A Restorative Last Mile Towards The Erasmus Medical Center, Rotterdam

Improving the quality of last mile reachability and arrival,
by assessing societies opinion on urban stress and restoratives,
and digitally researching scenarios by the use of personas.

P5 Presentation 23-06-2022

Rosalie Moesker 4898613

https://www.atelierlek.nl/projecten/erasmus-medisch-centrum

Erasmus MC Campus: where healthcare meets the future

June 15, 2021

For decades we've been seeing a sharp rise in the ageing population. People are getting older and fatal diseases are turning into chronic Ilnesses. Even though these are great achievements, they leave a growing population in need of care while the number of health professionals stays the same. Simultaneously, personalized health care is rapidly replacing generic treatment methods.

Erasmus MC Campus: where healthcare meets the future

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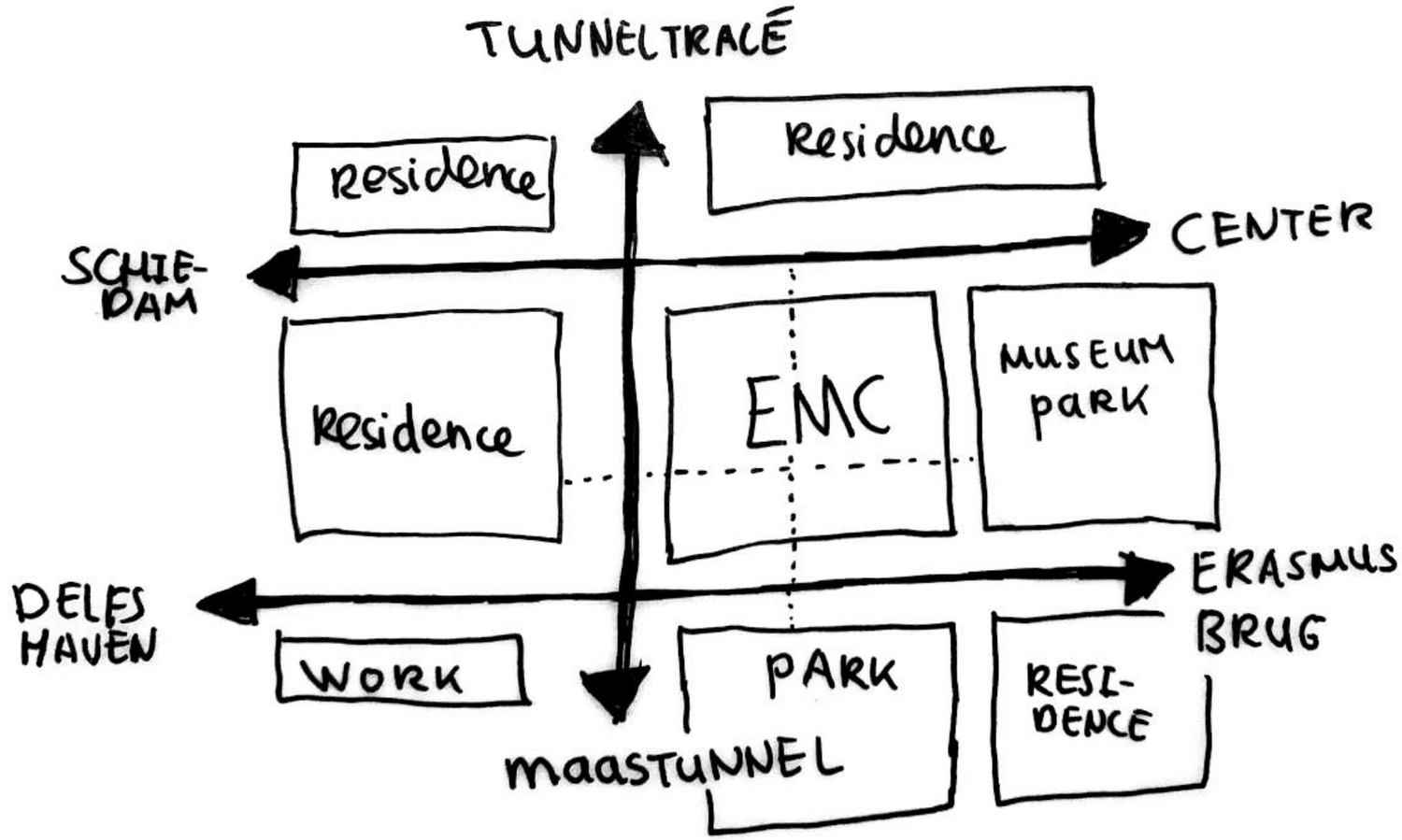
Connecting health and technology

At the Erasmus MC Campus we facilitate the full innovation cycle, from cohort research to business development and from prototyping to implementation. We do this in an urban environment, with a strong connection to the city and society.


TUNNELTRACÉ
Residence
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2022

474.00 m2
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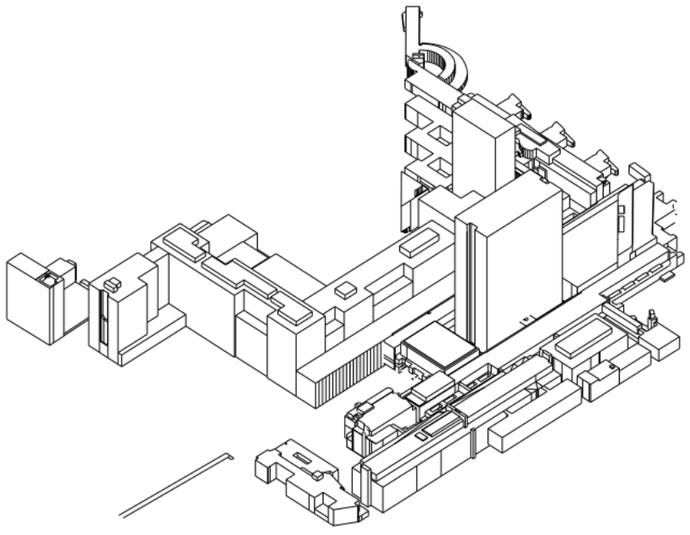

2050

744.00 m2
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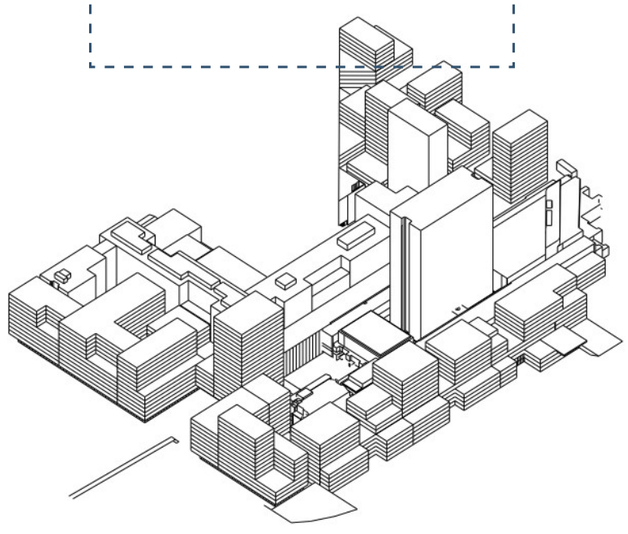
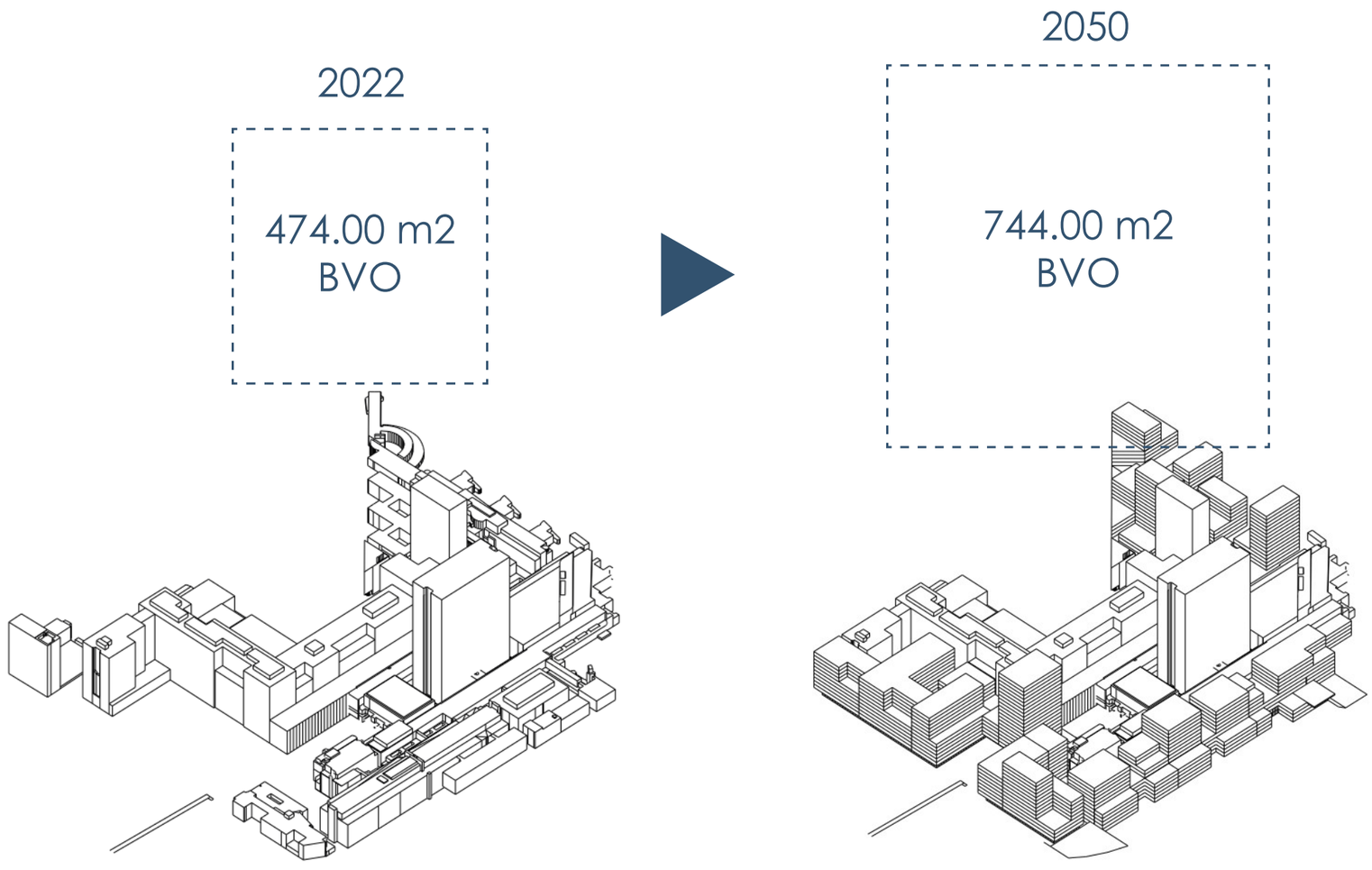


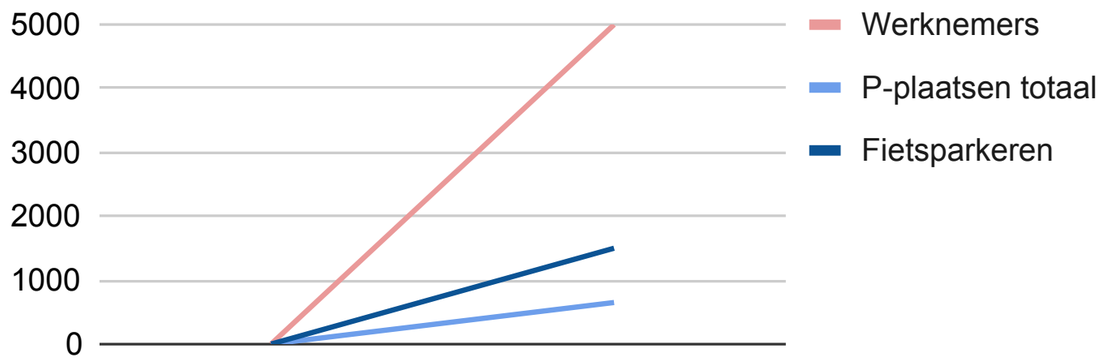
Densification leads to an **increase of 5000 employees**

Densification results into more people coming in and out the campus

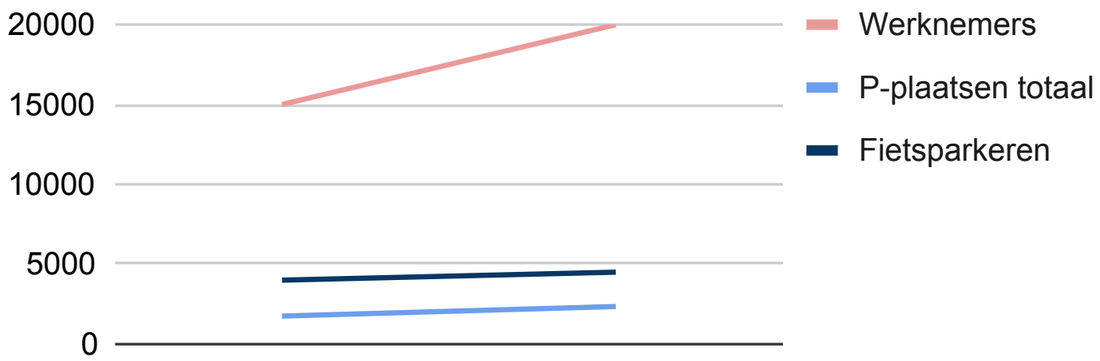


Densification leads to an **increase of 5000 employees** and **minor increase of parking**

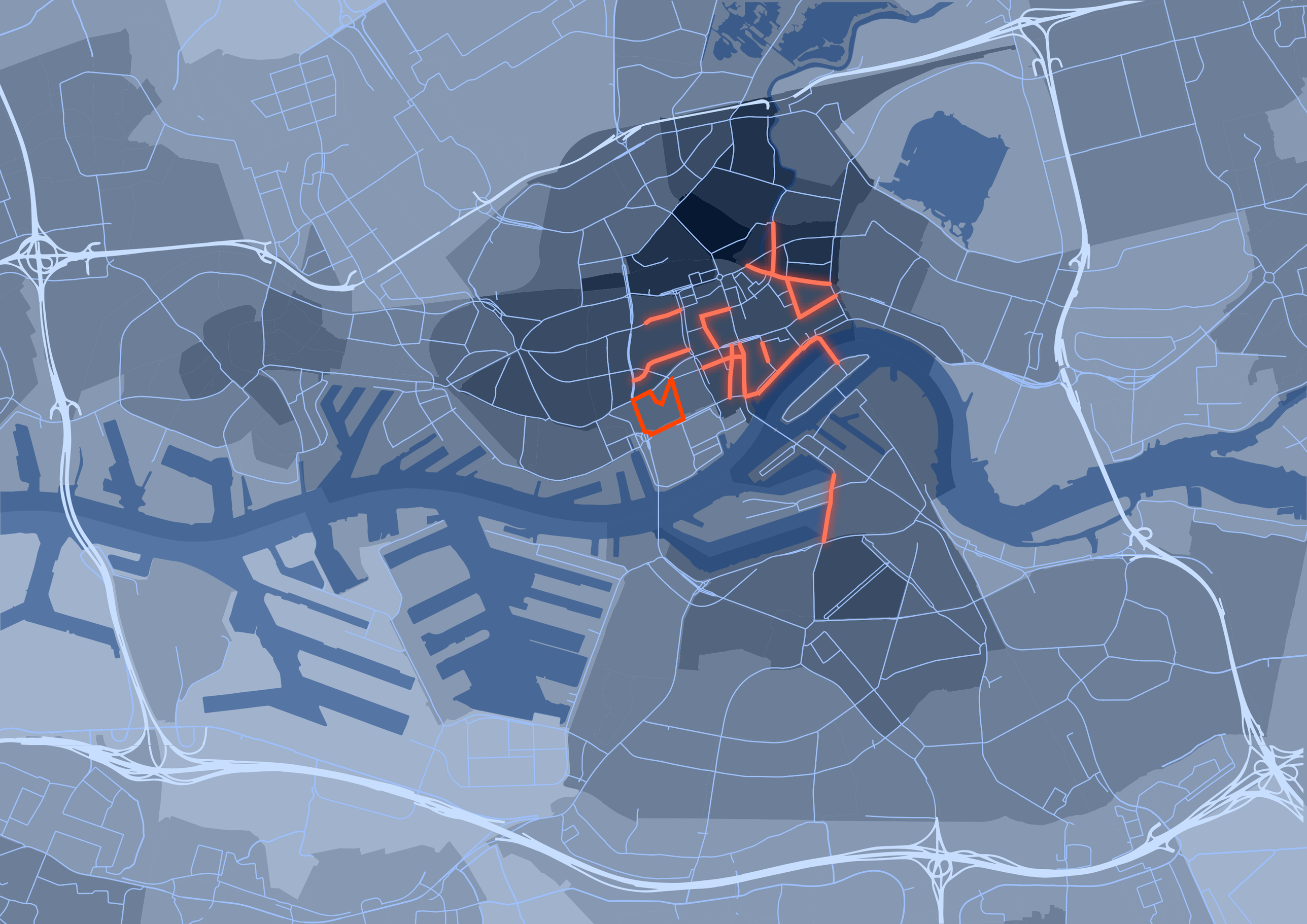
Densification results into more people coming in and out the campus, while the aim is to not increase the amount of parking spaces. This leads to a situation where the Erasmus MC Campus is less accessible by car.



Increase towards 2050

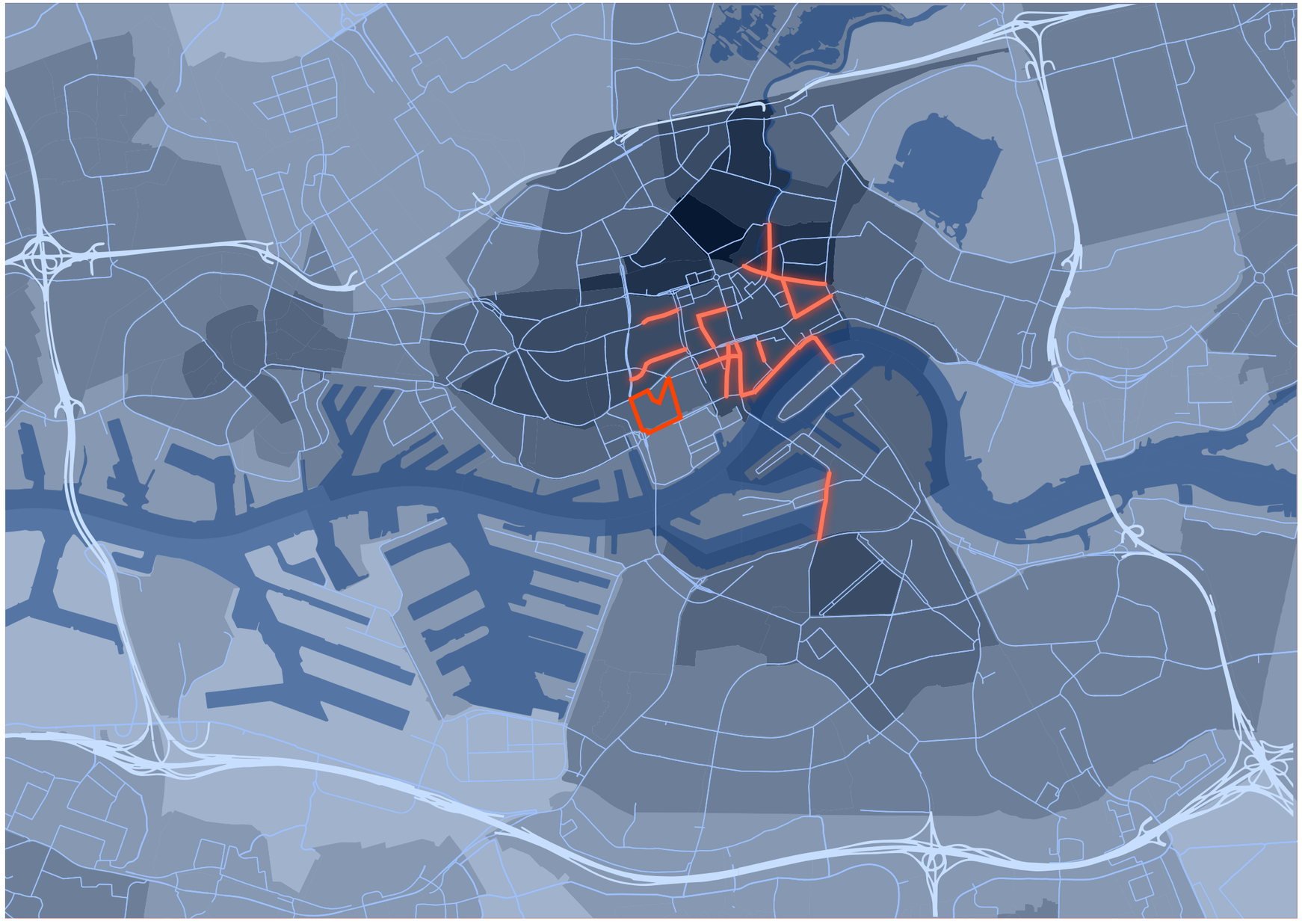


Total amounts towards 2050



Located in a
dense city center with a decreasing car spead

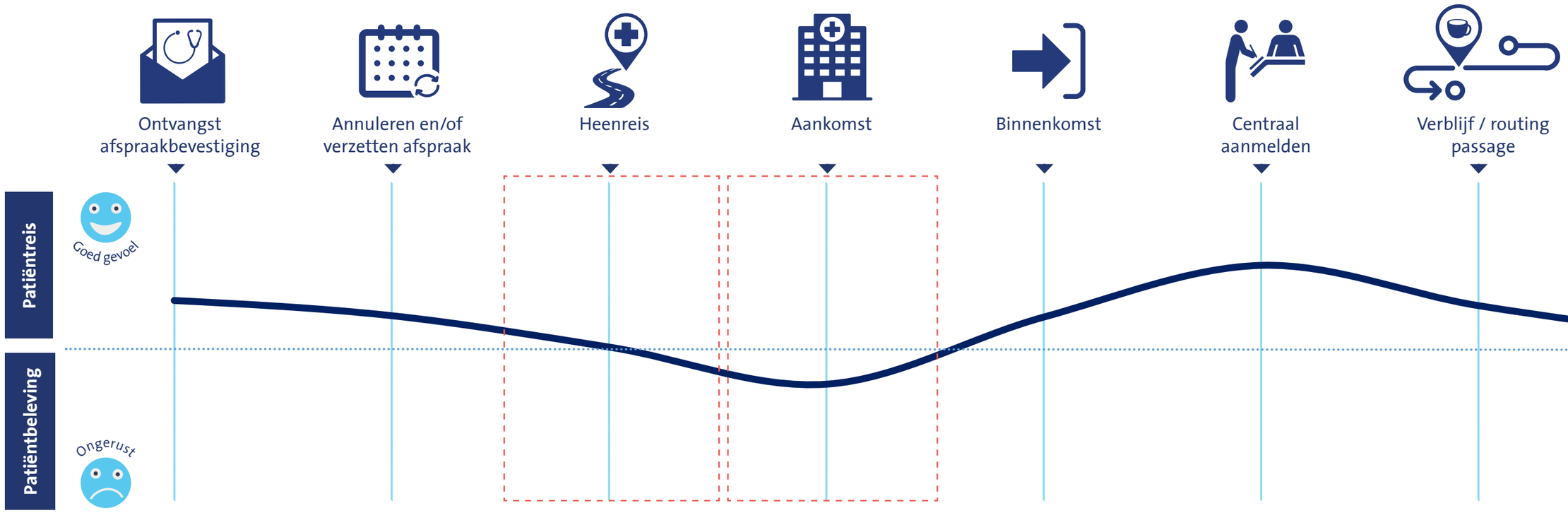
Rotterdam is densifying and taking cars out of the city and decreasing the speed limit to improve livability. This leads to a situation with less easy access towards the Erasmus MC Campus.

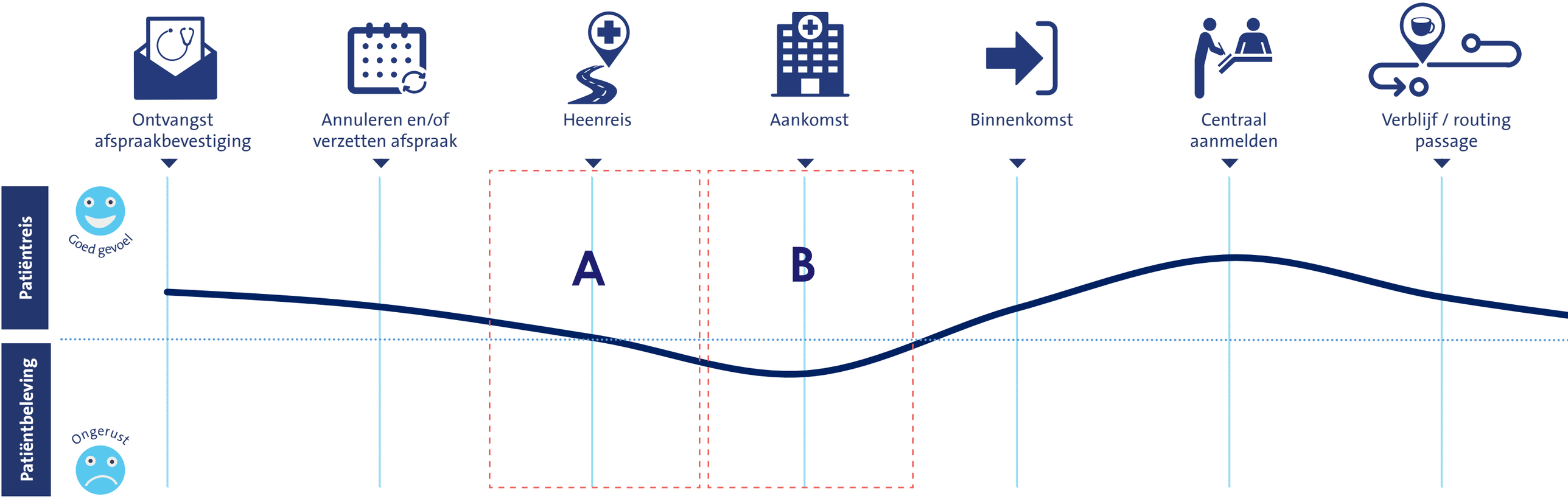


In the current situation

patients are worried until they reach the main entrance door

Patients don’t feel relieved by the current way of traveling towards the Erasmus MC. Arriving on time is stressful.





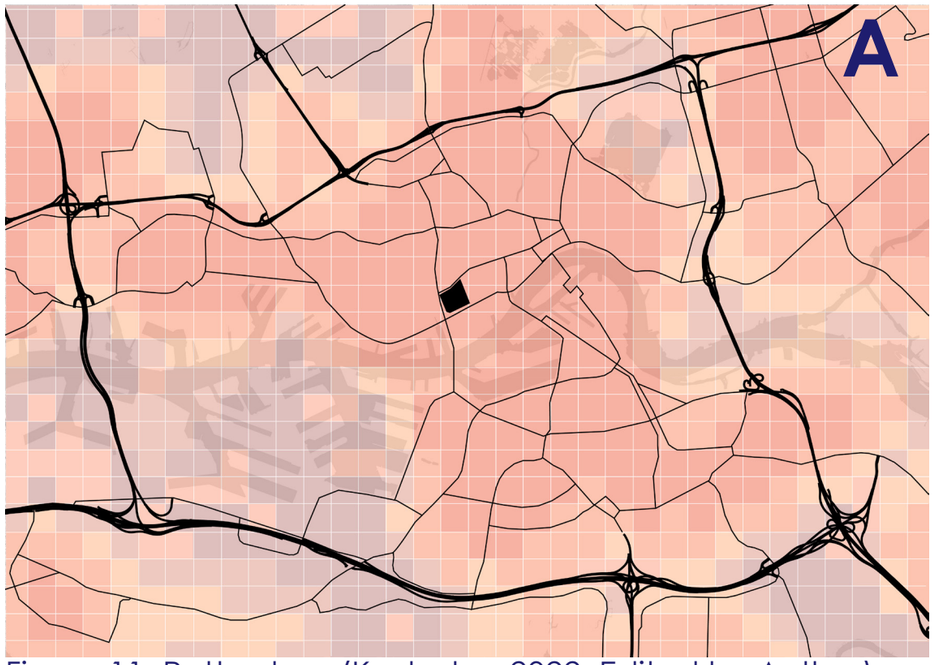


Figure 11. Rotterdam (Kadaster, 2022. Edited by Author)

Figure 12. Atelier LEK - Erasmus Medisch Centrum. (2020)

Which **mobility scenarios** are possible and suitable for an **inclusive accessibility** to the future EMC Campus, and how can spatial interventions **relieve stress** on the last mile and arrival?

What are the most suitable and preferred routes based on urban aspects and individual motivations?

