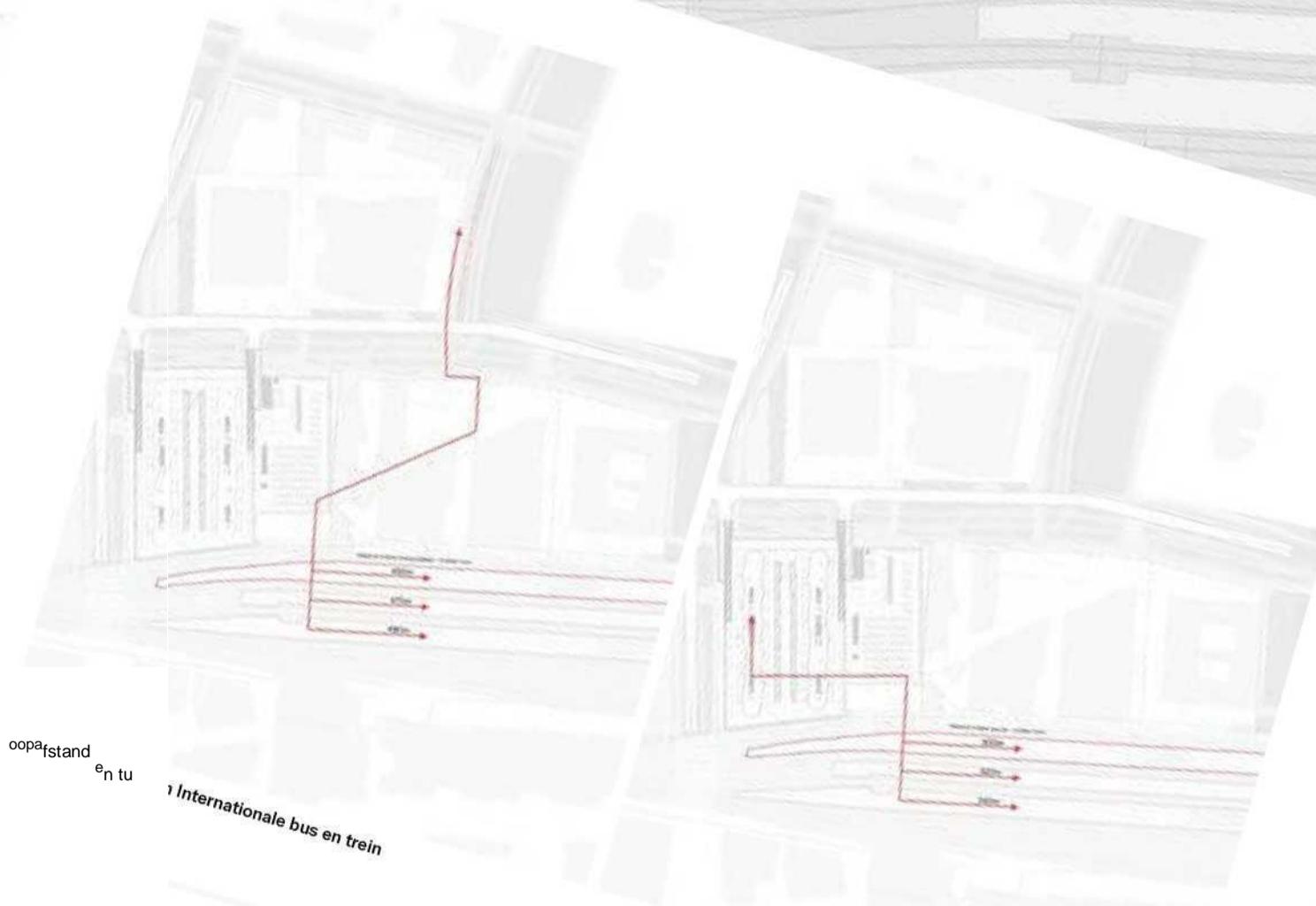


158

MirT-verkeer
NG MMK
Eindhoven
Mova_{res} +
+ KCAP +
TA_m v



159



oostperron
tuin

LeopAFS_{tocht}
ten midden trein tot midden perron bus

RESOLUTION DIRECTIONS MODEL 11

160

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 161



View of the bus station roof park

RESOLUTION DIRECTIONS MODEL 15



Axonometry

Model 15

Underground bus station (level 1) under Fellenoord and Necker coil

General description of the direction of solution

This model is because an underground, long stretched bus station (level -1) is partly northward Necker coil and largely below the Fellenoord. The bus station overlaps with the bus tunnel under the Fellenoord. Bus platforms extend to John F. Kennedylaan. The main entrances to the bus station are

located under a large station hole connected to the station hall. Buses run through tunnels to and from the station, with an underground bus buffer on the northern side of Cluster 5 under the Fellenoord. The bicycle park is located underground (level -1) between the bus station and the railway, with space for expansion. The station hall on the ground floor (level 0) is transverse to the track and connects to the underground bus station via the hatch. There is space for real estate on the bicycle park and partly in the open field. The bus station will be equipped with a station square which, in this model, will form part of the public space framework. The track side roof park route can be accessed via a staircase towards the station square.

Global areas of building blocks	m
Length of tunnels/speeds other than ramp in metres	450 55
Length of ramps in metres	0
	m ²
Tunnel speed surface	7.000
Tunnel area -1 (including structural outer wall)	6.750
Bus station surface – 1 (including structural outer wall)	18.400
Bus buffer surface (including structural outer wall)	5.850
Bicycle parking area (per layer – x2)	9.100
Green mowing area	2.500
Surface solidified	3.750
Green roof area (station hall) * * *	6.250
Energy roof area (station hall)	1.500
Area of buildings cluster 6 (no MMK)	6.500
Area of buildings cluster 6 (indicative CSR)	55.000
Station hall area (transfer room)	5.500
Station area (commercial)	1.600
Logistics area (warehouse)	570

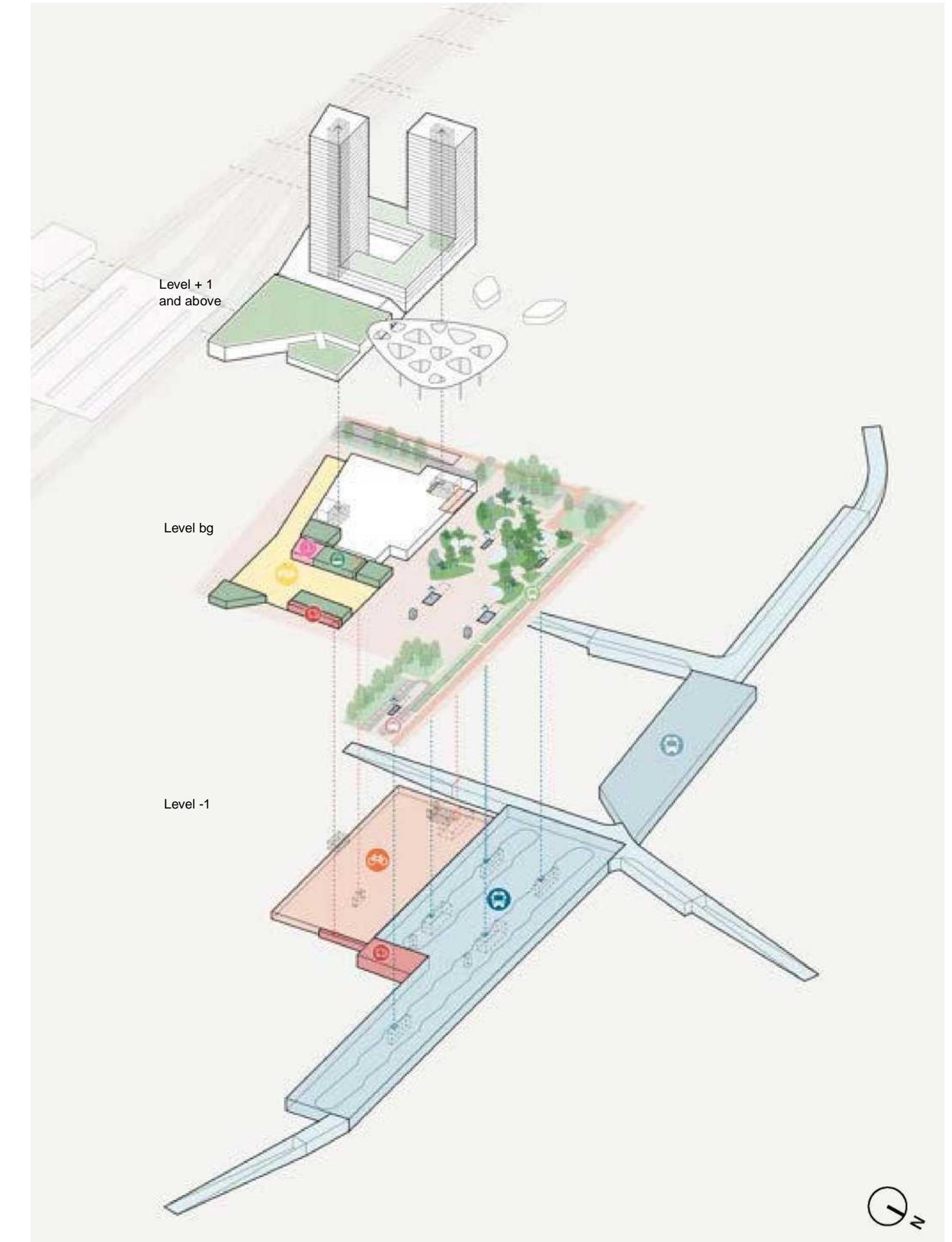
RESOLUTION DIRECTIONS MODEL 15

Distinctive elements

- Bus platforms further away from the station hall;
- Digestion pipe platforms positioned under an aperture;
- In the mowing field, space is needed in the public space framework for connecting pipe platforms.
- More real estate possibly independent of bus station and partly independent of bicycle parking;
- The diagonal to the TU is crossed by the receiving domain. Alternatively, a hatch on the side of the diagonal may be used;
- There is a trackside connection via the station hall

to the interdistrict connection in the Vestdijk Tunnel.

The station barrier is located at the Fellenoord and becomes part of the public space framework, making it necessary to cut off car traffic.



Functional axonometry of the building blocks (oa bus station, bus buffer, bicycle parking, station hall and connecting tunnels)

RESOLUTION DIRECTIONS MODEL 15

166

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 167



Aerial view from the south

RESOLUTION DIRECTIONS MODEL 15

168

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

169



Plan map top view
Differences from the Long List

scale 1: 2000

1. SKE contour and real estate opportunities:
The model remains even further outside the SKE contour, which means that more real estate can be developed in the open ground, in addition to the bicycle parking area. As a result, approximately 55.000 m² of bvo property is possible.

2. Bus station position:
The bus station is now further east, with a connection to TU Eindhoven and a floor level of 8,7 NAP, similar to model 2.
This makes the functioning of the underground intersection more certain.

3. Clearances and kneeling in Fellenoord:
The connections in the profile of Fellenoord may require a kneeling, with the main connections of the bus station now under an aperture and disconnected from the station hall. This will require further investigation in the future.

4. Bus platforms and flexibility:
The bus station now has 32 stops, which can be changed or extended flexibly. The carriageway is integrated into the bus station, and the bus buffer is located under Fellenoord.

5. Logistics:
The logistic traffic flows are routed through level -1 of the bus station, from which goods can be transported with a logistic lift to the commercial premises in the station hall.

6. Bicycle storage:
The bicycle park is now single-layer, partly under real estate and partly under the station, allowing real estate development both in the open ground and above the bicycle park.

7. Route to city centre and TUE:
The route from the Eindhoven TU to the city centre and cluster 5 now passes through the station hall, via the station square and with an option along the track.



Ground floor level (station hall and commercial, green and real estate)

scale 1: 2000



Level -1 (bus station, bus buffer, bicycle parking and connecting tunnels)

scale 1: 2000

RESOLUTION DIRECTIONS MODEL 15

170

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 171



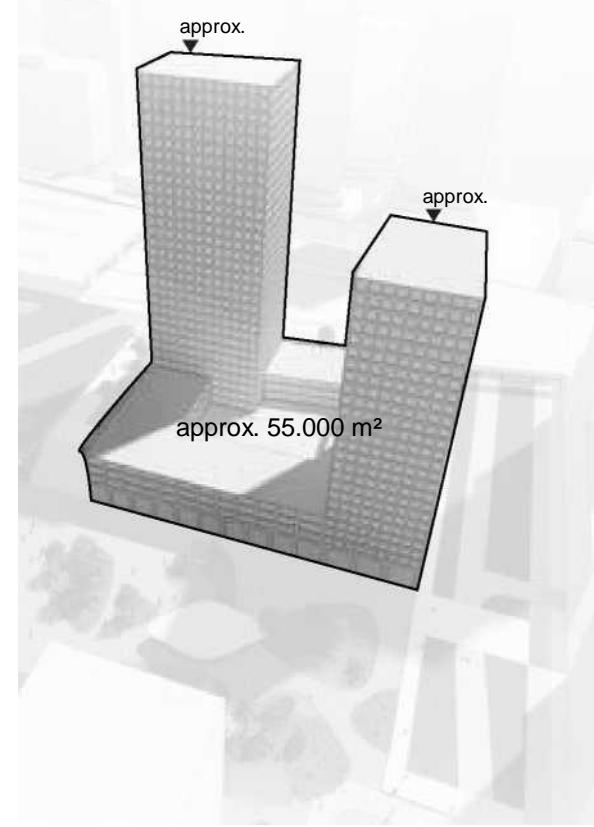
Aerial view from the north

Real estate opportunities irrespectively of area development: For this model, an advanced station hall has been chosen, followed by a hatch on a green station hall located partly in the Fellenoord. The bubble platforms are partly below the Fellenoord and the openings partly end up in the boulevard. This means that the knots are intertwined with the public space framework and that a knee may be necessary for transiting car traffic. This needs to be explored further in the future.

In this model, real estate is possible partly in the open field but for the most part under the single-layer bicycle park. This makes it possible to say with a reasonable degree of certainty that this property is realistically feasible and feasible. In the developed variant, there is room for at least 55.000 m² of GFA in real estate. This may be extended to higher towers, but this also means that the affordability of the (potential) dwellings comes under pressure. The advantage of this increased volume is that it can be made in a building block typology where good social housing can also be realised.

For the future, it is necessary to look more closely at the constructive challenges for real estate on top of the bicycle parking area and the impact of high construction on the wind climate and reflection on the station square.

Routing: The route from TUE to city centre and cluster 5 passes through the station hall and is a design challenge for the future. In addition, there is the possibility to connect the station square to the roof park (Highline) along the track via the roof park at the top of the station hall. The connection from the station to the Fellenoord is prominent due to the station square that passes into the boulevard. The possibility of an allure station at Fellenoord is very present in this model, provided that it is well developed.



Real estate opportunities (indicative volume)



Public space map



Activation of the receiving and ambient domain

RESOLUTION DIRECTIONS

MODEL 15



RESOLUTION DIRECTIONS MODEL 15

174

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 175



View of the station and station square from the entrance from Fellenoord

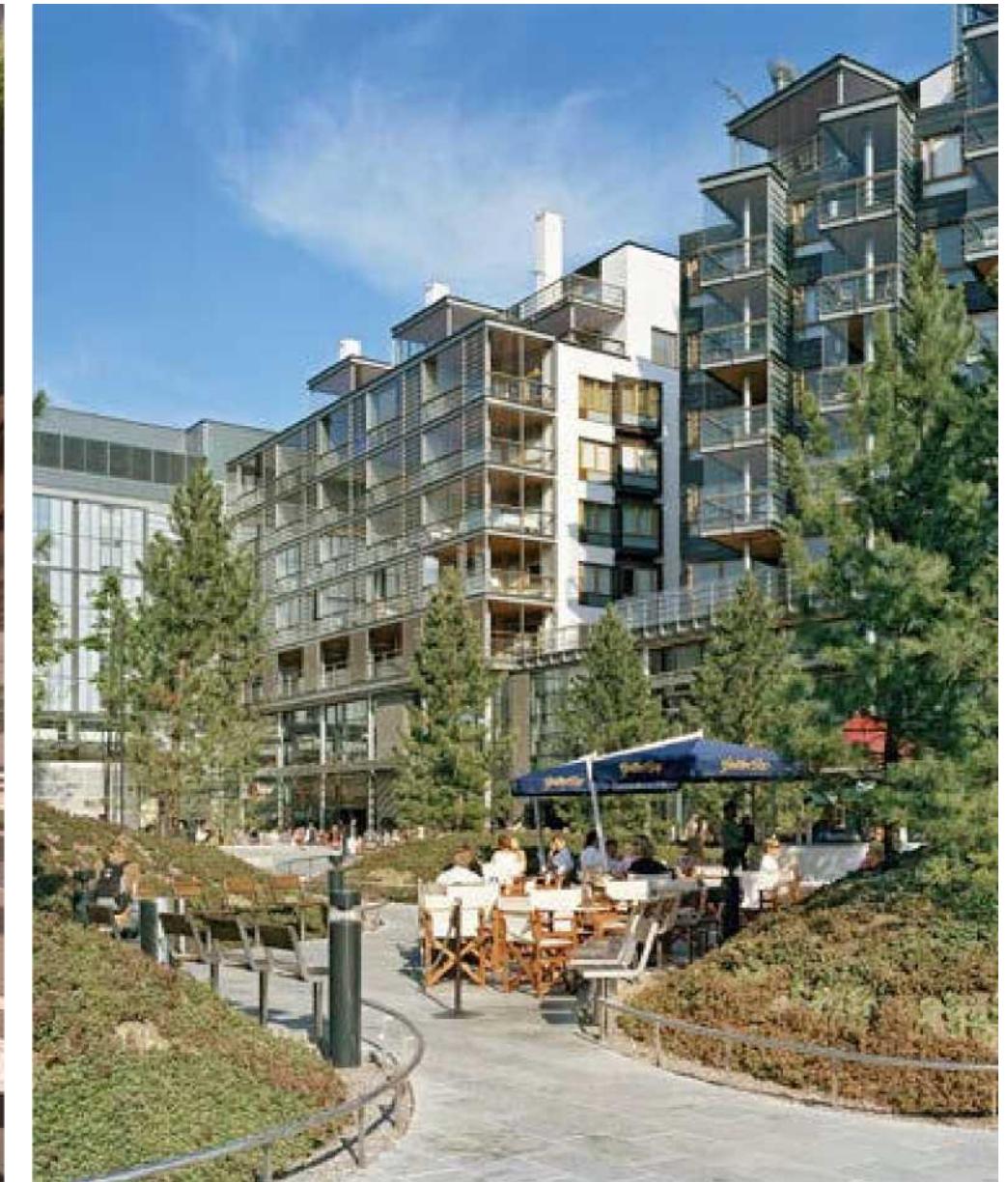
RESOLUTION DIRECTIONS MODEL 15

176

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 177



View of the station square from the roof of the station hall



Reference bus station and Helsinki station Kampii



Utrecht Central hatch



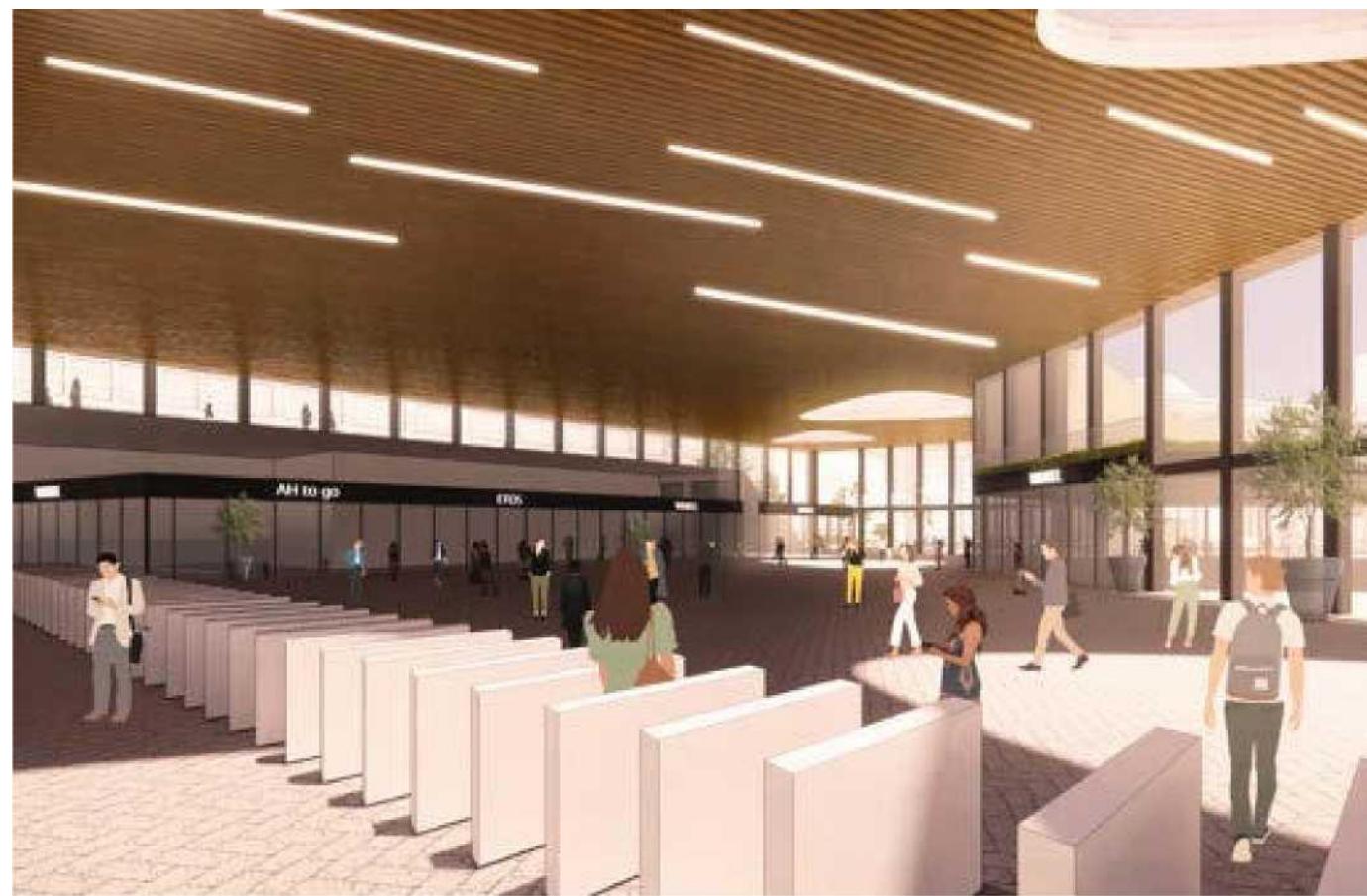
Metropol Parasol Seville



RESOLUTION DIRECTIONS MODEL 15

178

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 179



View from the station hall to the station gallery and direction of the passengers' domain of the buses