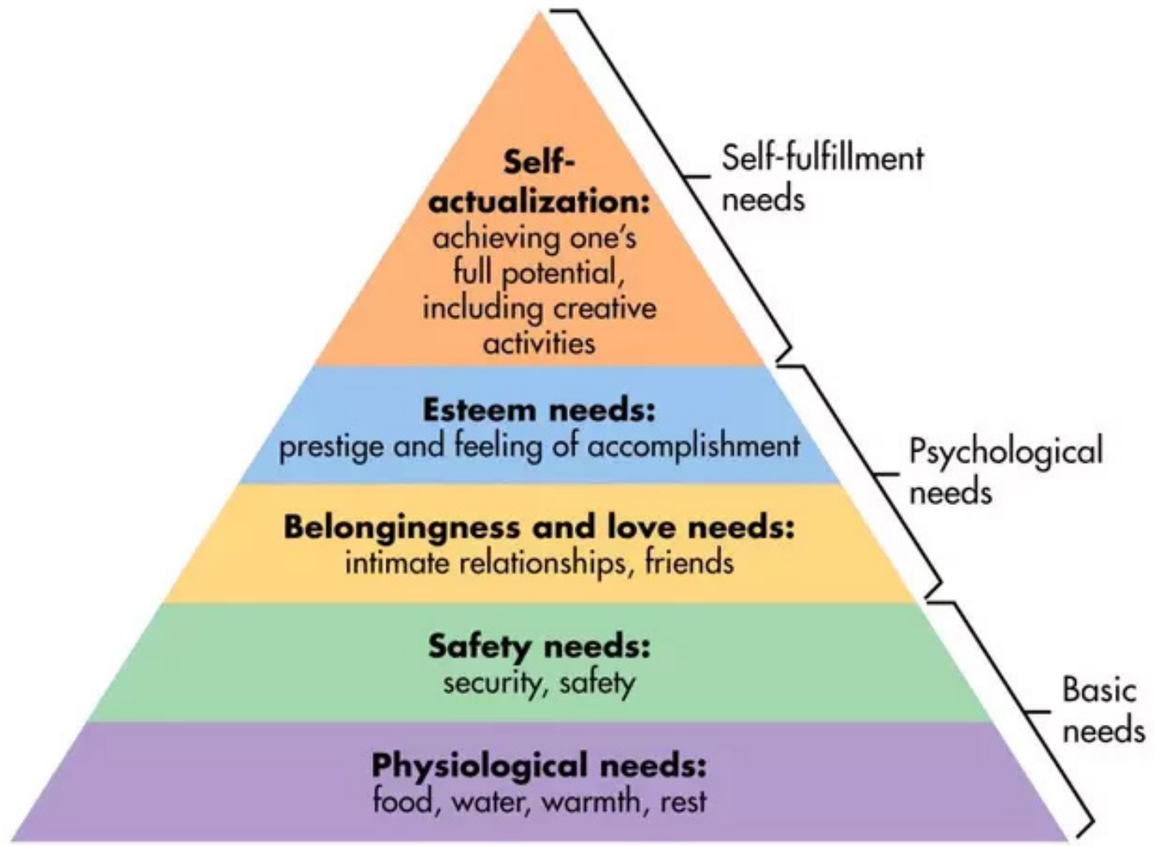
Which **mobility scenarios** are possible and suitable for an **inclusive accessibility** to the future EMC Campus, and how can spatial interventions **relieve stress** on the last mile and arrival?

How are the mobility personas defined traveling to the EMC defined to provide inclusivity?

What aspects in the city influence mental health and what spatial requirements can be advised to minimize urban stress?

https://www.trouw.nl/nieuws/de-rotterdamse-metro-kan-het-groeiende-aantal-passagiers-bijna-niet-meer-aan~b0687cc3/

"Any motivated behavior, either preparatory or consummatory, must be understood to be a channel through which many basic needs may be simultaneously expressed or satisfied. Typically an act has more than one motivation." (Maslow, 1943)



(Maslow, A. H., 1943)

Method

Creating individual choices by 4 categories

Basic need
to be efficient

Personality
preferences

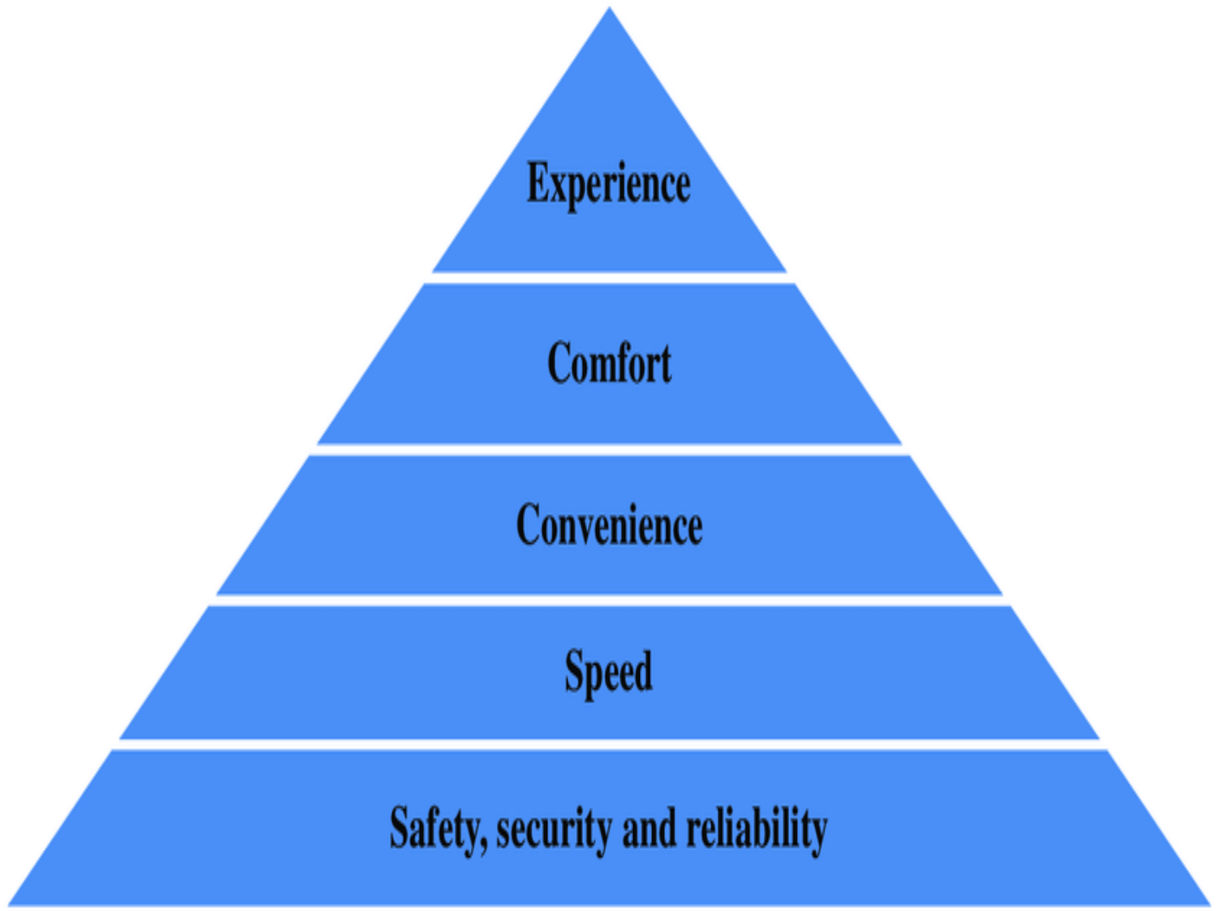
Disability

Stress and
restorative level

Persona based modeling

Basic needs

Choose a most efficient route based on the **shortest time** and **least amount of transits**



(Gromule et al., 2017)

Persona based modeling

Personality Preference

Tangible futures: Combining scenario thinking and personas. In this research they combined theories to define persona's reacting on mobility situations. (Vallet et al., 2020)

"*•The sociology-based Social Practice Theory (SPT) (Reckwitz, 2002; Shove, Pantzar, & Watson, 2012).*

•The Sinus Milieu approach developed in market research (Bertram & Berthold, 2012). Behavior is influenced by general values, beliefs and viewpoints.

•The Behavior Change Model (Fogg, 2009), focusing on preconditions for encouraging behavior change." (Vallet et al., 2020 p.7)

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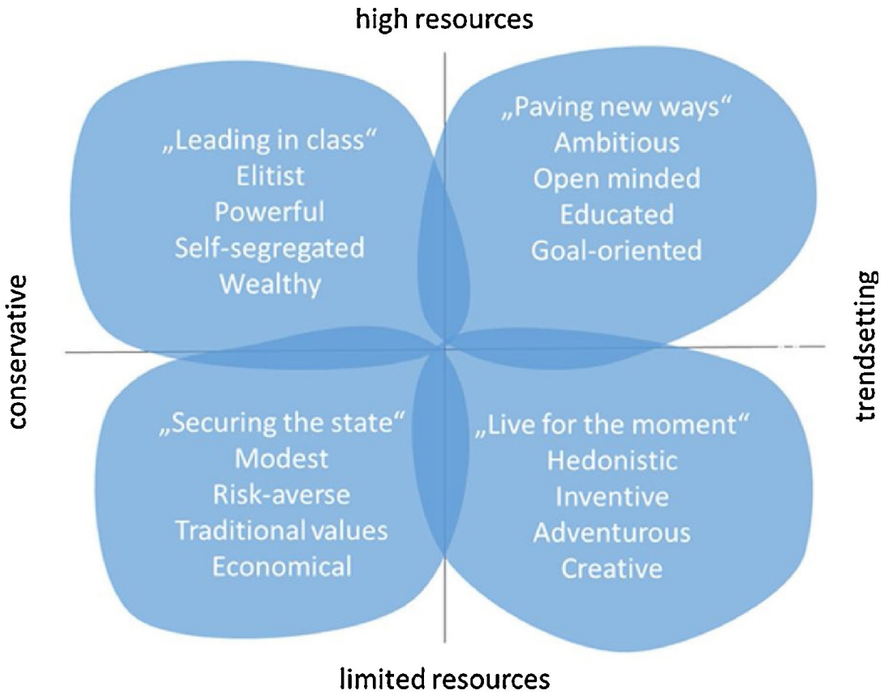


Persona based modeling

Personality Preference

Mobility personas by Vallet et al.

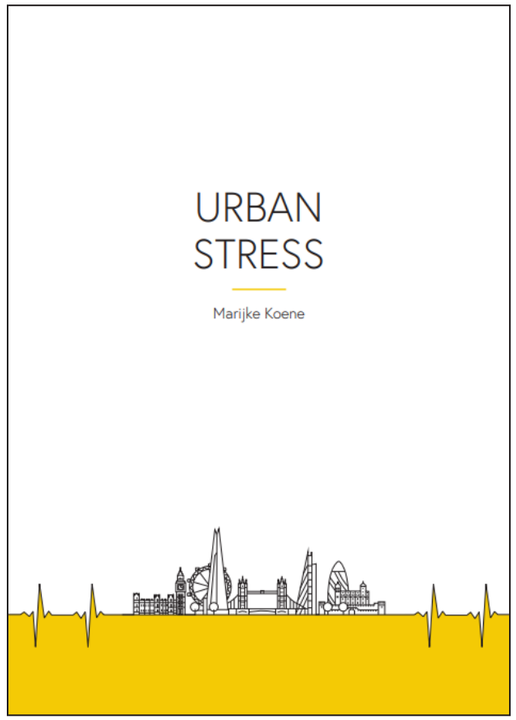
Conservative Maintainer	Mobility is a necessity; it needs to be affordable, safe and efficient. In rural areas, the car is dominant; in urban areas public transport can be an alternative, if it is deemed safe enough. The activity radius is quite narrow.
Conservative Elite	Mobility is a means for displaying the status. Far-distance travelling is common for business and leisure. Transport modes allowing (hierarchical) separation from other groups (exclusive car, first class in trains and aircrafts) are preferred.
Modern Individualist	Mobility is a means of getting somewhere and is viewed pragmatically, although "new" and trendsetting options are more interesting than others. Services offering a notion of coolness along with ease of use and flexibility are very attractive (E.g. Uber).
Hedonisitic, adventurous	Mobility is fun, either through the experience provided by the means of transport itself or by the chance to provoke reactions from other people (e.g. colorful or self-build longboards, tuned up cars), risky behavior is possible. Financial limitations determine their options.

Restoratives and stressors

"Scenes of the outdoor physical environment vary substantially in the extent to which they are preffered"

Kaplan, S. (1987). Aesthetics, Affect, and Cognition. Environment and Behavior, 19(1), 3–32.

Stress and restorative research



Urban Stressors
Marijke Koene
Koene elaborated a list of urban stressors and explained how this urban stress can be reduced through urban design.

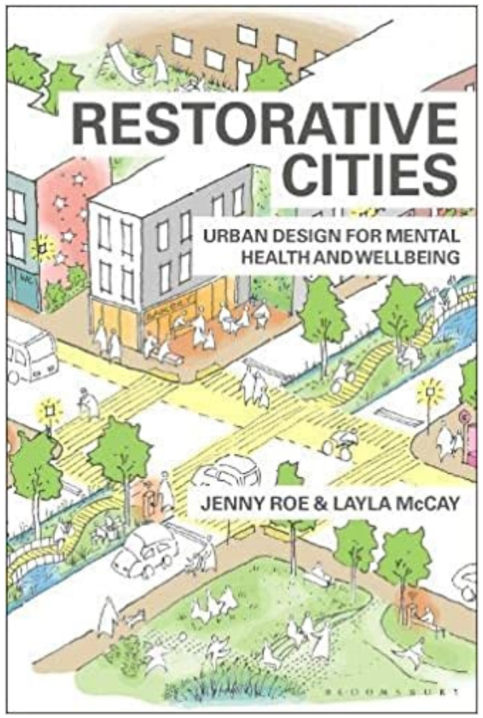
"Urban Environment Stressors
01. Density (Zipjet, 2017)
02. Crowding (Van den Berg, 2007; Van Dorst, 2005; Stokols, 1972; Evans & Cohen, 1987)
03. Boring megascapes (Weintraub, 2015)
04. Garbage, graffiti and disrepair (Montgomery, 2014)
05. Sharp architectural angles (Montgomery, 2014)
06. Traffic (jams) (Levy-Leboyer, 1892; Montgomery, 2014; Zipjet, 2017)
07. Parking problems (Levy-Leboyer, 1982)
08. Accessibility & availability of green (Burton, 1990; Zipjet, 2017)
09. High-rise (Gifford, 2007)
10. Public transport (Montgomery, 2014; Zipjet, 2017)
11. Perception of security (Zipjet, 2017; Burton, 1990)
12. Lay-out of architecture and urban design (Burton, 1990)

Social urban stressors
16. Gender inequality (Zipjet, 2017)
17. Race inequality (Zipjet, 2017)
20. Lack of social support networks (Burton, 1990)

Stressors from urban conditions
21. Sunshine hours (Zipjet, 2017)
22. Air pollution (Zipjet, 2017; Evans & Cohen, 1987)
23. Noise pollution (Zipjet, 2017; Evans & Cohen, 1987; Burton, 1990)
24. Light pollution (Zipjet, 2017)

Health stressors
31. Physical health (Zipjet, 2017)
37. Lack of exercise (Burton, 1990)"
(Koene, 2018, P.29)

Stress and restorative research



Restorative Cities
Layla McCay
Mental health can be influenced positively by creating restorative environments.

The study builds upon how places can recover mental fatigue, depression, stress and anxiety.

Figure 30. 7 restorative elements
(Roe & McCay, 2021)

Are urban visitors' general preferences for green-spaces similar to their preferences when seeking stress relief?

Attributes and attribute levels	General preferences	Preferences for stress reductions
Physical factors		
Walking distance from home to green space	[3.5%]	[3.0%]
5 min of walking distance[a]	0.097	0.000
15 min of walking distance	***0.132	***0.136
30 min of walking distance	***−0.126	**−0.097
45 min of walking distance	**−0.102	−0.039
Area size	[3.1%]	[2.9%]
Very small area (10 ha)[a]	−0.131	−0.112
Small area (120 ha)	**0.096	***0.113
Medium-sized area (600 ha)	0.047	0.014
Large area (>2000 ha)	−0.012	−0.014
Area design	[9.8%]	[7.8%]
Trees and meadows[a]	0.136	0.109
Manicured park	***0.313	***0.261
Less maintained setting (fallow)	***−0.178	***−0.188
Bushes	0.065	0.051
Trail with bushes	***−0.408	***−0.341
Forest	*0.072	**0.107
Trail type	[7.7%]	[4.7%]
1 m gravel[a]	−0.157	−0.198
2 m gravel	b ***0.246	b ***0.139
4 m gravel	***0.230	***0.165
4 m asphalt	b ***−0.319	b **−0.105
Recreational infrastructure	[4.0%]	[4.0%]
No bench[a]	0.044	0.079
Bench empty	***0.123	***0.116
Bench full	***−0.168	***−0.195
Traffic noise	[7.5%]	[7.0%]
No traffic noise[a]	0.282	0.282
Traffic noise hardly to hear	−0.012	−0.024
Traffic noise clearly to hear	***−0.270	***−0.258

Arnberger, A., & Eder, R. (2015). Are urban visitors' general preferences for green-spaces similar to their preferences when seeking stress relief? Urban Forestry & Urban Greening, 14(4), 872–882

What is your age? *

- < 20
- 20 - 29
- 30 - 39
- 40 - 49
- 50 - 59
- 60 - 69
- 70 >

Which of the descriptions below fits you best? *

- Conservative, below average or average income. Traditional values are important (such as family, religion, honesty or modesty). New developments (other social groups, technological developments, political changes) are received with skepticism.
- Conservative elite, above average or average income. Preservation or extension of status and influence has priority. New developments are accepted if they support your conservative attitude.
- Hedonist, below average or average income. Status and fun are important, that's why you sometimes use your savings for an expensive car/smartphone. You are interested in new things, creative, adventurous and willing to take risks.
- Modern individualist, above average or average income. You are interested in new developments and you are goal-oriented. You take calculated risks when success is likely. You also make intensive use of digital media (for fun and, for example, for efficiency and career).

You have just made a choice. How close is your choice to your real lifestyle and personality? *

	1	2	3	4	5	6	7	8	9	10	
Don't connect at all	○	○	○	○	○	○	○	○	○	○	Connect seamlessly

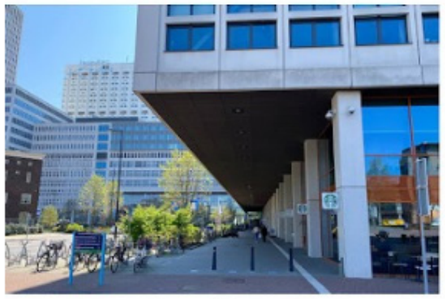
How relaxed are you right now? *

	1	2	3	4	5	6	7	8	9	10	
Stressed	○	○	○	○	○	○	○	○	○	○	Relaxed

How stressful would you find the situation? *

1

2



3

4

	1 - not stressful	2	3	4	5 - very stressful
Situation 1	○	○	○	○	○
Situation 2	○	○	○	○	○
Situation 3	○	○	○	○	○
Situation 4	○	○	○	○	○

How relaxing would you find the situation? *

1

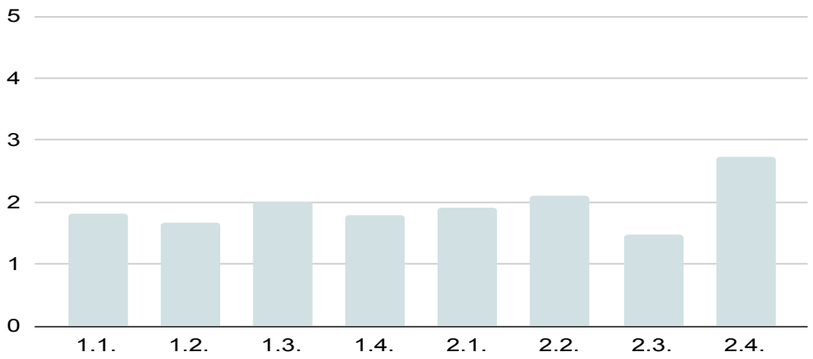
2

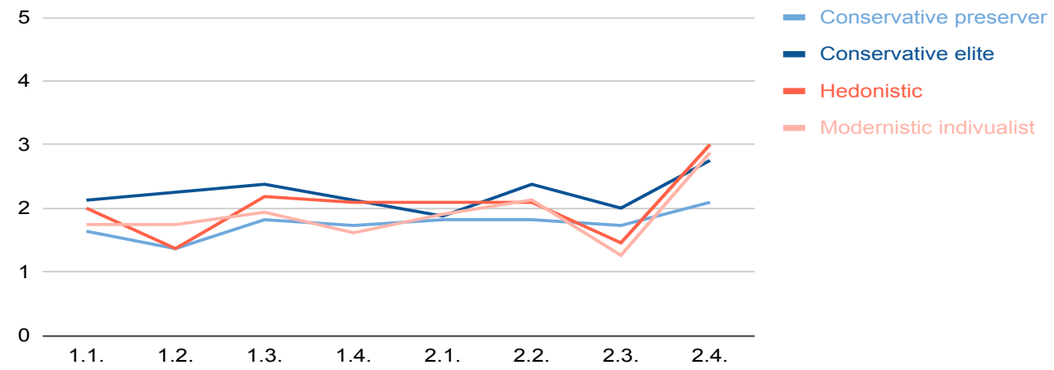
3

4

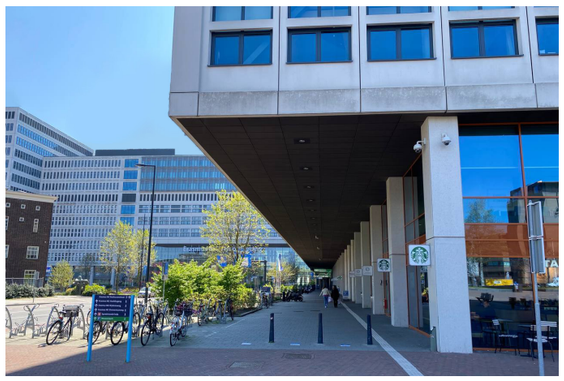
	1 - not relaxing	2	3	4	5 - very relaxing
Situation 1	○	○	○	○	○
Situation 2	○	○	○	○	○
Situation 3	○	○	○	○	○
Situation 4	○	○	○	○	○

Comparing and Measuring Urban Stressors



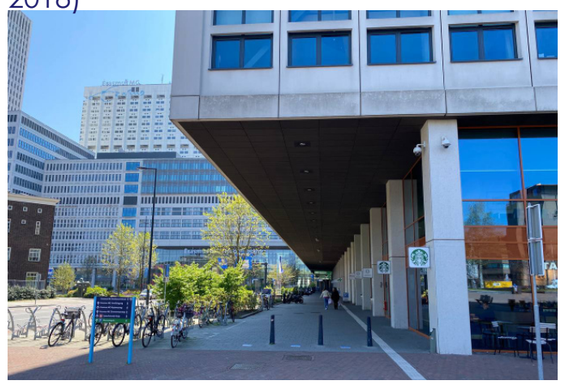


1.1. Density (Zipjet, 2017) (Koene, 2018)

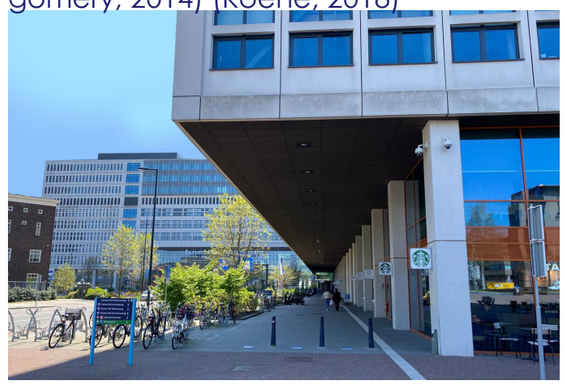


1.2. Round architectural edges (Added for survey comparison)

1.3. High-rise (Gifford, 2007) (Koene, 2018)



1.4. Sharp architectural angles (Montgomery, 2014) (Koene, 2018)



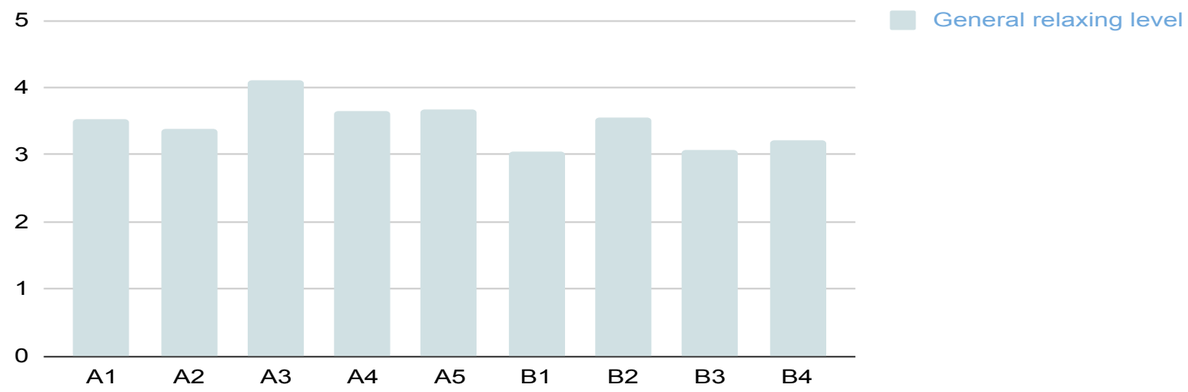
2.1. Crowding (Van den Berg, 2007; Van Dorst, 2005; Stokols, 1972; Evans & Co-

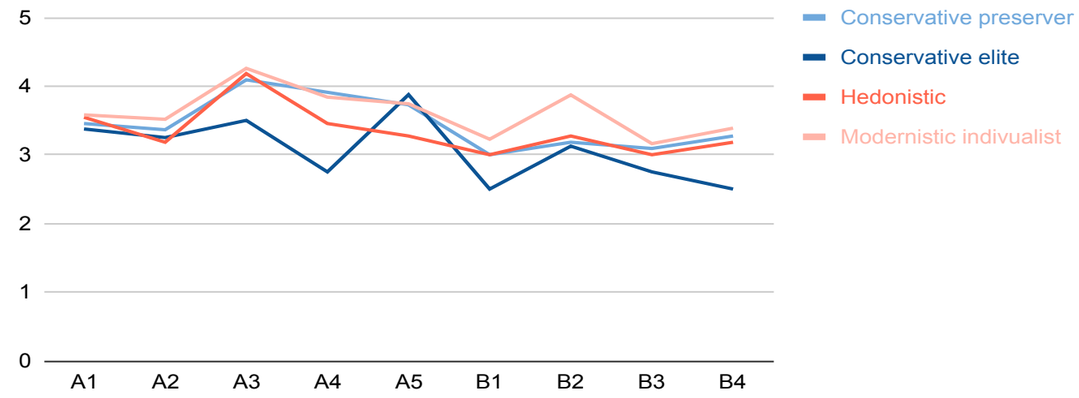
2.2. Garbage (not neat) (Montgomery, 2014) (Koene, 2018)

2.3. Brick public space without added stressors (added for survey comparison)

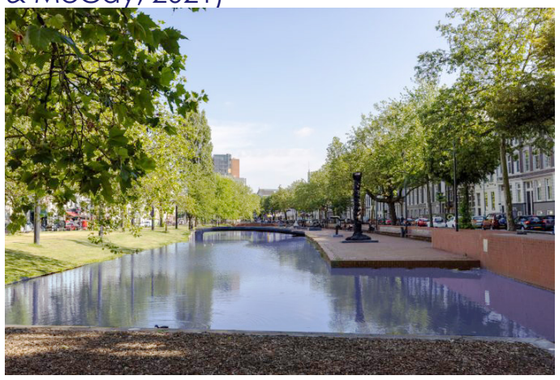
2.4. Traffic (Levy-Leboyer, 1892; Montgomery, 2014; Zipjet, 2017) (Koene, 2018)

Comparing and Measuring Restoratives

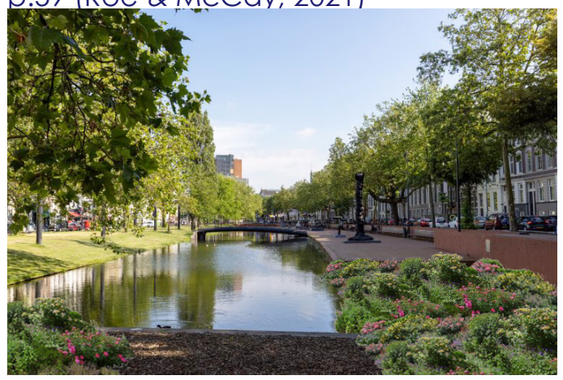




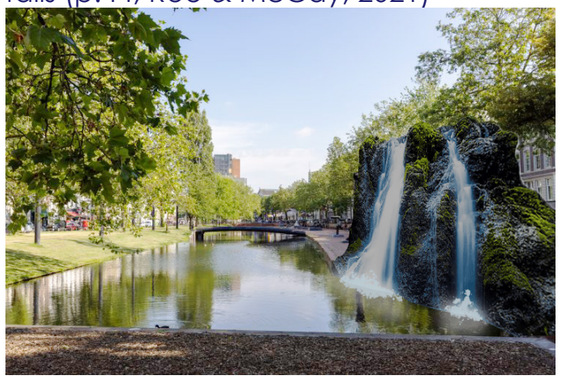
A1. Without blue water (comparison)
A2. High quality clean water (p.49, Roe & McCay, 2021)