View in the station hall at the level of the openings to the bus platforms



View from the station pitch

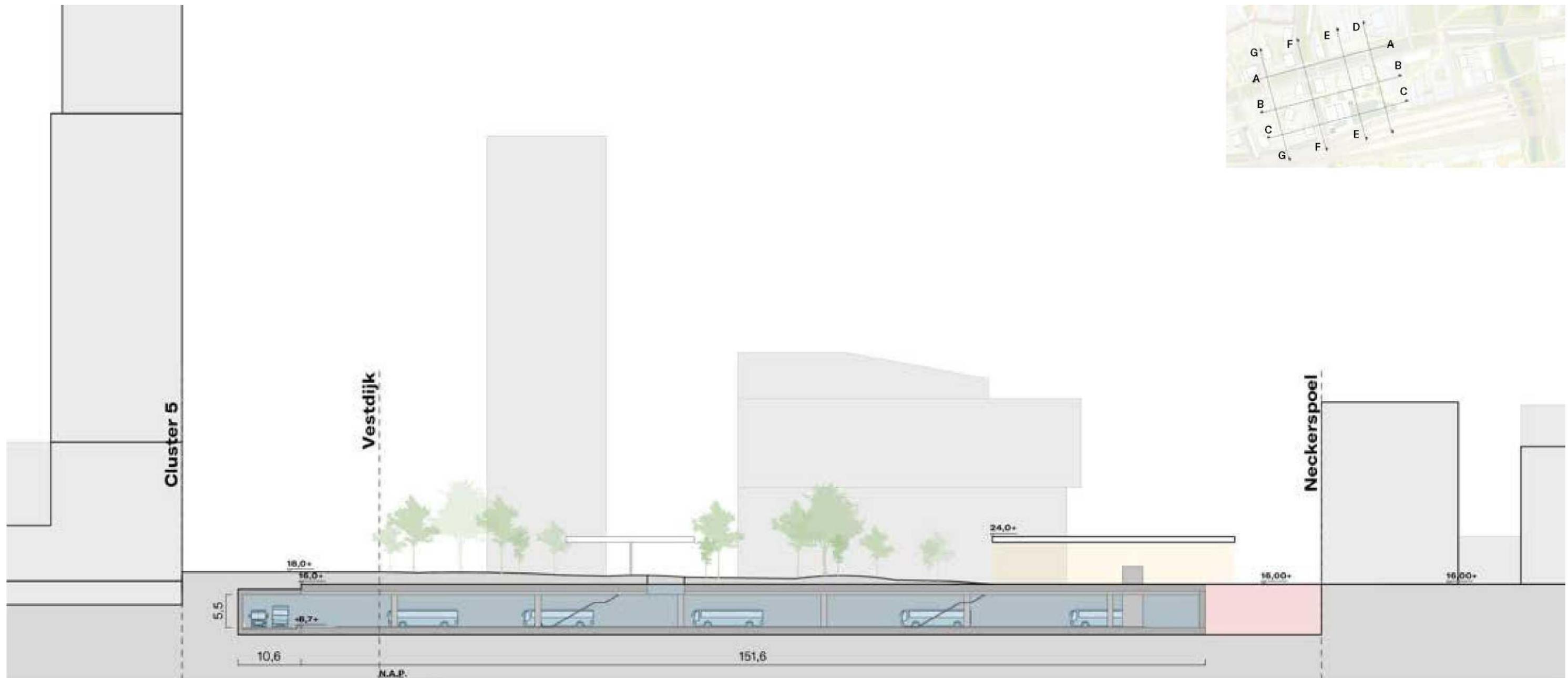


View of a bubble platform

RESOLUTION DIRECTIONS MODEL 15

180

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 181



Stuttgart train station reference – daylight entrance



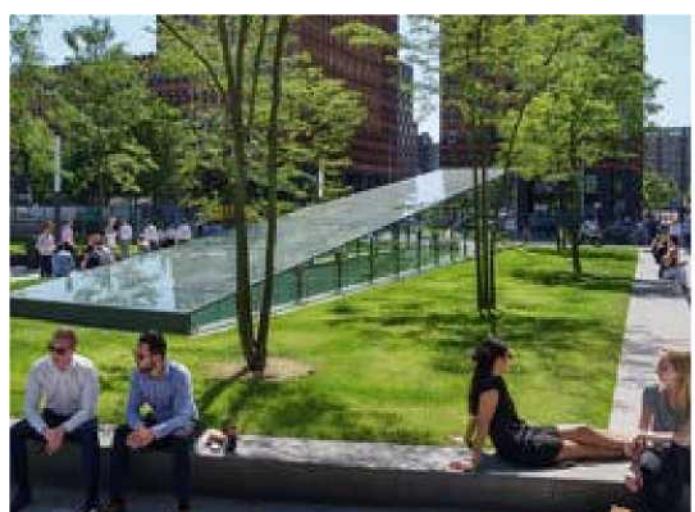
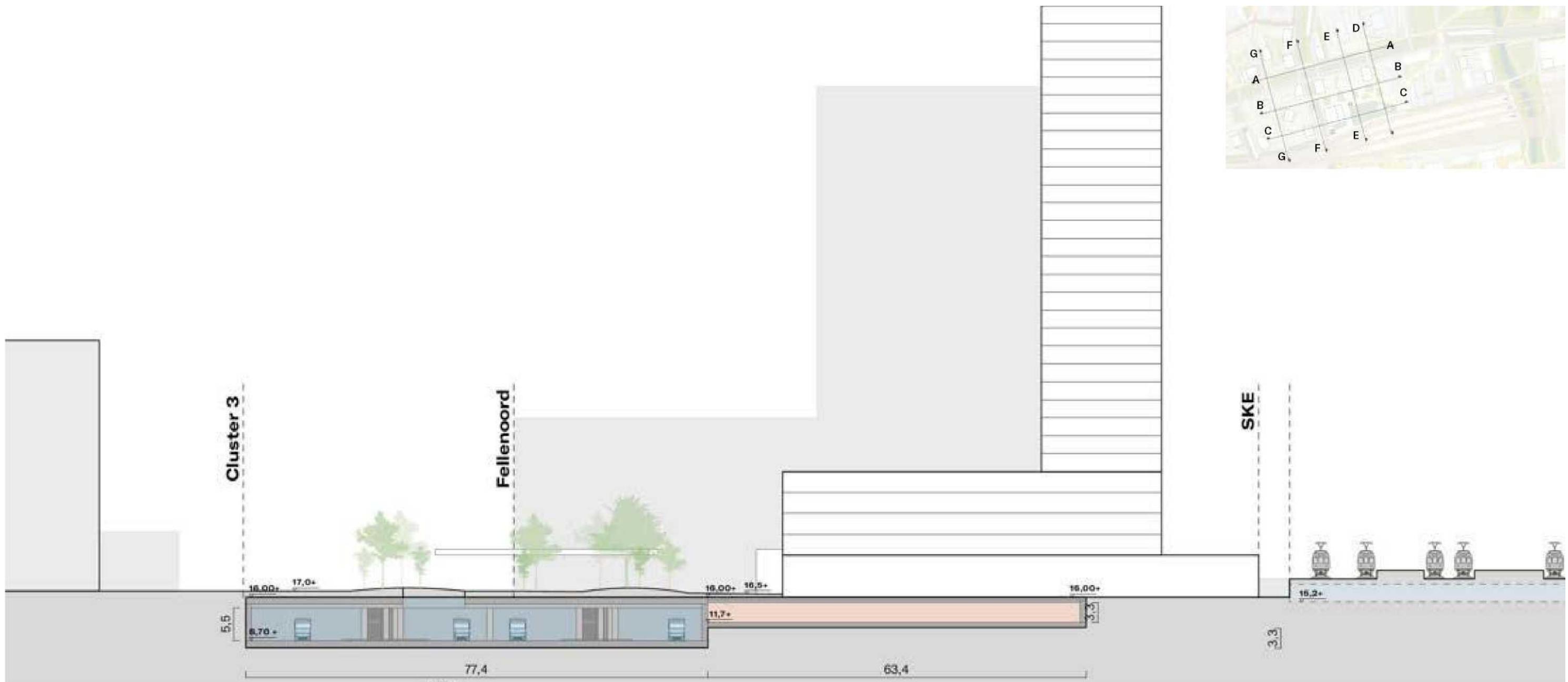
Reference Bratislava bus station – height and lighting



RESOLUTION DIRECTIONS MODEL 15

182

MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 183



References Mahlerplein Amsterdam and Kruisplein Rotterdam, green station squares on top of underground structures



Reference Helsinki Kampii



RESOLUTION DIRECTIONS MODEL 15

184

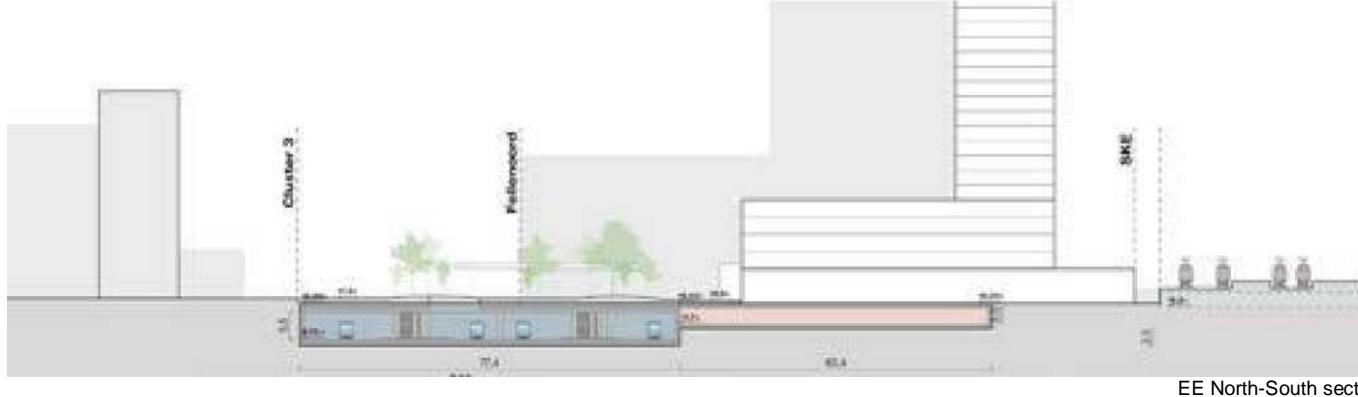
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

185



scale 1: 2500



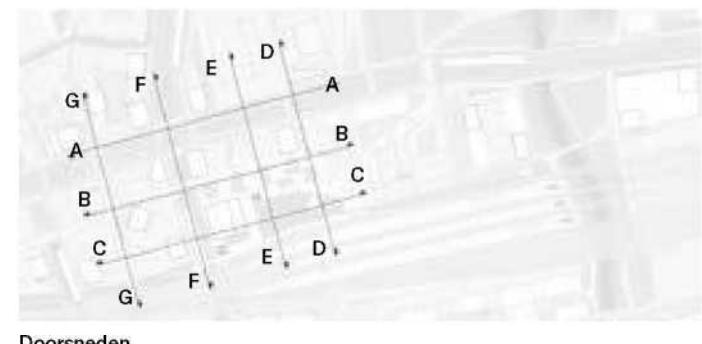
RESOLUTION DIRECTIONS MODEL 15 – SECTIONS

186

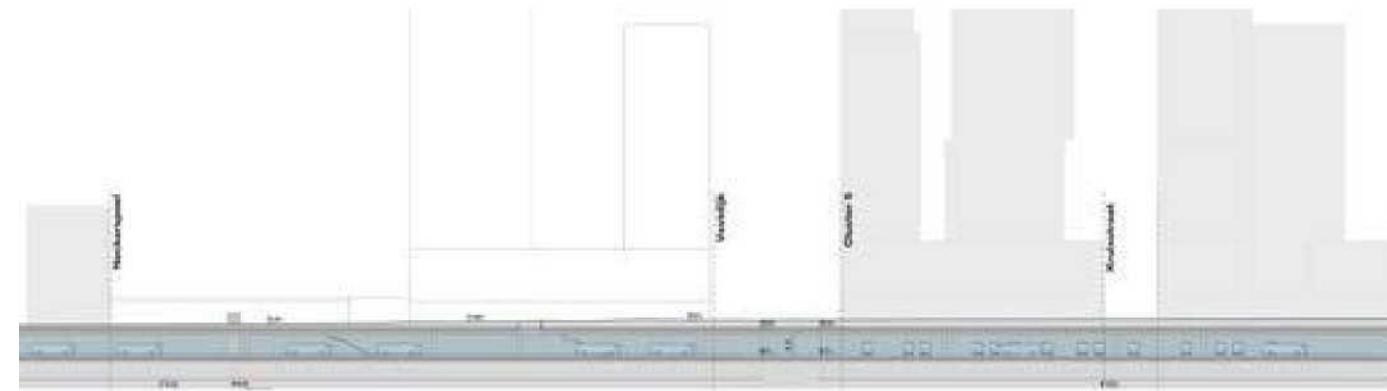
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