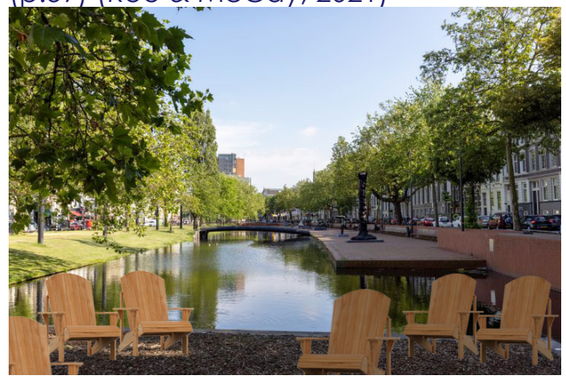
A3. Attractive planting around water p.59 (Roe & McCay, 2021)



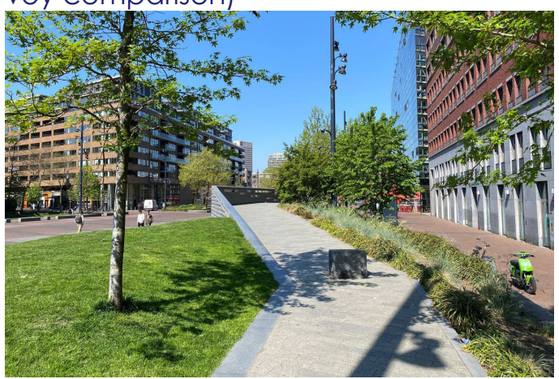
A4. Crashing waves, dramatic water-falls (p.44, Roe & McCay, 2021)



A5. Attractive seating around water (p.59) (Roe & McCay, 2021)



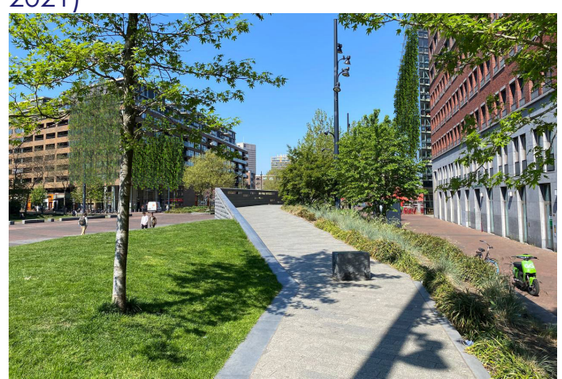
B1. Simple urban park with a few trees and no green facades (Added for survey comparison)



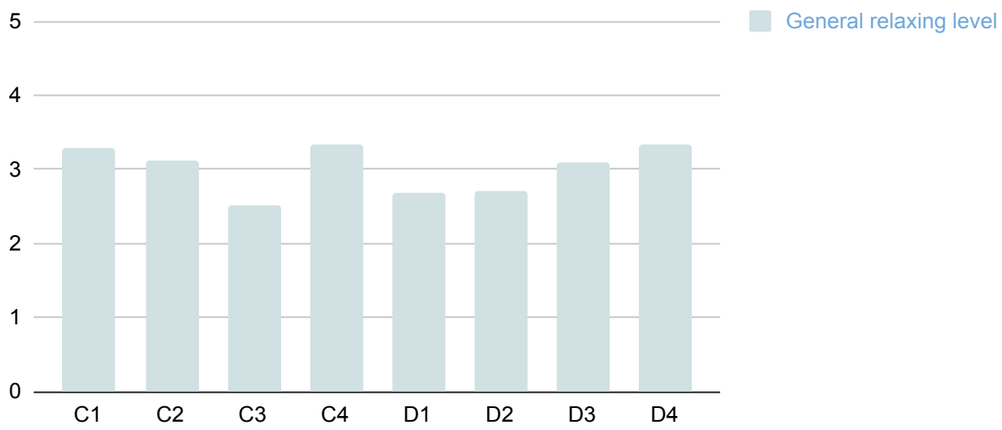
B2. Tree canopy of at least 30 percent (p. 32, Roe & McCay, 2021)

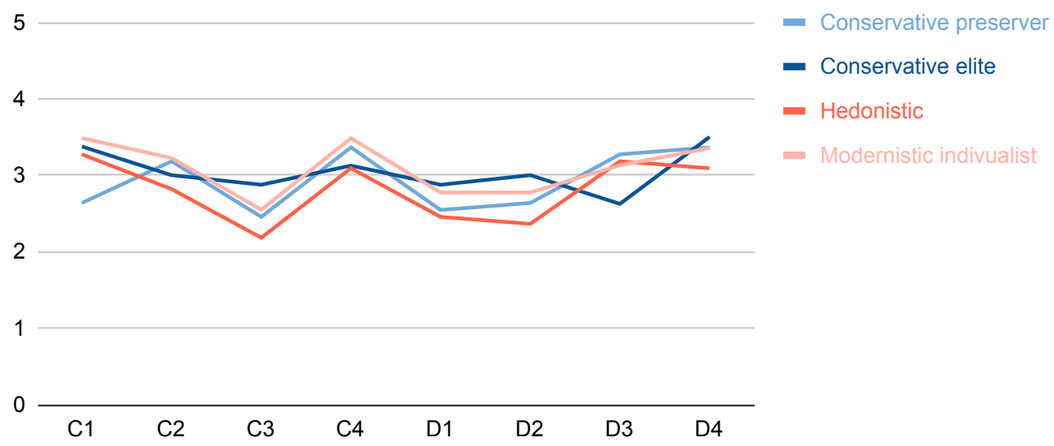
B3. Rich inbiodiversity like animal species (p. 33, Roe & McCay, 2021)

B4. Green walls (p. 37, Roe & McCay, 2021)



Comparing and Measuring Urban Stressors





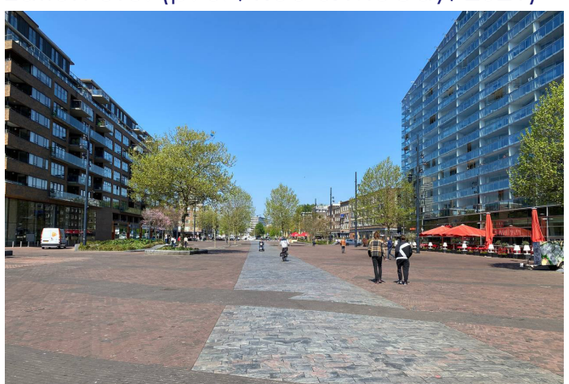
D1. Facade with large storefront (added for survey comparison)

D2. Fine-grain storefronts (p. 87, Roe & McCay, 2021)

D3. Varied facades (p. 87, Roe & McCay, 2021)

D4. Local character (p. 87) and historic fascination (p. 25, Roe & McCay, 2021)

C1. Wayfinding by use of color organization etc. (p. 87, Roe & McCay, 2021)



C2. Paving without separated functions (added for survey comparison)

C3. Cycle tracks separated from other traffic (p. 131, Roe & McCay, 2021)

C4. Textural variation (p. 86) and surface structure (p. 85, Roe & McCay, 2021)

Conclusions

- Objects in distance, do not have a significant influence on the stress value, except for the conservative elite

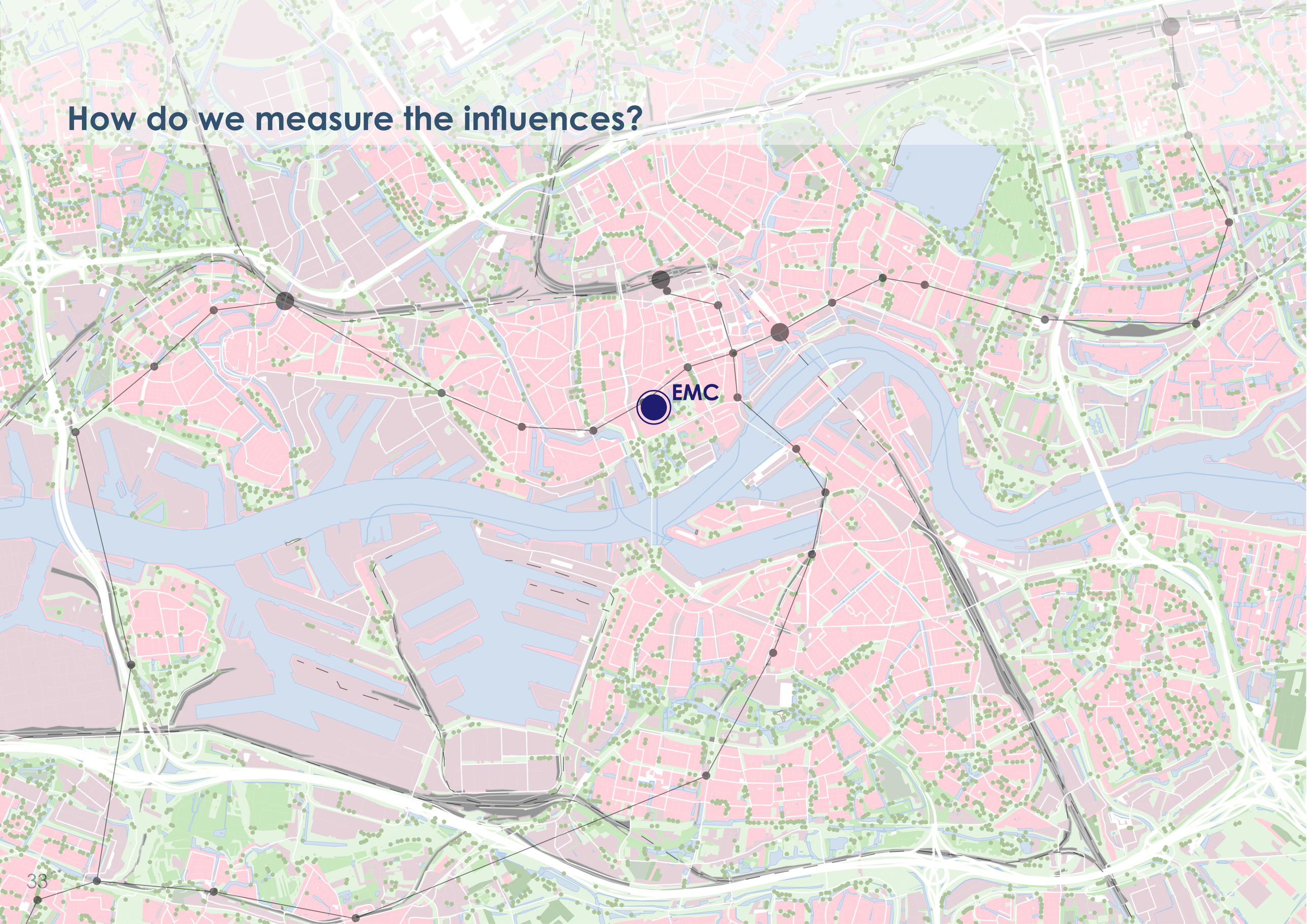
- The conservative elite is showing contrasting values the other lifestyle groups.
Assumed could be this group is used to drive in a car and mostly focusing on distant objects. Which makes nearby objects in the public space not influence their well being as much as it does to other groups.

- Taxi busses are the only stressor that is significantly higher then the stress value of not neatly parked bikes, crowding or urban design elements

- Adding attractive planting makes water more relaxing then clear water, waterfalls or attractive seating

- Creating a tree canopy is more relaxing than green facades, biodiversity and an urban park

How do we measure the influences?



Digital Procedural Model

- Simulate the created personas on a digital procedural model

It says more than a person would be able to comprehend or explore in the given time of a project. The digital model is not about geometry anymore, but the ultimate integration of data.

Research Limitations and future research

1. The weighted sum method does not take coincidences in account and mathematically calculates the sum of the entire route.

2. The current model is not a traffic model and only uses the data of a traffic model.

3. The interweaving between 2 models and the impact on the results at the low scale level (the EMC Campus) and the transport model is not a common practice

Multi Criteria Analysis

Choosing a route based on a weighted sum model

Basis need
to be efficient

Personality
preferences

Disability

Stress and
restorative level

The advantage of the weighted sum method is to identify a single unique solution for implementation (Ooi et al., 2017).

Aspects to be weighted	**Model Goal**	**Weight**
• *Stress or restorative level*	*Avoid or Attract*	*0.13*
• *Lifestyle Personality*	*Personal Preference*	*0.18*
• *Dissability*	*Mode is possible or not*	*0.23*
• *Necessity of life*	*Fastest route*	*0.46*
		1.0

	Value	Type of motivation	Model event
Image	0.0473	• Stress level and restorative	Avoid or attract
Accessibility PT system	0.074	• Dissability	Mode is possible or not
Travel comfort	0.0871	• Stress level and restorative	Avoid or attract
Travel information	0.093	• Necessity of life	Fastest route
Passenger Safety	0.104	• Dissability	Mode is possible or not
Punctuality	0.1126	• Lifestyle Personality	Preference
Ticket price	0.1201	• Lifestyle Personality	Preference
Operational speed	0.1784	• Necessity of life	Fastest route
Frequency	0.1835	• Necessity of life	Fastest route

Stress level and restorative

Image	4.73
Travel comfort	8.71
	13.44

Dissability

Accessibility PT system	7.4
Passenger Safety	10.4
	17.8

Lifestyle Personality

Punctuality	11.26
Ticket price	12.01
	23.27

Necessity of life

Travel information	9.3
Operational speed	17.84
Frequency	18.35
	45.49

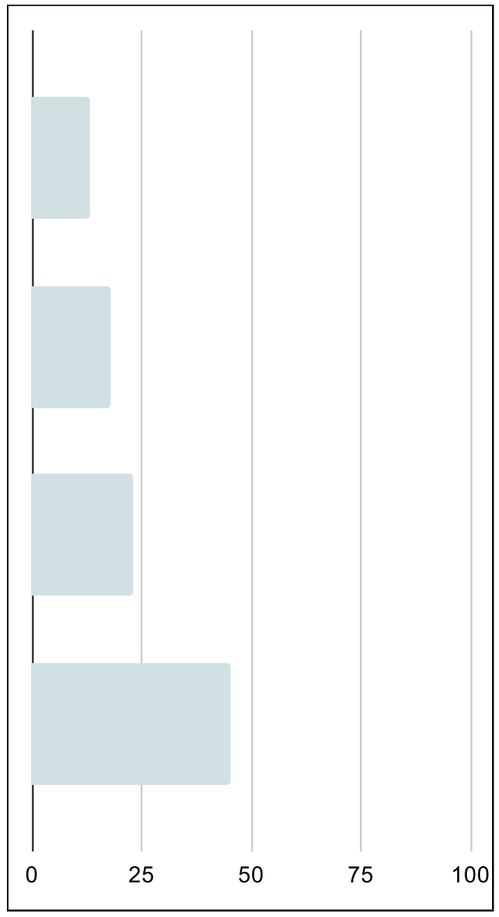


Table 1, Creating weights by the theory of Brispat, P. ,2017 (edited by author)

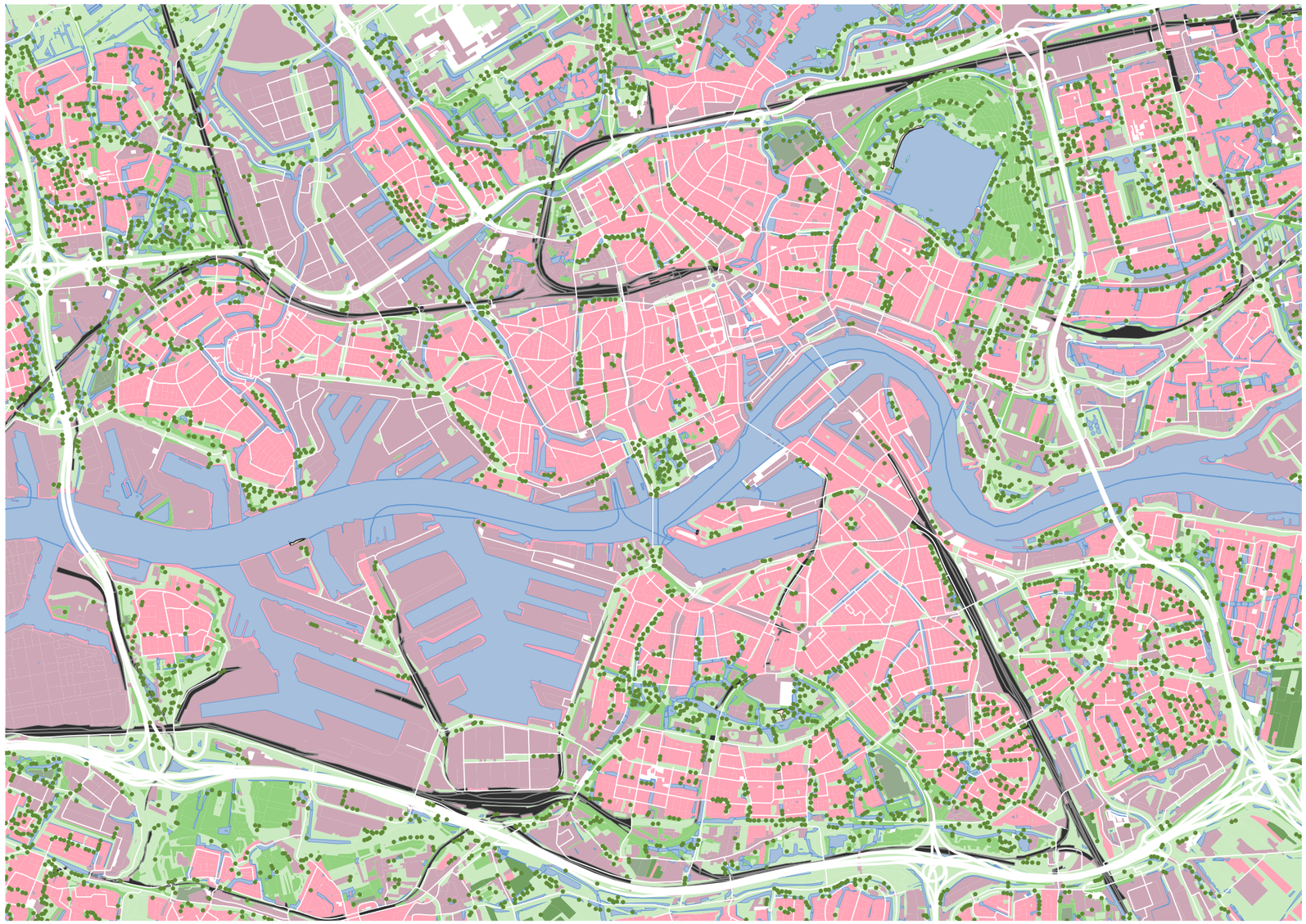
Persona based modeling: input model

Restoratives and stressors

	STRESS		RESTORATIVE GREEN		RESTORATIVE URBAN	
	Urban aspects	City life	Water	Urban park	Contemporary	Before 1940
Conservative maintainer	1.636363636	1.863636364	3.709090909	3.136363636	2.818181818	3.363636364
Conservative elite	2.21875	2.25	3.35	2.71875	2.833333333	3.5
Modern individualist	1.758064516	2.040322581	3.787096774	3.411290323	2.892473118	3.35483871
Hedonistic	1.909090909	2.159090909	3.527272727	3.113636364	2.666666667	3.090909091

Persona based modeling: input model

Restoratives and stressors



B.1.

Figure 65, Example used to retrieve survey data

B.2.

Figure 66, Example used to retrieve survey data

Figure 67, Trees in a street example (Author)

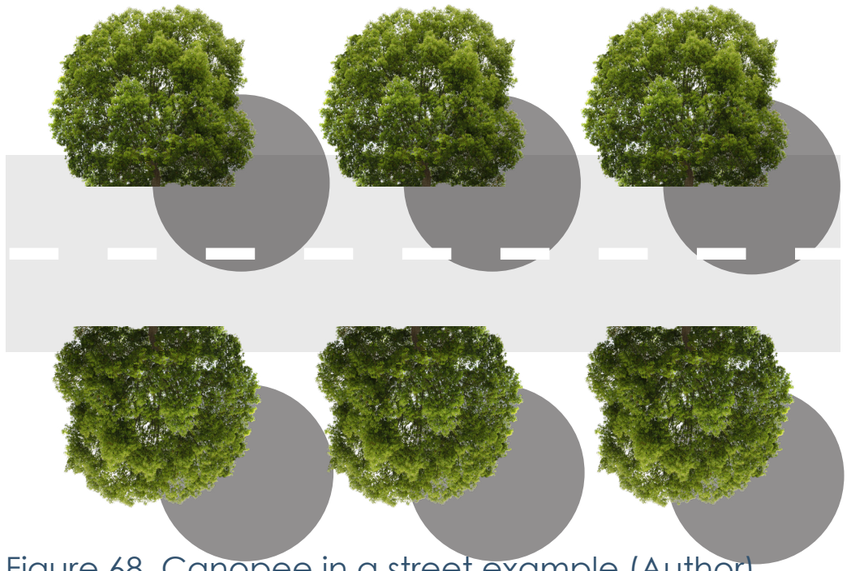


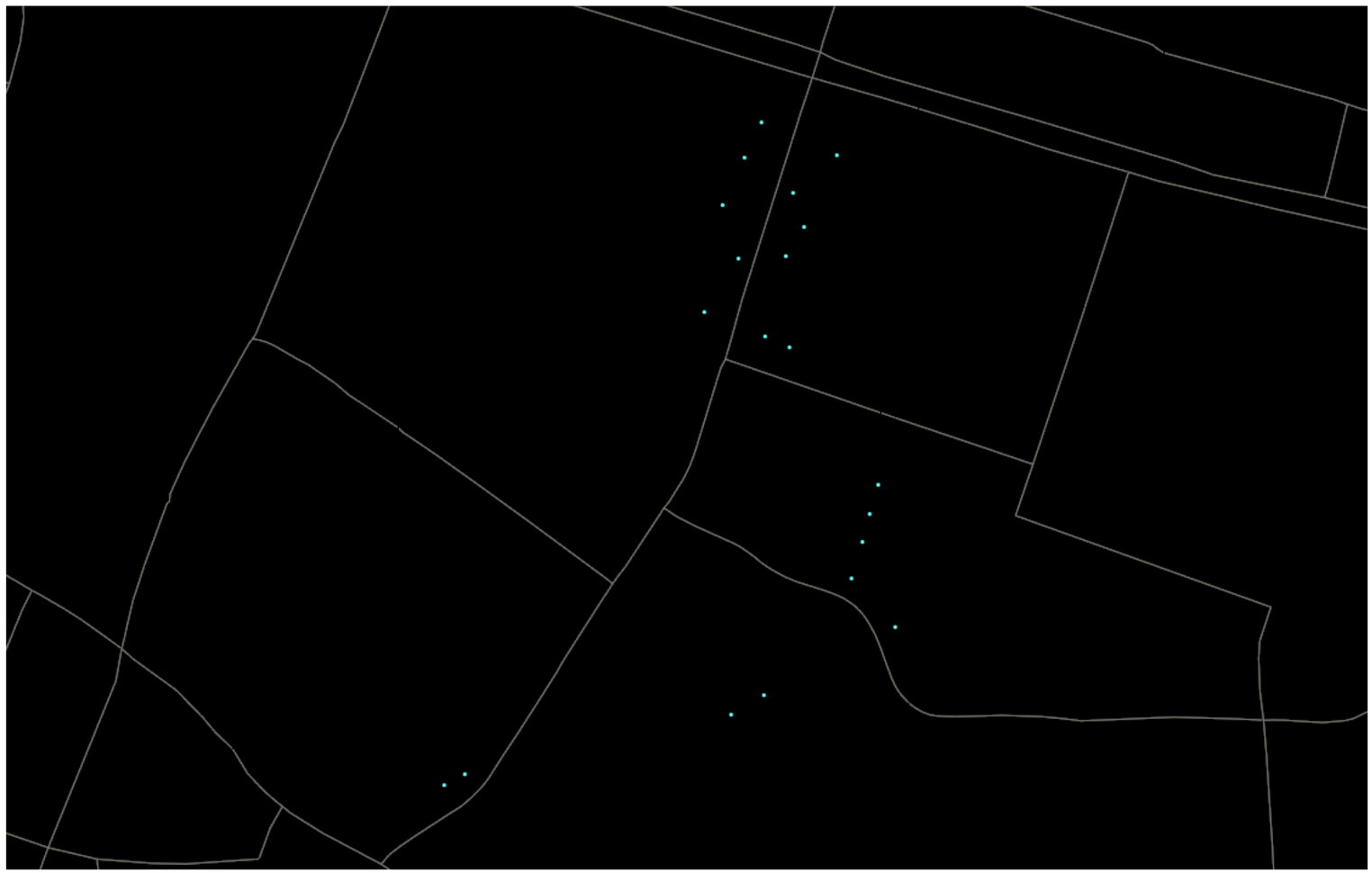
Figure 68, Canopee in a street example (Author)

Persona based modeling: input model

Restoratives and stressors

Tree

Road segment

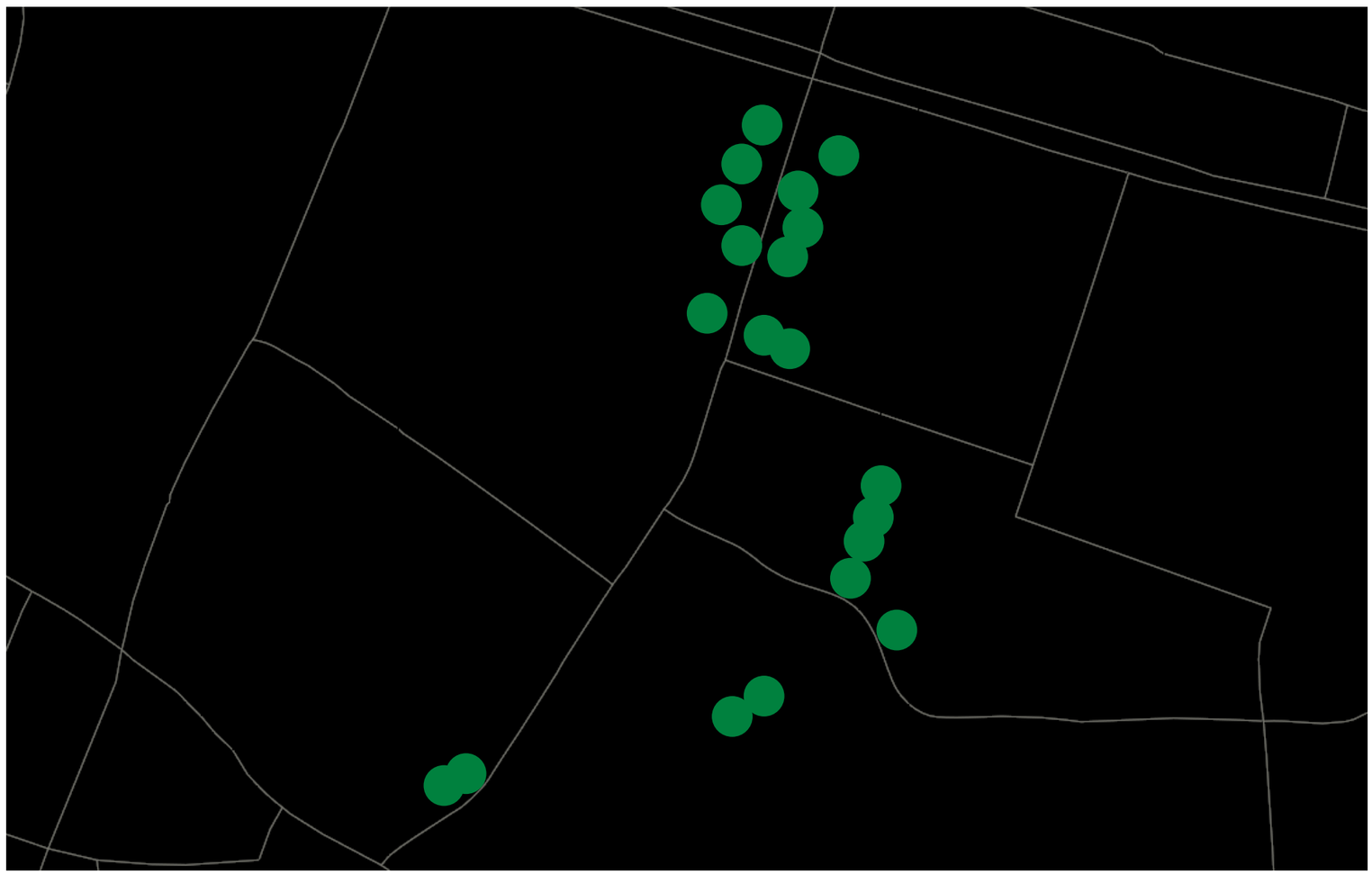


Persona based modeling: input model

Restoratives and stressors

Tree

Road segment



```
if (@personality == 1){
    if (s@type_inrichtingselement == “boom”){
    f@boomcost = 2.7;
    }
}
```

```
if (@personality == 1){
```
If the personalitytype is 1, the following statement is applicable

```
if (s@type_inrichtingselement == “boom”){
```
If there are trees adjacent to the road segment

```
f@boomcost = 2.7;
```
The restorative tree value is 2.7

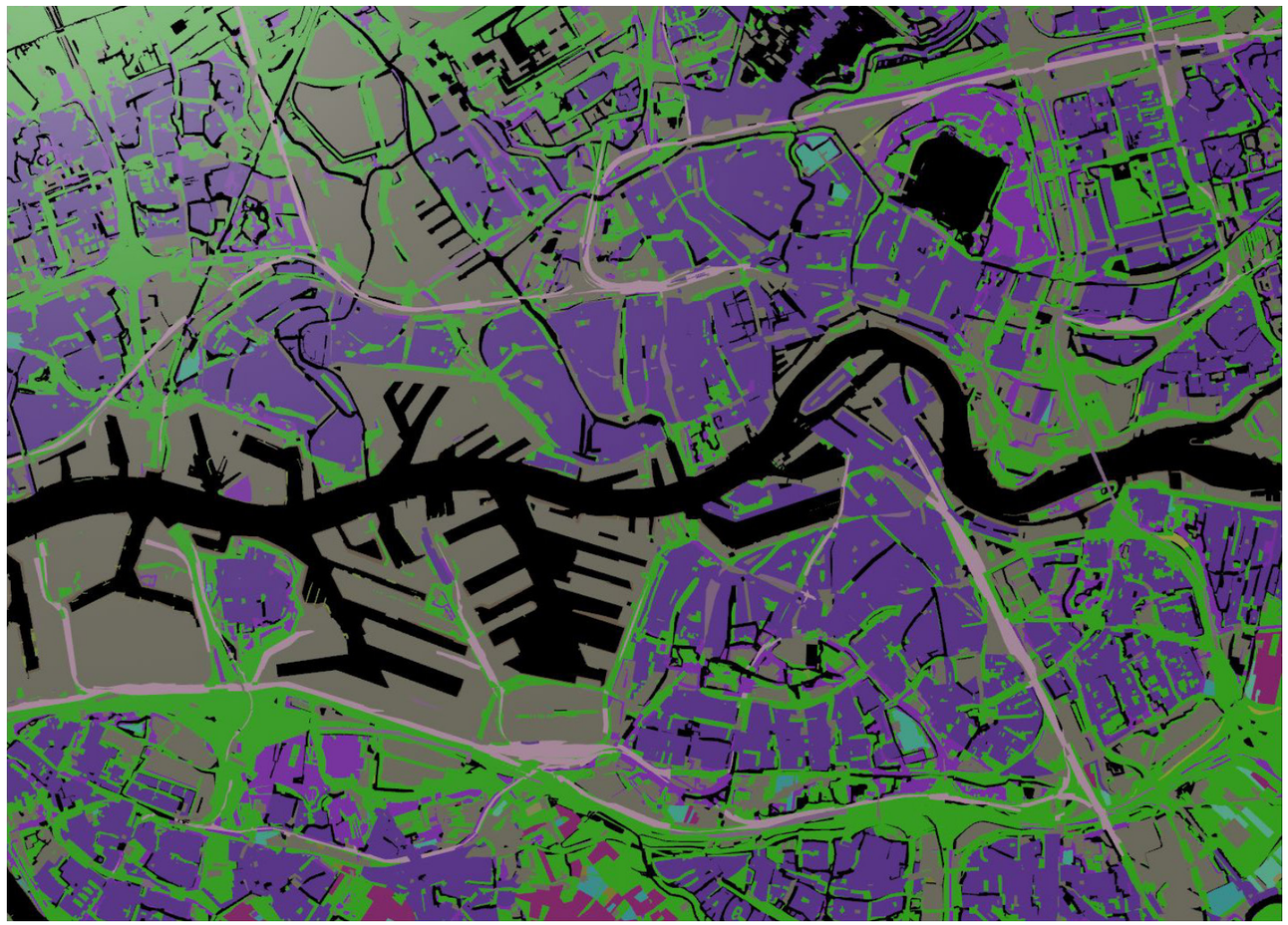
Persona based modeling: input model
Restoratives and stressors

Water

Buildings

Urban park

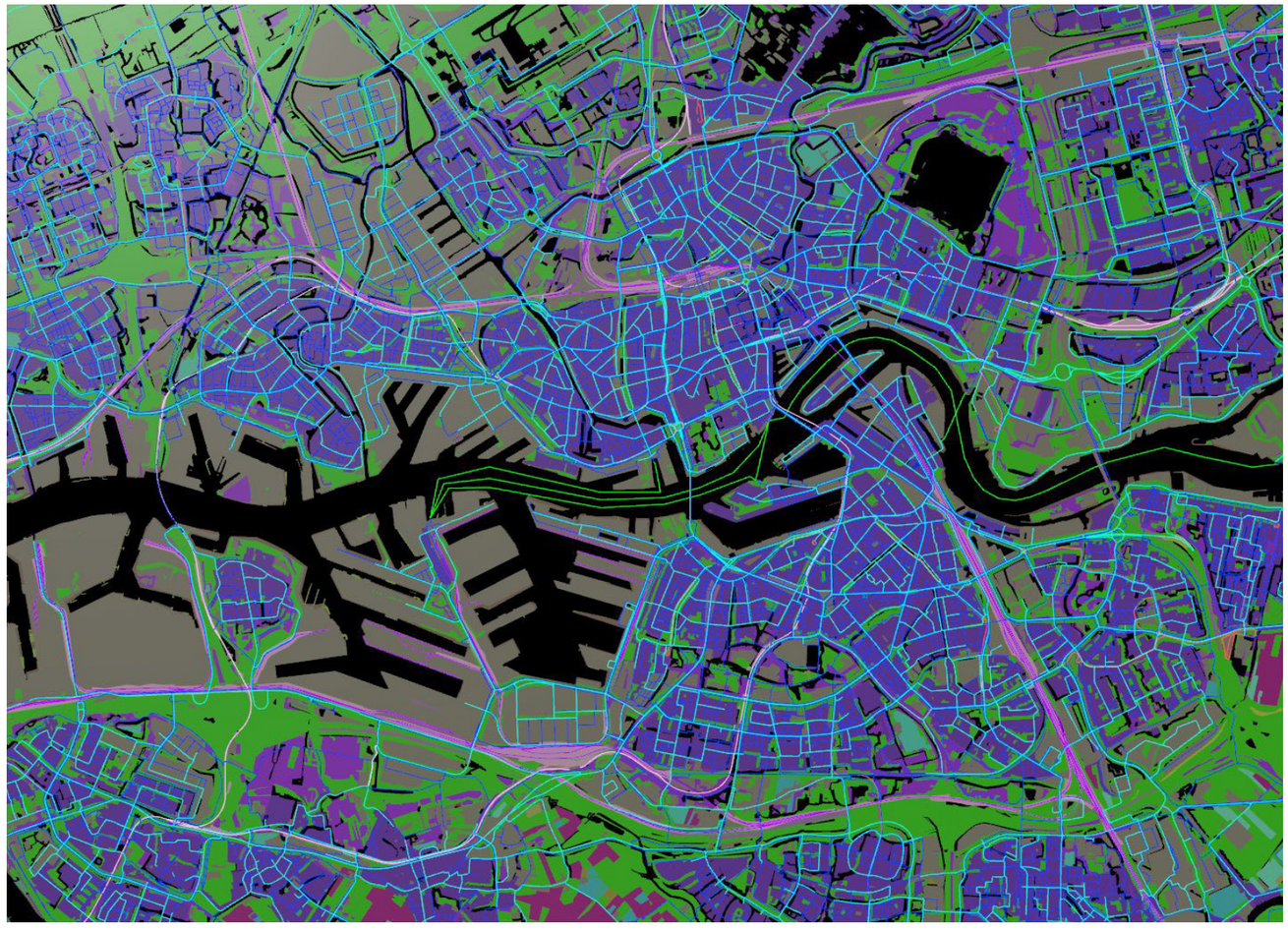
Industry

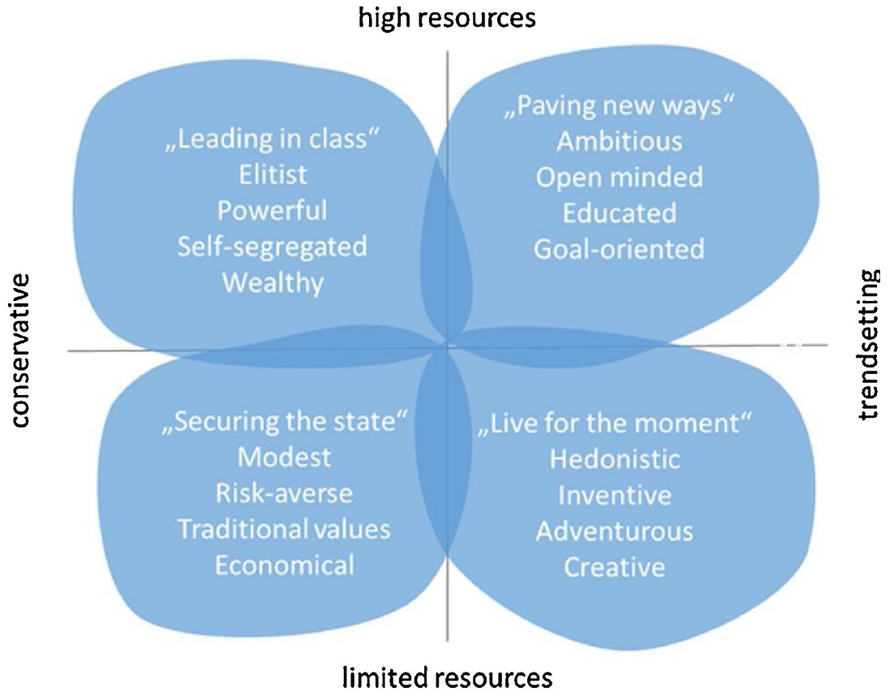


```
if (@personality == 1){
  if (s@type_landgebruik ==
"bebouwd gebied"){
     f@stresscost1 = 1.64;
  }
    if (s@type_landgebruik ==
"spoorbaanlichaam"){
     f@stresscost2 = 1.64;
  }

   //RESTORATIVE GREEN
  if (s@type_landgebruik ==
"grasland"){
     f@parkcost = 3.13;
   }

   if (s@type_inrichtingselement
== "boom"){
      f@boomcost = 3.13;
   }

  if (@water == 1){
     f@watercost = 3.71;
  }

}


f@stresscost = sum(@stresscost1
+ @stresscost2);

f@restorativecost = sum(@park-
cost + @boomcost+ @water-
cost);


if (@stresscost == 0){
      @stresscost = 1;
}
if (@restorativecost == 0){
      @restorativecost = 1;
```

Persona based modeling

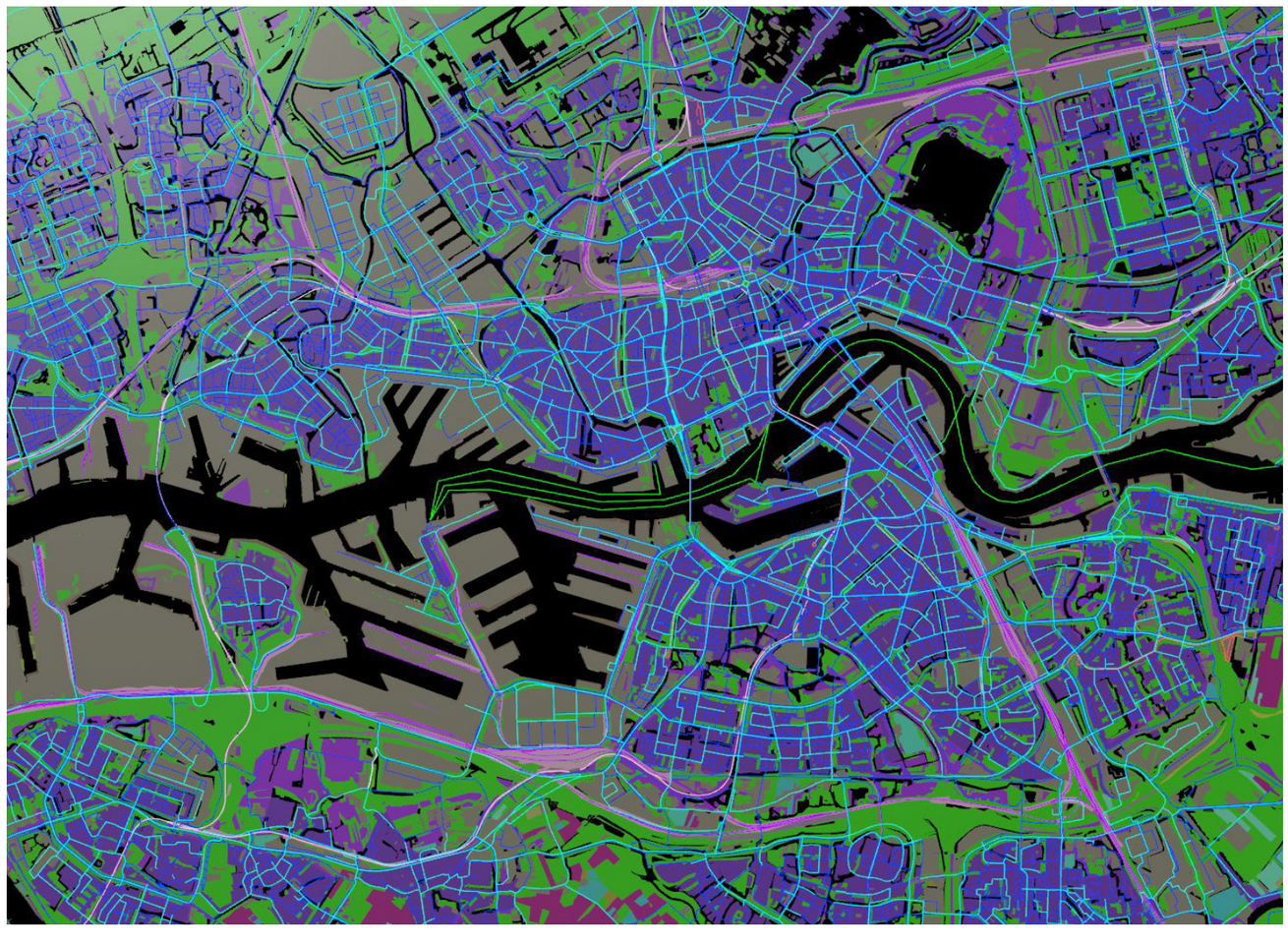
4 Personality Preference





Persona based modeling

Personality Preference

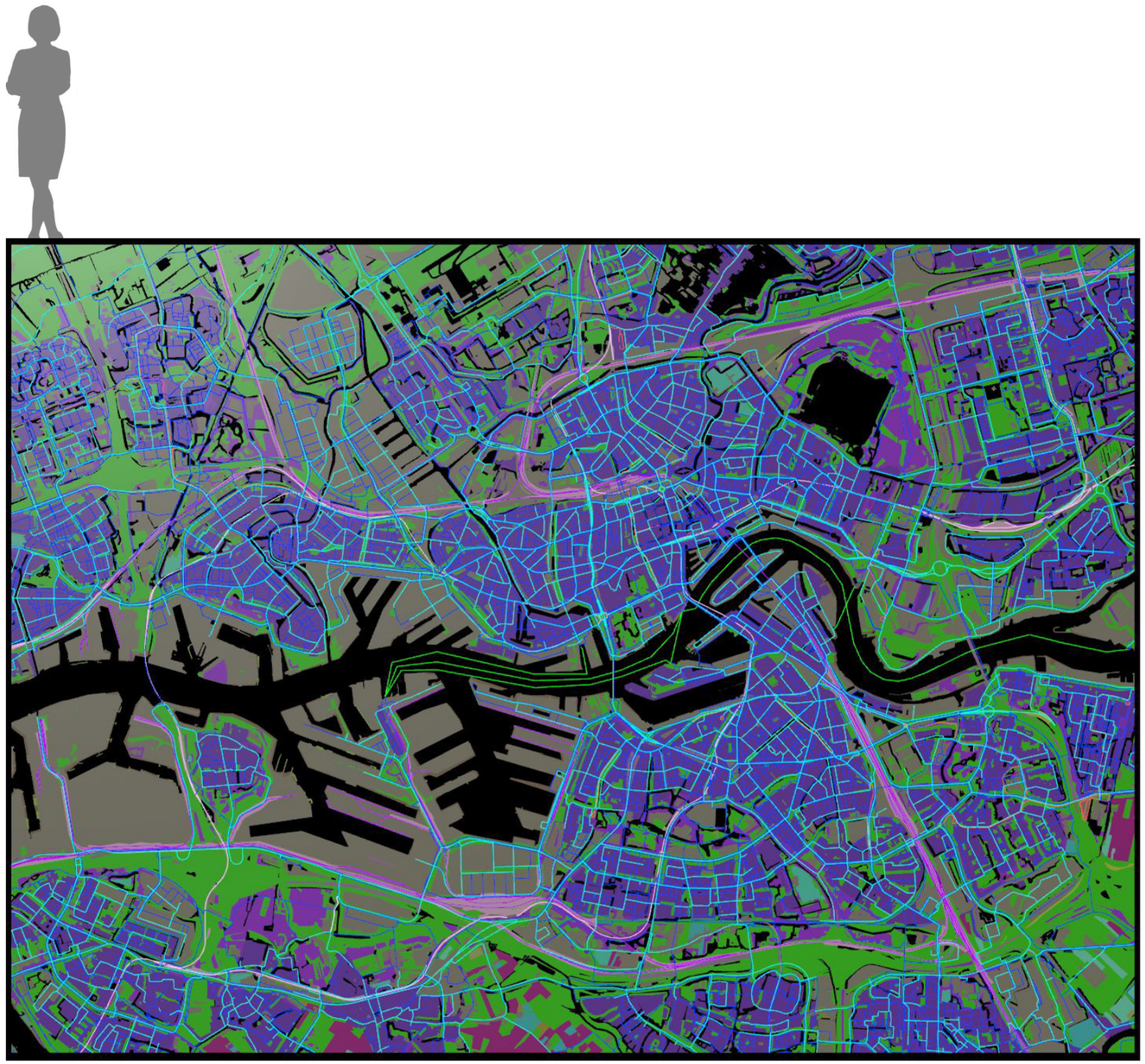


```
if (@personality == 1){

//CHOOSE MODE
   if (@road_type == 2){ //fiets
      @costmode = 5;
   }

   if (@road_type == 3){ //auto
      @costmode = 5;
   }

   if (@road_type == 4){ //tram
      @costmode = 1;
   }

   if (@road_type == 5){ //metro
      @costmode = 1;
   }

//NO TRANSIT ABOVE TIME?
   if (@transit == 1){
      @costtransit = 2;
   }

   if (@perimeter > 50){
      if (@transit == 1){
         @costwalk = 5;
   }
      else
         @costwalk = 1;
   }

}



@costpersonality = sum(@cost-
mode +
@costtransit + @costwalk);

if (@costpersonality == 0){
      @costpersonality = 1;
} // Cost can not be 0!
```

Persona based modeling

Basic needs

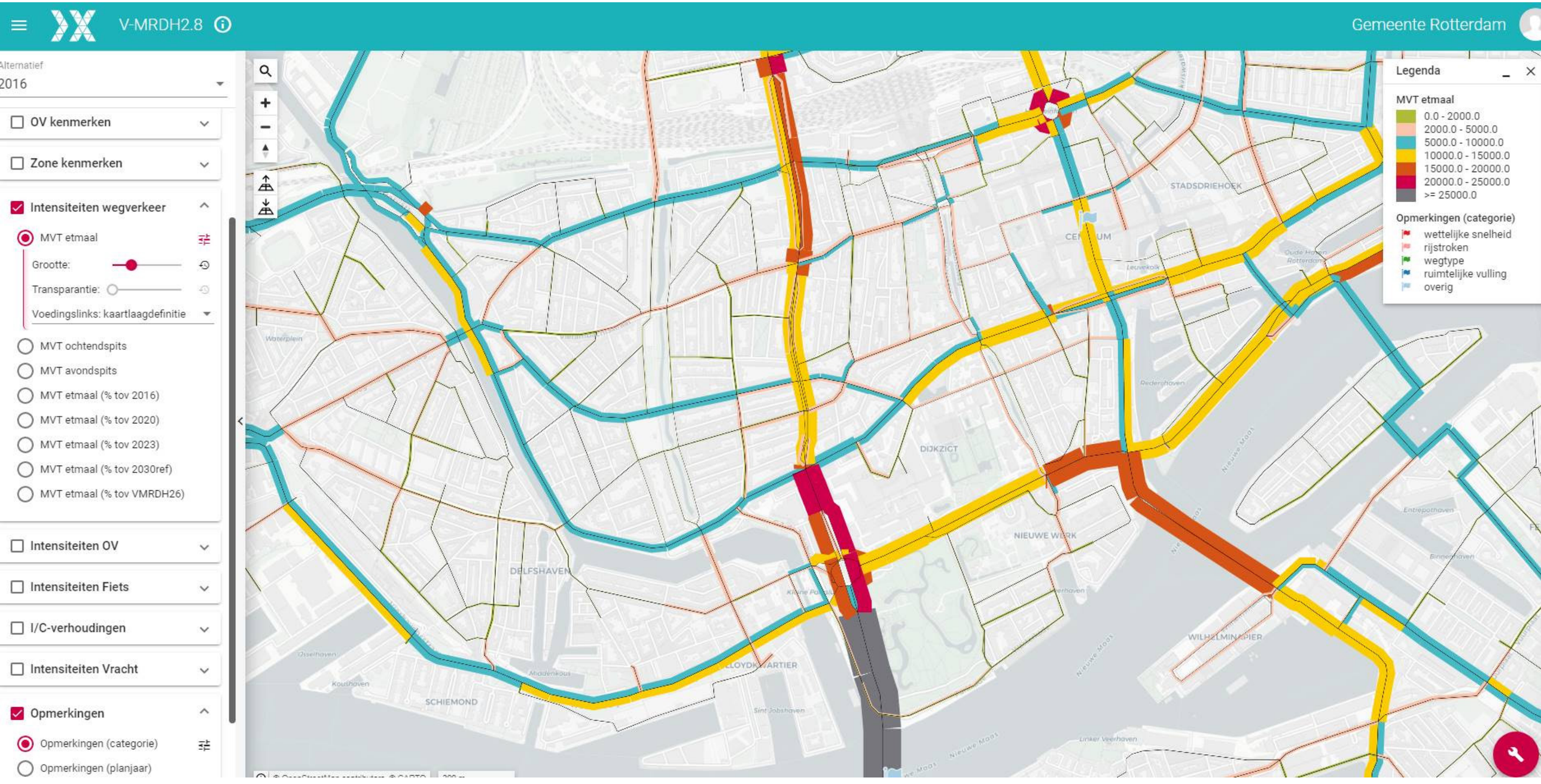
Choose a most efficient route based on the **shortest time** and **least amount of transits**



```
f@costbasic;

if (@speed != 0){
    f@timecost = (@perimeter * @
speed);
}
else {
    @timecost = (@perimeter * 5);
}

if (@transit == 1){
    @transitcost = 2;
}
else {
    @transitcost = 1;
}

f@costbasic = sum(@timecost + @
transitcost);

if (@costbasic == 0){
        @costbasic = 1;
}
```