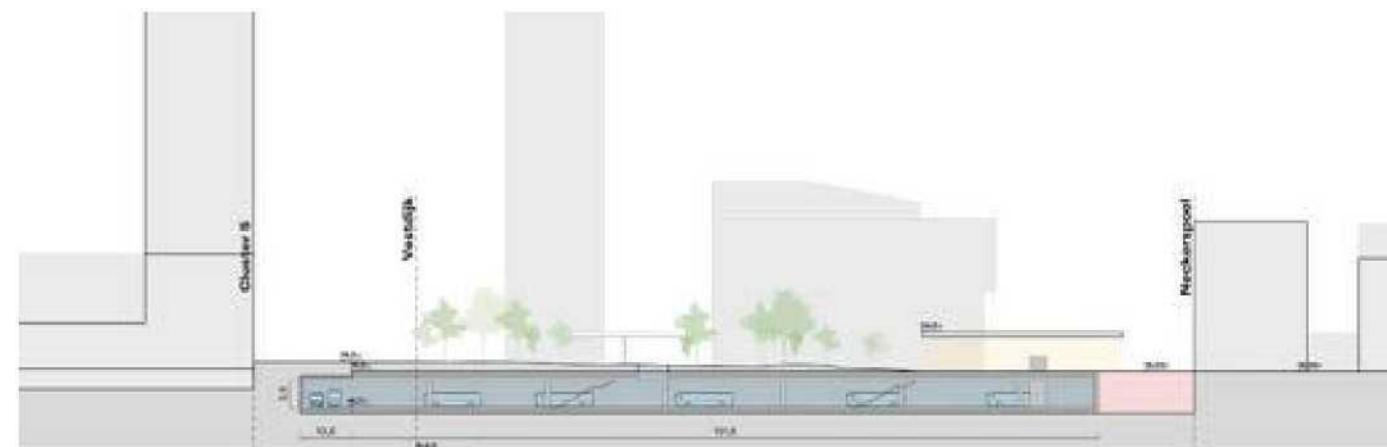
187



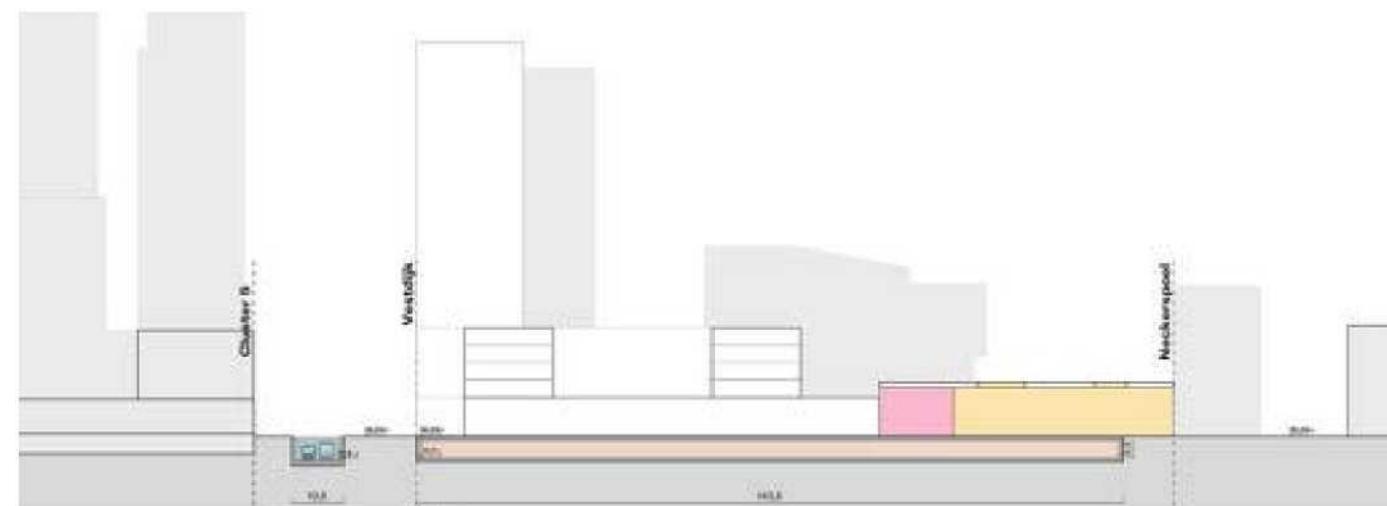
Doorsneden



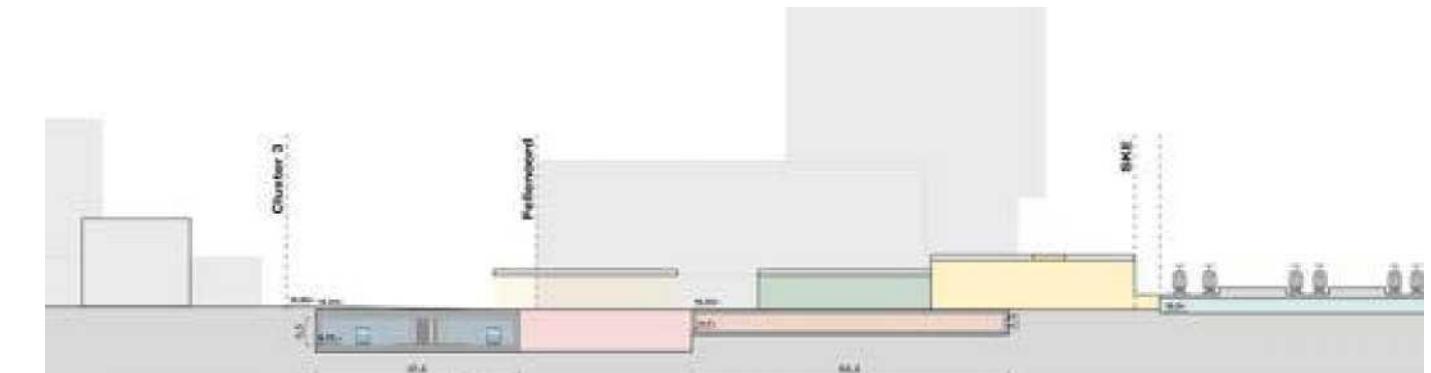
Doorsnede AA west-oost



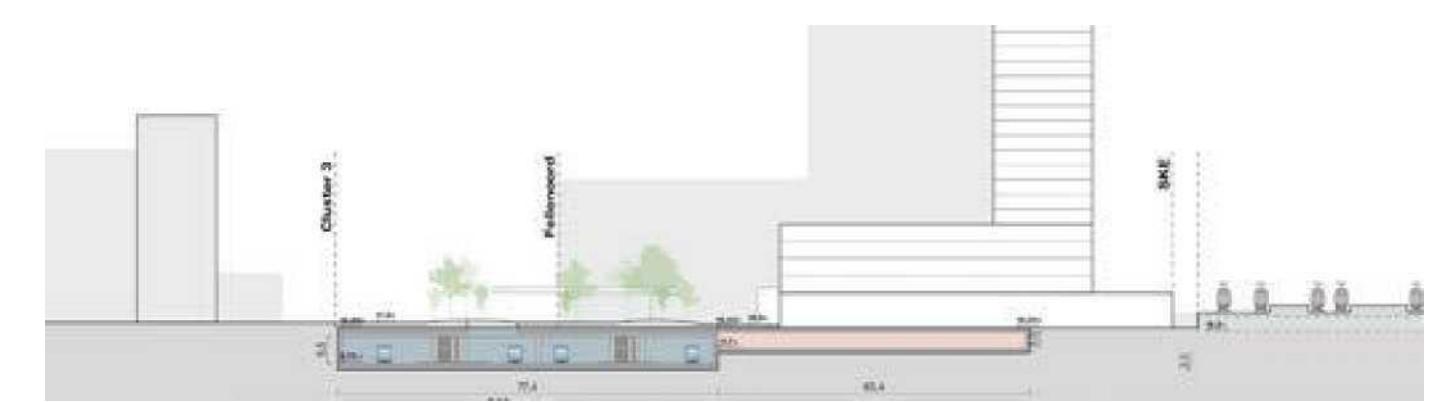
Section BB West East



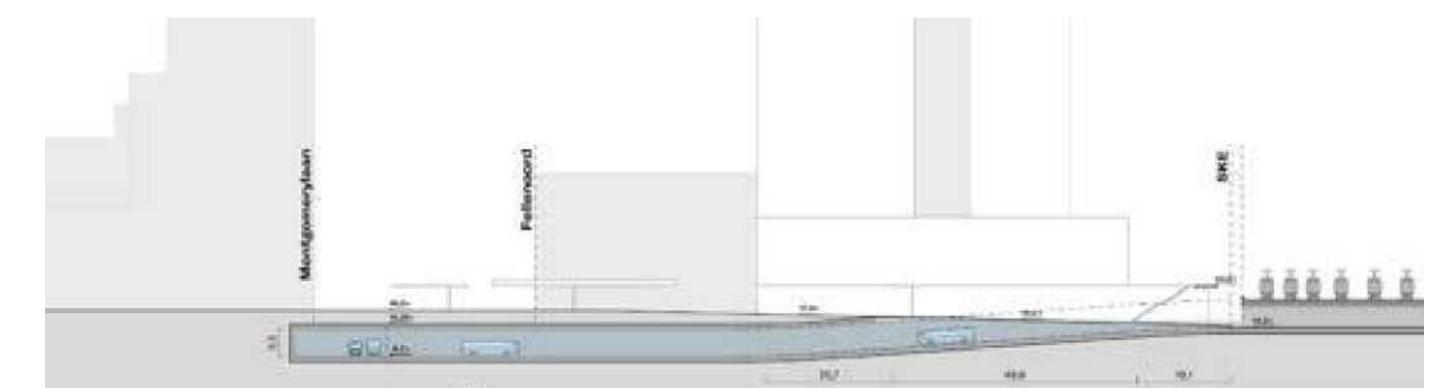
Section CC West East



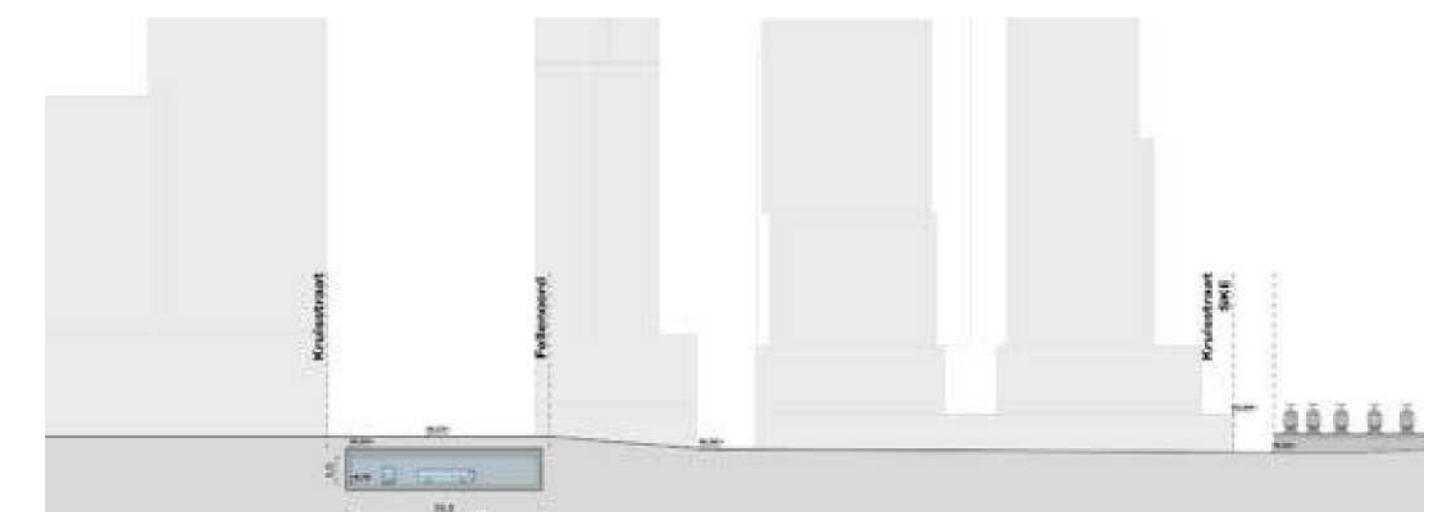
Section DD North-South



EE North-South section



Diameter FF North-South



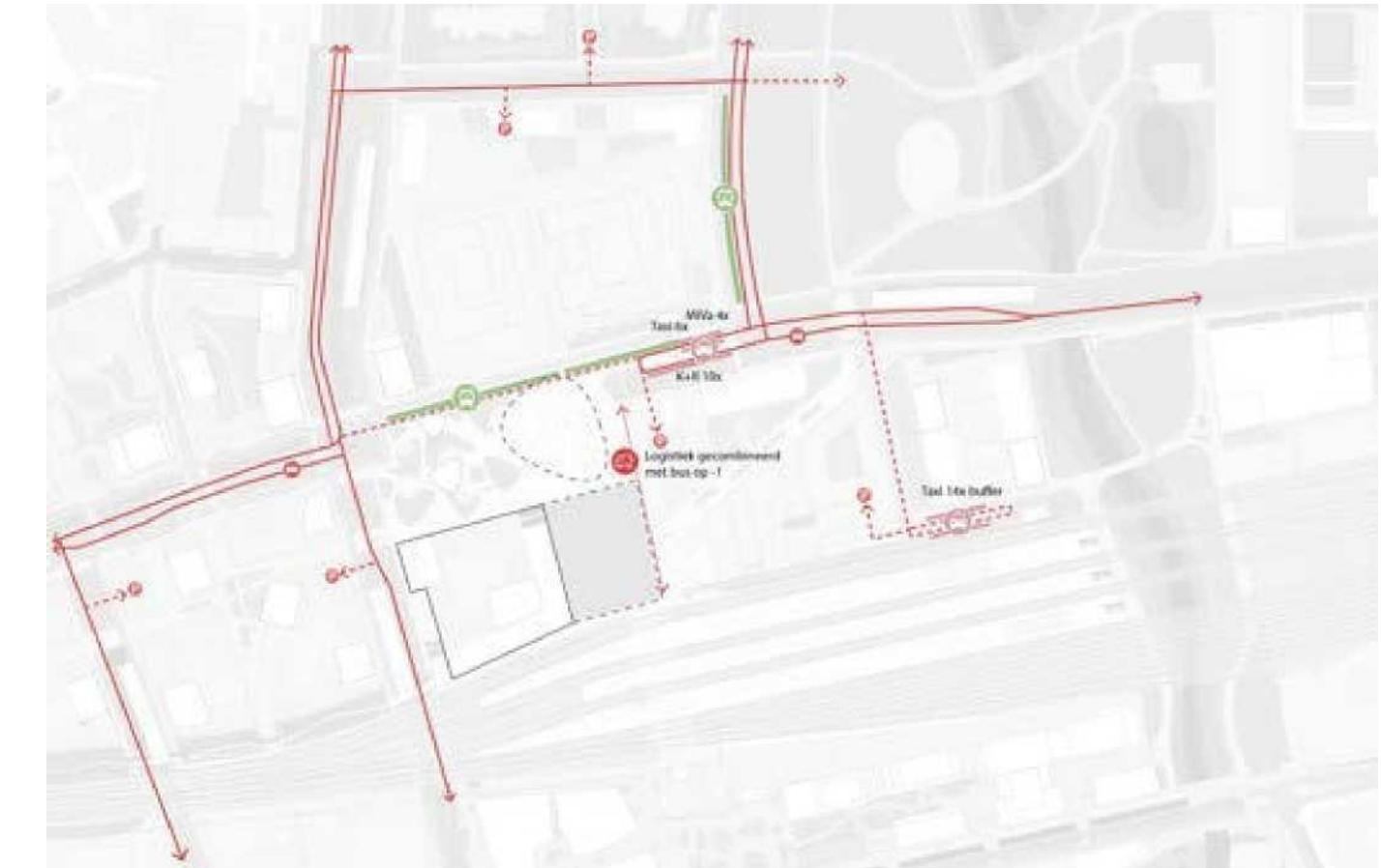
GG North-South section

RESOLUTION DIRECTIONS MODEL 15 – MOBILITY

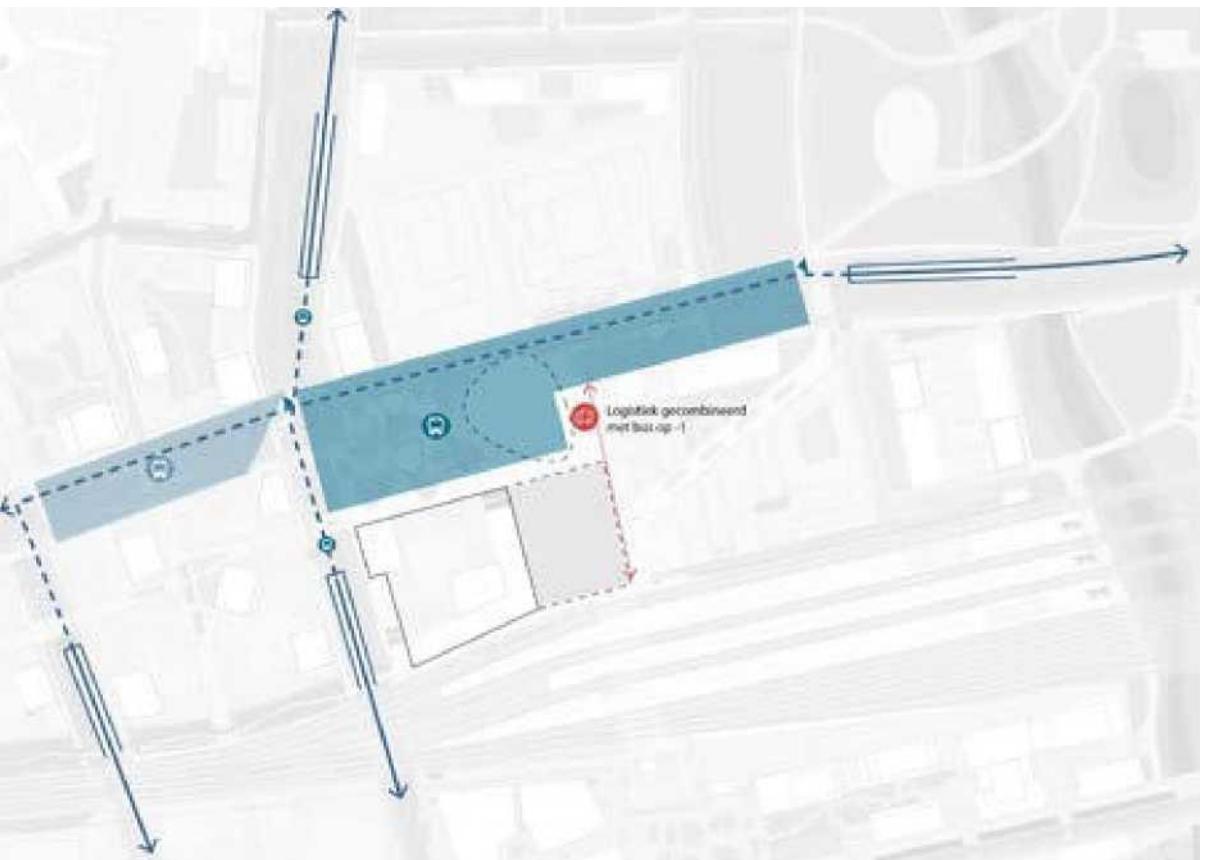
MIRT Exploration MMK, Eindhoven Movares + KCAP + Team V 189



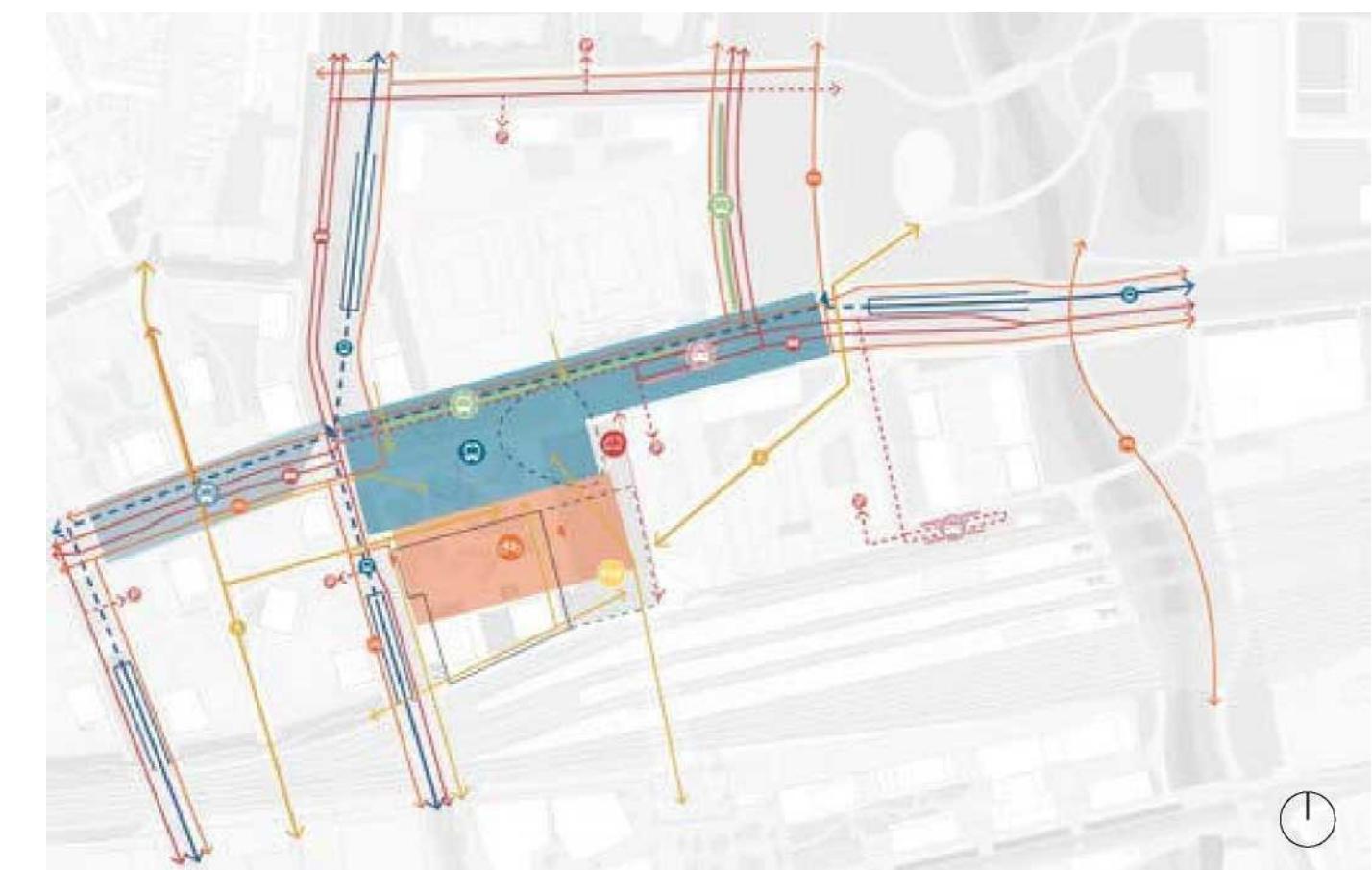
Pedestrian and bicycle routing



Routing k & r, taxi, TV, ib, car parking



Routing buses



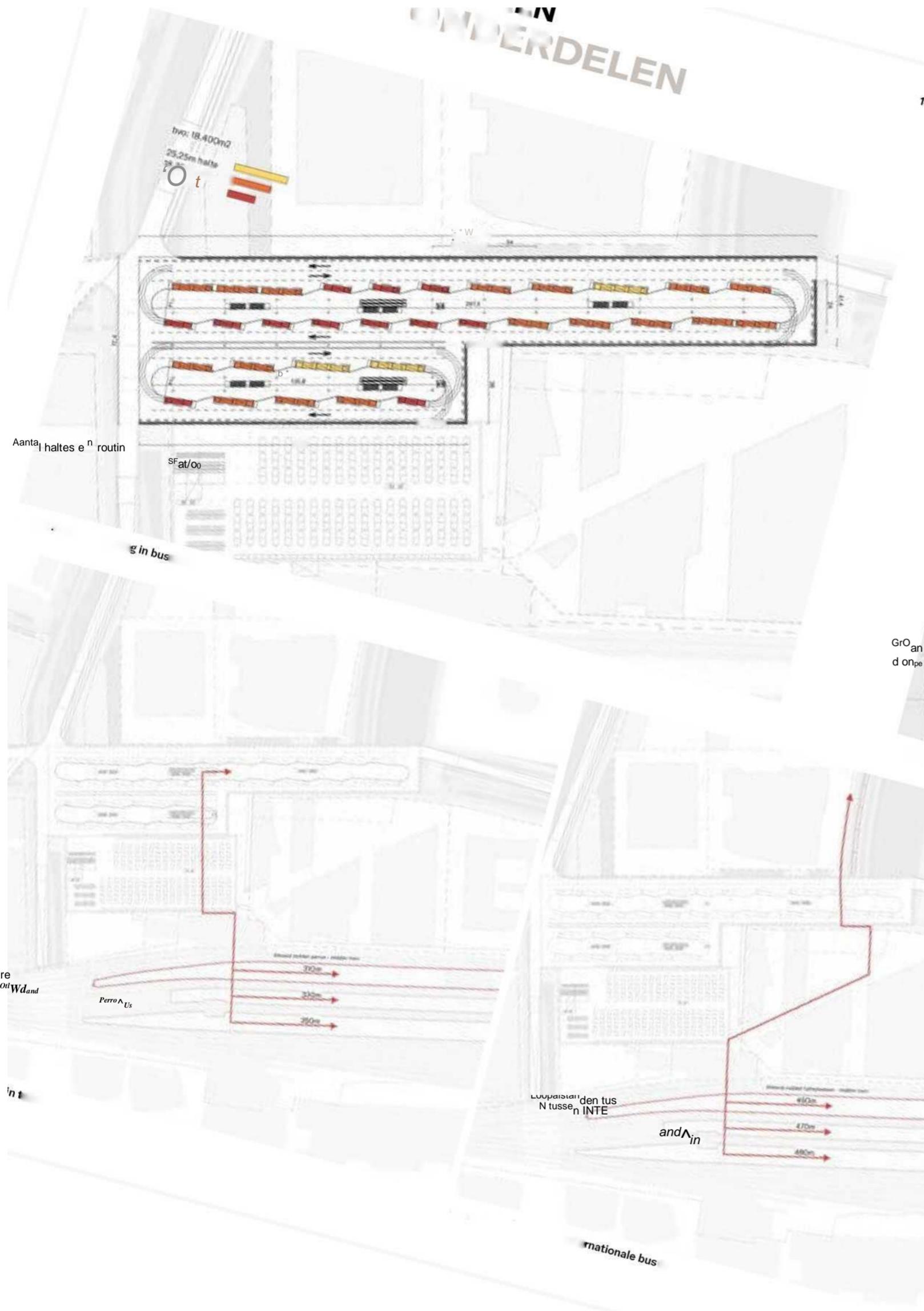
Routing of total mobility

MODERATING THE SINGULARITY

15 – ON

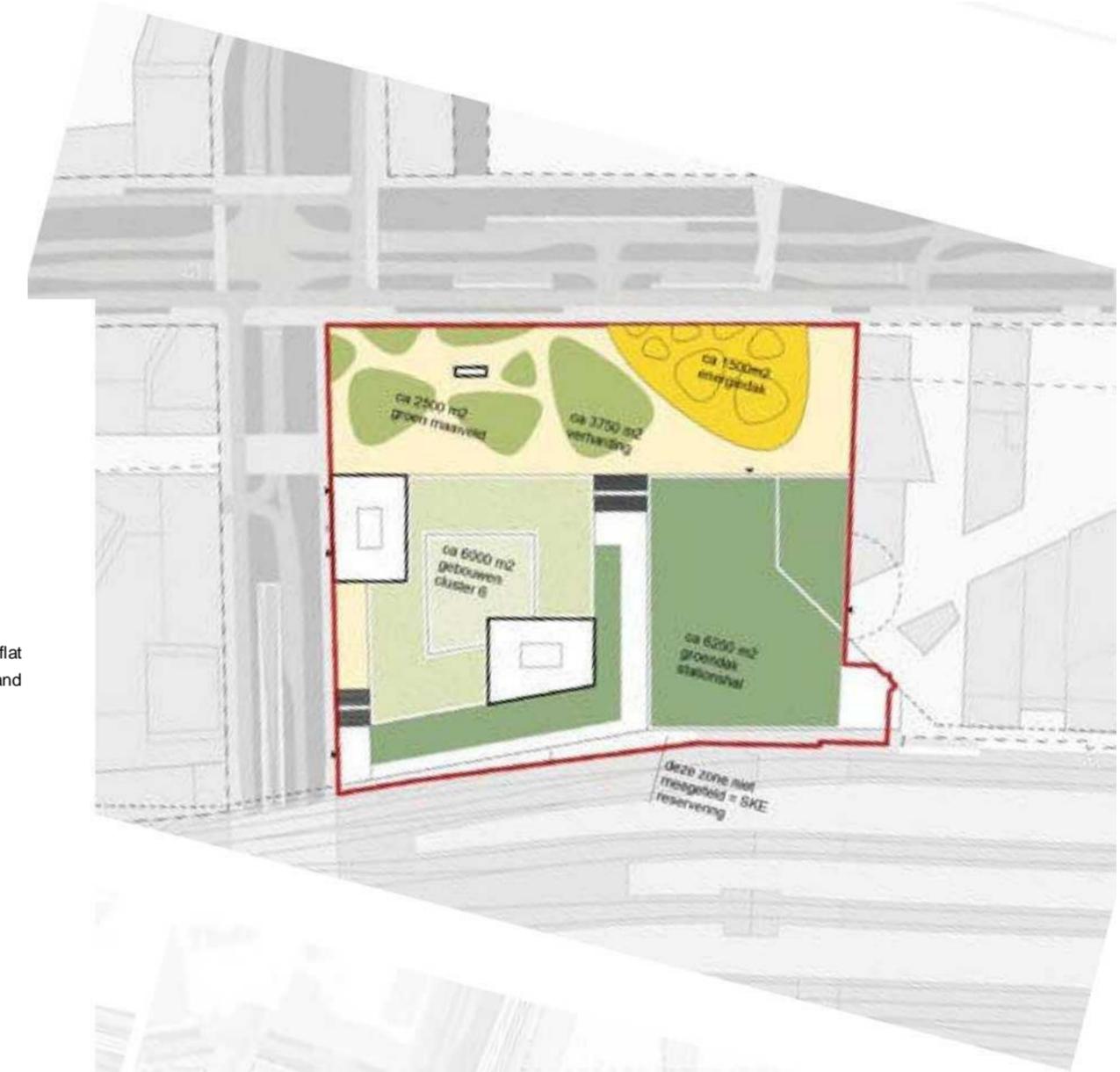
SONDERDELEN

190



MIRT Verke NN_{ing} M_{MK}
Final furnac

OVA_{res} + KCAP + T
EAM \



RESOLUTION DIRECTIONS MODEL 15

192

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

193



View of the station and station squares and the entrance to the bus platforms



6. VERIFICATIE TOPEISEN

6. VERIFICATION TOPEISS 196

MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

197

Verification of requirements from the Functional Programme of Requirements (FPvE) MMK Eindhoven

The solutions on the short list contain the building blocks contained in the Building Book developed in parallel, which is annexed to this document. All the solutions on the short list comply with the Guidelines and, to a greater or lesser extent, with a set of requirements. These requirements come from the Functional Programme of Requirements (FPvE), which is drawn up in cooperation in a KES (Customer Specification) pathway, organised and supervised by the consortium, with the Municipality of Eindhoven, the Province of North Brabant, NS, ProRail, Waterschap and the Safety Region.

The resolution directions have been verified against the set of toperequirements. On the right side is a matrix with the verification per solution direction: meets or does not meet the requirement, and if not whether the requirement is achievable.

Red	direction of solution not in accordance with the requirement
Orange	needs to be further developed in the exploration, requirement seems difficult to achieve
yellow green	should be further elaborated in the exploration, requirement seems achievable solution direction meets the requirement
grey	not applicable