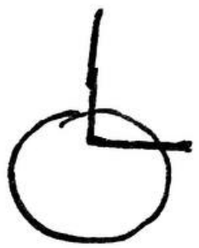
Persona based modeling

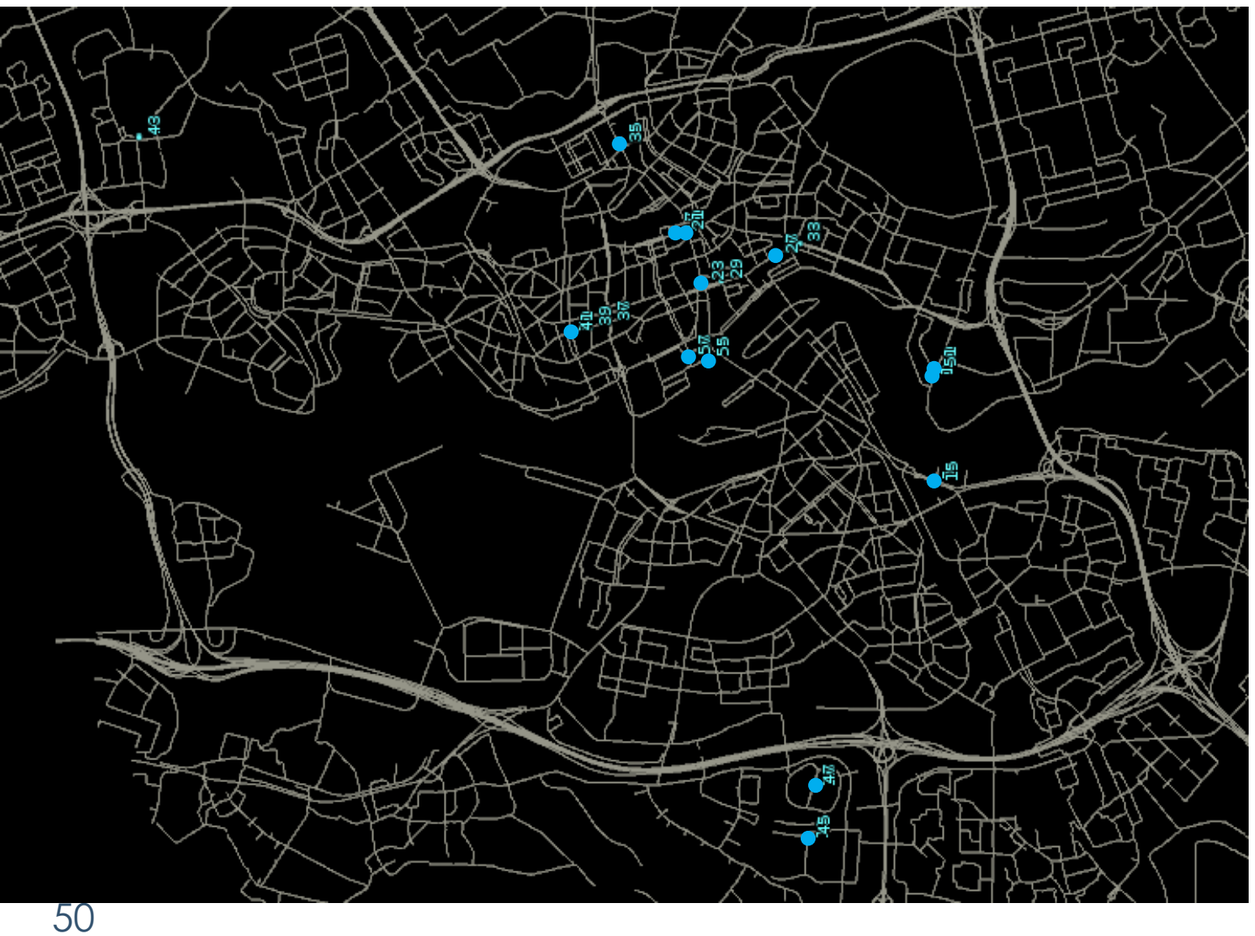
Basic needs



Persona based modeling

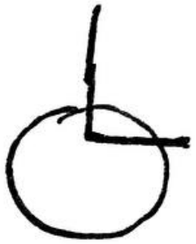
Disabilities

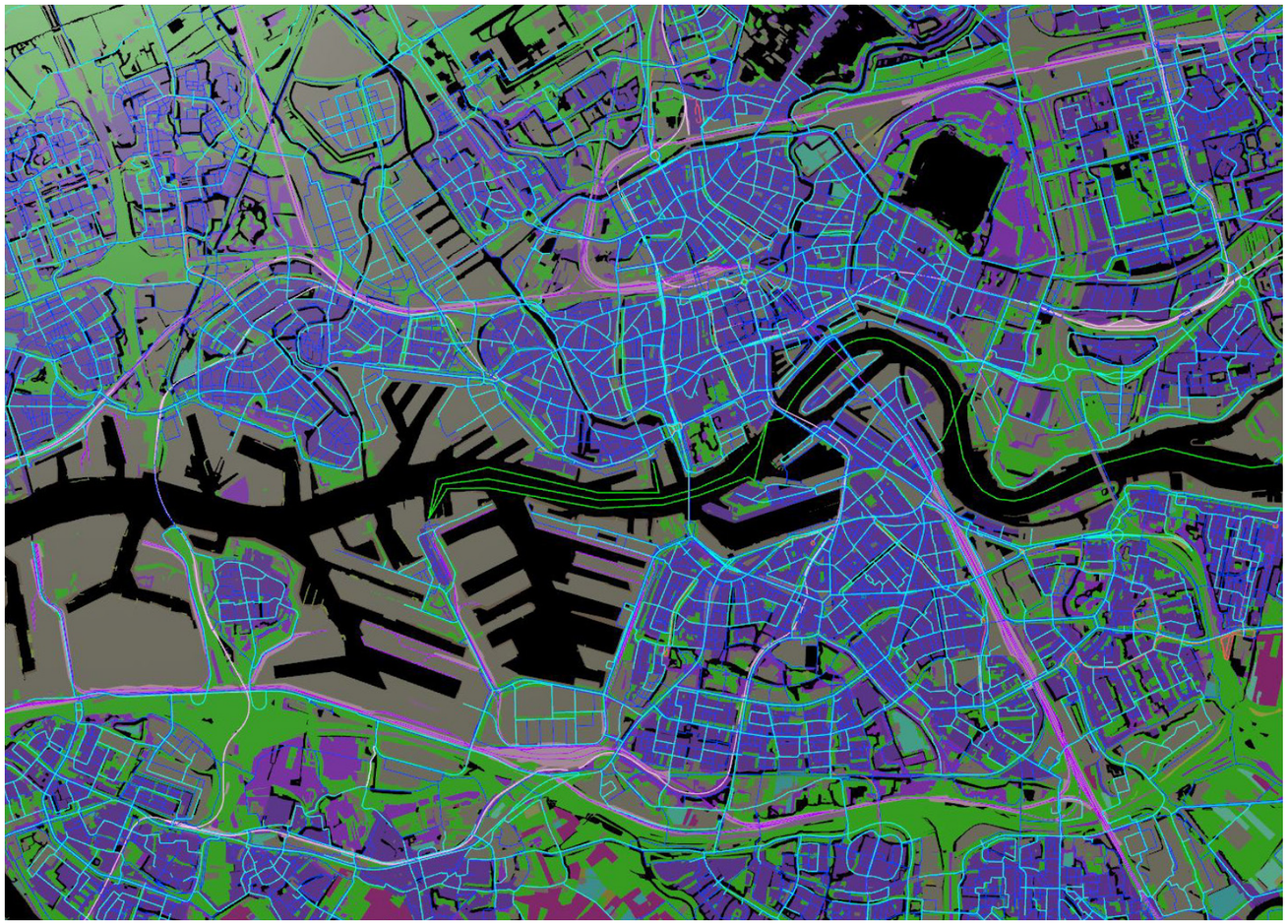




Persona based modeling

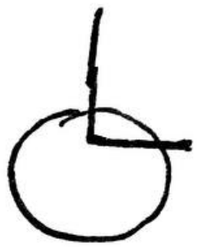
Disabilities

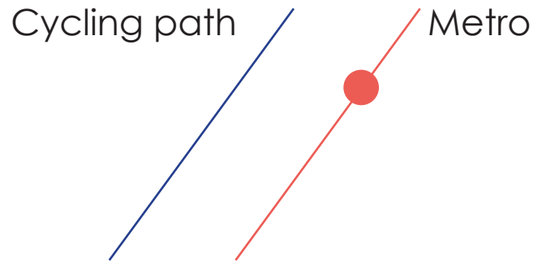


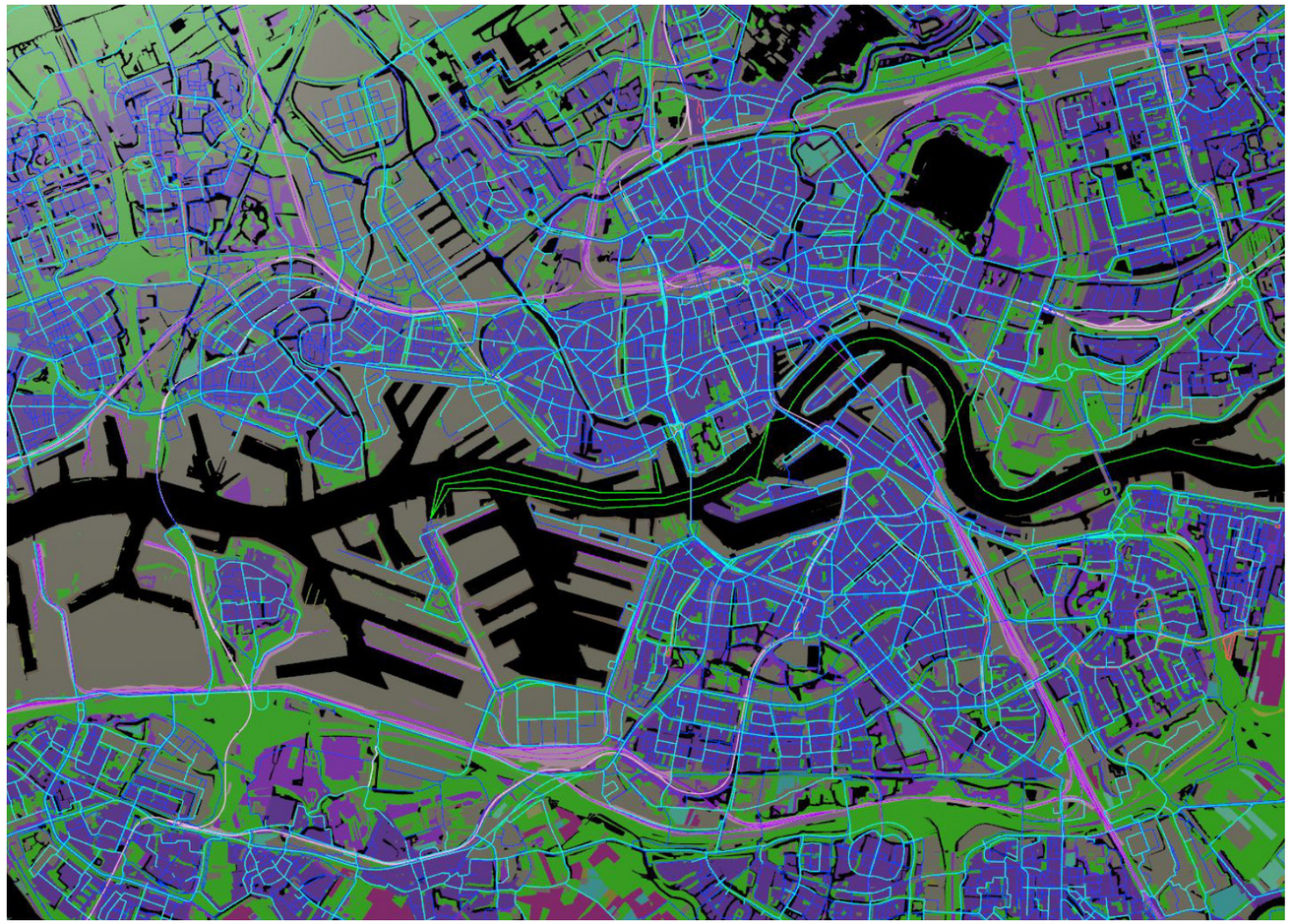


Persona based modeling

Disabilities

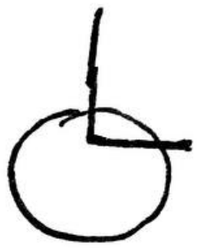


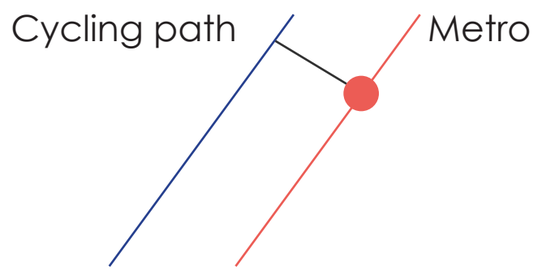


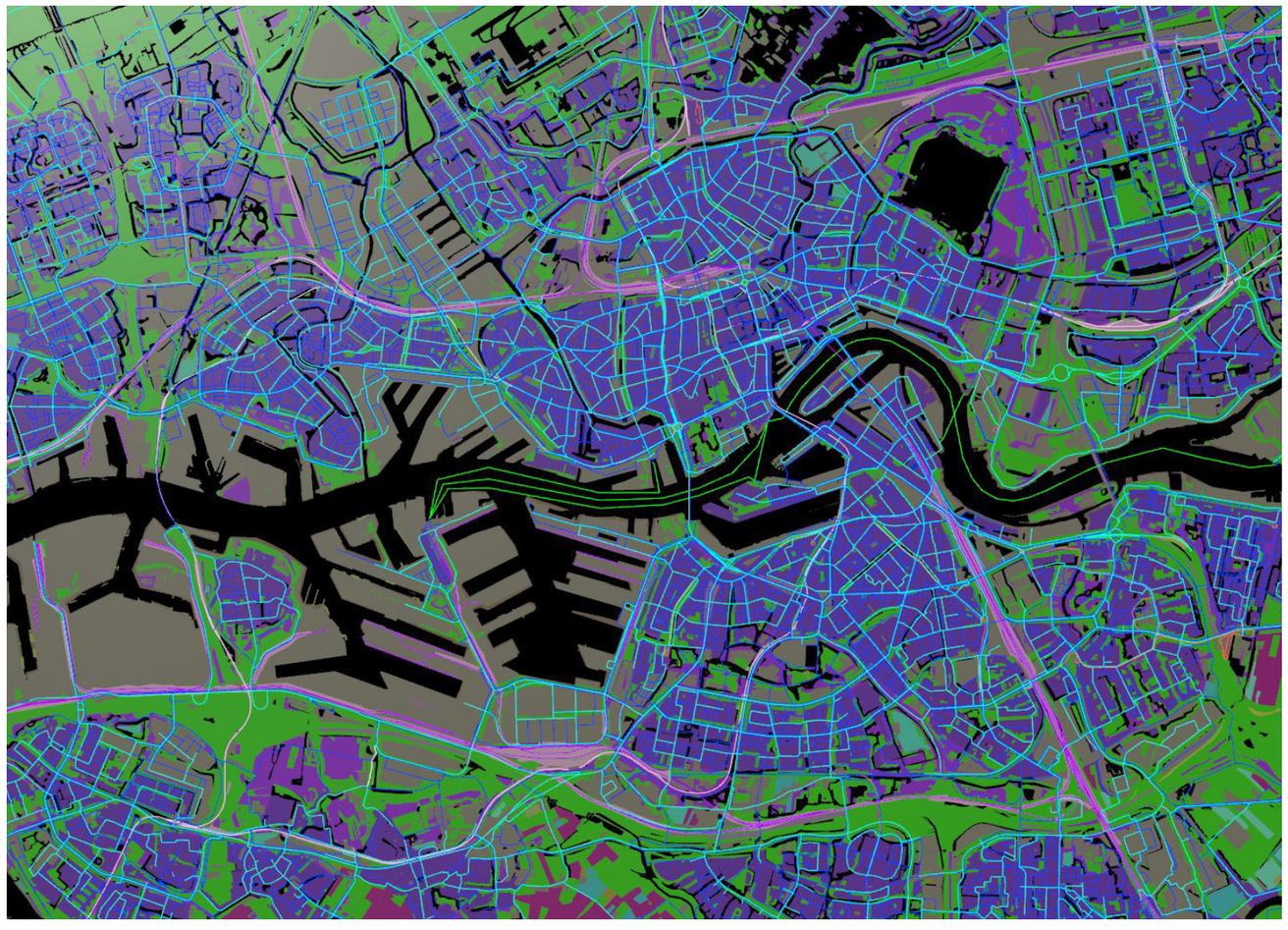


Persona based modeling

Disabilities







```
//SMALL ACTIVITY RADIUS
@disability = 2;
i@disabilitycost;
i@notransit;
i@walkdistance;

if (@road_type == 1 || 2){
    i@walkdistance = 4;
}

if (@transit == 1);{
    i@notransit = 5;
}

@disabilitycost = sum(@walkdistance + @
notransit);
```

Persona based modeling

Disabilities

40 unique personas

Aspects to be weighted	Model Goal	Weight
• *Stress or restorative level*	*Avoid or Attract*	*0.13*
• *Lifestyle Personality*	*Personal Preference*	*0.18*
• *Disability*	*Mode is possible or not*	*0.23*
• *Necessity of life*	*Fastest route*	*0.46*
		1.0

- The shortest path node in Houdini to find the lowest total cost to the Erasmus MC.

- Making the cost lower: MIN(Value)/Value
- Making the cost higher: Value/MAX(Value)

```
//personality lifestyle
@sum_personality =
(@min_personality/@costpersonality) * 0.23;

//basic needs
@sum_basicneed =
(@min_basic/@costbasic) * 0.46 ;

//disabilities
@sum_disability =
(@disabilitycost/@max_disability) * 0.18;

//mental
f@sum_stress =
(f@min_stress / f@stresscost) * 0.065;
f@sum_restorative =
(f@restorativecost/f@max_restorative) * 0.065;

@pathcost =
sum
(@sum_personality +
@sum_basicneed +
@sum_disability +
f@sum_stress +
f@sum_restorative);
```


https://www.trouw.nl/nieuws/de-rotterdamse-metro-kan-het-groeiende-aantal-passagiers-bijna-niet-meer-aan~b0687cc3/

Persona based modeling

Input limitations and considerations

- According to the Sinus Praxis theory there are more than 12 person-agroups (Barth et al., 2017)

- A hybrid field of human characteristic to explore a richer relation between mobility motivation and mental health

- Geodemographic data to access familiarity

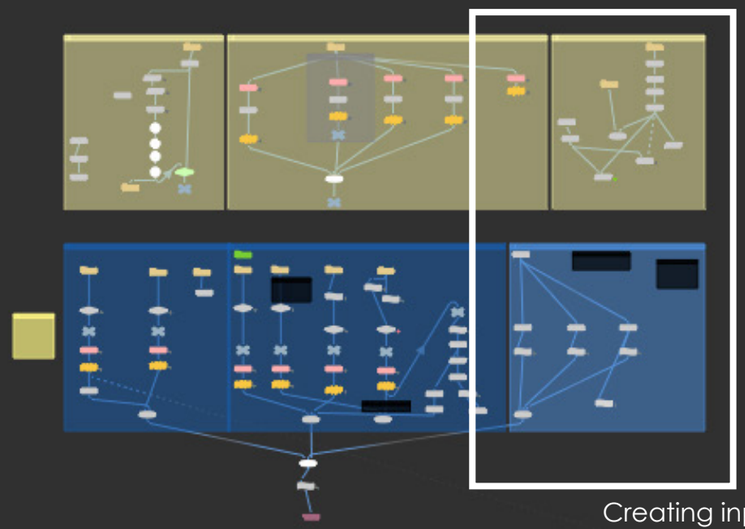
What are the most suitable and pre-
ferred routes based on urban aspects
and individual motivations?

What are the most suitable and pre-
ferred routes based on urban aspects
and individual motivations?

- Start points and end points

- Method explanation

- Calculation results



Creating input network data

Input network data

Creating personas used for simulation

Importing Public Transport data

Preparing network data and add values such as road ID and variables for speed, segment type etc.

Connecting Networks by Hans Hoogeboom

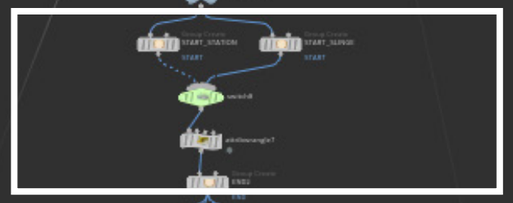
Base for Micro scale simulation

Calculate total restorative and stress value at arrival

Simulation Rotterdam scale

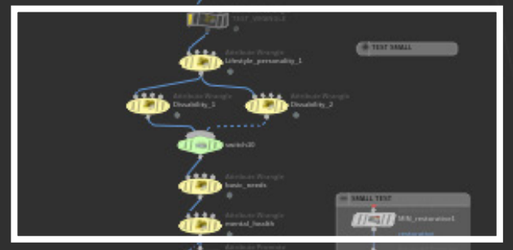
Input network

Transfer urban aspects with stress or restorative values on the network

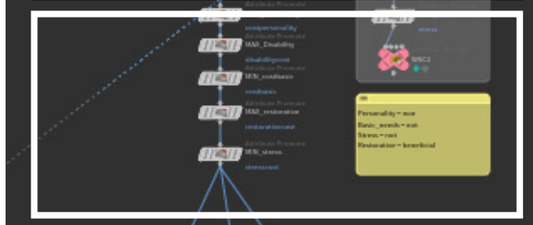


Define start and end points

Switch between 4 persona preferences

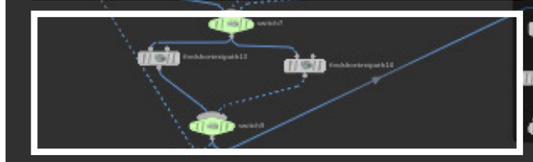


Codes calculating the routes are added here according to the Weighted Sum Method

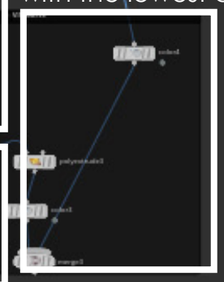


Defining max and min values for calculating the Weighted Sum

Calculate pathcost with the Weighted Sum Method. (personas take the path with the lowest cost).

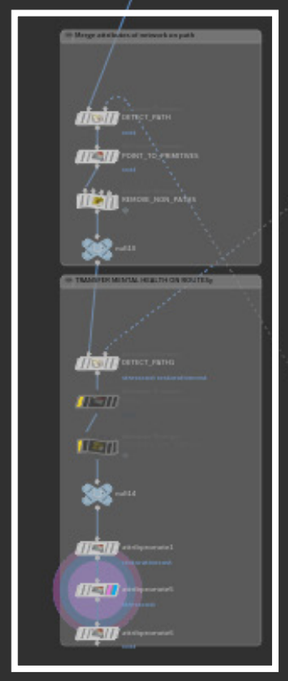


Simulate routes by calculating the lowest cost for the entire path



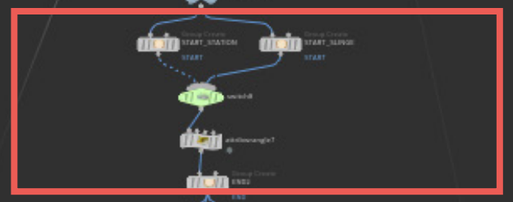
Visualize route

Calculate total restorative and stress value at arrival



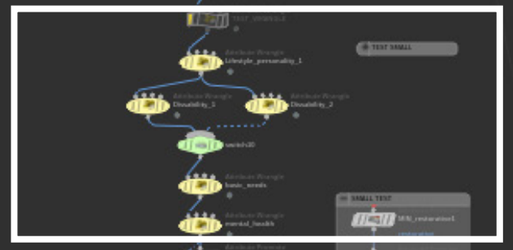
Input network

Transfer urban aspects with stress or restorative values on the network

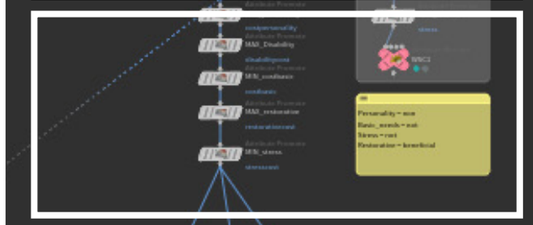


Define start and end points

Switch between 4 persona preferences

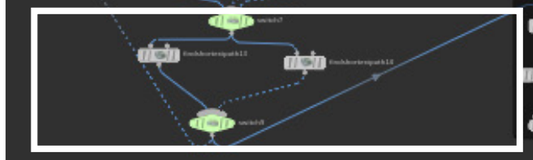


Codes calculating the routes are added here according to the Weighted Sum Method

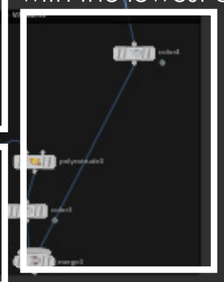


Defining max and min values for calculating the Weighted Sum

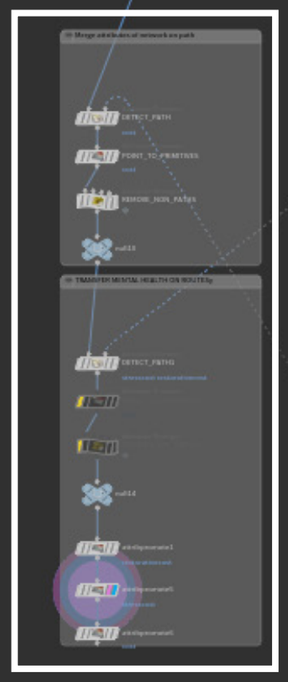
Calculate pathcost with the Weighted Sum Method. (personas take the path with the lowest cost).



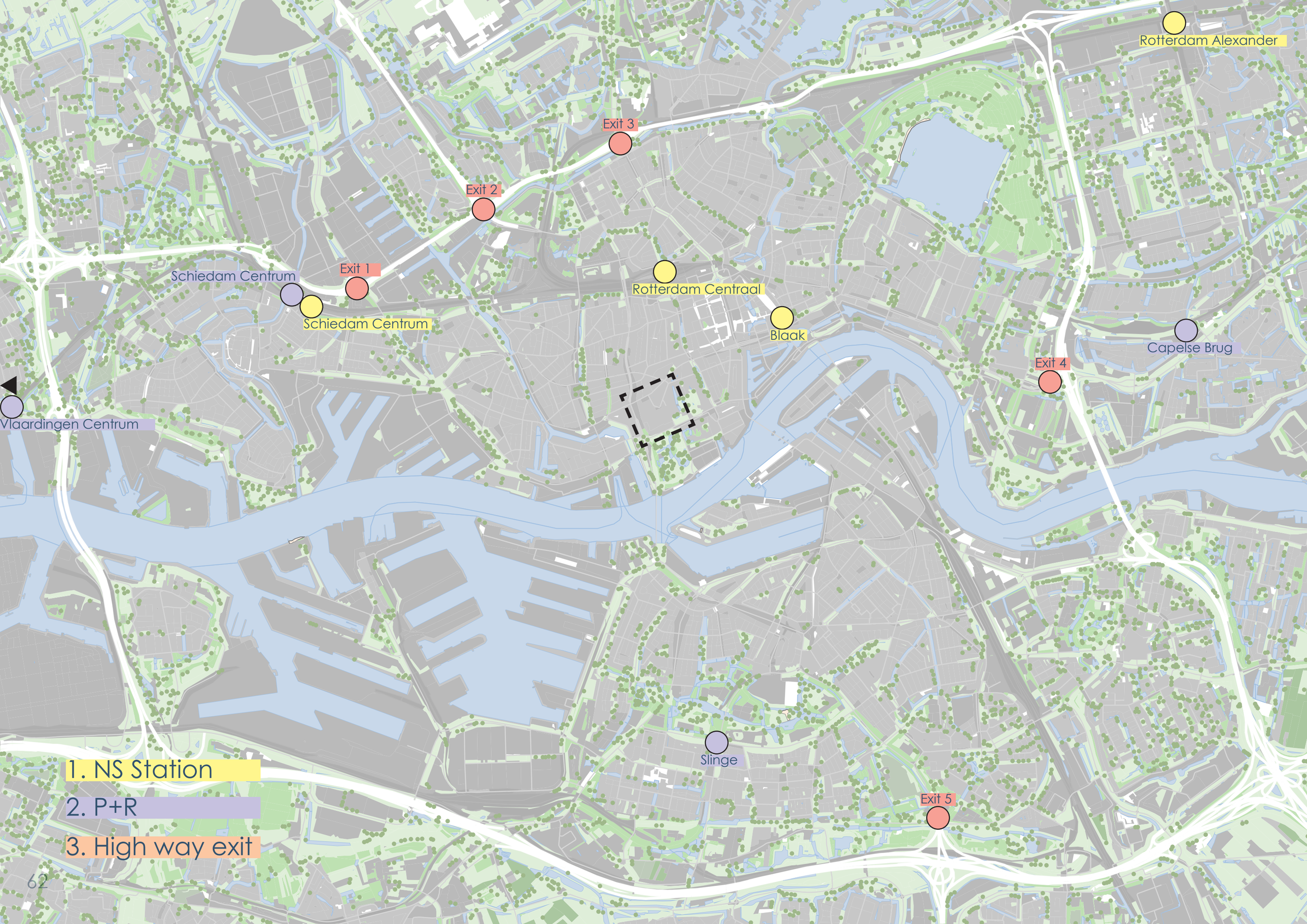
Simulate routes by calculating the lowest cost for the entire path



Visualize route



Calculate total restorative and stress value at arrival


Rotterdam Alexander
Exit 3
Exit 2
Exit 1
Schiedam Centrum
Schiedam Centrum
Rotterdam Centraal
Blaak
Capelse Brug
Exit 4
Vlaardingen Centrum
Slinge
Exit 5
1. NS Station
2. P+R
3. High way exit

A. Entrance Zone EMC

B. P Erasmus

C. Bike Parking

Zone 1

Zone 2

Zone 3

Zone 4

Zone 5

1

2

3

4

5

NETWORKTYPE	MODE	STARTPOINT	ENDPOINT
Car	Car	3. Afrit	C. P Erasmus
Slow Traffic + PT	1. NS Station	B. Entrance Zone	
	2. P+R	B. Entrance Zone	

In model: All networks on

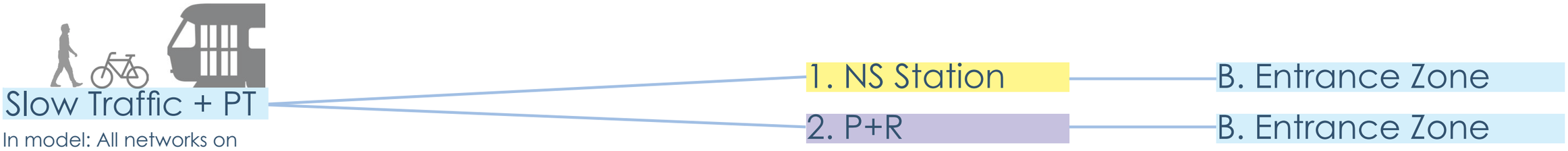
Two Methods

Weighted Sum Method

Aspects to be weighted	**Model Goal**	**Weight**
• *Stress or restorative level*	*Avoid or Attract*	*0.13*
• *Lifestyle Personality*	*Personal Preference*	*0.18*
• *Disability*	*Mode is possible or not*	*0.23*
• *Necessity of life*	*Fastest route*	*0.46*
		1.0

Mental Health

Aspects to be weighted	**Model Goal**	**Weight**
• *Stress level*	*Avoid*	*0.5*
• *Restorative level*	*Attract*	*0.5*



Model settings

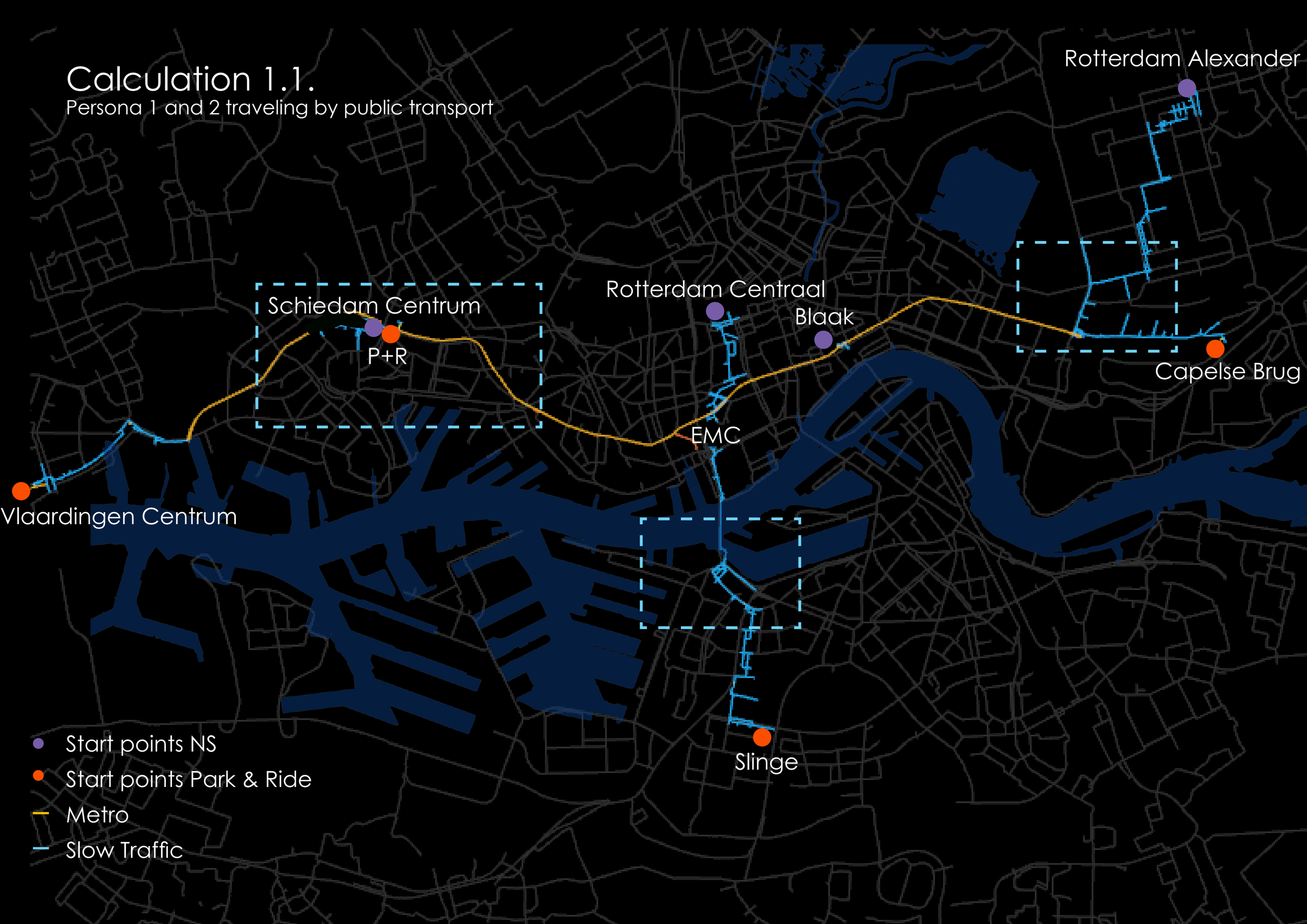
NETWORK	Public transport + Slow Traffic | Car
STARTPOINTS	NS Stations | P+R | Afrit
DESTINATIONS	Entrance Zone | Parking EMC Campus
DISABILITY	No | Low activity range
PERSONALITY	1 | 2 | 3 | 4
CALCULATION	Weighted Sum | Mental Health

Model settings

NETWORK	Public transport + Slow Traffic | Car
STARTPOINTS	NS Stations | P+R | Afrit
DESTINATIONS	Entrance Zone | Parking EMC Campus
DISABILITY	No | Low activity range
PERSONALITY	1 | 2 | 3 | 4
CALCULATION	Weighted Sum | Mental Health

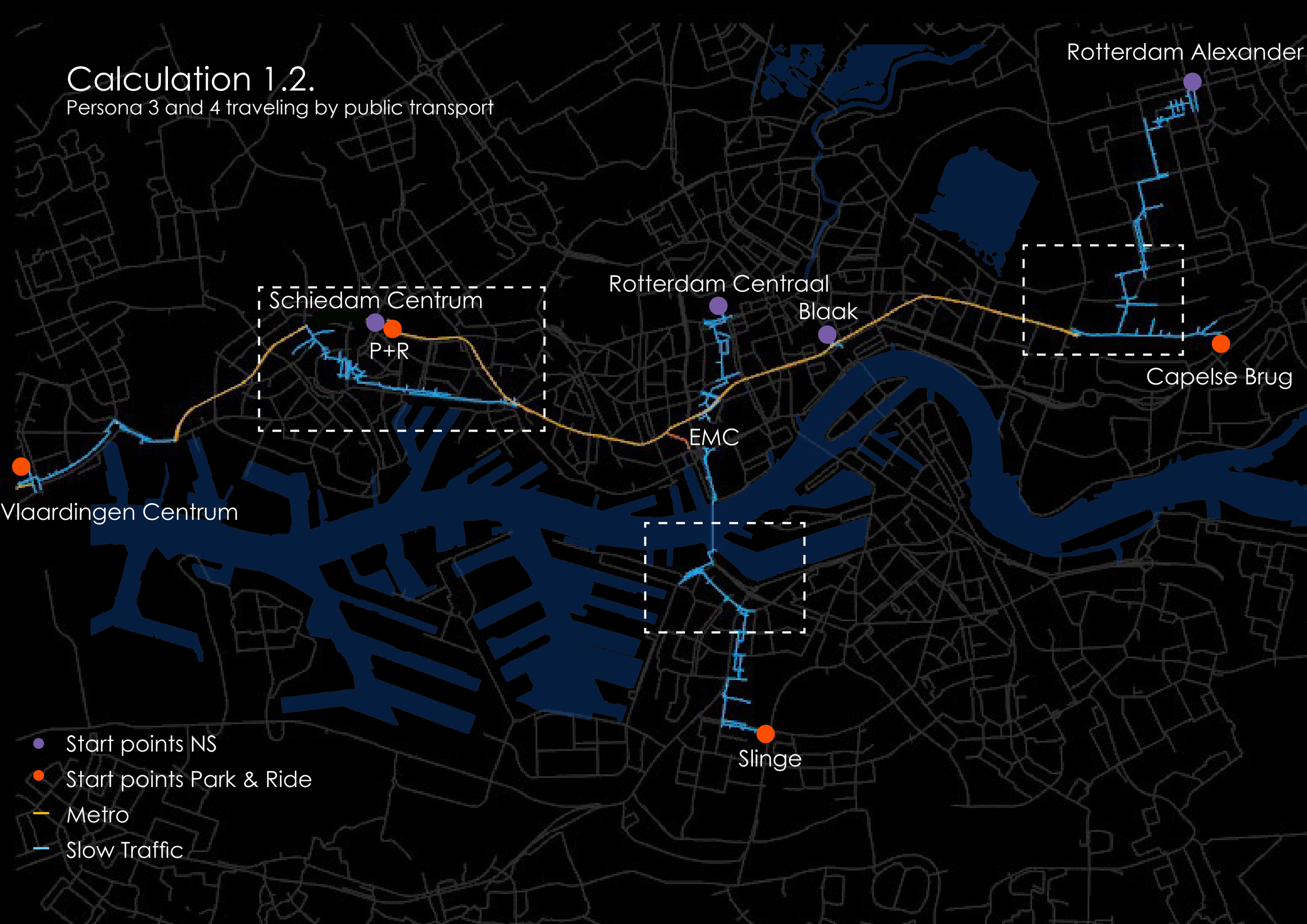
Calculation 1.1.

Persona 1 and 2 traveling by public transport

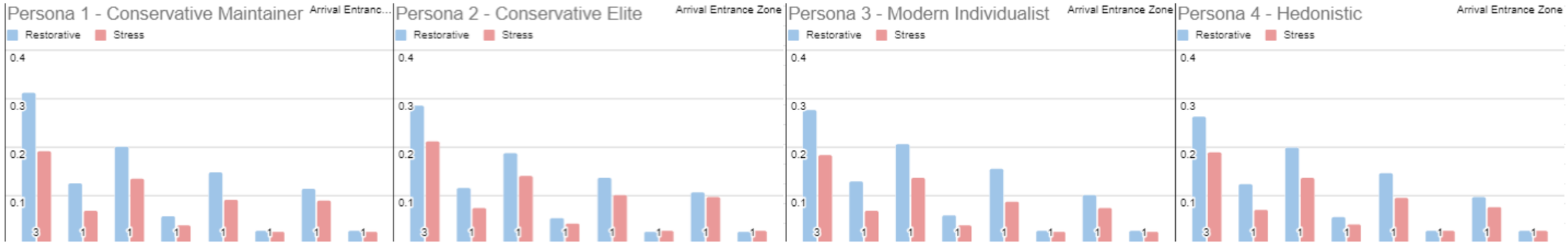


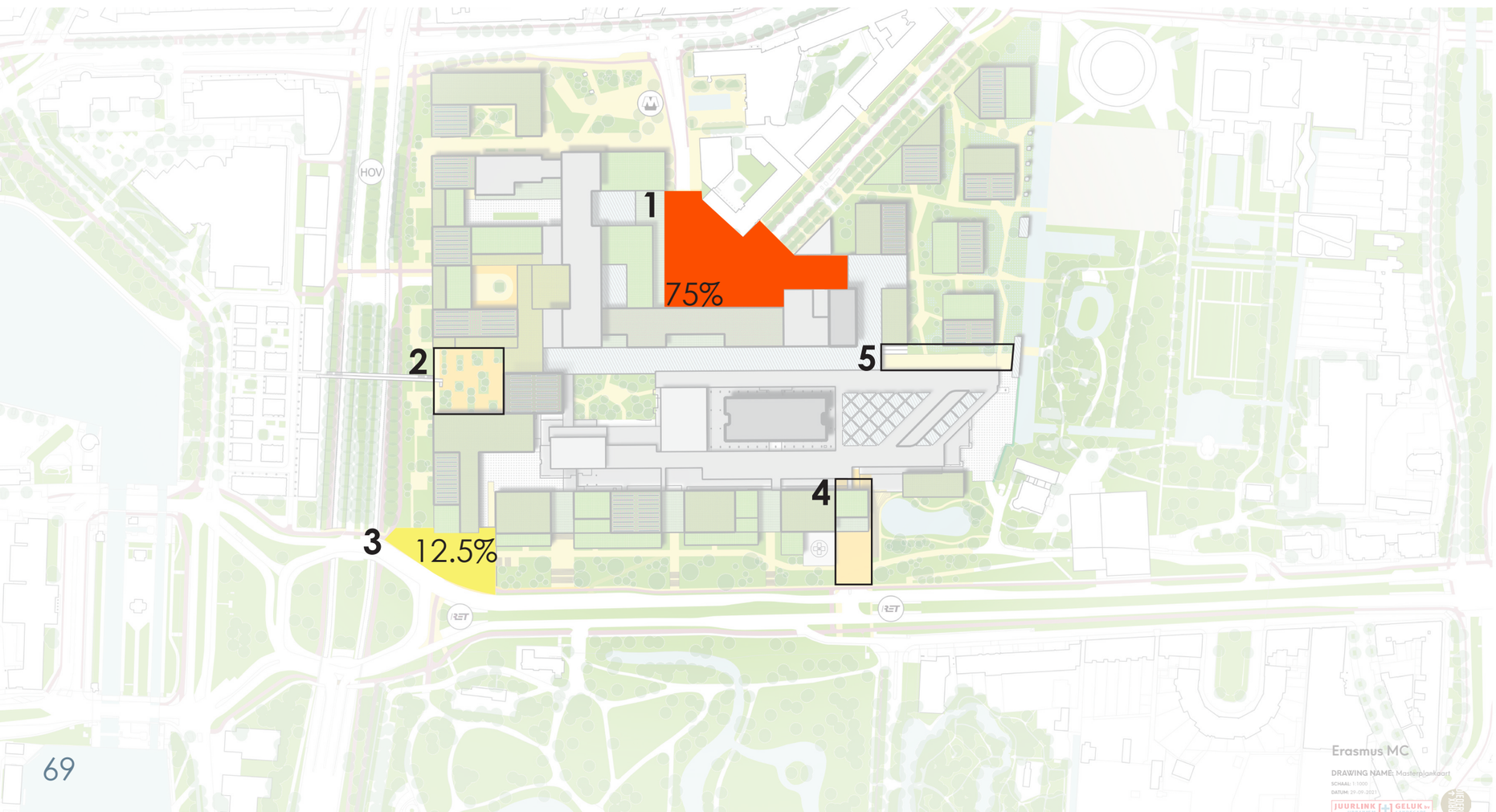
Calculation 1.2.

Persona 3 and 4 traveling by public transport



Conclusion calculation 1





75 - 100%

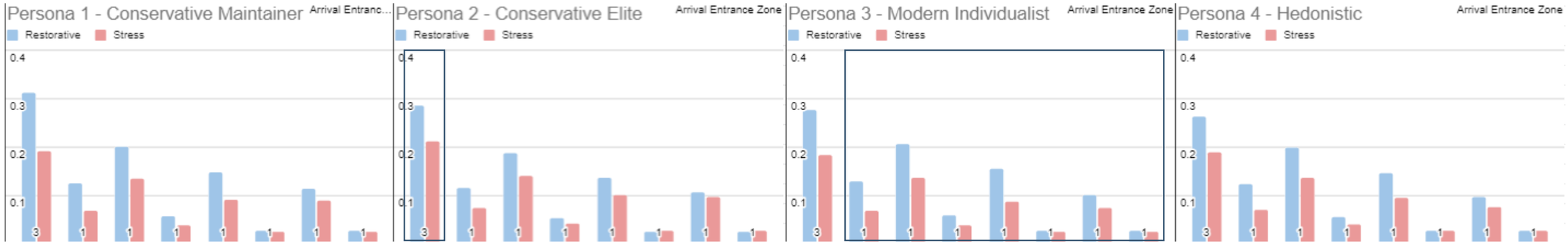
50 - 75%

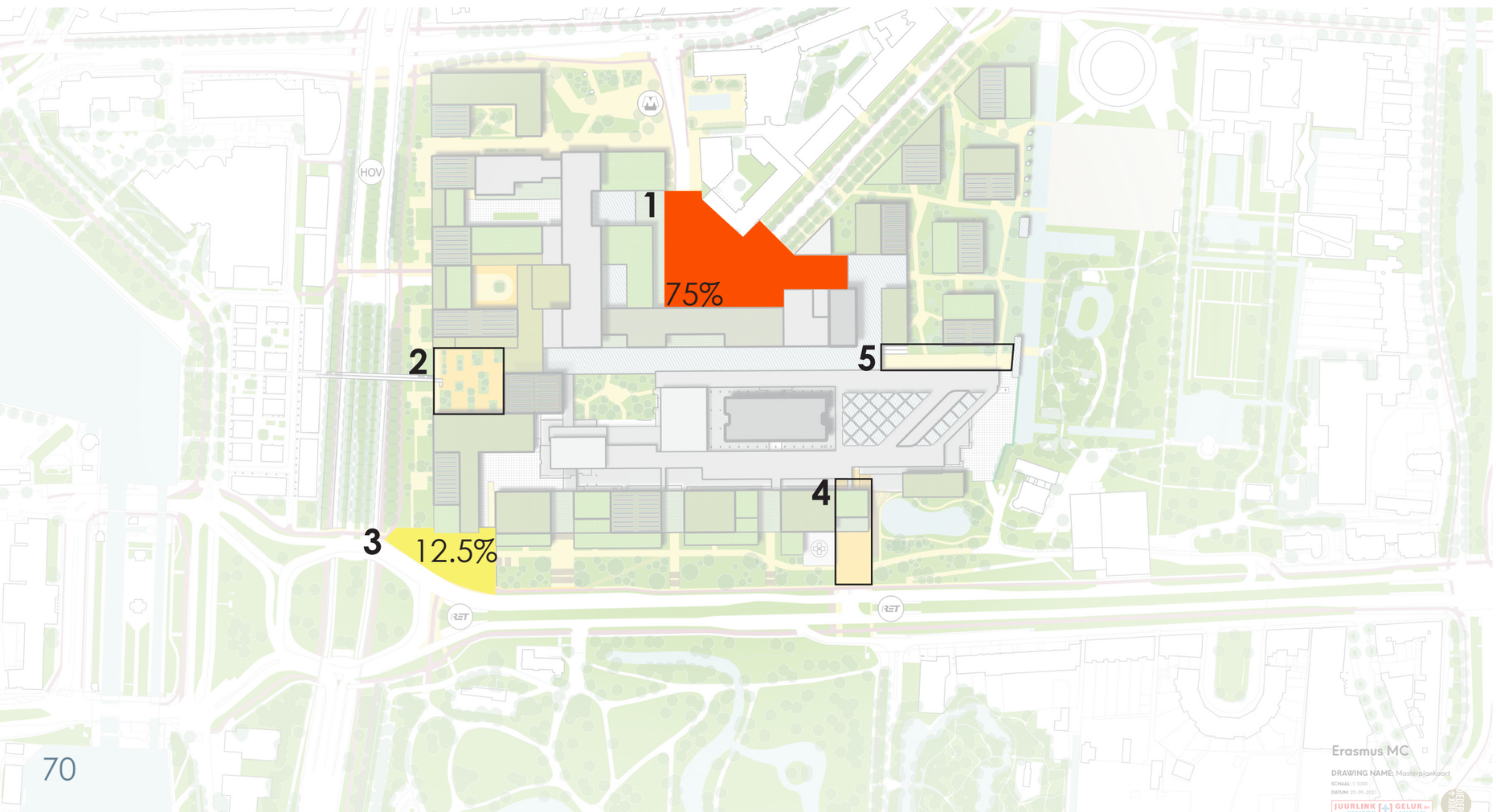
25 - 50%

1 - 25%

0%

Conclusion calculation 1





75 - 100%

50 - 75%

25 - 50%

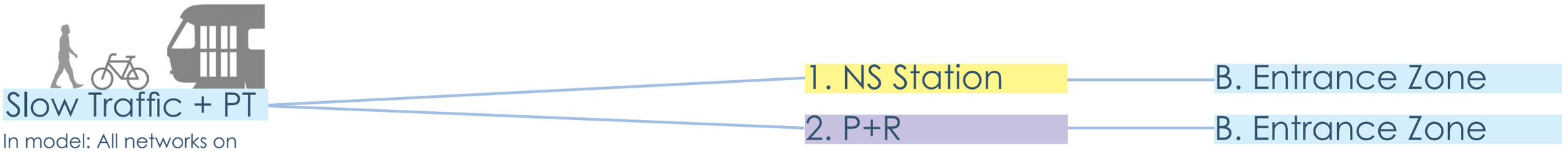
1 - 25%

0%

Conclusion 1

- Entrance 3: Conservative Elite

- Entrance 1: Modern Individualist



Model settings

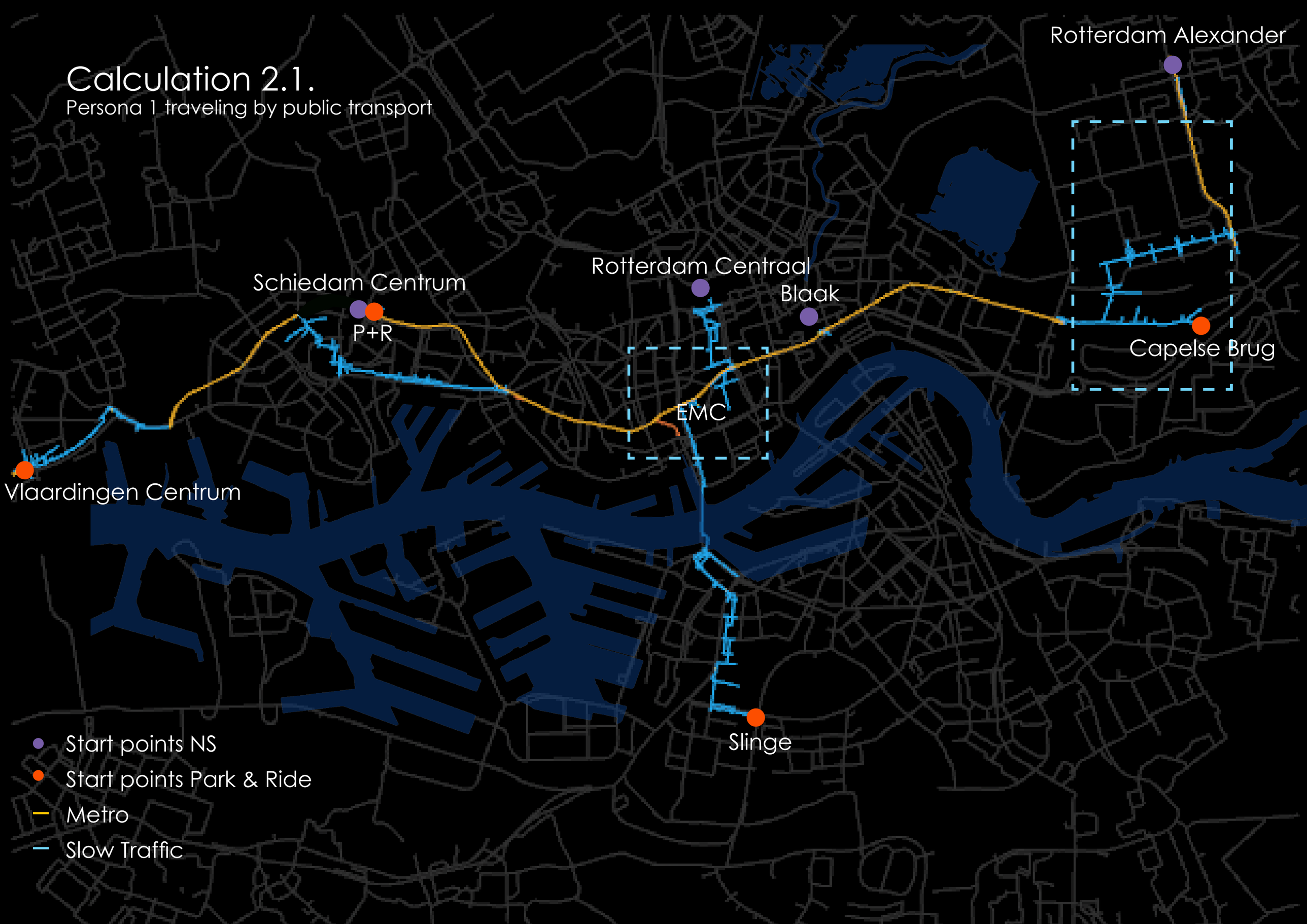
NETWORK	Public transport + Slow Traffic | Car
STARTPOINTS	NS Stations | P+R | Afrit
DESTINATIONS	Entrance Zone | Parking EMC Campus
DISABILITY	No | Low activity range
PERSONALITY	1 | 2 | 3 | 4
CALCULATION	Weighted Sum | Mental Health

Model settings

NETWORK	Public transport + Slow Traffic | Car
STARTPOINTS	NS Stations | P+R | Afrit
DESTINATIONS	Entrance Zone | Parking EMC Campus
DISABILITY	No | Low activity range
PERSONALITY	1 | 2 | 3 | 4
CALCULATION	Weighted Sum | Mental Health

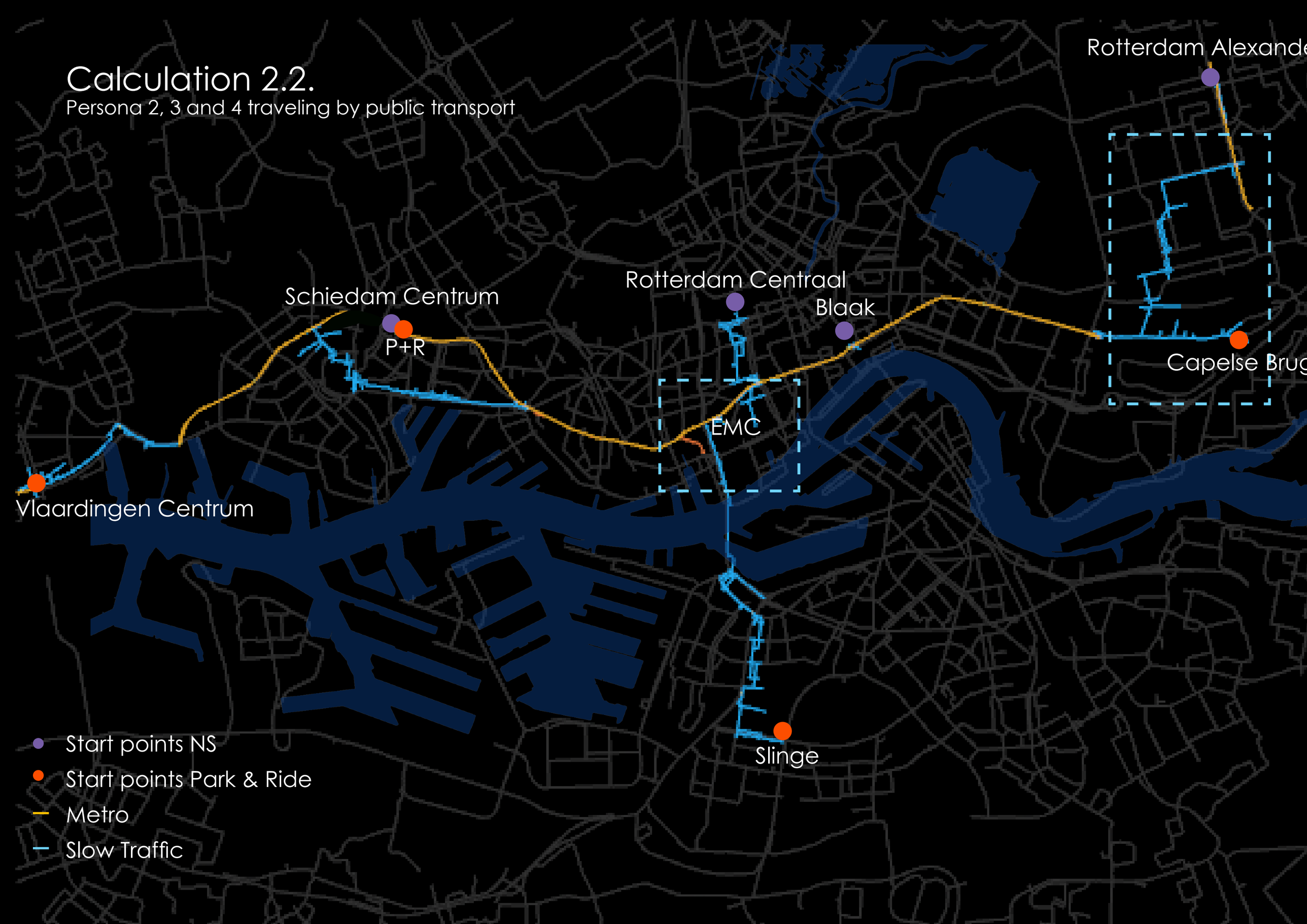
Calculation 2.1.

Persona 1 traveling by public transport

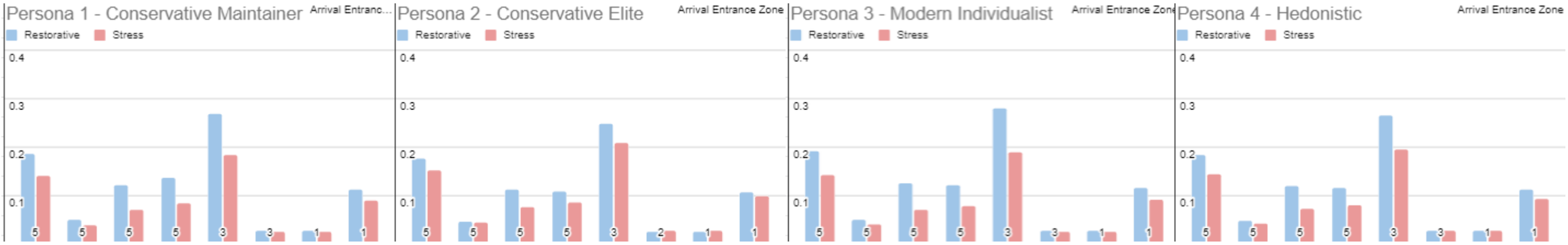


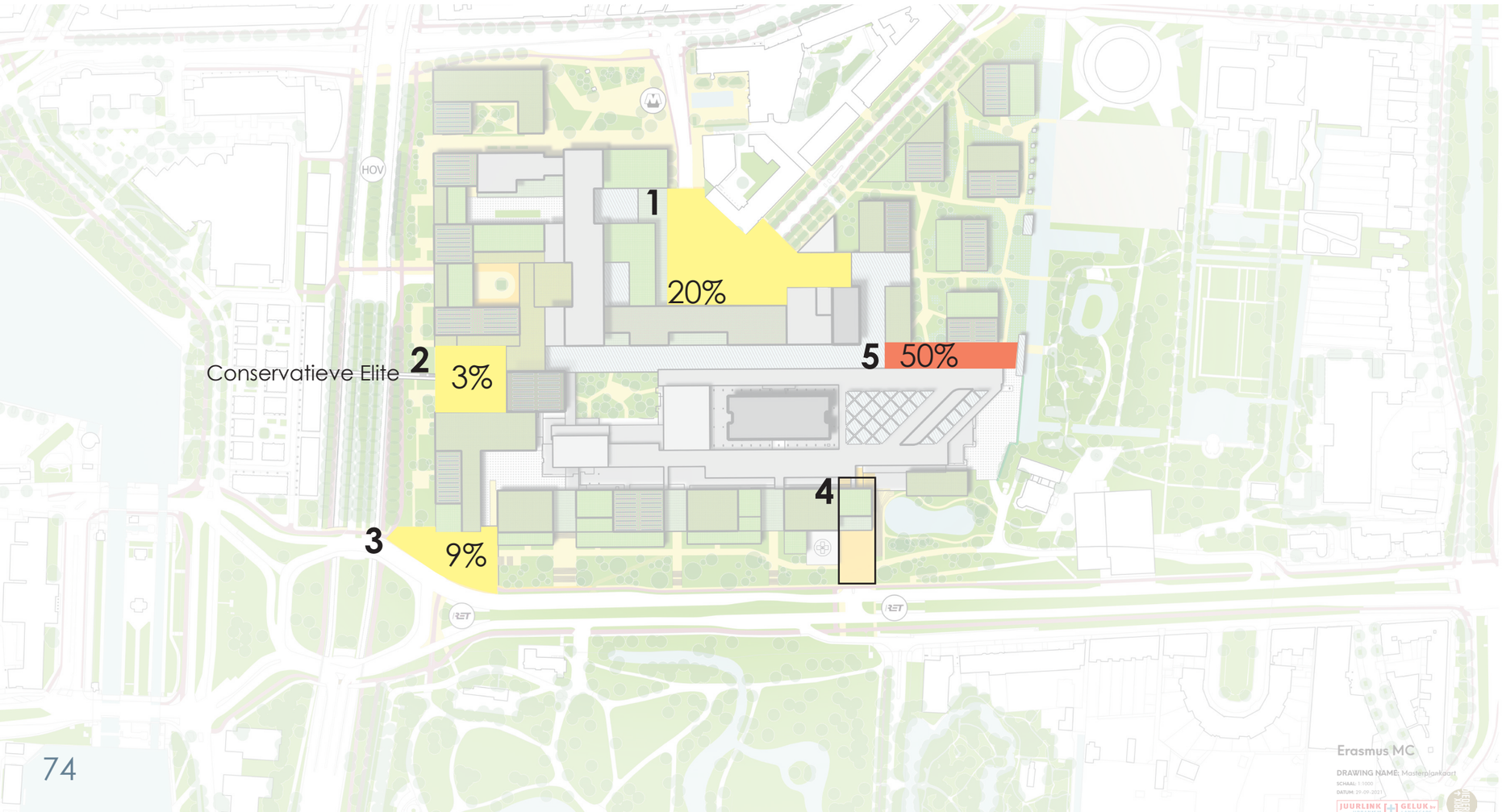
Calculation 2.2.