Top requirements v2.0				
Subject	ID MMK- # #	Own text	New egg text following FPvE v1.8	Verification information of Verification through: (S = shortlist, B = building book)
0 MMK	MMK-004	The MMK ECT uses the Development Vision & Development Framework Fellenoord Internationale Kroon XL (approved 2-2-2022) as the starting point for the development of the public space.		S
0 MMK	MMK-026	The transfer system MMK EH/V allows the Reiziger to switch between Bus and Fiets and vice versa within 5 minutes (between central stabiling and central bus platform).		5 min = 350 m S
0 MMK	MMK-032	The transfer system MMK EH/V allows the Reiziger to switch between Bus and Train and vice versa (between the centre of the train and the centre of the platform within 5 minutes).	The transfer system MMK EH/V allows the Reiziger to switch between Bus and Train within 5 minutes and vice versa (between the centre of the train and the centre of the bus platform).	5 min = 350 m S
0 MMK	MMK-037	The MMK ECT provides the Reiziger at least with protection against rain and wind when switching between train, bus and bicycle.		S
0 MMK	MMK-066	The MMK ECT provides the Reiziger with a view to and recognition of the station building from the leading routes.		S
0 MMK	MMK-067	The MMK ECT provides the Reiziger with a view and identification of routes from the station building.		S
0 MMK	MMK-111	The MMK ECT allows the Reiziger to switch between Internationale Bus and Fiets and vice versa (between the centre of the train and the centre of the bus platform within 10 minutes).		10 min = 700 m S
0 MMK	MMK-134	For real estate at the station hall, at moving field level, 250 m ² is reserved for entrance/logistics/etc. The 250 m ² TV real estate is not included in the station hall programme (reception area).	If real estate is placed at the station hall, 250 m ² should be reserved at moving field level to make this real estate accessible (for entrance/logistics/etc.) This 250 m ² is in addition to the MMK programme of the station hall (reception area).	S
0 MMK	MMK-145	In the diagonal direction TU/e, a width of 16 m shall be used in front of or through the station building.		S
0 MMK	MMK-299	The MMK ECT should enable real estate development.		S
0 MMK	MMK-301	The MMK should not prevent intended future developments for (SKE) regeneration.		S
0 MMK	MMK-322	If there are negative effects on groundwater flow, mitigation measures must be taken.		
0 MMK	MMK-344	The distance between bicycle parking exit and station entrance shall not exceed 100 metres.		S
1 bus transport system	MMK-048	The distance between bus buffer and bus station shall not exceed 2.5 minute driving time.	2.5 min = 1 km S (based on 24 km/h)	
1.1 Bus station	MMK-033a	The MMK ECT allows pedestrians to cross unevenly with buses.	Split requirement	
1.1 Bus station	MMK-033b	Passengers at the bus station are not allowed to cross from platform to platform.	Split requirement	
1.1 Bus station	MMK-046	The bus station is accessible to emergency services in accordance with their requirements (speed, accessibility, stabiling area, safety, etc.).	The MMK is accessible to emergency services in accordance with their requirements (speed, accessibility, stabiling area, safety, etc.). high-level experts opinion, stairs, accessibility of	S
1.1 Bus station	MMK-063	The bus station is accessible via bus lanes with the routes via Fellenoord, Veldm, Montgomerylaan, Prof. Dr. Dorenboslaan, Vestdijk Tunnel and		S
1.1 Bus station	MMK-269	The bus station has at least 27 entry stops and 4 exit stops. The lengths of entry stops are 14 x 13 m, 12 x 18.75 m and 1 x 25.25 m. The length of exit stops shall be 18.75 metres.	The bus station has at least 27 entry stops and 4 exit stops. The lengths of entry stops are suitable for buses as follows: 14 13-metre buses, 12 18.75-metre buses and 1 25.25-metre buses. The lengths of exit stops are suitable for 18.75-metre buses. For the specific length distribution among the platforms, the provisions of the 'Mobility report – Exploration of the size of the bus station' apply, version 2.0.	B
1.1 Bus station	MMK-302	The MMK offers space for at least 2050 entry stops and 30 exit stops in 4. The length of the entry stops is 14 x 13 m, 14 x 18.75 m and 2 x 25.25 m. The length of exit stops shall be 18.75 metres.	The MMK bus station offers space for at least 2050 entry stops and 30 exit stops in 4. The length of the entry stops is 14 x 13 m, 14 x 18.75 m and 2 x 25.25 m. The length of exit stops shall be 18.75 metres. For the specific length distribution among the platforms, the provisions of the 'Mobility report – Exploration of the size of the bus station' apply, version 2.0.	B
1.2 Busbuffer	MMK-284	Buffer stations and associated drivers' accommodation are positioned separately from entry and exit stops within the multimodal knob, in a logical way in relation to the entrance and exit bus routes. Lengths of buffer stations in accordance with 'Mobility report – Bus station size forecast', version 2.0.	Buffer stations and associated drivers' accommodation are positioned separately from entry and exit stops within the multimodal knob, in a logical way in relation to the entrance and exit bus routes.	S
1.2.1 bus buffer platforms	MMK-287	The bus buffer has 20 bus buffer stops. Length of bus buffer stations in accordance with 'Mobility report – Bus station size forecast; version 2.0'.		B
1.4 North Bus Station Hall	MMK-237	The bus station has a transfer space of 1.200 m ² for VVO.		B
2.1 International stops	MMK-289	There should be 7 separate stops for international buses suitable for		B
3.1 Replacement train stops transport	MMK-115	Train replacement stops can be reached by a simple and safe pedestrian route to and from the station (max 400 m walk).		S
3.1 Replacement train stops transport	MMK-118	Train replacement stops are not located on either side of a crossing (to avoid unsafe traffic situations and poor passenger oversight).	Replacement train stops are located on one side of a crossing (to avoid unsafe traffic situations and lack of overview for passengers).	S
4 cycle transport system MMK	MMK-291	Within the MMK there is a minimum space for 6335 own bicycles, divided into 5900 own bicycles, 25 scooters, 650 outdoor model bicycles and 60 outdoor model bicycles XL.	Within the MMK there is a minimum space for 6335 own bicycles, divided into 5900 own bicycles, 25 scooters, 650 outdoor model bicycles and 60 outdoor model bicycles XL.	B
4.1 MMK bicycle parking	MMK-088	The position of bicycle parking spaces and associated entrances are logically and findable connected to the network of cycle routes.		S
4.1 MMK bicycle parking	MMK-090	Entrances/exits of bicycle parks (for pedestrians) are from the station's (covered) reception area.		
4.1 MMK bicycle parking	MMK-293	Within the MMK bicycles OV bicycles and outdoor model bicycles are mainly indoors in the bicycle park.		S
4.1.1 Stabiling sites	MMK-238	Within the MMK there is a minimum of 7400 bicycles including shared bicycles, outdoor model bicycles and (partial) scooters.	Within the MMK there is a minimum of 7400 bicycles including shared mobility, of which 520 for public transport b2b, 50 shared scooters, 20 shared cargo bikes, 230 other shared bikes.	B
4.1.1 Stabiling sites	MMK-292	Within the MMK there is a minimum space for 820 parking places for shared mobility, of which 520 for public transport b2b, 50 shared scooters, 20 shared cargo bikes, 230 other shared bikes.		B
5.1 Interface link	MMK-161	There shall be an interdistrict connection between the northern and southern sides of the track through the Vestdijk Tunnel.		S
6 Car system	MMK-231	4 disabled parking spaces must be located within 100 metres of the		S
6 Car system	MMK-294	MMK offers space for 34 parking spaces, including 6 taxi stands, 14 taxi buffers, 4 mig stands and 10 K + R. (to be distributed dynamically over time).		S
6.1 Logistics	MMK-236	The station has 463 m ² warehouse space at the reference floor and 531 m ² warehouse space at the ambition floor.		B
6.1 Logistics	MMK-358	The loading and unloading area is safe, logical and easily connected to both the warehouse and the shops. In other words, the logistic system of supply but also waste treatment functions as a whole.		
7.1 North Train station hall	MMK-235a	In the station hall there is at least 2.320 m ² of VVO transfer space for rail passengers.	Split requirement	B
7.1 North Train station hall	MMK-235b	The transfer area must be for the benefit of rail passengers in order to orient themselves towards (continuing their) journey, to buy a ticket and to link up the various modes of transport.	Split requirement	B
7.1.3 commercial facilities Train	MMK-234	The station has 1.400 m ² of VVO commercial space in the reference variant and 1.600 m ² of VVO in the ambition variant.		
7.1.3 commercial facilities Train	MMK-362	The commercial areas are at the head of the pedestrian route for the train passenger.		

Certification Model 0 +	Template e 1	Template Model 2	Model 11	Model 15

11



7. CONCEPTFASERING

7. NOTICE OF CONCEPTUAL TEMPORARY LOCATIONS

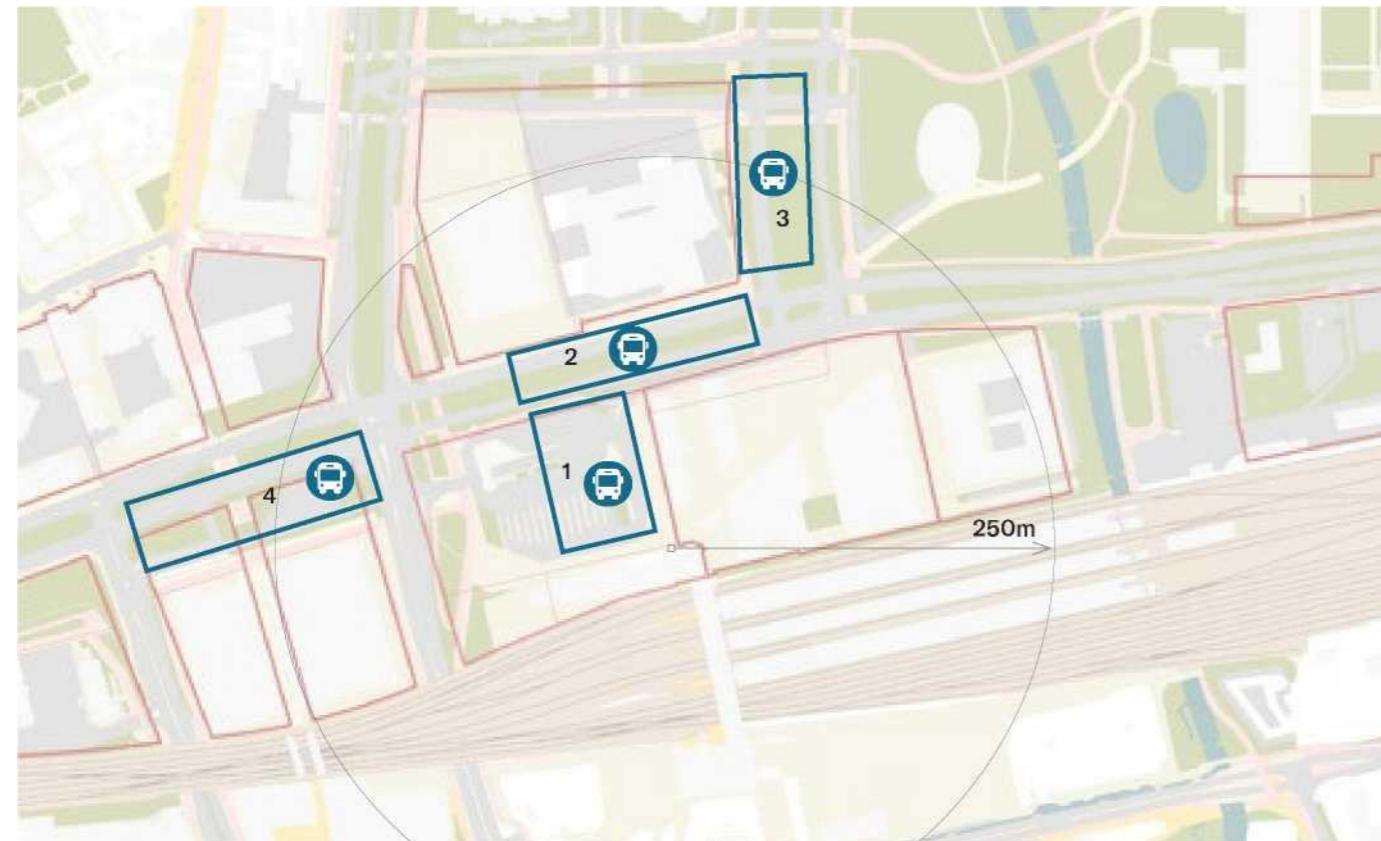
Phasing – temporary sites

The implementation of the MMK will be a major operation, whatever model is ultimately chosen. The limited space of the current northern entrance and the associated bus station will in all cases undergo a major transformation. In particular, the refurbishment of the bus station will have a major impact on the construction phase. That phasing cannot be dissociated from the operation process of the bus station. At the station entrance, something can often be temporarily removed without this significantly affecting the function. In the case of the bus station, however, this is not the case, since the temporary withdrawal of even a small part of the bus station from use may soon result in the entire bus station no longer operating. This means that a proper phasing is only possible if the operation of the bus station is included in the planning.

General principles (for this phase):

- Robust phasing: Minimum (intermediate) phasing steps: ensures simplicity and oversight for users
- Passengers centrally, minimising changes to flows

- Station (tunnel) remains open on the north side
- Exploitation and commercialisation embedded as much as possible
- Maintain station building functions in temporary situation in proximity
- Choose temporary facilities in such a way that they do not interfere with them
- activities that do not have a link to the European Week of Sport
- Construction time is around 6 to 8 years, so temporary facilities are of long duration: good quality!

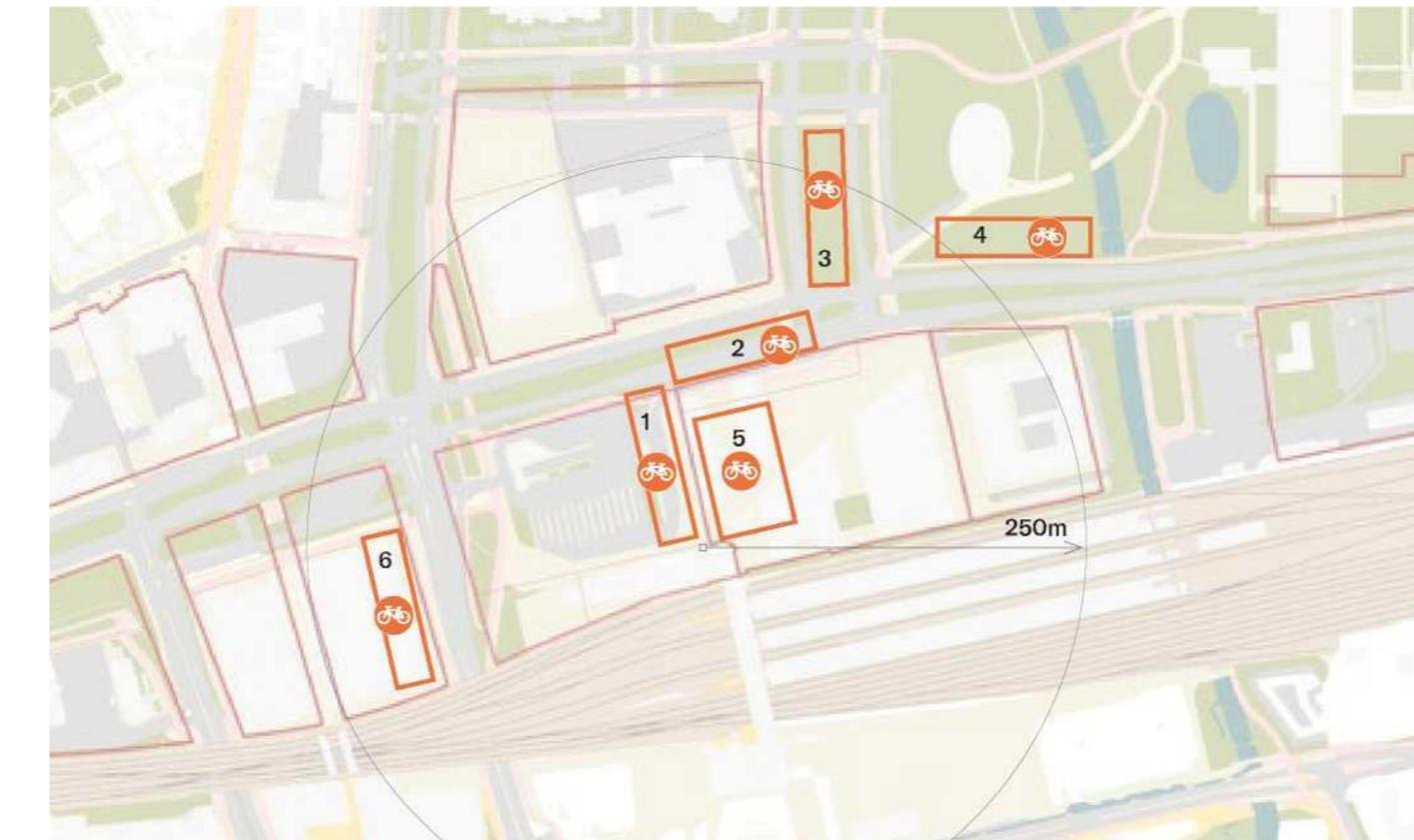
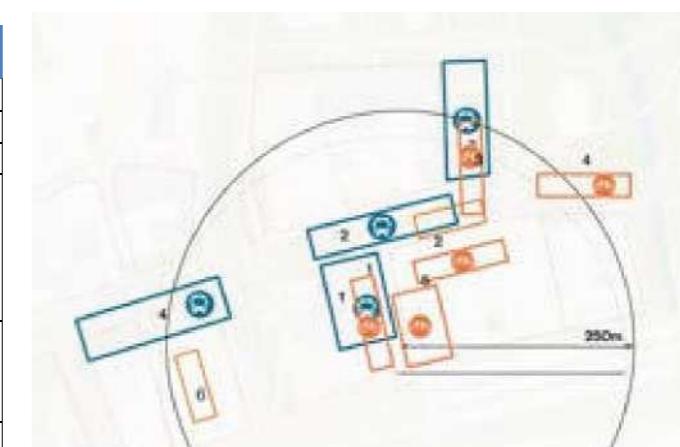


Temporary bus station

1 – Neck coil	Is at the location where the new bus station is to be located, so cannot be used during the realisation of the bus station not feasible
2 – fellenoord	Is located in the area of bus station and bus tunnel. Above ground: This is a possible location if you first build the tunnel (and use the current bus station) and then build it on top of a temporary bus station so that the bus station can then be demolished and built (thus longer construction time). Temporary bus station may conflict with building not feasible further investigation
3 – Kennedylaan (cones)	A temporary bus station could be set up in the area of cones and trees. So the cost of the artwork (cones) is higher and the trees and walking distance is higher than today. Can be either above ground or below ground (duration)
4 – cluster 5	To the north, cluster 5 is also the location for the bus buffer in most models. Above ground: Is not feasible to set up a bus buffer not feasible the area below ground: It may be possible to build the bus buffer first and use it as a temporary bus station. However, in order to be accessible, all tunnels must be ready not feasible .

Possible combinations

Bus location	Bicycle location	Description
1a PO Box 1		Unfeasible
1b	Bicycle 1	Unfeasible
2 Shuttle		Further investigation
3a PO Box 3	By bicycle 3	Location 3 for the temporary bus station on mowing ground can be combined, but in addition on + 1 a temporary bicycle park and a hangar on + 1 to the station
3b PO Box 3	With bike 2, 3, 4, 5 or 6	Location 3 for the temporary bus station can be combined with all possible bicycle locations (except 1)
4 PO Box 4		Unfeasible



Temporary bicycle parking

1 – Gatoma neck coil	Is located at the location where the new bus station/bicycle park is to be located and where building space is needed, so cannot be used during the construction of the bus
2 – fellenoord	Is located in the bust tunnel area. This is a possible location if you first build a tunnel (and use the current bicycle parking area) and then build a temporary bicycle parking area on top of it so that the current parking area can then be demolished.
3 – Kennedylaan (cones)	A temporary bicycle park could be built in the area of cones and trees. So the cost of trees and walking distance is higher than today
4 – Chamber of Commerce	On the TU/e site. Running distance is more than today
5 – Kennedy business center	It may be possible to place the temporary bicycle parking in the car park under the Kennedy business centre
6 – cluster 5	TPV demolished stock exchange building. These locations are possible, the focal point is sufficient working space for the construction of the Vestdijk bust tunnel and accessibility during this construction.

7. NOTICE OF CONCEPTUAL MODEL 0 +/1/2/11 AND 15

202

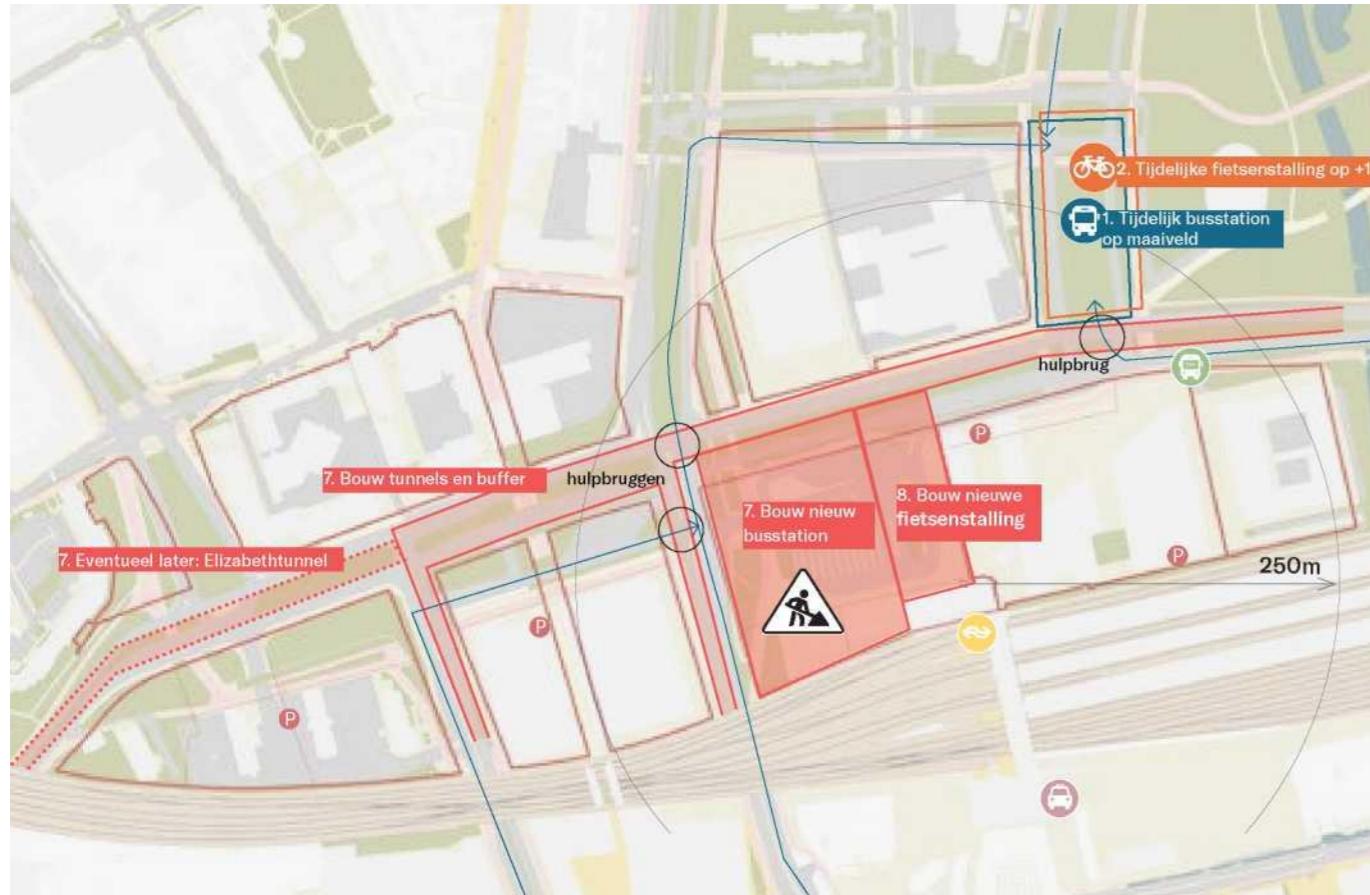
MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V

203

Model 0 +/1/2/11 concept phasing

The following is a possible phasing of the resolution directions 0 +/1/2 and 11. In the subsequent phase after NKO, the implications for phasing choices are further explored.



Temporary situation model 0 +/1/2/11

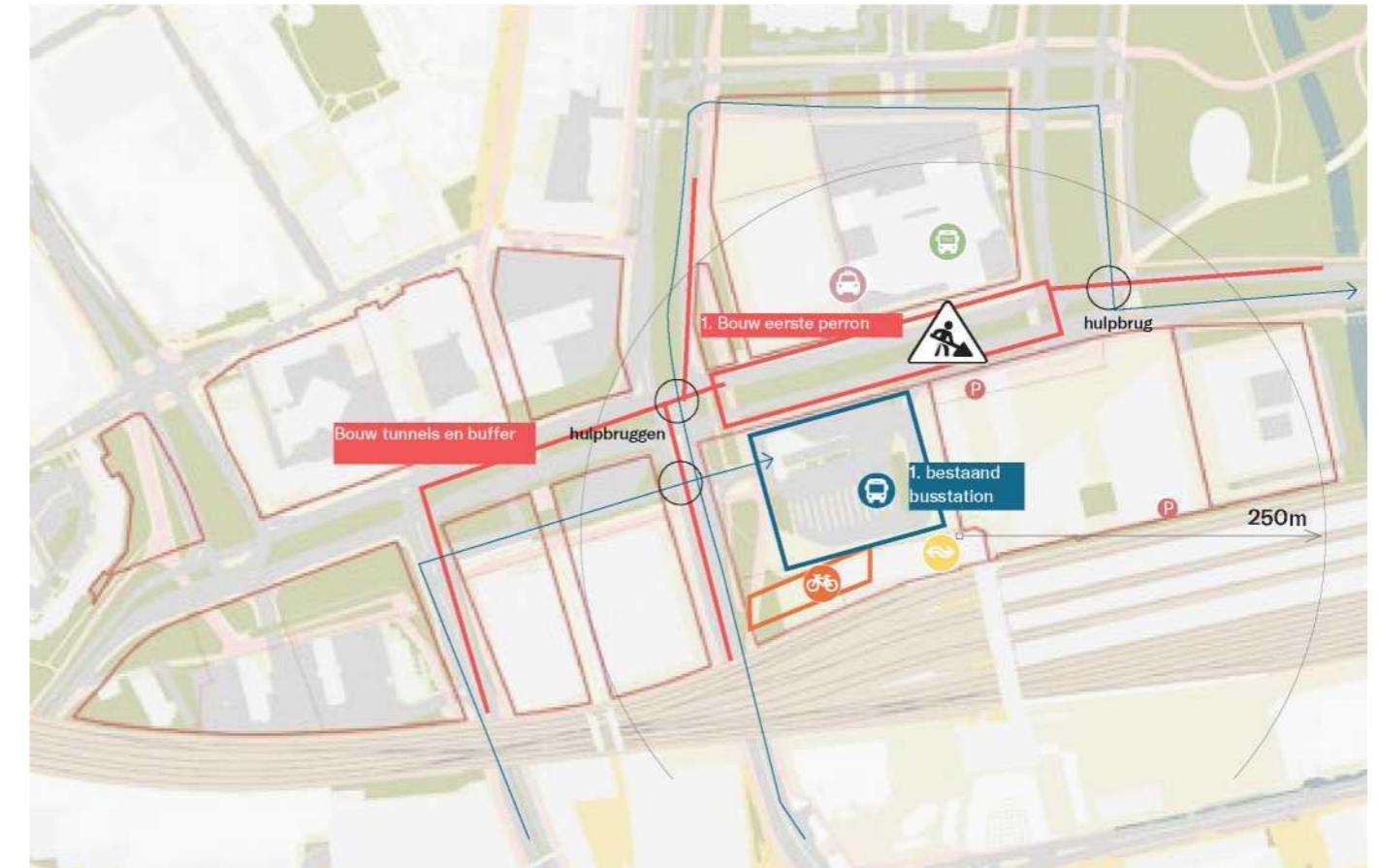
1. Need for temporary transfer of bus station
2. Need for temporary relocation of bicycle parking
3. Cyclists to the north temporarily via Boschdijk Tunnel and via Dommel Tunnel
4. Taxi k & and MIVA temporarily to the south
5. Logistics can be temporarily demolished from the south (Noordzicht building will be demolished immediately)
6. Whole Cluster 6 will be building land
7. Construction of new bus station, buffer and tunnels in a number of steps
8. Bicycle parking construction work
9. Buses make extra meters = operation check

Template 11:

10. Tunnels may be able to be built more southerly
11. No bus buffer in Fellenoord (integrated) therefore more room for sub-phasing

Model 15 concept phasing

The following is a possible phasing of solution direction 15. This is substantially different from the previous models because it is possible that (part of) the existing bus station can continue to operate temporarily while the new bus station is being built. In the subsequent phase after NKO, the implications for phasing choices are further explored.