Persona 2, 3 and 4 traveling by public transport



Conclusion 2





75 - 100%

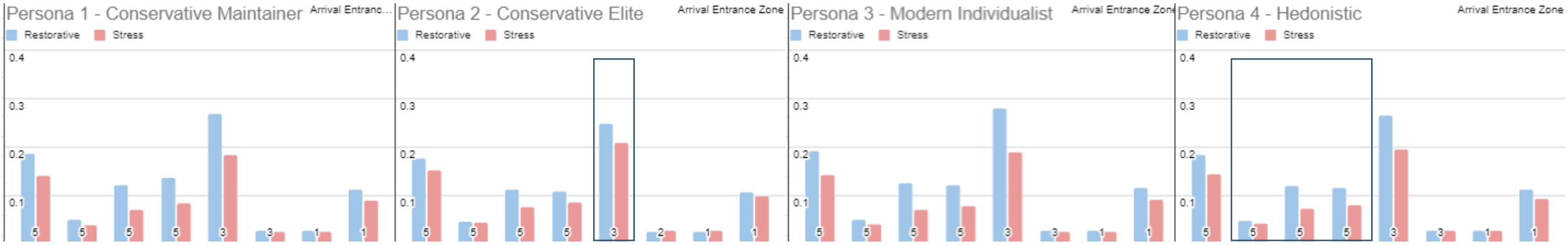
50 - 75%

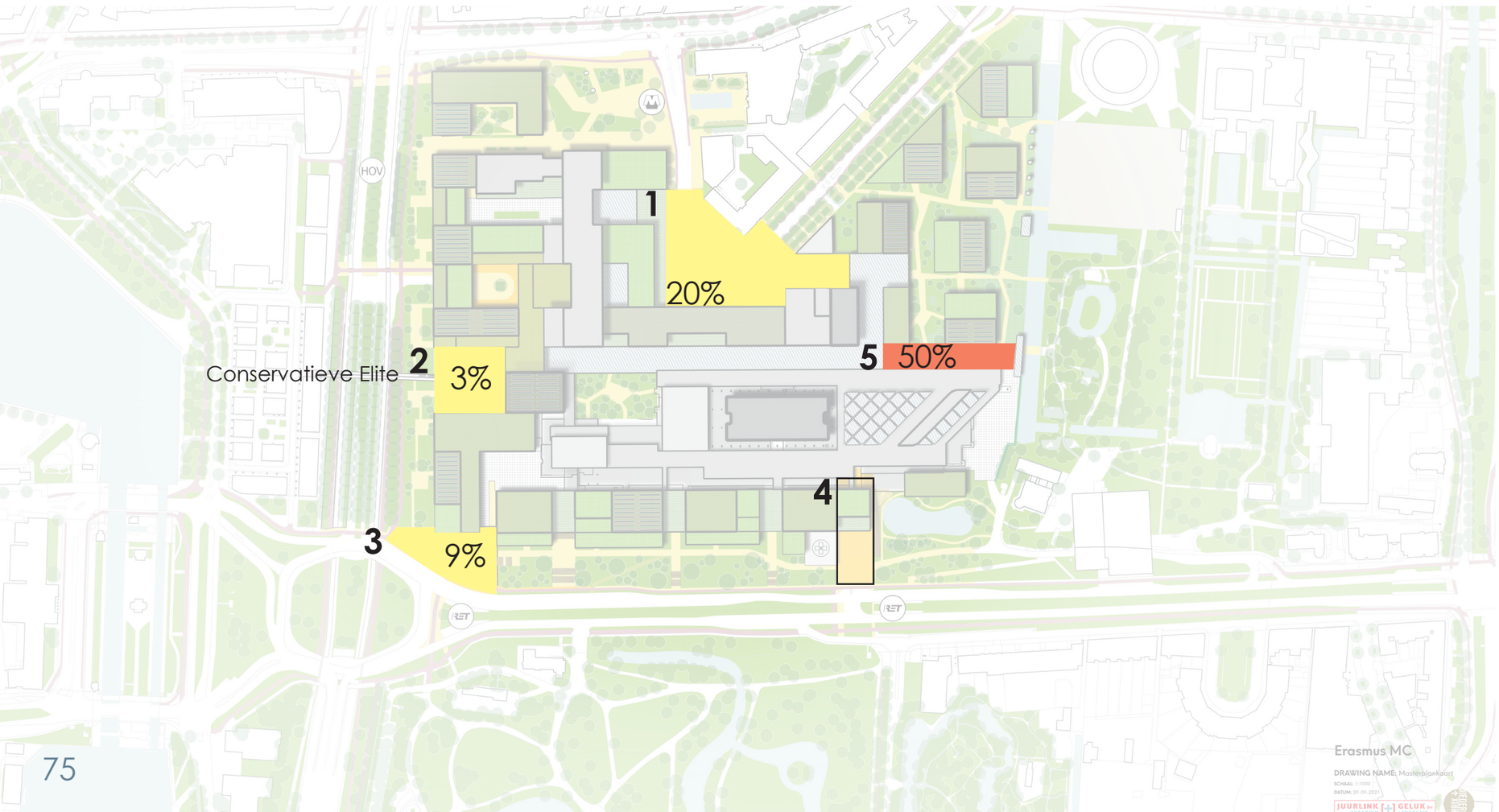
25 - 50%

1 - 25%

0%

Conclusion 2





75 - 100%

50 - 75%

25 - 50%

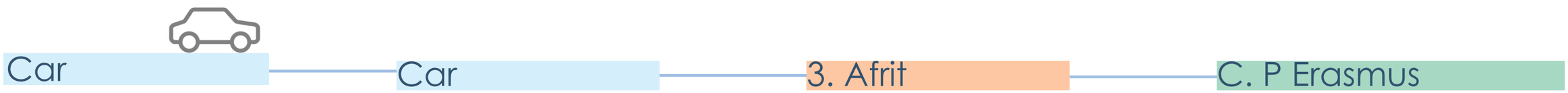
1 - 25%

0%

Conclusion 2

- Entrance 3: Conservative Elite

- Entrance 5: Hedonist



Model settings

NETWORK	Public transport + Slow Traffic | Car
STARTPOINTS	NS Stations | P+R | Exit
DESTINATIONS	Entrance Zone | Parking EMC Campus
PERSONALITY	1 | 2 | 3 | 4
CALCULATION	Weighted Sum | Mental Health
SCENARIO	2020 | 2030

Model settings

NETWORK	Public transport + Slow Traffic | Car
STARTPOINTS	NS Stations | P+R | Exit
DESTINATIONS	Entrance Zone | Parking EMC Campus
PERSONALITY	1 | 2 | 3 | 4
CALCULATION	Weighted Sum | Mental Health
SCENARIO	2020 | 2030

Calculation 3.1.
Persona 1 traveling by car in 2020

Calculation 3.2.
Persona 1 traveling by car in 2030

Calculation 3.3.
Persona 2 traveling by car in 2020

Calculation 3.4.
Persona 2 traveling by car in 2030

2020

1

2

3

4

HOV

RET

RET

Erasmus MC

DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

DATUM: 29-09-2021

JUURLINK [+] GELUK bv
URBANISM LANDSCAPE

2030

1

2

3

4

HOV

RET

RET

Erasmus MC

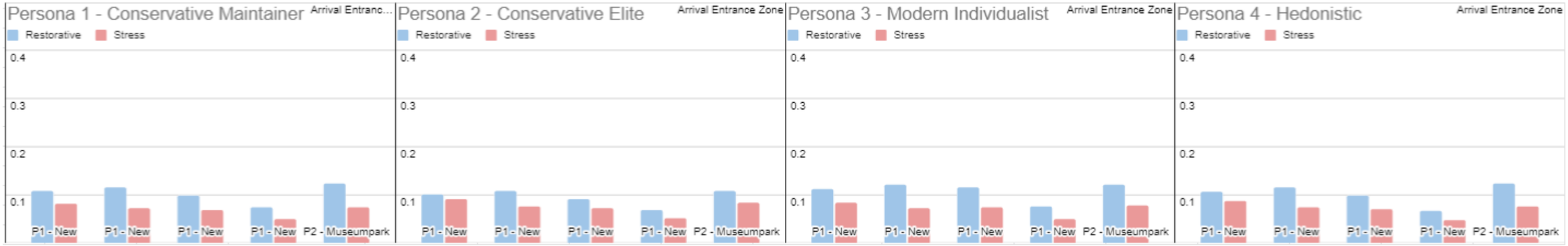
DRAWING NAME: Masterplankaart

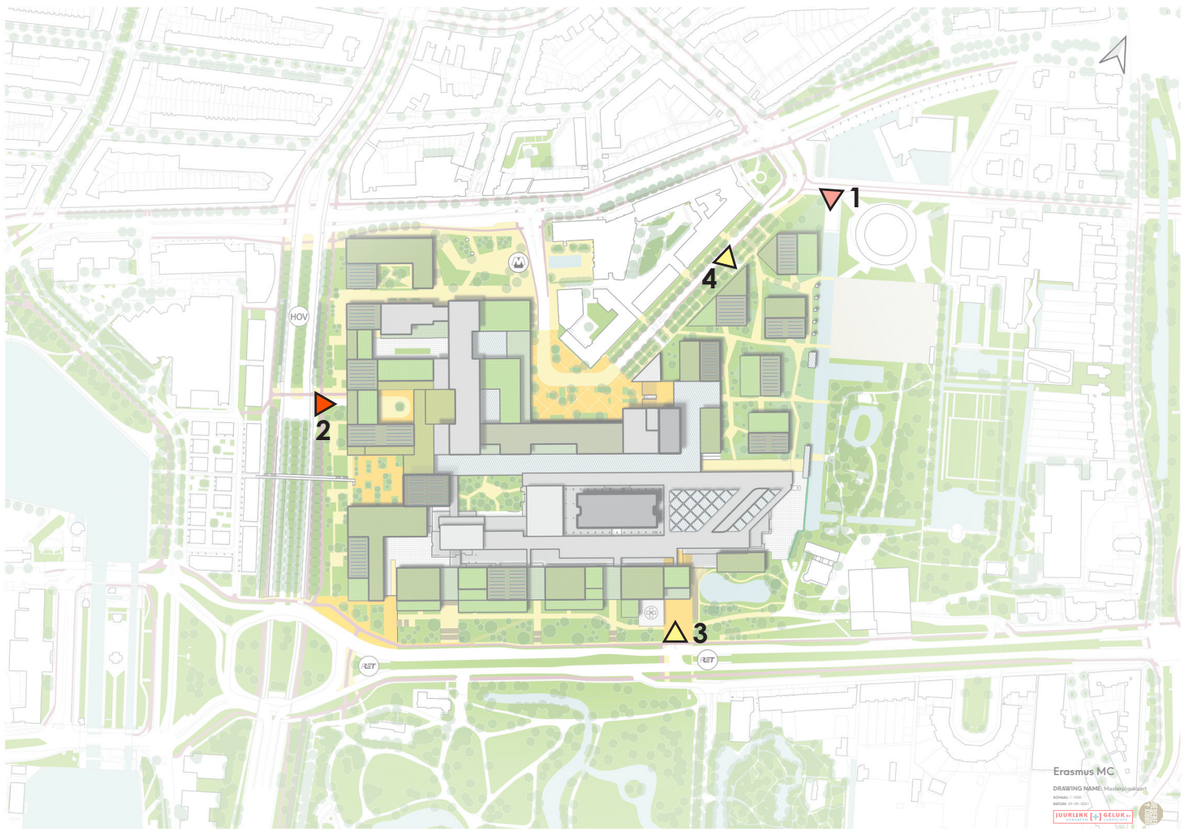
SCHAAL: 1:1000

DATUM: 29-09-2021

JUURLINK URBANISM [+] GELUK bv LANDSCAPE

Conclusion 3





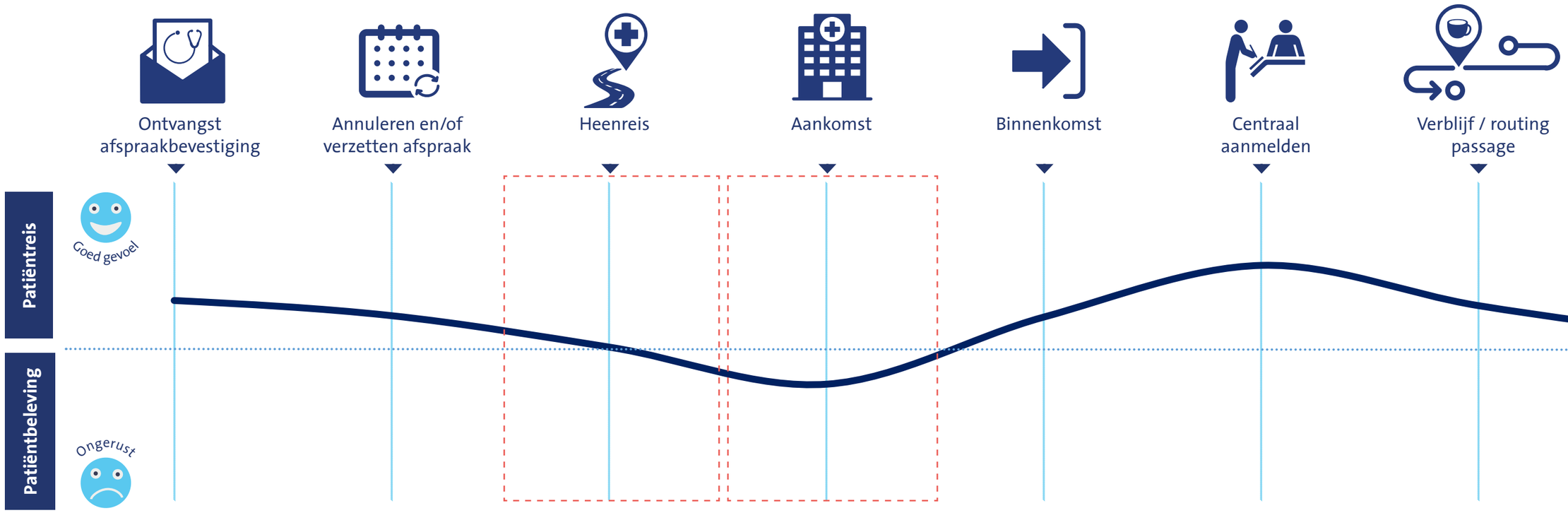
Conclusion 3

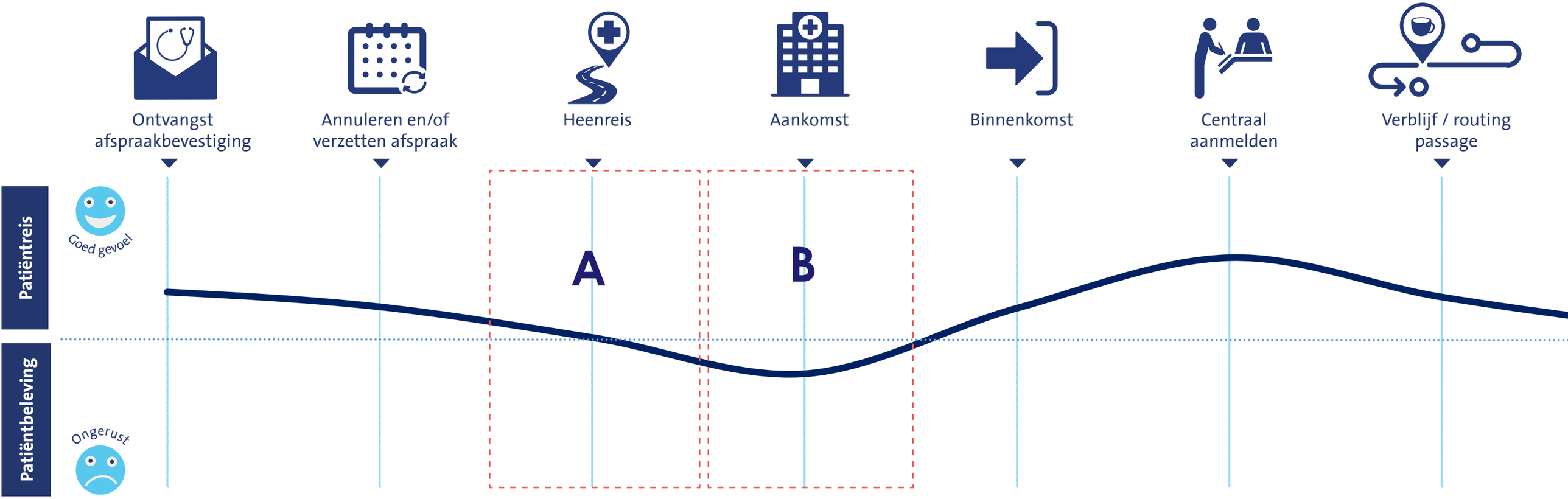
- Entrance 1: Conservative maintainer

- Entrance 2: Conservative elite

In the current situation
patients are worried until they reach the main entrance door

Patients don’t feel relieved by the current way of traveling towards the Erasmus MC. Arriving on time is stressful.





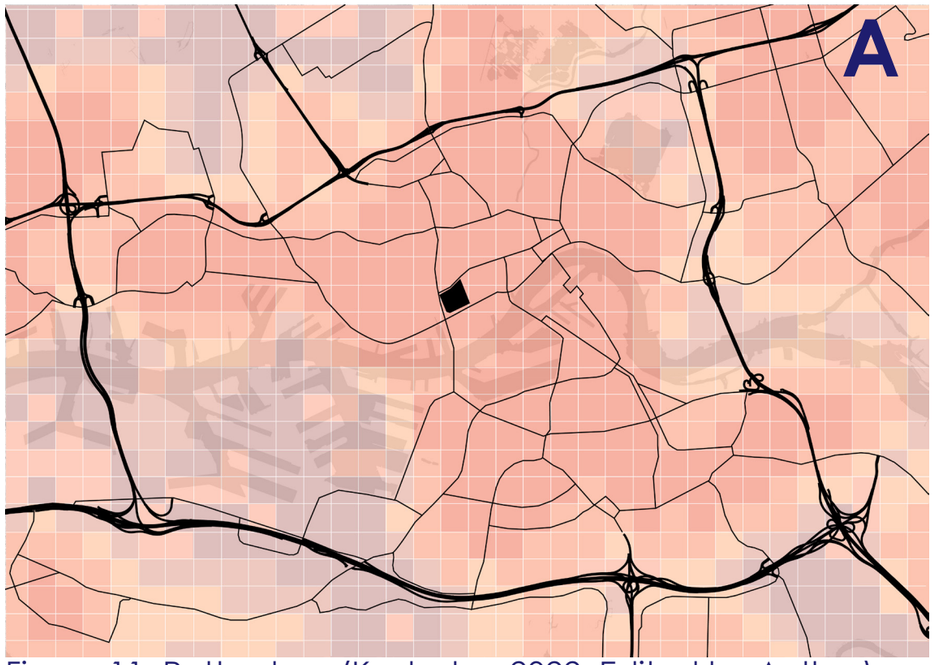


Figure 11. Rotterdam (Kadaster, 2022. Edited by Author)

Figure 12. Atelier LEK - Erasmus Medisch Centrum. (2020)