Temporary situation model 15

1. In step 1, no temporary bus station is necessary: current bus station Necker coil can continue to operate (construction of first platform of new bus station in Fellenoord)
2. No need to move bicycle parking or otherwise to Beurs building
3. Need to cut traffic in Fellenoord, need rerouting
4. Temporary bus crossing
5. Buses make extra meters = operation check
6. No space for damp walls means deep walls (more expensive)
7. Noordzicht can stay longer



A detailed architectural rendering of a modern railway station complex. In the foreground, a large, curved platform is lined with people walking. To the right, a modern building features a glass facade with the text "Eindhoven Centraal" and a train icon. Behind the station, several other large, rectangular buildings are visible, some with light-colored facades and others with darker, reddish-brown tones. A prominent feature is a tall, thin vertical garden or a series of stacked planters on a wall. The area is landscaped with various trees and shrubs, including a notable yellow-leaved tree in the center. The sky is overcast with soft, diffused light.

8. ONTWERPRISICO'S

8. DESIGN RISKS 206

This chapter describes key design risks for the resolution directions. The list is not exhaustive and provides points of attention for the subsequent stages.

Model 0 +

semi-underground bus station (level -1/2) at Necker coil



Template 1

underground bus station (level -1) at Necker coil (parallel)



Model 2

underground bus station (level -1) – Necker coil (square)



Model 11

multi-layer bus station (level -1 and + 1) entirely on Necker coil



Model 15

underground bus station (level 1) under Fellenoord and Necker coil



The structure of the overhead section of the bus station is not of high quality and therefore does not have an international character.

The model works in terms of routing to cluster 5 and activation plinths does not fully comply with the development vision Fellenoord.

The total size of the real estate opportunities is smaller than the desired/required programme.

There is a possible imbalance in the spatial distribution between the station hall space for the train versus the bus hall.

Longer walking distances between train and bus offer less quality for the passenger (risk of experience and appreciation)

The development may not be in line with the objectives for cluster 6/raamwerk public space/does not fit within the defined development vision and is therefore also politically riskier.

Increased dependence on the public space framework; more space in the framework needed.

There is too little/no space for cables and pipes and green in the Fellenoord framework.

There are many differences in height between the node components with an impact on passenger experience, walking times and maintenance.

The total size of the real estate opportunities is likely to be lower than the desired/required programme.

Temporary bus station may be located on Kennedylaan site for 10 years (relatively long walking distances).

The development of a real estate programme is easier to implement (in a bicycle park), but the overall size is smaller than the desired/required programme.

The public route from the TUE ('the diagonal') collides with the receiving domain, which poses a risk to the public access of the connection to the station pitch and cluster 5.

Temporary bus station may be located on Kennedylaan site for 10 years (relatively long walking distances).

The total size of the real estate opportunities may be smaller than the desired/required programme.

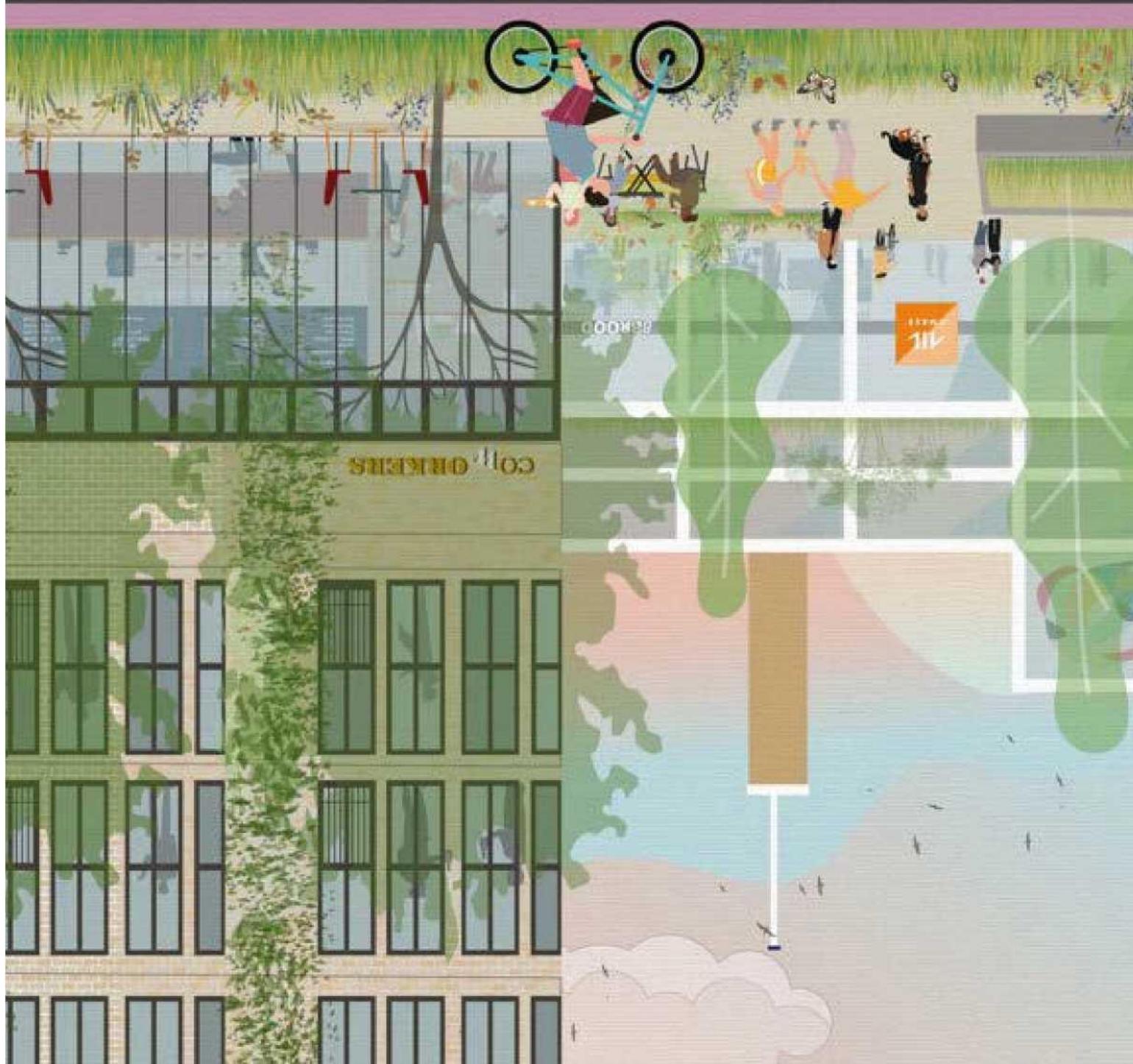
A bicycle parking over 2 layers may be less effective.

208 CREDITS 209

Movares Daalseplein
100 3511 SX Utrecht
TheNetherlands + 31
(0) 30 265 5555
info@movares.nl
<mailto:info@movares.nl>

KCAP
Piekstraat 27 3071 EL
Rotterdam
TheNetherlands + 31
(0) 10 7890 300
rotterdam@kcap.eu
<mailto:rotterdam@kcap.eu>

Team V Asterweg 15L
1031 HL Amsterdam
TheNetherlands + 31
(0) 20 344 95 00
info@teamv.nl
<mailto:info@teamv.nl>





ANNEX: MIRT EXPENDITURE ASSISTANCE SUBJECT TO SUBSTANCES Final



MIRT-VERKENNING BOARD MMK EINDHOVEN

Version:
2.0 (1 October 2024)

Authorisation sheet

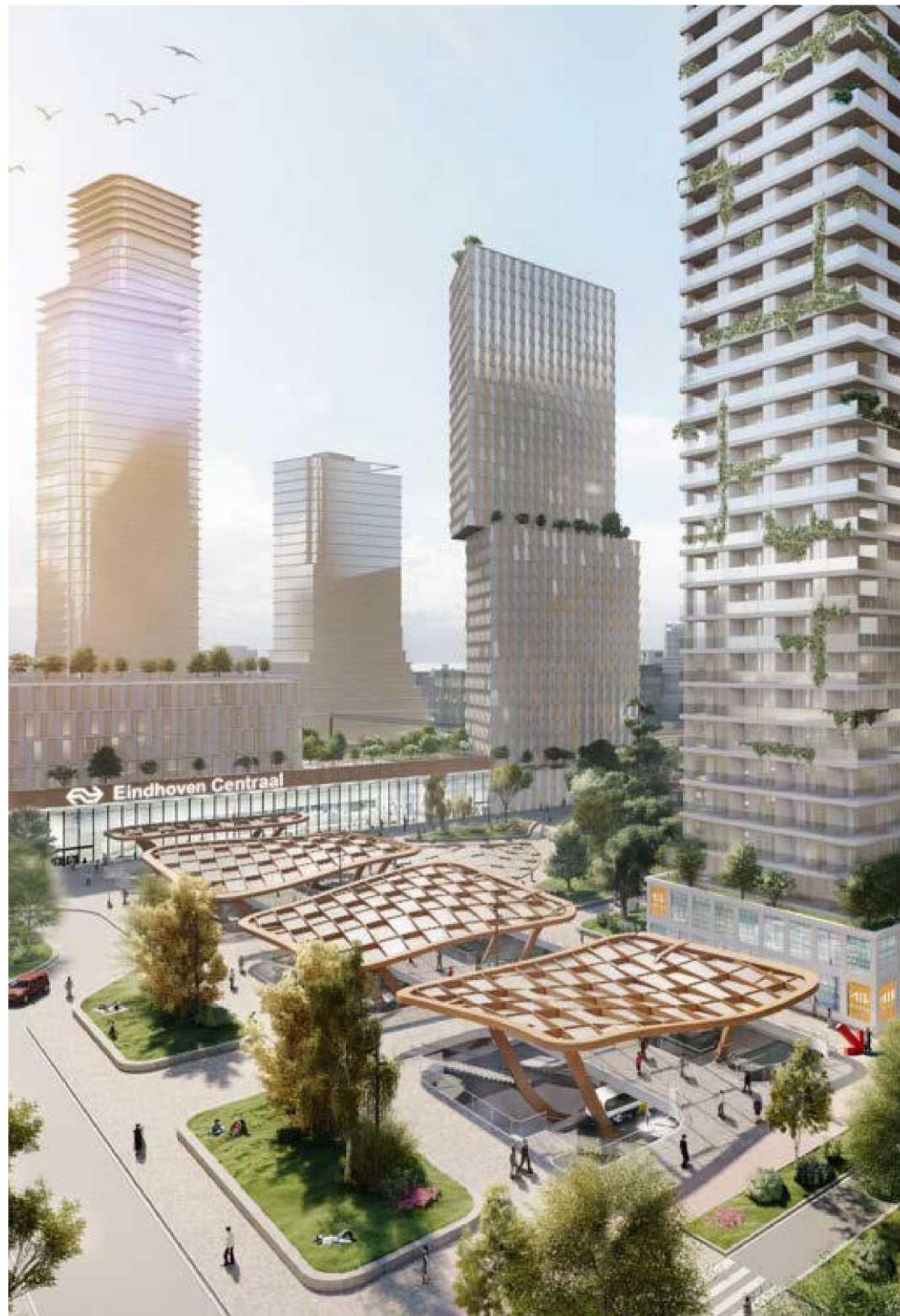
Final version control and release

	Name	Date
Prepared by	ARD Jan Wolters, Mariëtte Kooren, Edwin Megens	1-10-2024
Checked by	Frank Werner, Jeroen van Schooten	1-10-2024
Authorised by	Richard Savenije	1-10-2024

Version

	Name	Date	Short explanation
Q0.1	1th concept Building Book	16-4-2024	First version with building blocks associated with long list resolution directions
v0.2	2th concept Building Book	13-6-2024	Second version containing building blocks associated with short list resolution directions
v0.3	3th concept Building Book	10-7-2024	Third version containing building blocks associated with short list resolution directions
v1.0	Final Building Book (for review)	11-7-2024	Final version with building blocks associated with short list resolution directions
v2.0	Final Building Book (review processed)	1-10-2024	Final version with building blocks associated with short list resolution directions

1. INTRODUCTION AND PURPOSE
2. OVERVIEW OF MMK BUILDING BLOCKS
3. BUILDING BLOCKS PER SOLUTION DIRECTION 24

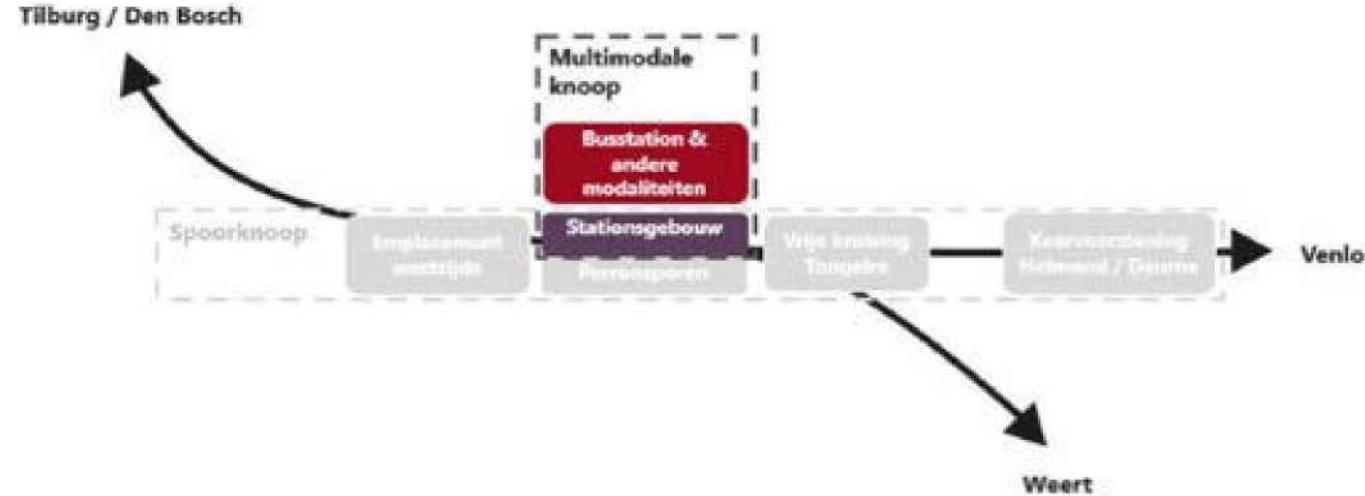


1. INTRODUCTION AND

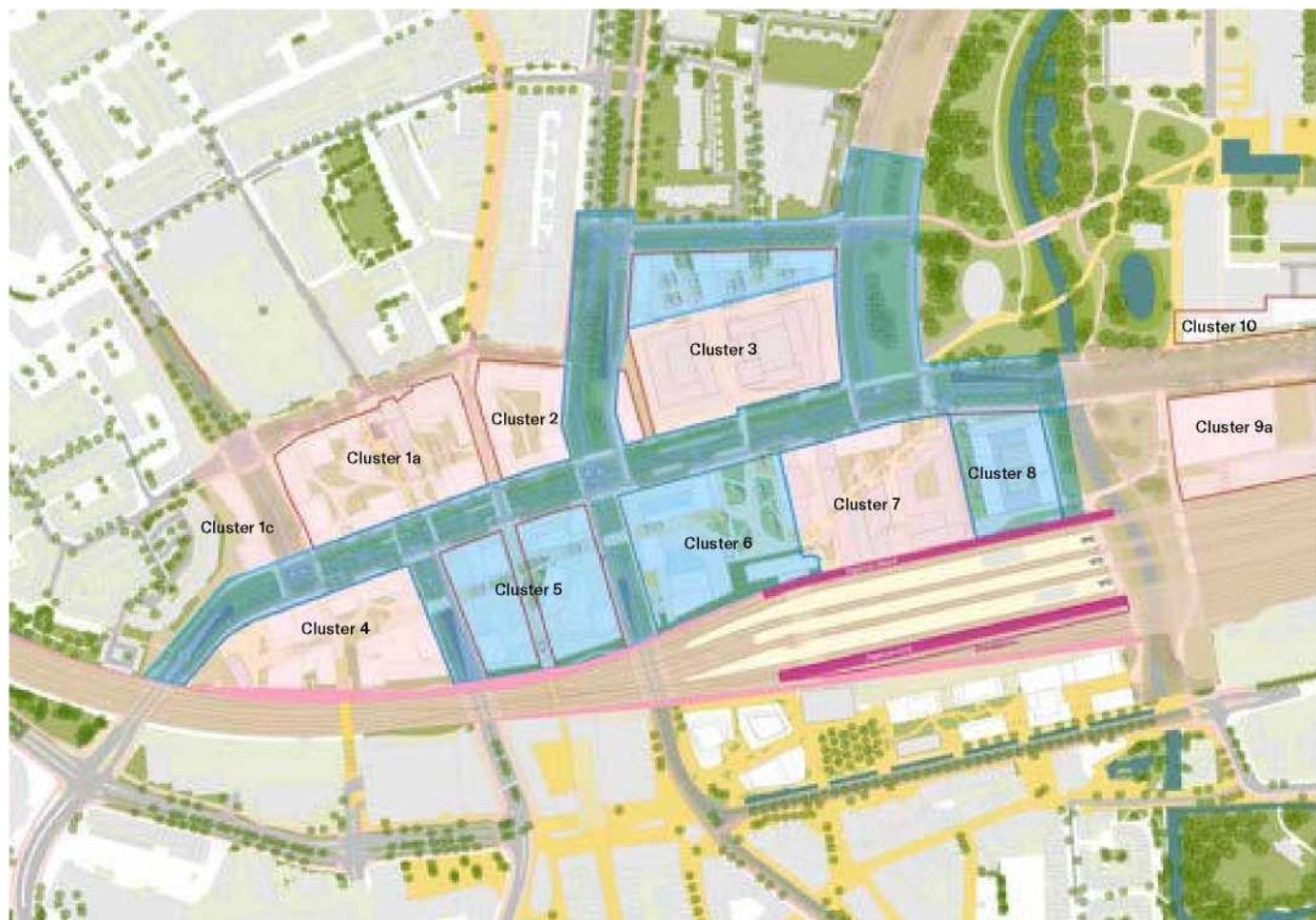
1. INTRODUCTION AND OBJECTIVE OF THE PUBLIC OF PUBLIC 9

PURPOSE

“Building book for the Multimodal Knooppunt Eindhoven”



Coloured parts within dashed line: scope of the MMK MIRT Exploration



Cope area MMK in Fellenhoord, Eindhoven

1.1 Purpose of document

In front of you is the Building Book for the MIRT Multimodal Knooppunt (MMK) reconnaissance in Eindhoven. This document is an annex to the Draft Summary of Short List of Solutions MIRT Exploration Multimodal Knooppunt Eindhoven.

A general project introduction, explanation of the MIRT exploration and preliminary steps can be found in the above document Notitie van Kansrijk Onderzoeken (NKO). In addition, the NKO describes the assessment of the different solutions and which solutions will be further developed in the next phase of the MIRT exploration (assessment phase).

1.2 Building blocks

There are several documents from the MIRT Exploration which form the basis for the elaborated building blocks:

- The adopted Action Plan (dated 27/09/2023, final) from the inception phase provides the framework for various documents that guide and flesh out the research and the development and evaluation of solutions.
- The Guidelines (dated 24/1/2024 version 1.0) set out various principles and specify them in more detail. It also defines a number of commonly used concepts.
- Sustainability ambition document (dated 6/3/2024 version 2.0), which gives effect to the sustainability objectives and in particular the priorities therein.
- Report on 0, including a long list (dated 11-6-2024 version 3.0), in which all the solutions envisaged (also known as a long list of solutions) were assessed and examined. This document contains the result of the first step of the step: sieve 0.
- The Functional Programme of Requirements (FPvE) drawn up during the analysis phase contains a complete set of wishes and requirements that a solution direction must meet to a greater or lesser extent. For the analysis phase and the NKO, we use a set of Topeisen (dated 27-08-2024, version 0.5) from the FPvE, which allows a verification to be carried out that is sufficient for the purposes of the NKO.
- Mobility reporting (dated 15/04/2024, version 1.0).

In addition, the larger urban planning framework for this study is determined by the ‘Development Vision & Development Framework Fellenhoord Internationale Knooppunt XL’, developed by KCAP, Rebel, APPM, and Goudappel on behalf of the Municipality of Eindhoven and the Province of Noord-Brabant in February 2022.

In addition, the OV-Knooppunt Eindhoven Regional Quality Framework (dated 18-03-2024, final) was drawn up. This framework guides the integrated coherence, structure and spatial quality of the OV-Knooppunt, and serves as a qualitative assessment framework for the Q team.

In this process, the parties involved (Gemeente Eindhoven, the Province of Noord-Brabant, ProRail, Nederlandse Spoorwegen and Bureau Spoorbouwmeester) worked with a multidisciplinary team of advisors from Movares, KCAP and Team V. During the process, urban planning, mobility, feasibility and technical aspects relating to the development of the MMK and integration with the existing railway station and Cluster 6 were examined in full.

1.3 Level of detail

For each building block, a plan of the different levels and/or principle has been drawn up. This indicates the (minimum) land take and dimensioning. The level of detail of the building blocks is such that they can be checked in sieve 1 against the Memorandum of Principles and Requirements.

1.4 Structure of the judgment

This document begins in Chapter 2 with an overview of the Topeisen that are the starting point for the building blocks and resolution directions and this phase of the MIRT Exploration. Chapter 3 presents the spatial translation of these requirements for the different building blocks of the MMK. These smaller building blocks are generic and applicable to all short list resolution directions. Chapter 4 focuses on the main building blocks (bus station, bus buffer, bicycle parking and station hall) per solution direction from the short list.

1. INTRODUCTION AND OBJECTIVE OF THE PUBLIC OF PUBLIC 9

2. OVERVIEW MMK BUILDING BLOCKS

OVERVIEW OF MMK BUILDING BLOCKS

12 MIRT Exploration MMK, EindhovenMovares + KCAP + Team V 13

Building blocks for the solutions

The Multimodal Knooppunt is made up of several components, known as building blocks.

The building blocks in accordance with the adopted Action Plan (dated 27.9.2023, final) are as follows:

- Renewed bus station;
- Busbuffer (inc. office and drivers' room);
- Canal tunnels from Vestdijk, Boschdijk (South), Field Marshal Montgomerylaan, Professor Dr Dorgelolaan and optional Elisabeth Tunnel;
- Bicycle parking;
- K & R and taxi supply, (loading and parking) facilities for shared mobility;
- New Nordic station (reception area and transfer area – train and bus, whether combined or not), including connection to the public area;
- Future Station Commercial Needs;
- Logistical facilities for station and station facilities;
- Structural facilities at the bus station for above-ground real estate (to be taken after sieve 1);
- Location for international buses;
- Location for train replacement transport;
- Provisions for transfer between all the above provisions;
- Future development of the interdistrict connection via the Vestdijk (to be taken after sieve 1).

Large (construction) stones

Some building blocks require a lot of space and are therefore decisive for the solution directions, these building blocks are referred to as the major building blocks. The main building blocks are the bus station, bus buffer, bicycle parking and station hall. The large building blocks may differ in shape and dimensions depending on the design chosen for the building block. These are therefore described in the next chapter, specifically for each model.

Other building blocks

On the next page you can see an overview of the possible shapes and dimensions of the other (smaller) building blocks. The commercial and information point building block is part of the station hall and can be found in the next chapter. The building blocks included in the short list are presented below in a legend applicable to the pictures accompanying the resolution directions.

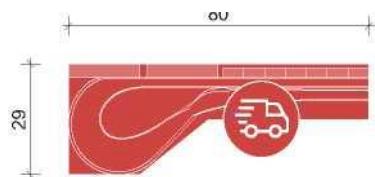
Disclaimer. not all building blocks, especially the smaller ones, have been developed yet, e.g. energy storage, water supply, toilets, cables and pipes. These will be addressed in the follow-up phase.

Major building blocks

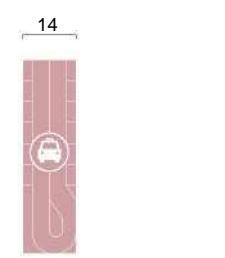
- | | |
|--|--|
| | Bus station + Bus tunnels and tours to the bus station |
| | Business buffer including office and drivers' area |
| | Bicycle parking (light orange is possible extension) |
| | Station hall: transfer room/Reception area |
| | Commercial (part of station hall) |
| | Information point (part of station hall) |

Other building blocks

- | | |
|--|---------------------------------------|
| | Logistics room |
| | K + R, taxi and shared transport |
| | Train replacement + International bus |



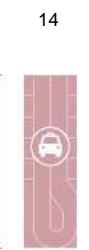
logistic
2 loading and unloading points, 7 pp for servicing and maintenance



Taxi/MIVA/car-
sharing
12 X MMK



Taxi
14 X outside
MMK



Kiss & ride
10 X inside or outside MMK



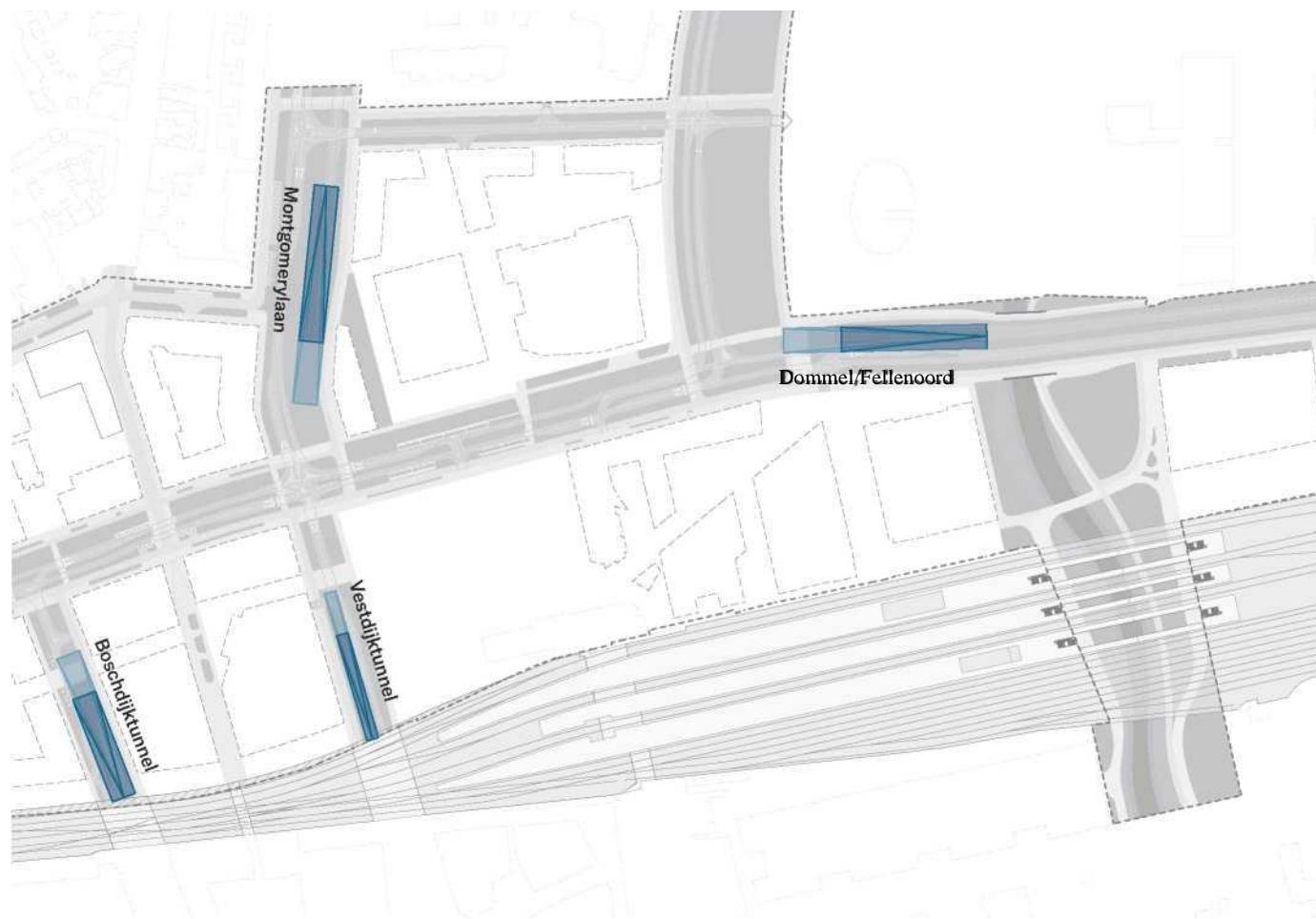
Train replacement transport
6 entry stops, 4 exit stops. 400 m to station



International buses 7 stops,
10 min to station



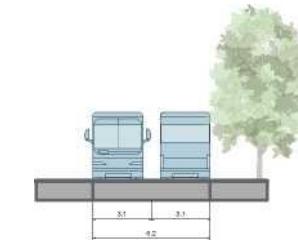
Green (MMK provides space for green in the subsoil)
2 400 m² compensation existing green
+ 1 X 1 600 m² minimum ambition (-10 % existing paving)
+ 2 X 1 600 m² maximum ambition (-20 % existing paving)
Ambition is 1 500 mm. Minimum is 500 mm for green



Tunnels specific

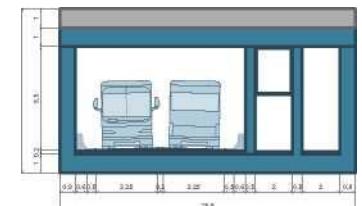
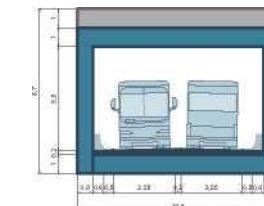
Bus lane

2 directions



General Bus tunnels

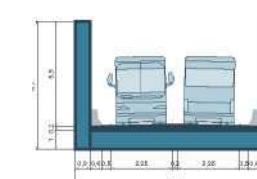
2 directions, ground cover varies by site/model



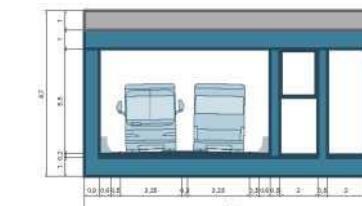
2 lanes
no parallel tunnel

two parallel tunnels

Boschdijk Tunnel &
Dommel/Fellenoord



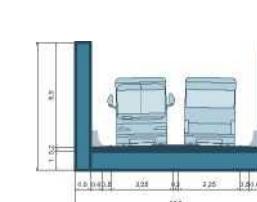
surface



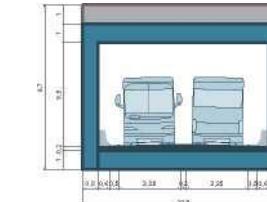
underground

Vestdijk Tunnel & Montgomerylaan

(Vestdijk Tunnel 1 or 2 directions to be further investigated in the next phase)



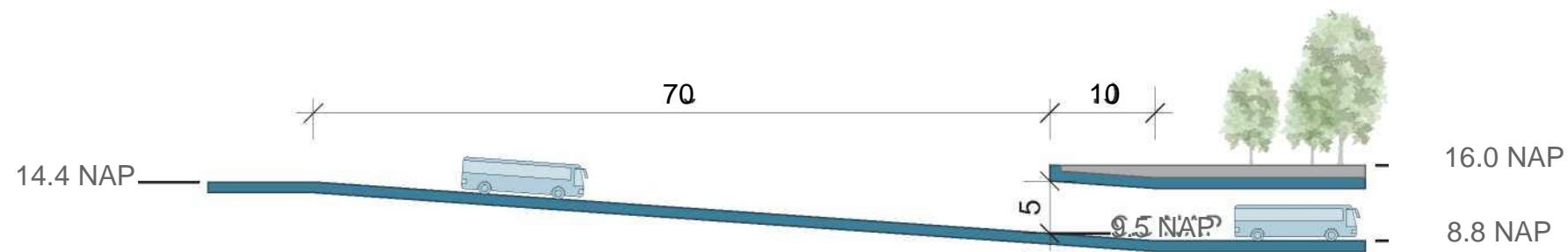
surface



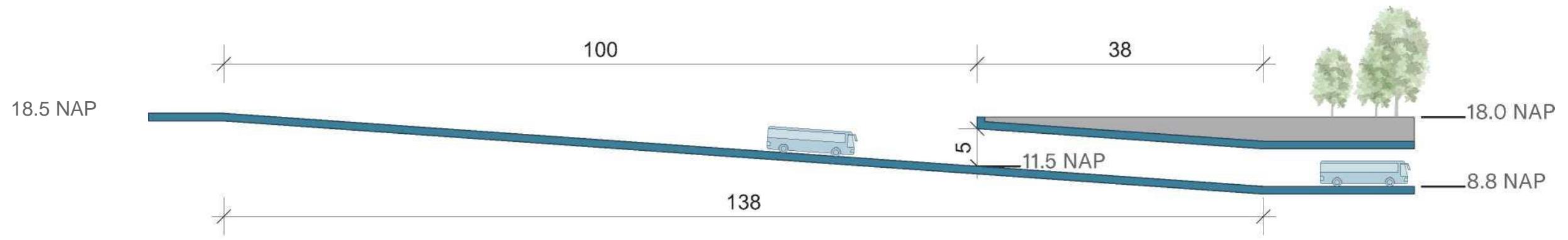
underground

Slope depending on the depth of the tunnel. To be developed in the next phase

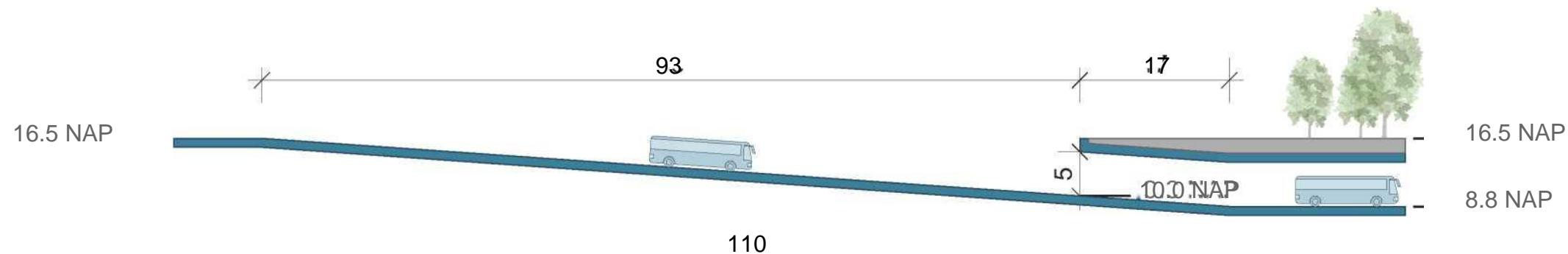
Boschdijk Tunnel/Vestdijk
Tunnel 7 % gradient



Montgomerylaan
7 % inclination



Dommel/Fellenoord
7 % inclination



3. BUILDING BLOCKS BY DIRECTION OF SOLUTION

OVERVIEW OF SOLUTIONS

20 MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V 21

TEMPLATE

TEMPLA

TE

Planning
map



Ground Floor



Underground level (-1)



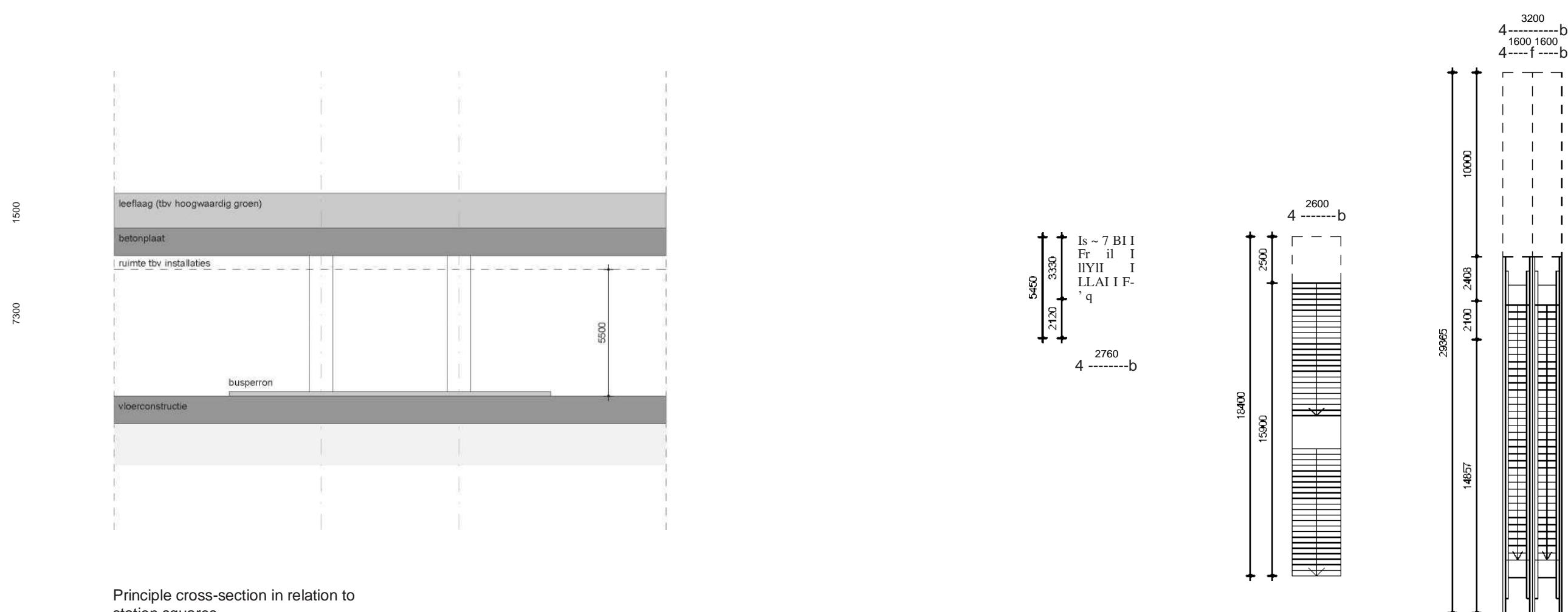
MODEL MODEL

2

11

15





Principle cross-section in relation to station squares

- ploughing by (concrete) plate
- max. excess voltage ca. 24 meters
- ceiling height: 5 500 mm

Tidal point at a vertical excess voltage of 8 000 mm
(note: (excl. standard escalators with an excess voltage > 8 000 mm)

Escalators

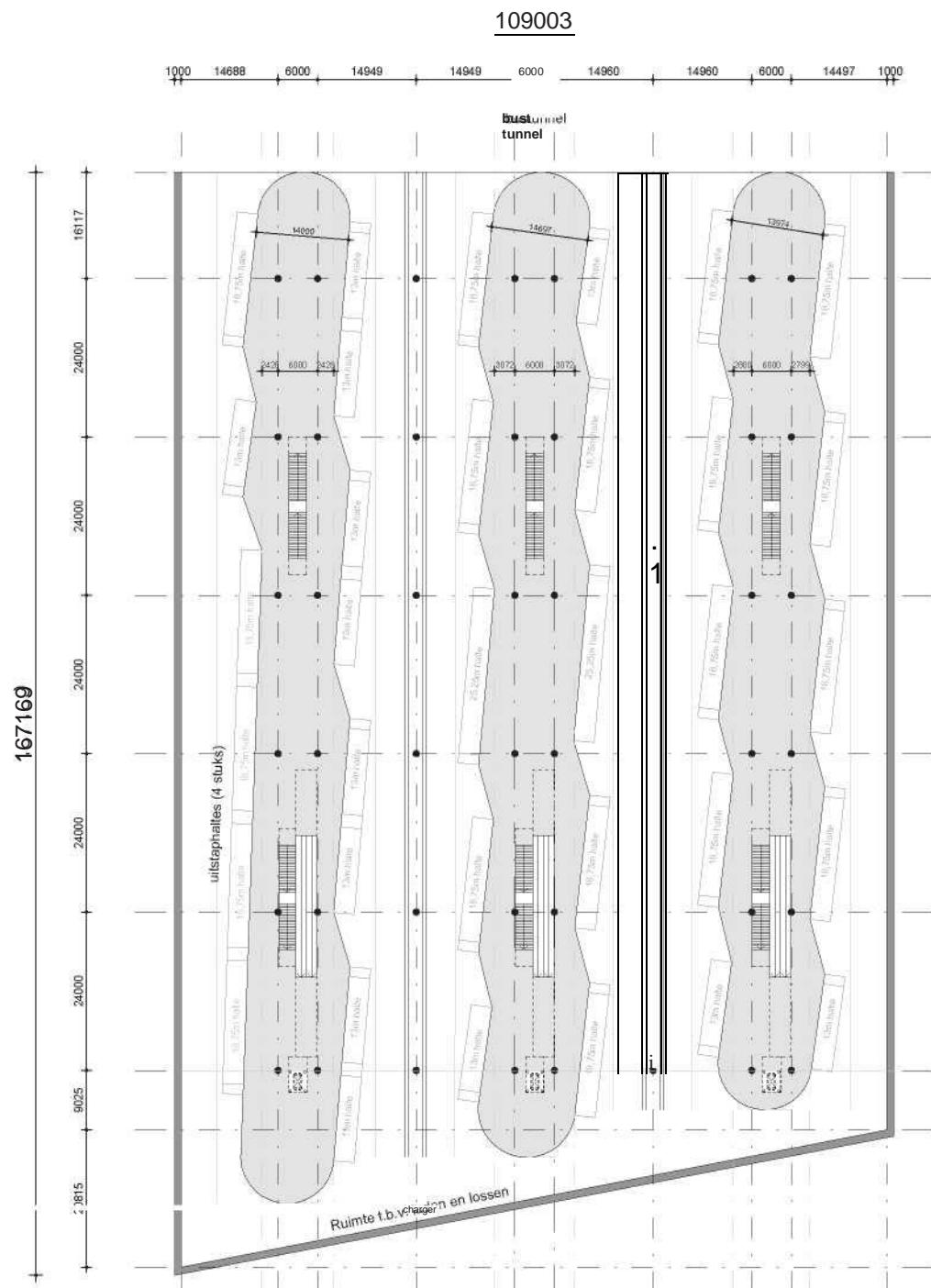
- Length: approx. 19.365 mm
- width: 1 465 mm
- net width: 1 000 mm
- obstacle free area for landing: 10.000 mm

Stairs

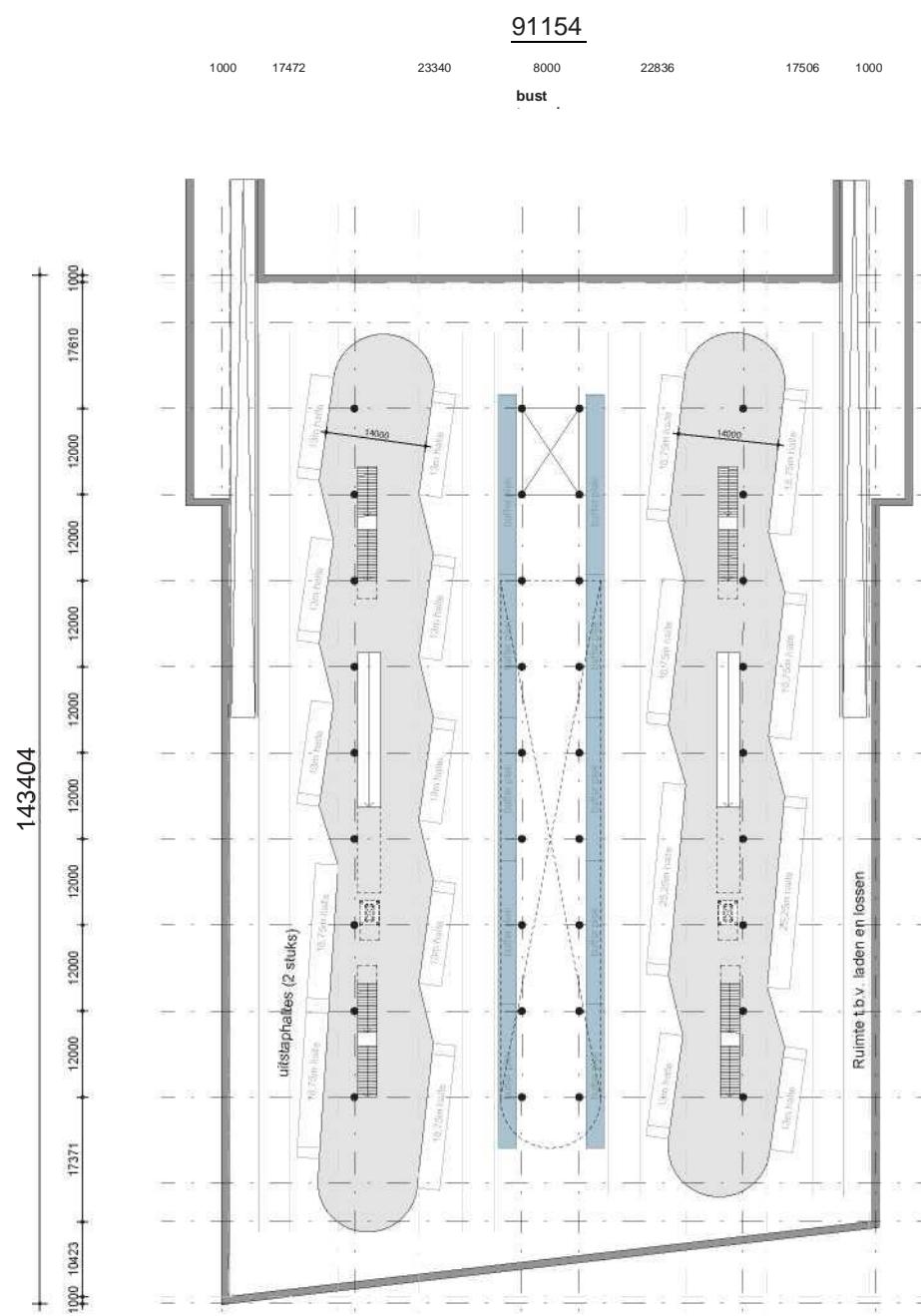
- For reasons of safety and comfort, the maximum capacity of a staircase is 38 persons per m1 width per minute.
- The minimum width of a staircase shall be 2 400 mm between handrails.
- The staircase shall be interrupted (halfway) by an intermediate platform if the number of steps exceeds 18.
- The interior of the staircase is 300 mm and the interior of the staircase is 170 mm.

Lift

- Place a turning space of 2100 x 2 100 mm in front of the lift.
- Obstacle clearance zone of 2 500 mm for stairs

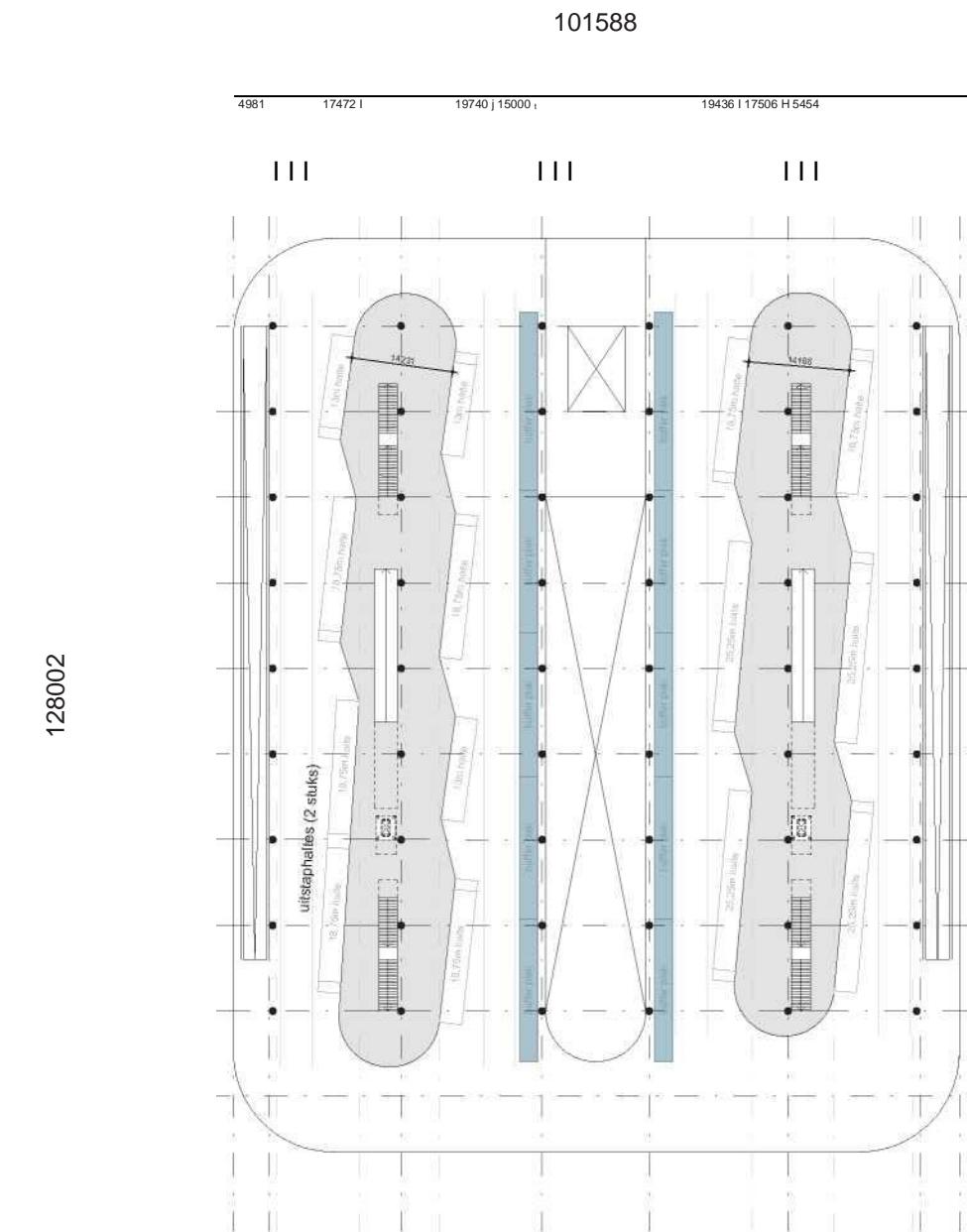


MODEL 11



Floor -1

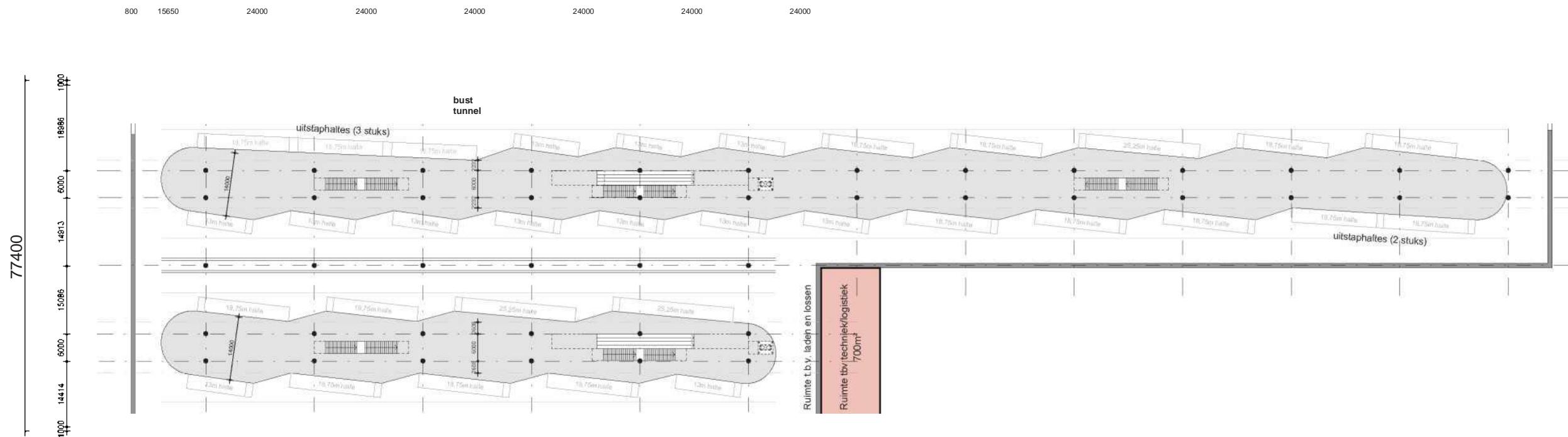
16 entry stops, 2 exit stops and incl. 10 buffer points



First floor

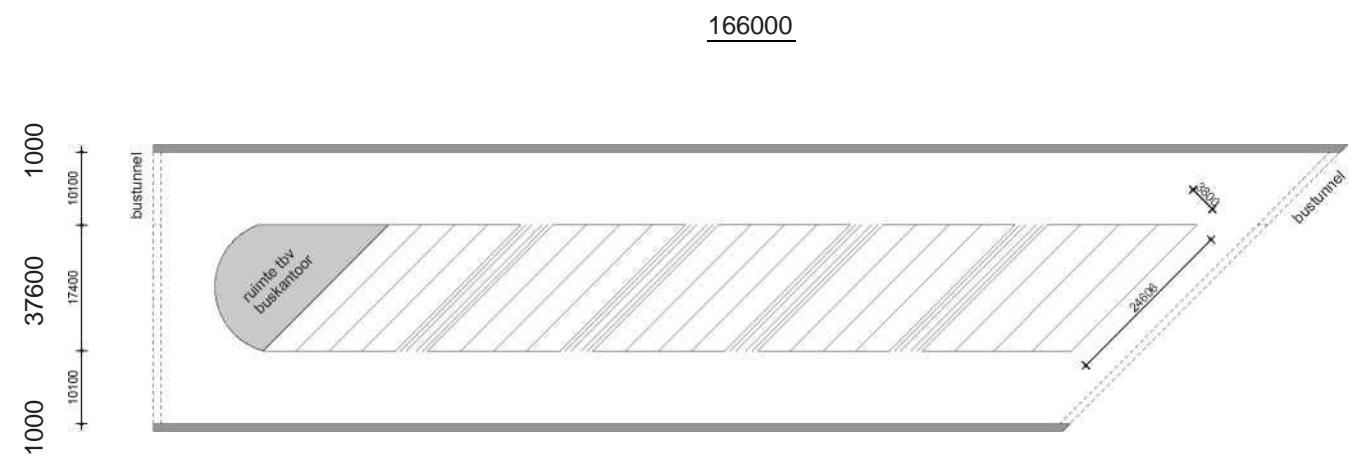
12 entry stops, 2 exit stops and incl. 10 buffer points

314133



Floor -1

27 entry stops, 5 exit stops



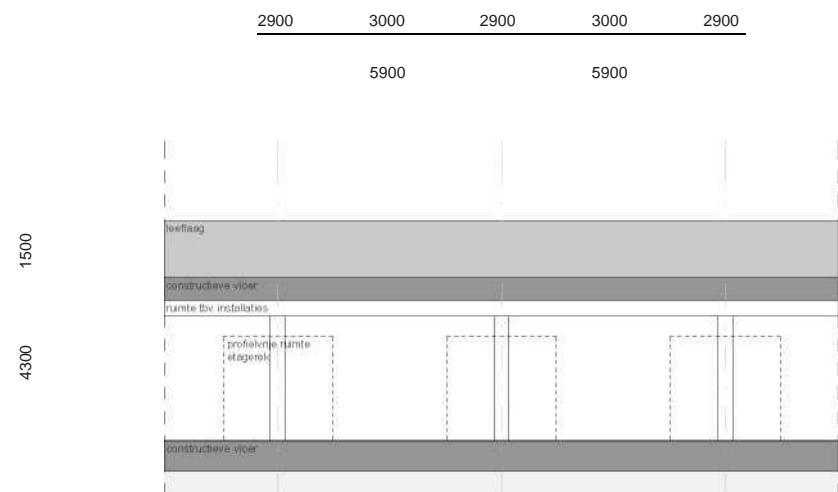
Bus buffer building block for model 0 +/-1/2/15
(Model 11 includes bus buffer integrated into the bus building)

Floor -1
20 places (loading 3 places), 3 service parking places
2.5 min driving time to bus station
incl. bus office space reservation and drivers' area

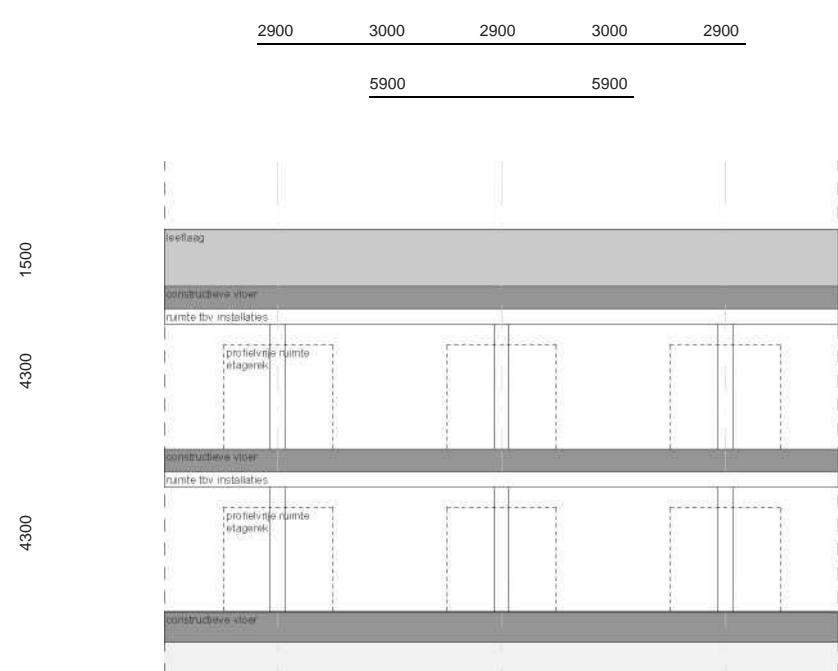
BICYCLE PARKING 32

MIRT Exploration MMK, Eindhoven

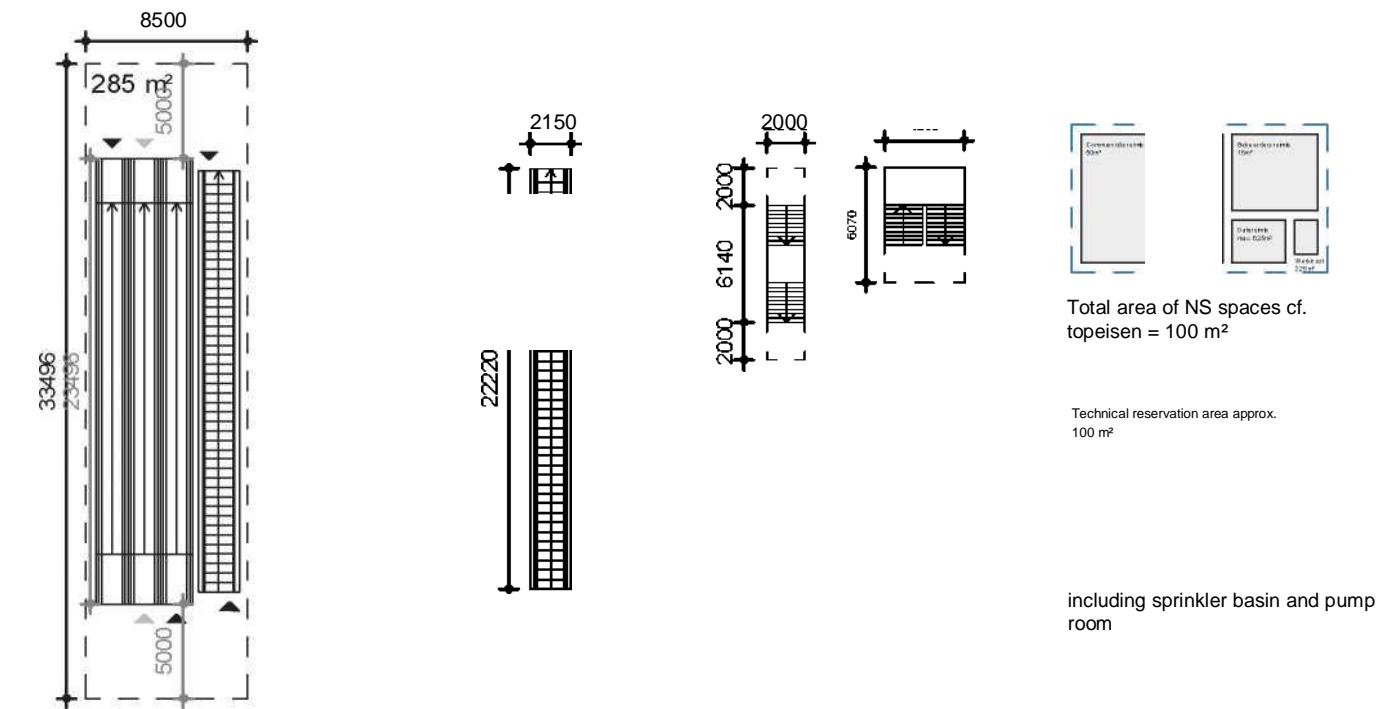
Movares + KCAP + Team V 33



Underground bicycle parking
1 building layer



Underground bicycle parking
2 building layers

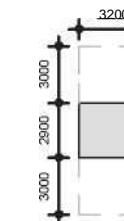
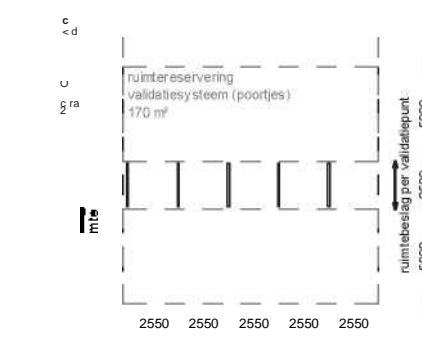


Primary access to
underground bicycle parking

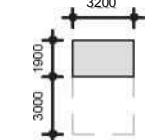
- 3x tapis rotating
- 1x stairs (2 cycle trunks)

Bicycle
staircase to
2st floor

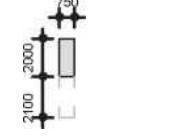
Voetganger staircase to
station hall or
emergency staircase



Double-sided
etails h.o.h.
400 mm 32
p.p.



Single-sided etails
h.o.h. 550 mm 12
p.p.
6.08 m² + gangway



Outer model free
box
750 mm x 2 000 mm
1 p.p.

Dimensioning of
paths:

- min. width of main paths: 3 000 mm
- min. width of sub-paths: 2 150 mm
- minimum ground clearance: 3 000 mm (excluding signposting)

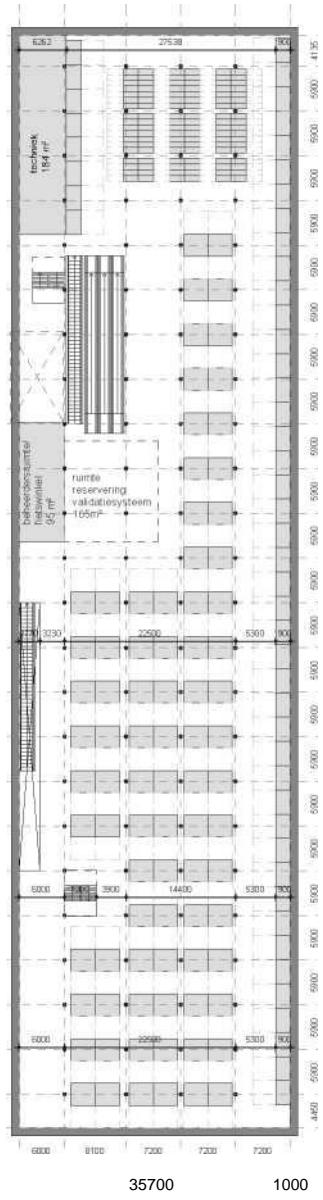
Customisation of bicycle
racks

- Double-sided pitch = standard pitches
- Single sided elongation = exterior bicycle model
- Outer model free box = outer model XL

BICYCLE PARKING₃₄

MIRT Exploration MMK, Eindhoven

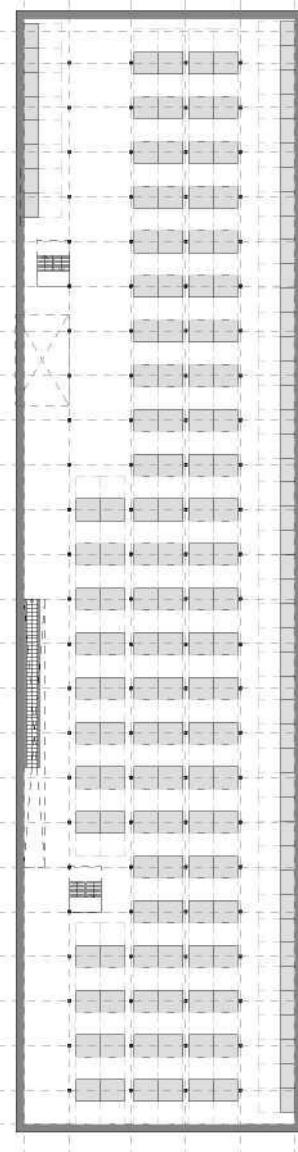
Movares + KCAP + Team V 35



Floor -1

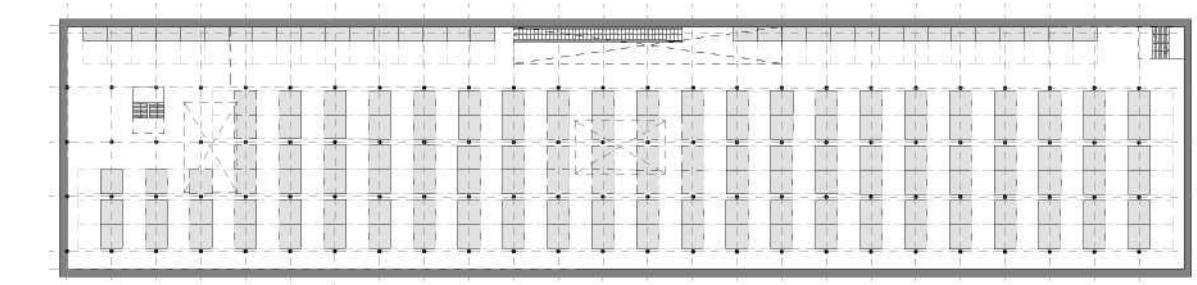
Total housing	7896 PP
Deepening -1	3420 PP
Level -2 h.o.h.	4476 PP
400 mm h.o.h.	83 %
500 mm outside	16 %
model XL BVO	1 %
	11.270 m ²

(incl. 820 parking places for shared mobility)



Level -2

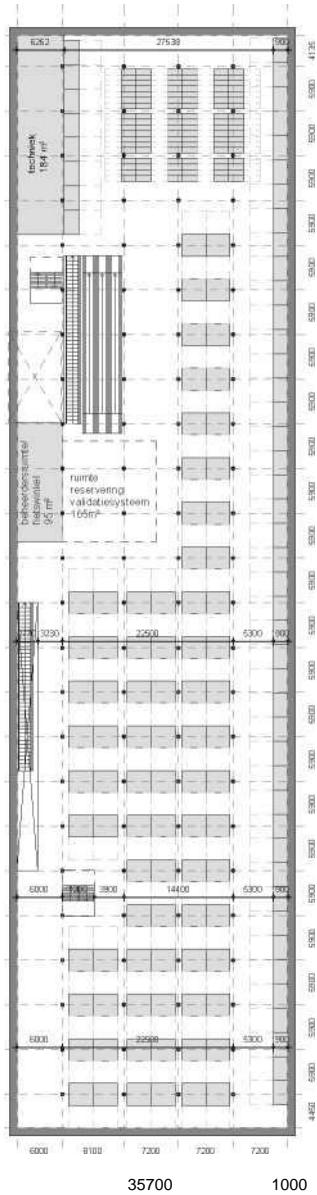
Floor .



FLOOR -2

Total stabbing	8044 PP
Floor -1	3340 PP
Level -2	4704 PP
h.o.h. 400 mm	21 %
h.o.h. 500 mm	7 %
Outer design XL	1 %
BVO	10.180 m

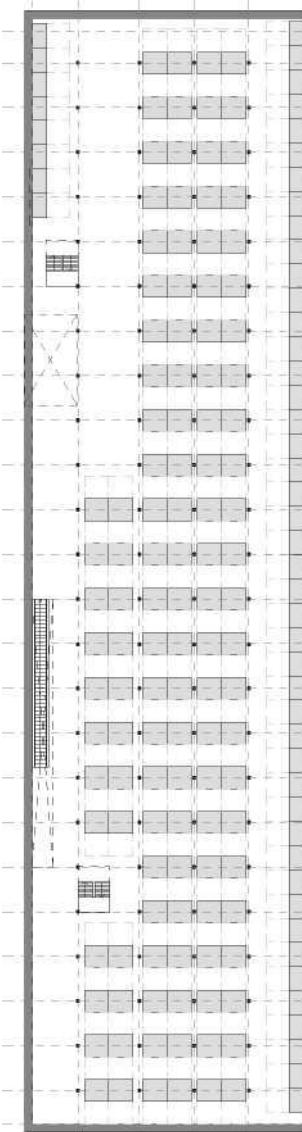
(incl. 820 parking places for shared mobility)



Floor -1

Total housing	7896 PP
Deepening -1	3420 PP
Level -2 h.o.h.	4476 PP
400 mm h.o.h.	83 %
500 mm outside	16 %
model XL BVO	1 %
	11.270 m ²

(incl. 820 parking places for shared mobility)



Level -2

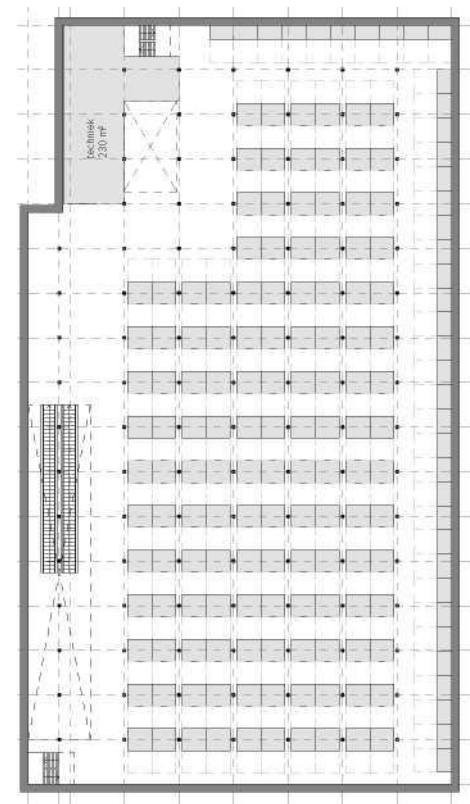
The figure is a detailed architectural floor plan of a building, likely a residential or institutional complex. The plan is organized into several sections:

- Top Left:** A vertical corridor section labeled "ruimte voor reservering en valideer systeem 120m²".
- Top Center:** A large rectangular room labeled "beveiligingsruimte fietsenstalling 111m²".
- Top Right:** A series of rooms arranged in a grid pattern, with dimensions 5900 x 5900 mm indicated for each unit.
- Middle Left:** A vertical corridor section labeled "ruimte voor reservering en valideer systeem 120m²".
- Middle Center:** A large rectangular room labeled "36000".
- Middle Right:** A series of rooms arranged in a grid pattern, with dimensions 5300 x 5900 mm indicated for each unit.
- Bottom Left:** A vertical corridor section labeled "ruimte voor reservering en valideer systeem 120m²".
- Bottom Center:** A large rectangular room labeled "36000".
- Bottom Right:** A series of rooms arranged in a grid pattern, with dimensions 5300 x 5900 mm indicated for each unit.
- Left Edge:** A vertical wall with a door and a window, labeled "12700", "14400", "14400", "7200", and "5300" from top to bottom.
- Right Edge:** A vertical wall with a door and a window, labeled "100390", "5300", "5300", "5300", "5300", "5300", "5300", "5300", and "1000" from top to bottom.
- Bottom Edge:** A horizontal wall with a door and a window, labeled "4100", "4400", "12000", "7200", "7200", "7200", "7200", "7200", and "1000" from left to right.

Floor -

Total stabling	8640	PP
Floor -1	3884	PP
Level -2	4756	PP
h.o.h. 400 mm	87 %	
h.o.h. 500 mm	11 %	
Outer design XL	2 %	
BVO	10.905	m ²

(incl. 820 parking places for shared mobility)

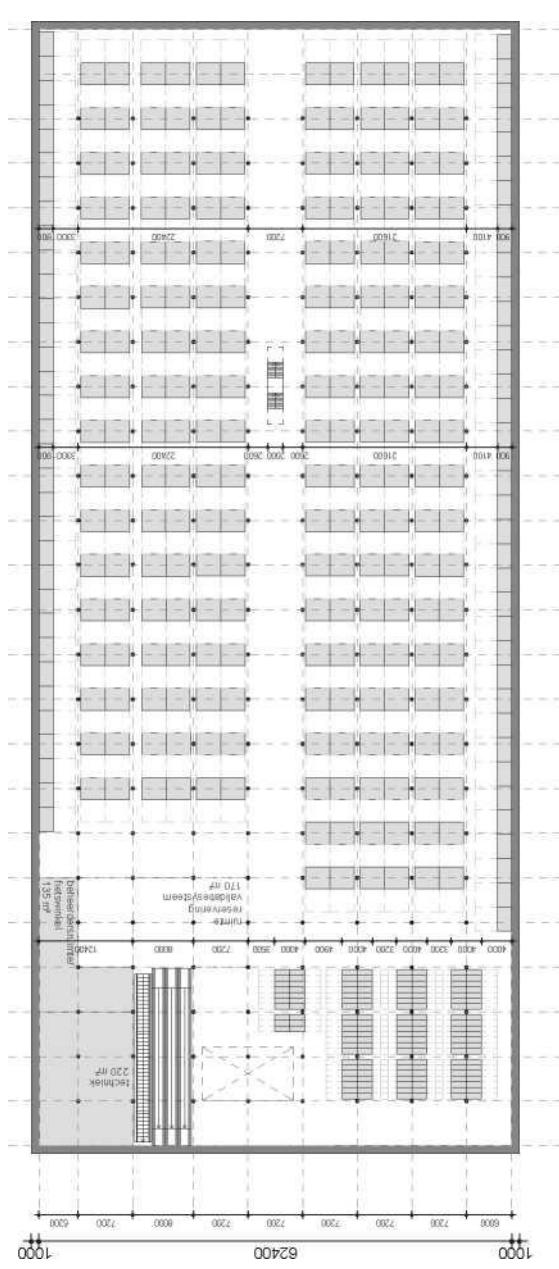


Level -2

o
)

0)

ON
CONDUCTA
THT



1000

62400

1000

C
D
o E
CD
CD
'O

ITE
MS
FOR
PUB
LIC
DELI
BER
ATIO
N

c CD
O
05
05
CL

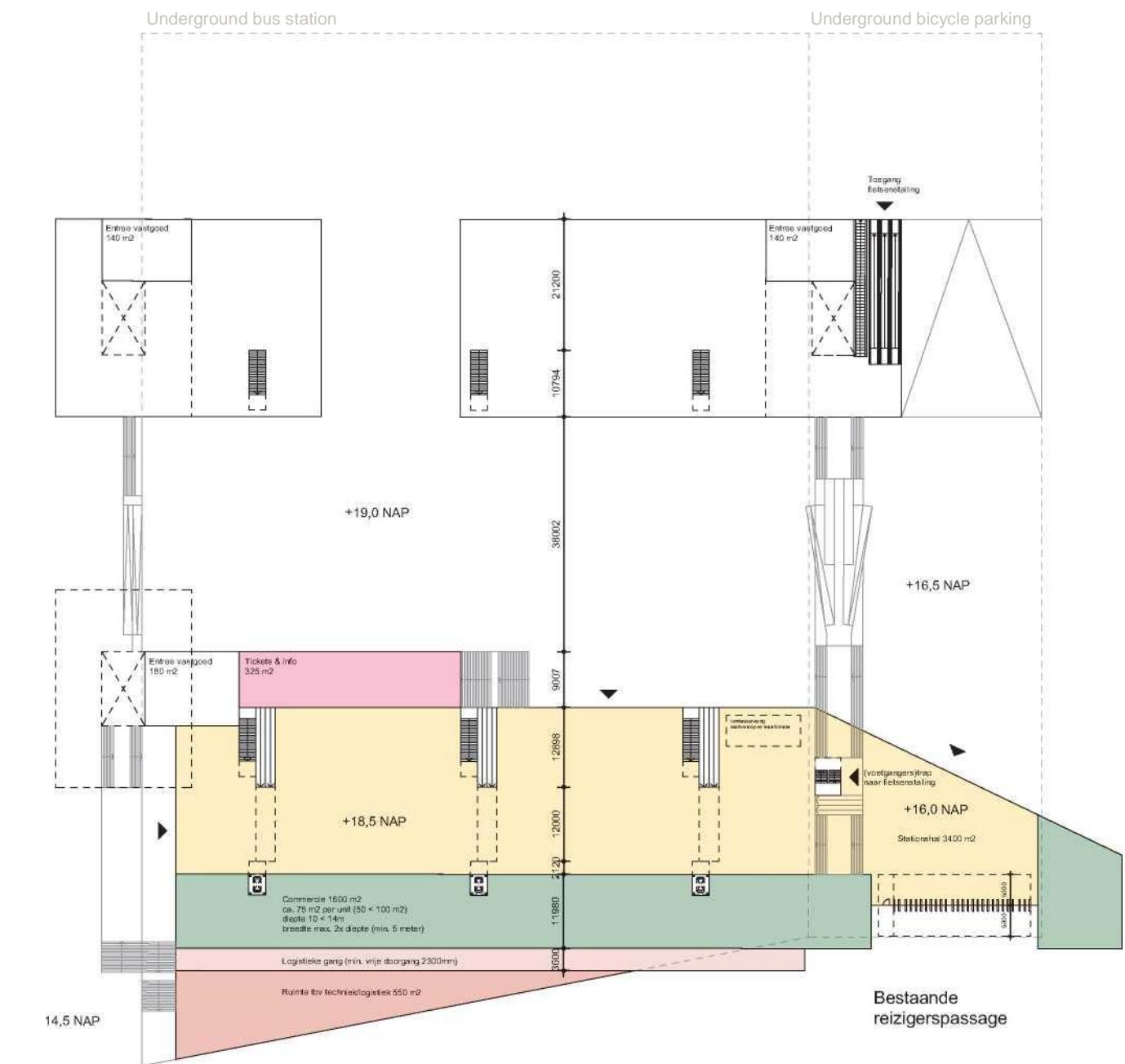
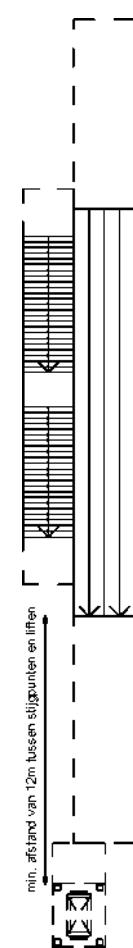
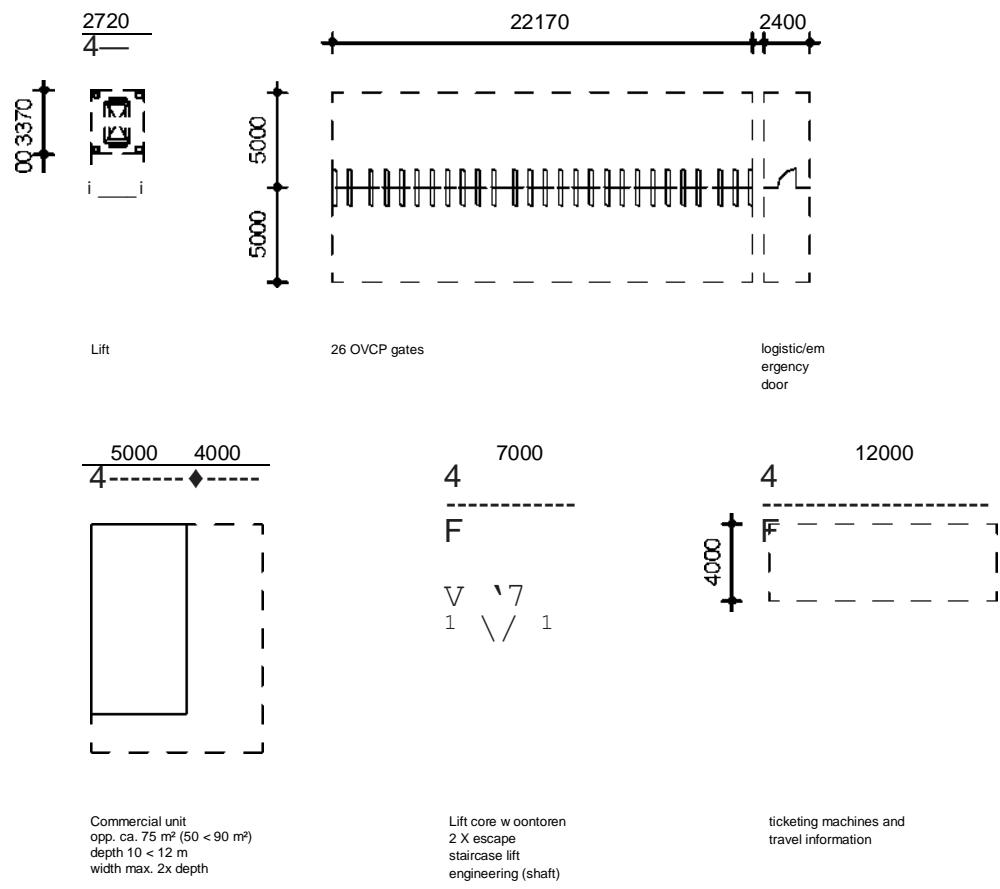
Üd C
'Q.
Q.
CD
"05
O
t O
O
05
—C
O
—C
CD
5
m

00

STATION HALL

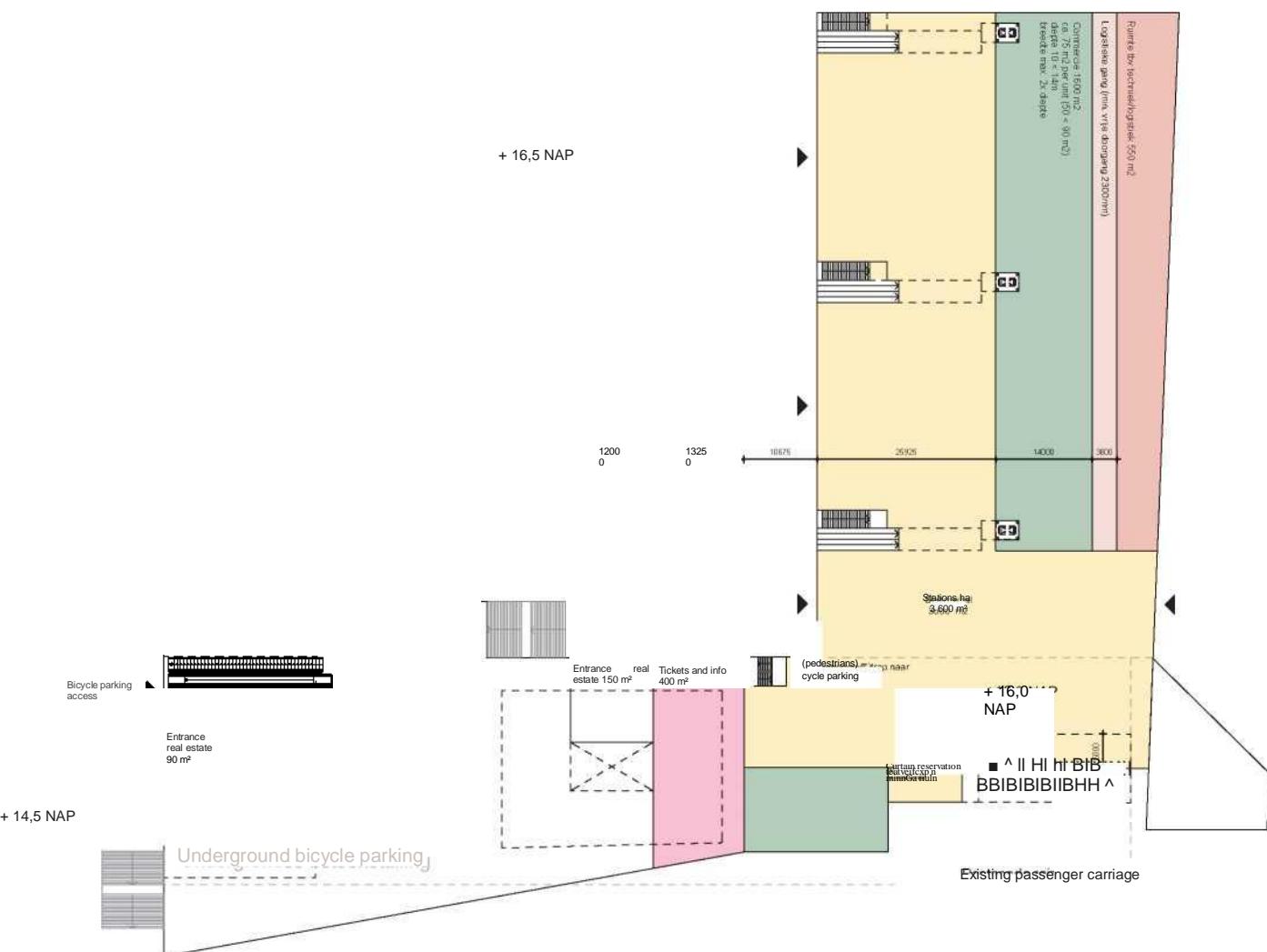
40 MIRT Exploration MMK, Eindhoven

Movares + KCAP + Team V 41

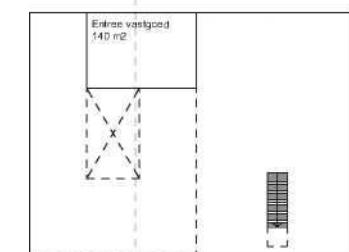


Station hall (train + bus)	3 400 m ²
I © 1 Commerce m ²	1600
181 Information point m ²	325
⑧ Logistics (warehouse)	550 m ²

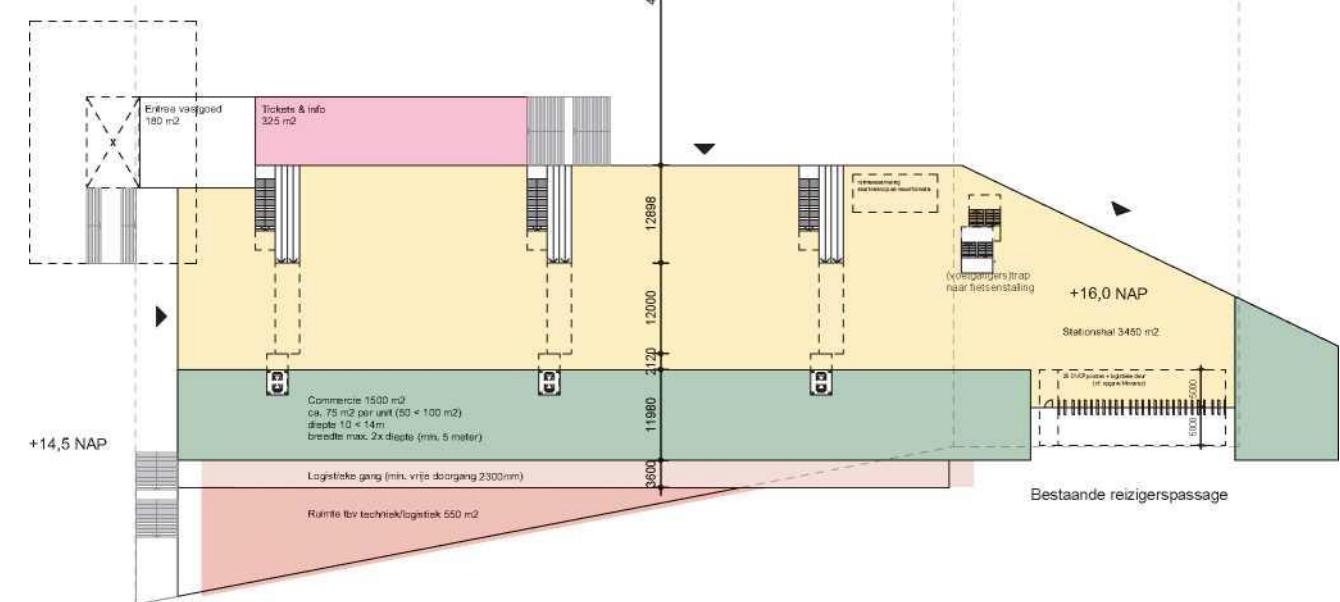
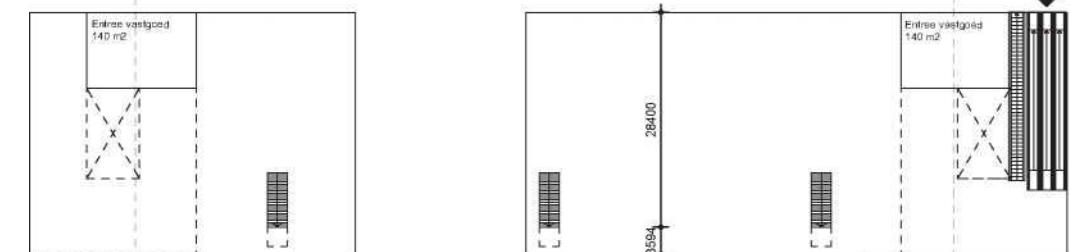
Underground bus station



Ondergronds busstation

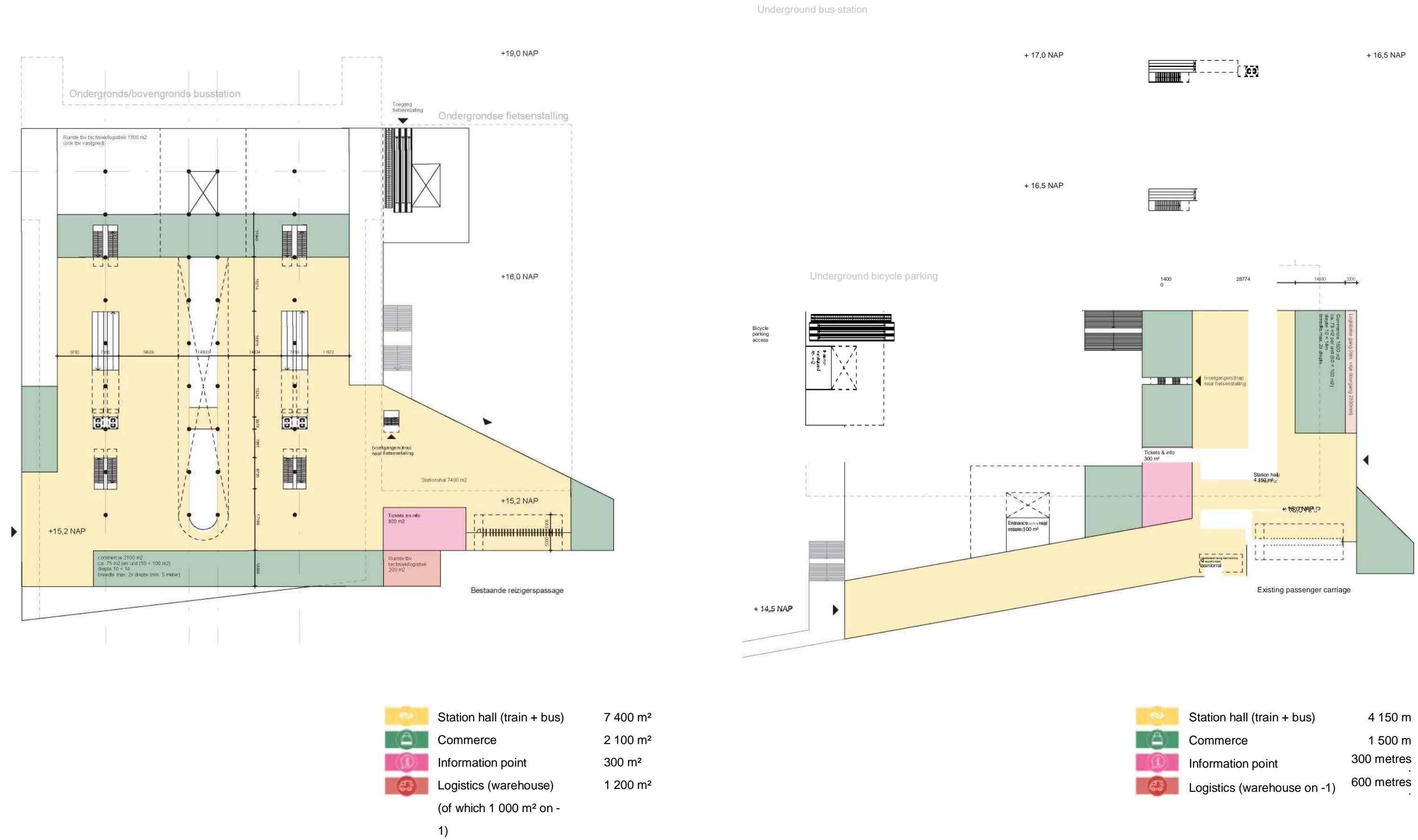


Ondergrondse fietsenstalling



	Station hall (train + bus)	3 400 m ²
	Commerce	1 600 m ²
	Information point	400 m ²
	Logistics (warehouse)	550 m ²

	Station hall (train + bus)	3 400 m ²
	Commerce	1 600 m ²
	Information point	325 m ²
	Logistics (warehouse)	550 m ²



KCAP
Piekstraat 27 3071 EL
Rotterdam The Netherlands
+ 31 (0) 10 7890 300
rotterdam@kcap.eu
<mailto:rotterdam@kcap.eu>

TEAM V
Asterweg 15L 1031 HL
Amsterdam The Netherlands
+ 31 (0) 20 344 95 00
info@teamv.nl
<mailto:info@teamv.nl>

Movares Daalseplein
100 3511 SX Utrecht The
Netherlands + 31 (0)
30 265 5555 info@movares.nl
<mailto:info@movares.nl>