Mapping highest stress arrivals

Conclusion 1

- Entrance 3: Conservative Elite

- Entrance 1: Modern Individualist

Conclusion 2

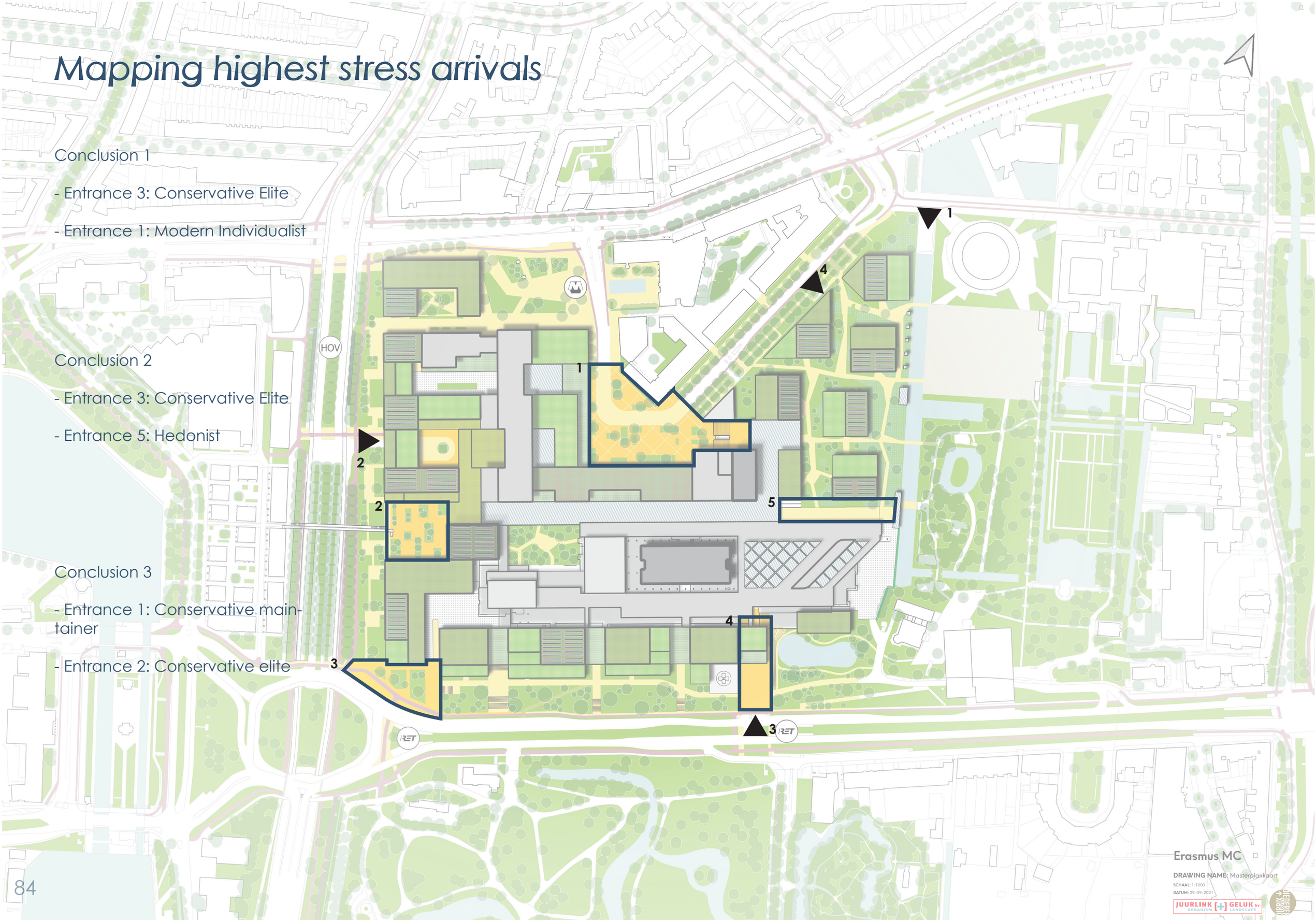
- Entrance 3: Conservative Elite

- Entrance 5: Hedonist

Conclusion 3

- Entrance 1: Conservative main-tainer

- Entrance 2: Conservative elite



Erasmus MC

DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

DATUM: 29-09-2021

JUURLINK [+] GELUK bv
URBANISM LANDSCAPE

Mapping highest stress arrivals

Conclusion 1

- Entrance 3: Conservative Elite

- Entrance 1: Modern Individualist

HOV

RET

RET

1

2

2

3

4

1

4

5

3

Erasmus MC

DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

DATUM: 29-09-2021

JUURLINK [+] GELUK bv
URBANISM LANDSCAPE

Mapping highest stress arrivals

Conclusion 1

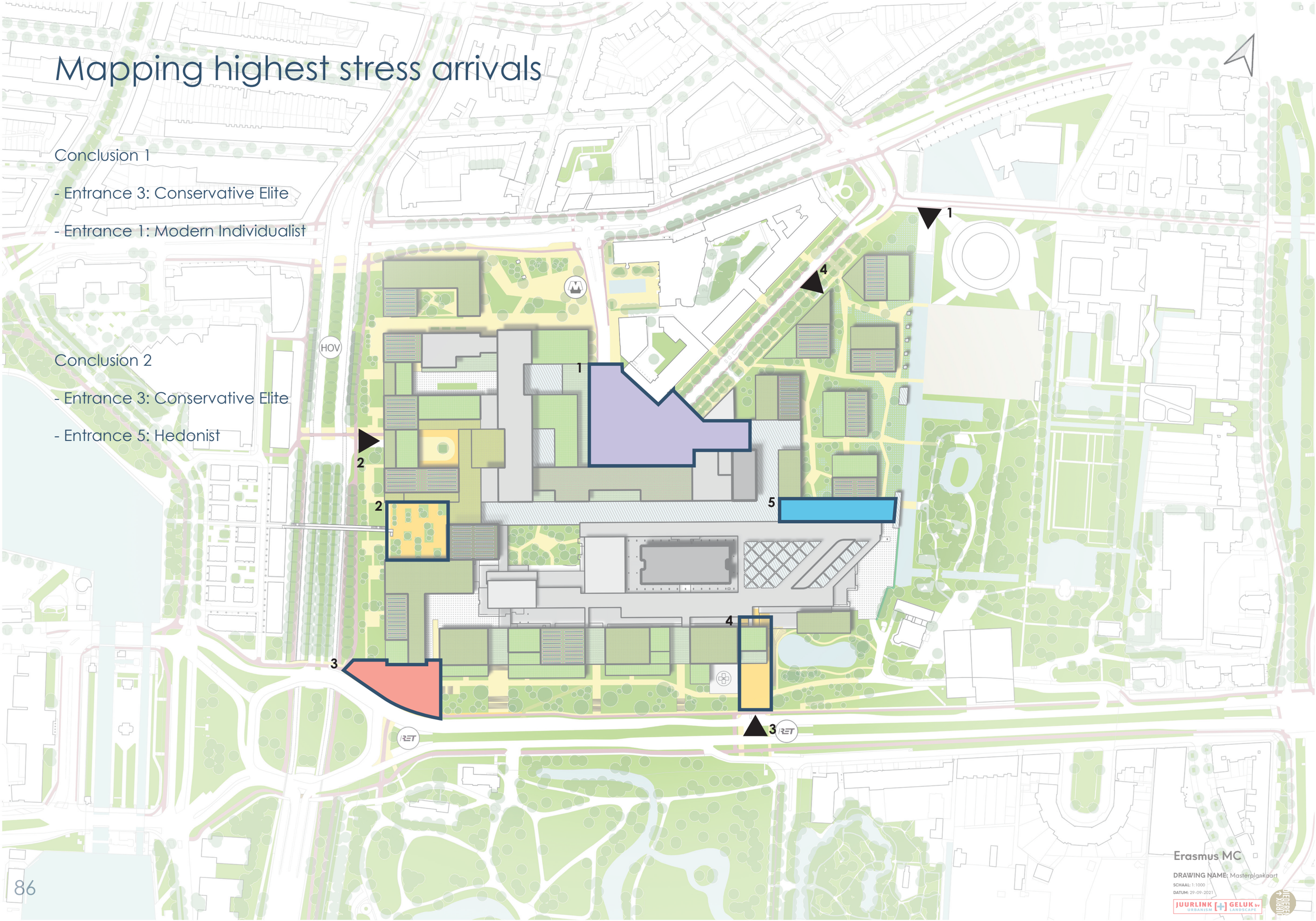
- Entrance 3: Conservative Elite

- Entrance 1: Modern Individualist

Conclusion 2

- Entrance 3: Conservative Elite

- Entrance 5: Hedonist



Erasmus MC

DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

DATUM: 29-09-2021

JUURLINK [+] GELUK bv
URBANISM LANDSCAPE

Mapping highest stress arrivals

Conclusion 1

- Entrance 3: Conservative Elite

- Entrance 1: Modern Individualist

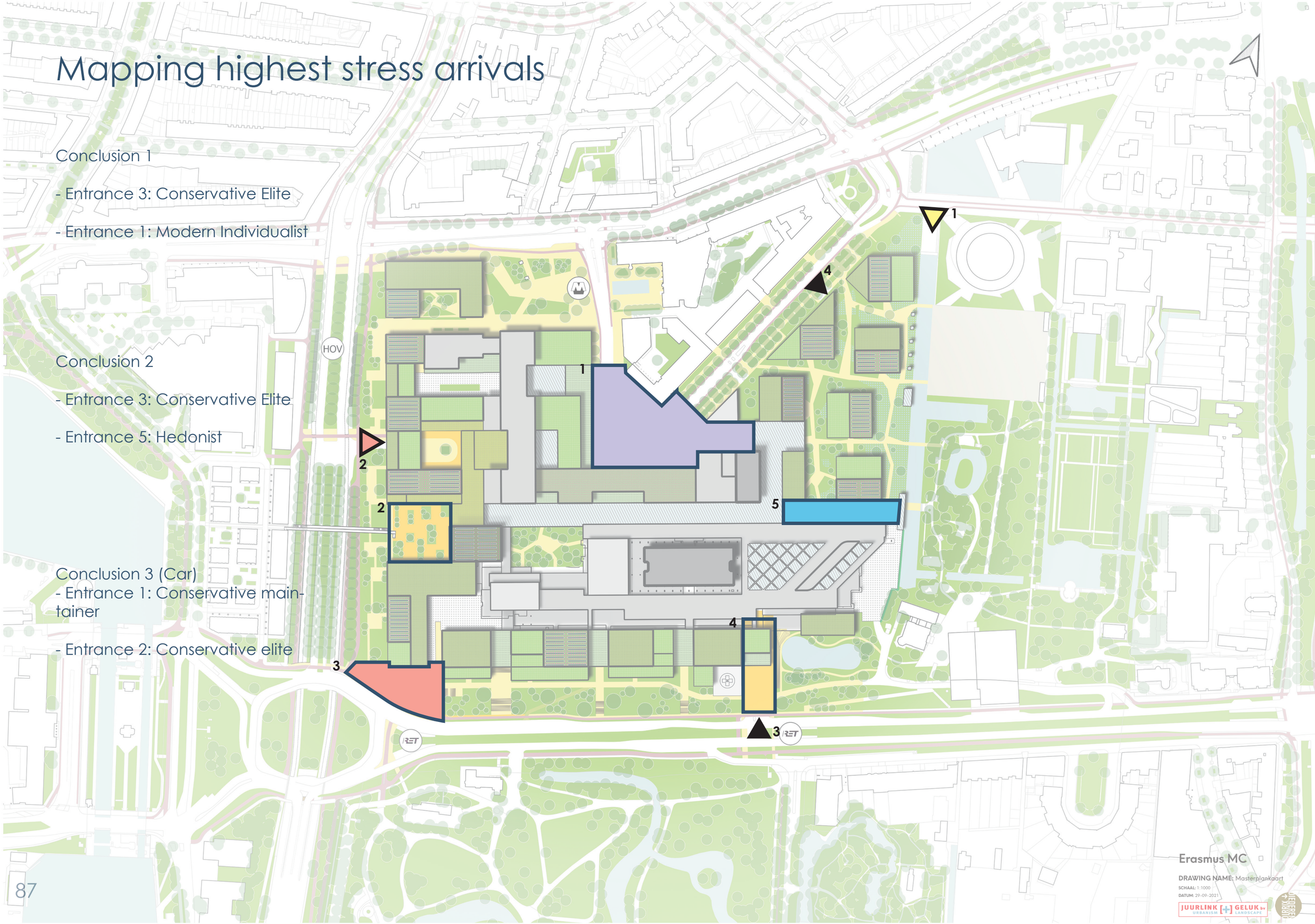
Conclusion 2

- Entrance 3: Conservative Elite

- Entrance 5: Hedonist

Conclusion 3 (Car)
- Entrance 1: Conservative maintainer

- Entrance 2: Conservative elite



Erasmus MC

DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

DATUM: 29-09-2021

JUURLINK [+] GELUK bv
URBANISM LANDSCAPE

Mapping highest stress arrivals

- Conservative Maintainer
- Conservative Elite
- Modern Individualist
- Hedonist

HOV

RET

RET

1

2

2

3

4

5

1

4

3

Erasmus MC

DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

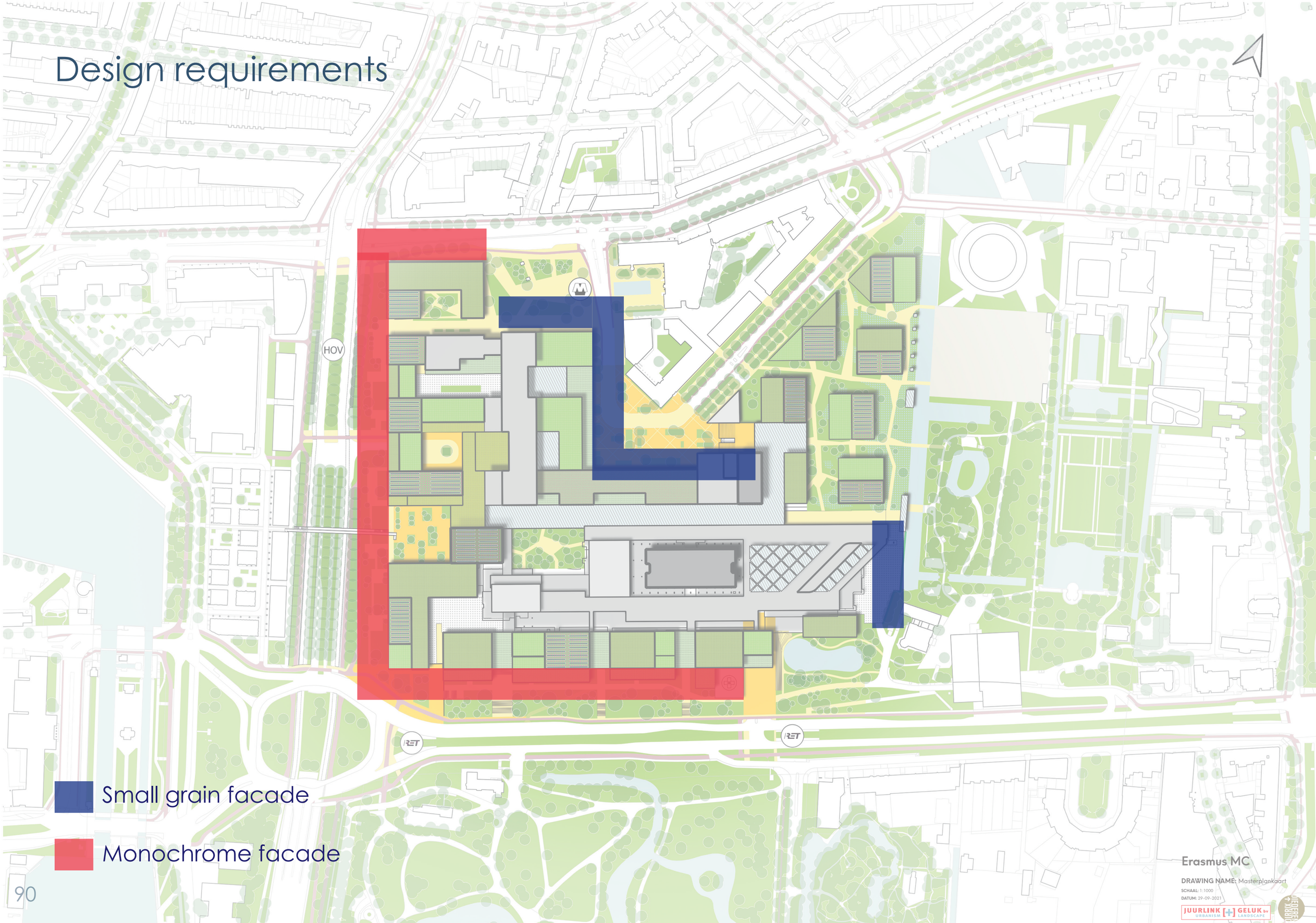
DATUM: 29-09-2021

JUURLINK [+] GELUK bv
URBANISM LANDSCAPE

Requirements based on lifestyle personalities

If certain groups perceive the environment differently than others, design requirements can also be based on this.

Design requirements



Small grain facade

Monochrome facade

Erasmus MC

DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

DATUM: 29-09-2021

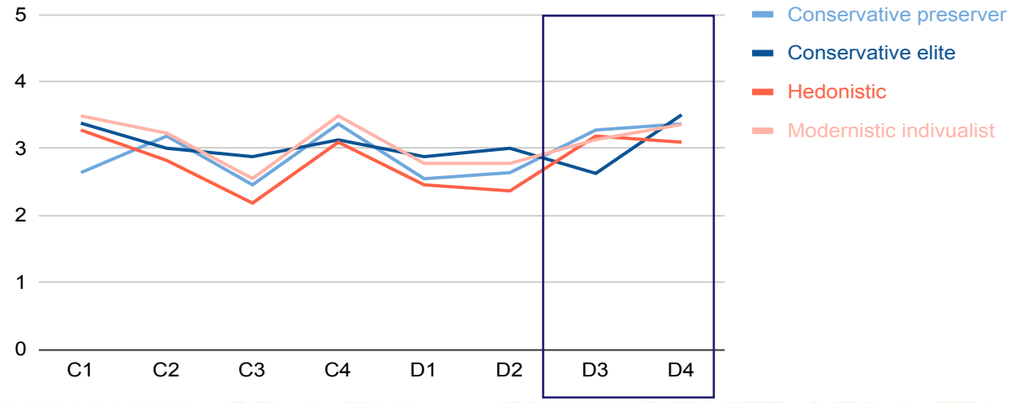
JUURLINK URBANISM + GELUK bv LANDSCAPE

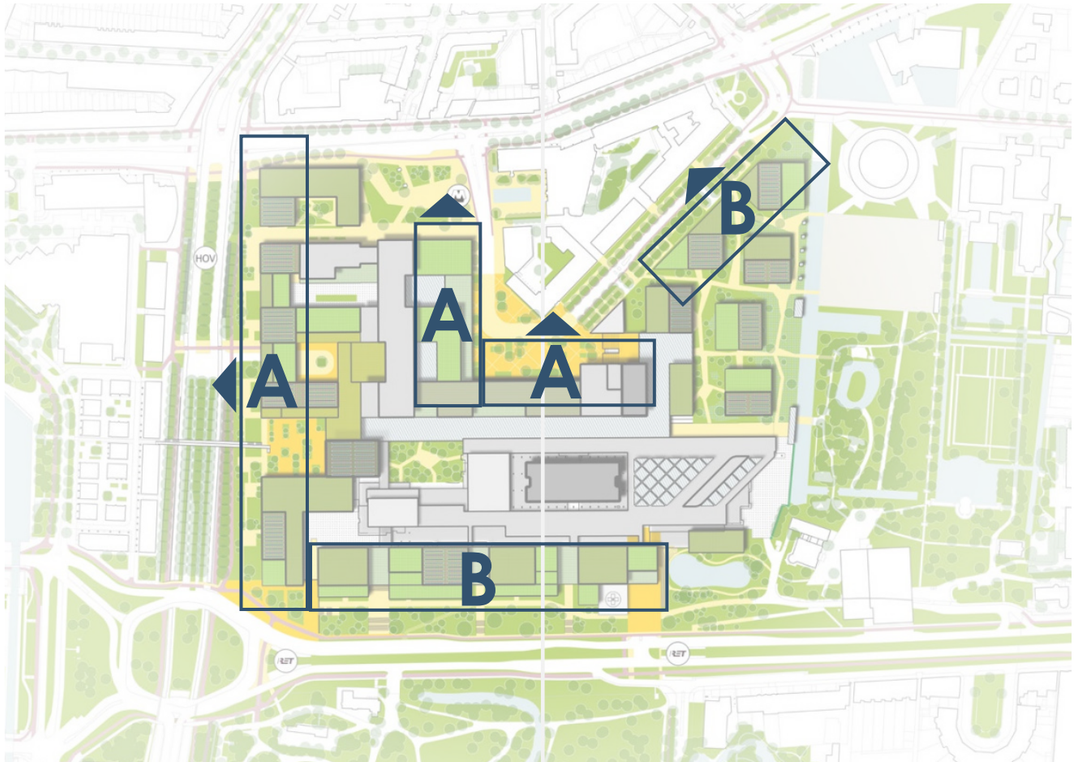
Requirements

A

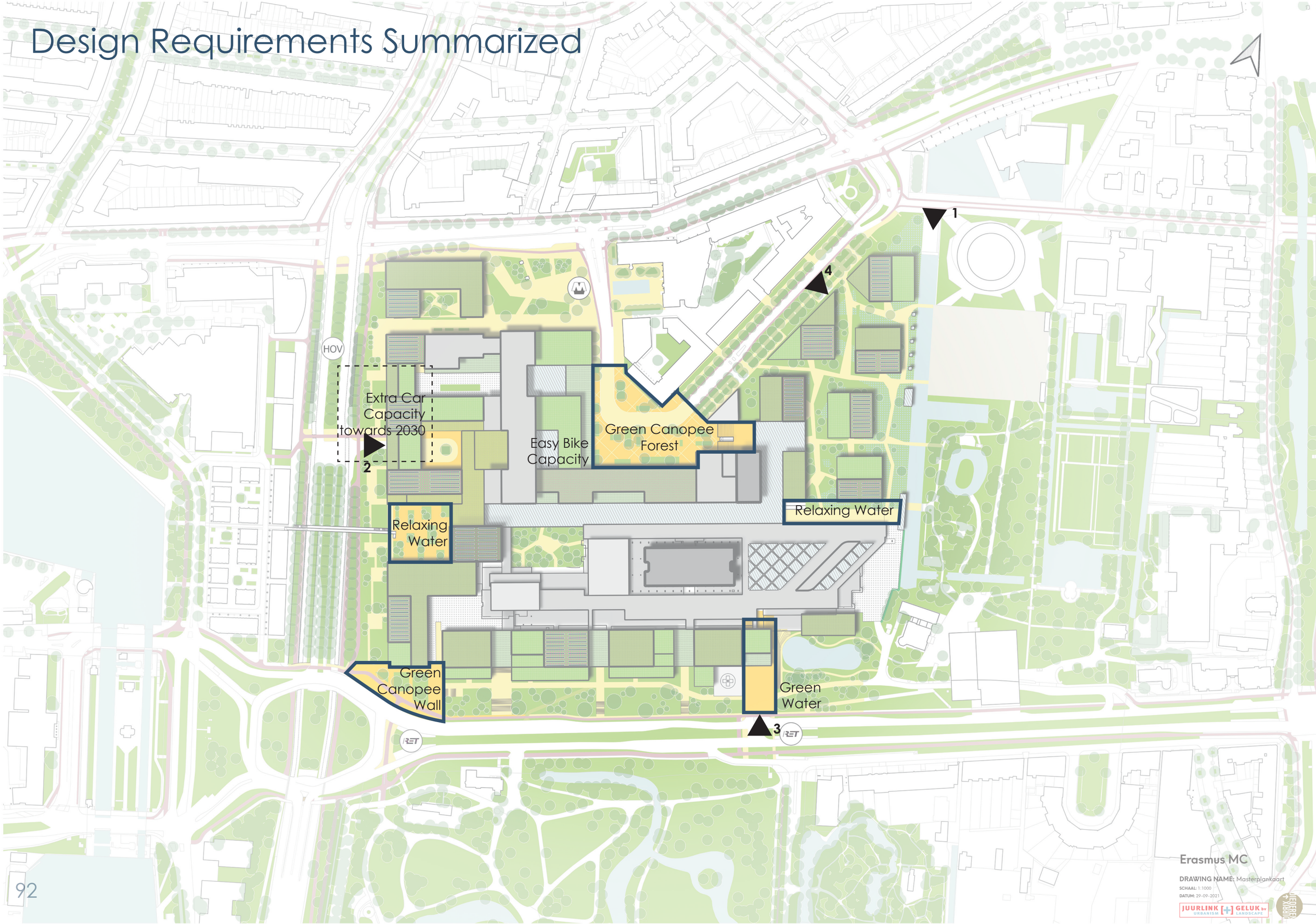
B

Facades B could be more beneficial for people arriving by car, since they are not approaching the building by foot. Facade A could be more beneficial for people arriving by public transport and approaching the campus by foot.





Design Requirements Summarized



Erasmus MC

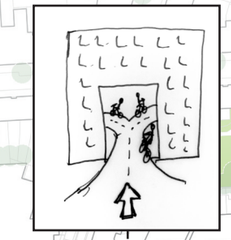
DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

DATUM: 29-09-2021

JUURLINK URBANISM [+] GELUK bv LANDSCAPE

Design Requirements Summarized



HOV

Extra Car Capacity towards 2030

2

Easy Bike Capacity

Green Canopee Forest

Relaxing Water

Relaxing Water

Green Canopee Wall

Green Water

1

4

3

RET

RET

Erasmus MC

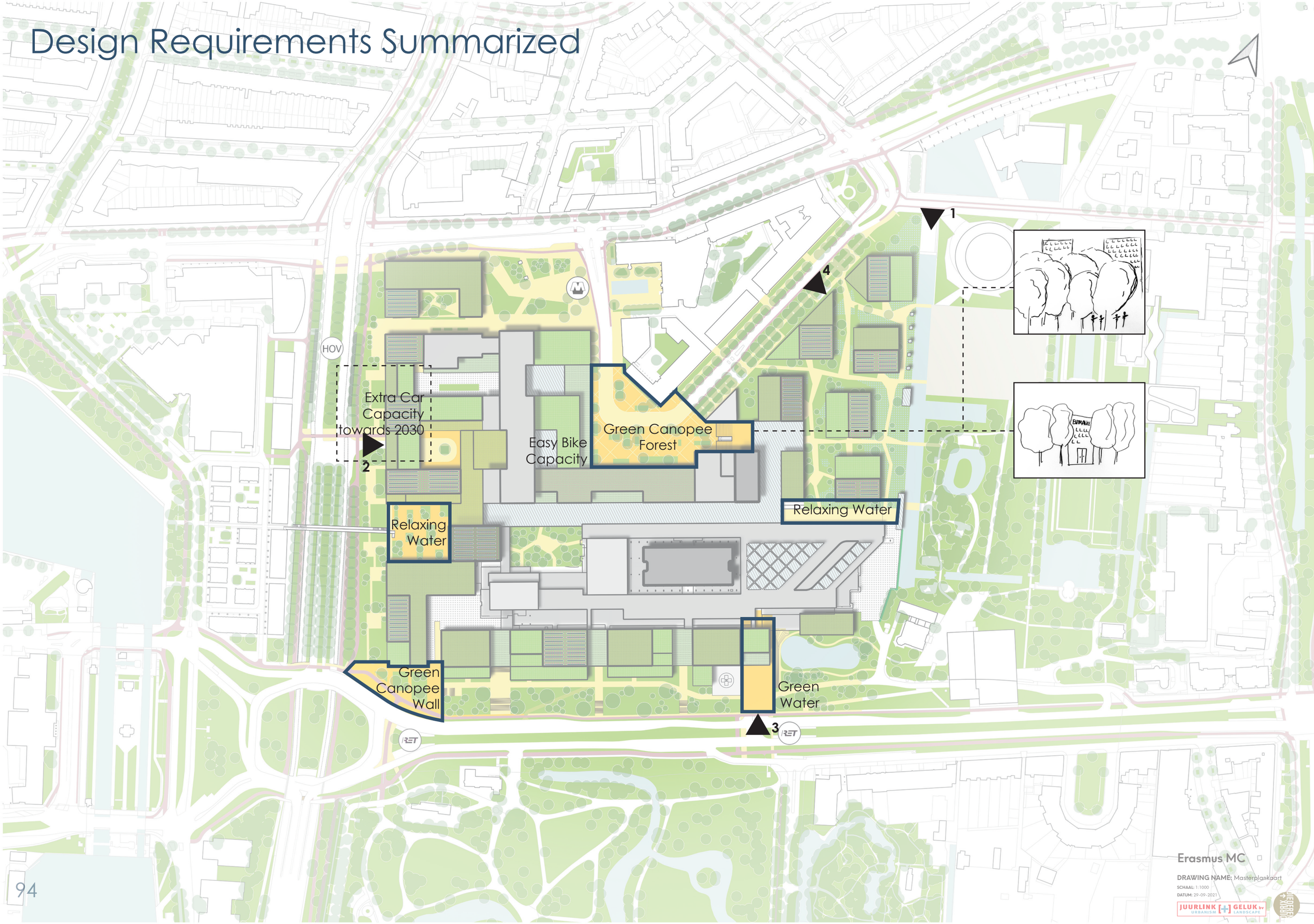
DRAWING NAME: Masterplankaart

SCHAAL: 1:1000

DATUM: 29-09-2021

JUURLINK URBANISM [+] GELUK BV LANDSCAPE

Design Requirements Summarized



Erasmus MC

DRAWING NAME: Masterplankaart

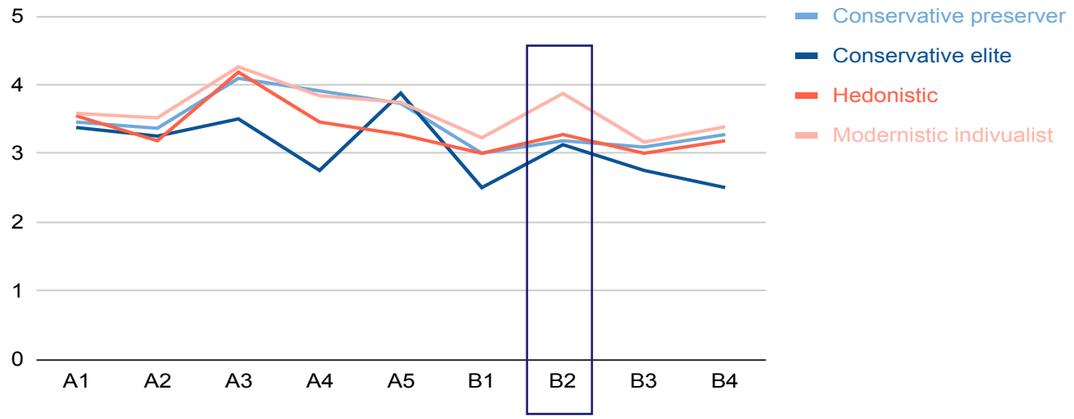
SCHAAL: 1:1000

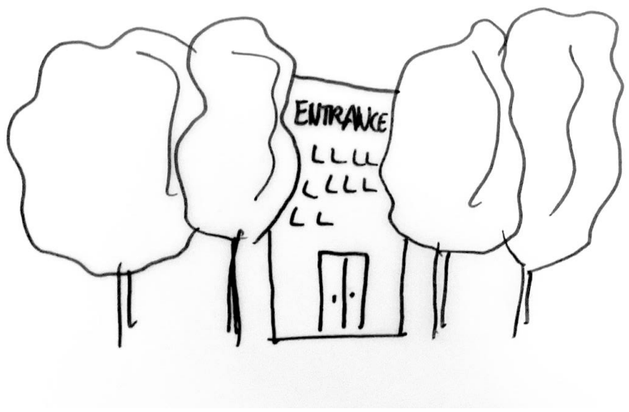
DATUM: 29-09-2021

JUURLINK URBANISM [+] GELUK BV LANDSCAPE

Requirements based on lifestyle personalities

A room made of trees folds around the people walking over the square, for a relaxing walk towards the hospital.





Design Requirements Summarized

Extra Car Capacity towards 2030

Easy Bike Capacity

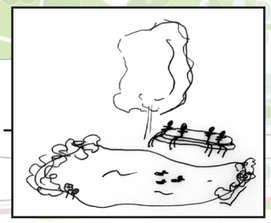
Green Canopee Forest

Relaxing Water

Relaxing Water

Green Canopee Wall

Green Water



Erasmus MC

DRAWING NAME: Masterplankaart

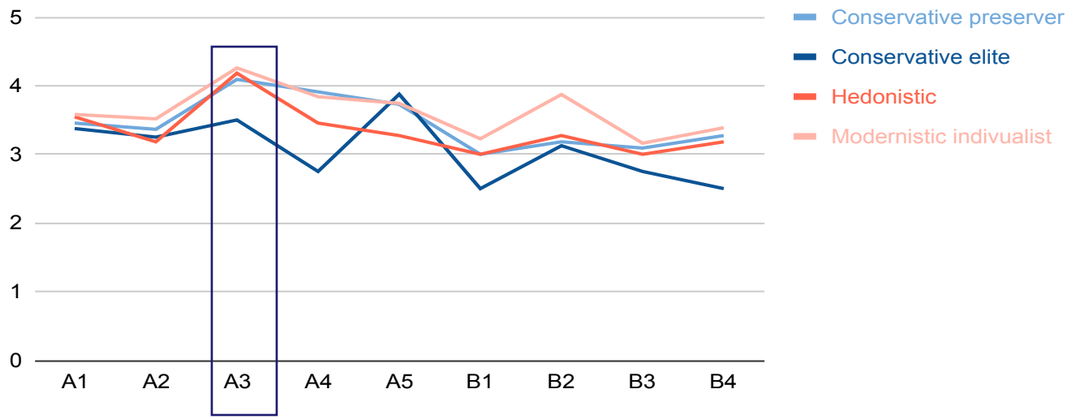
SCHAAL: 1:1000

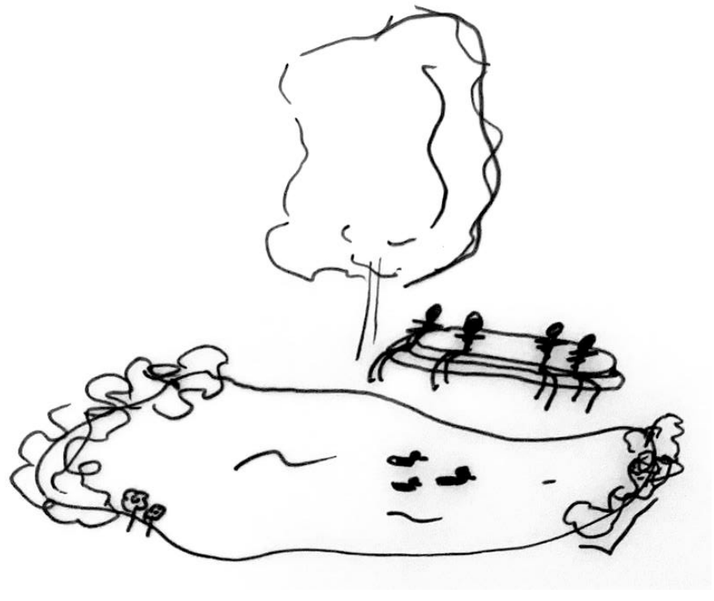
DATUM: 29-09-2021

JUURLINK [+] GELUK bv URBANISM LANDSCAPE

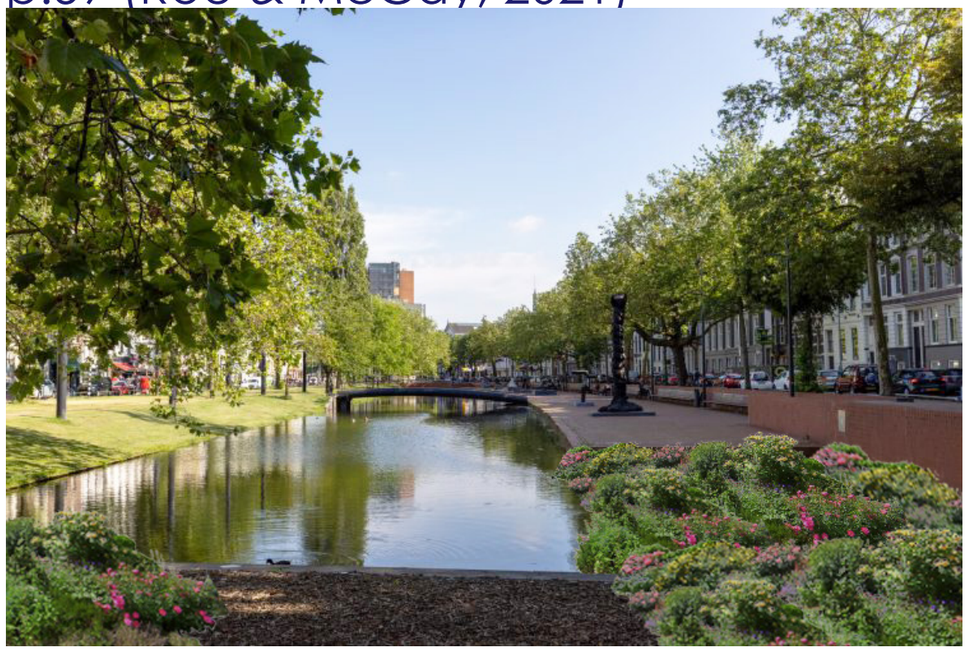
Requirements based on lifestyle personalities

- Adding attractive planting makes water more relaxing then clear water, waterfalls or attractive seating

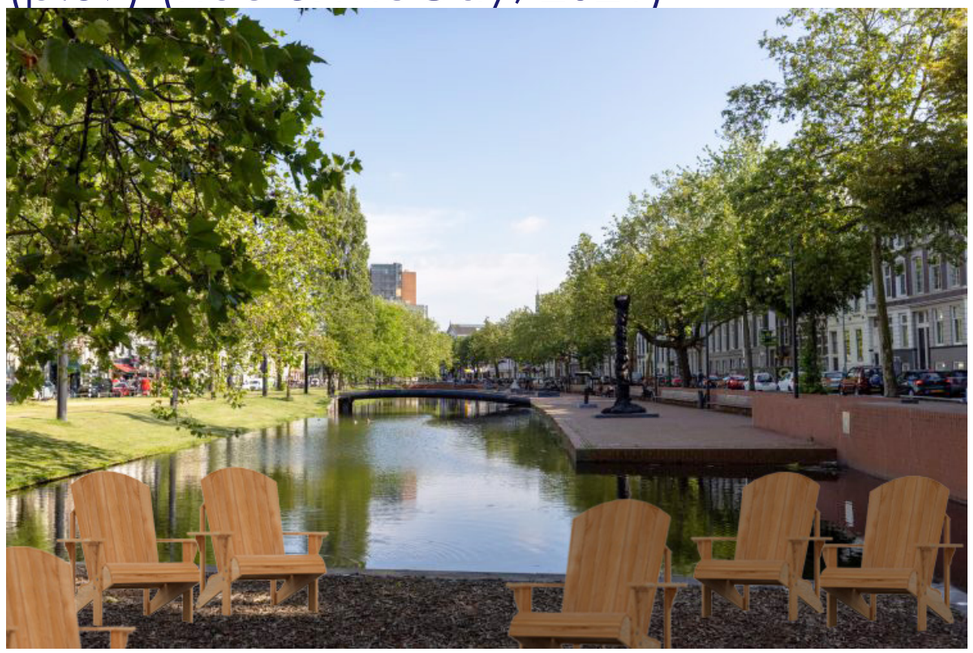


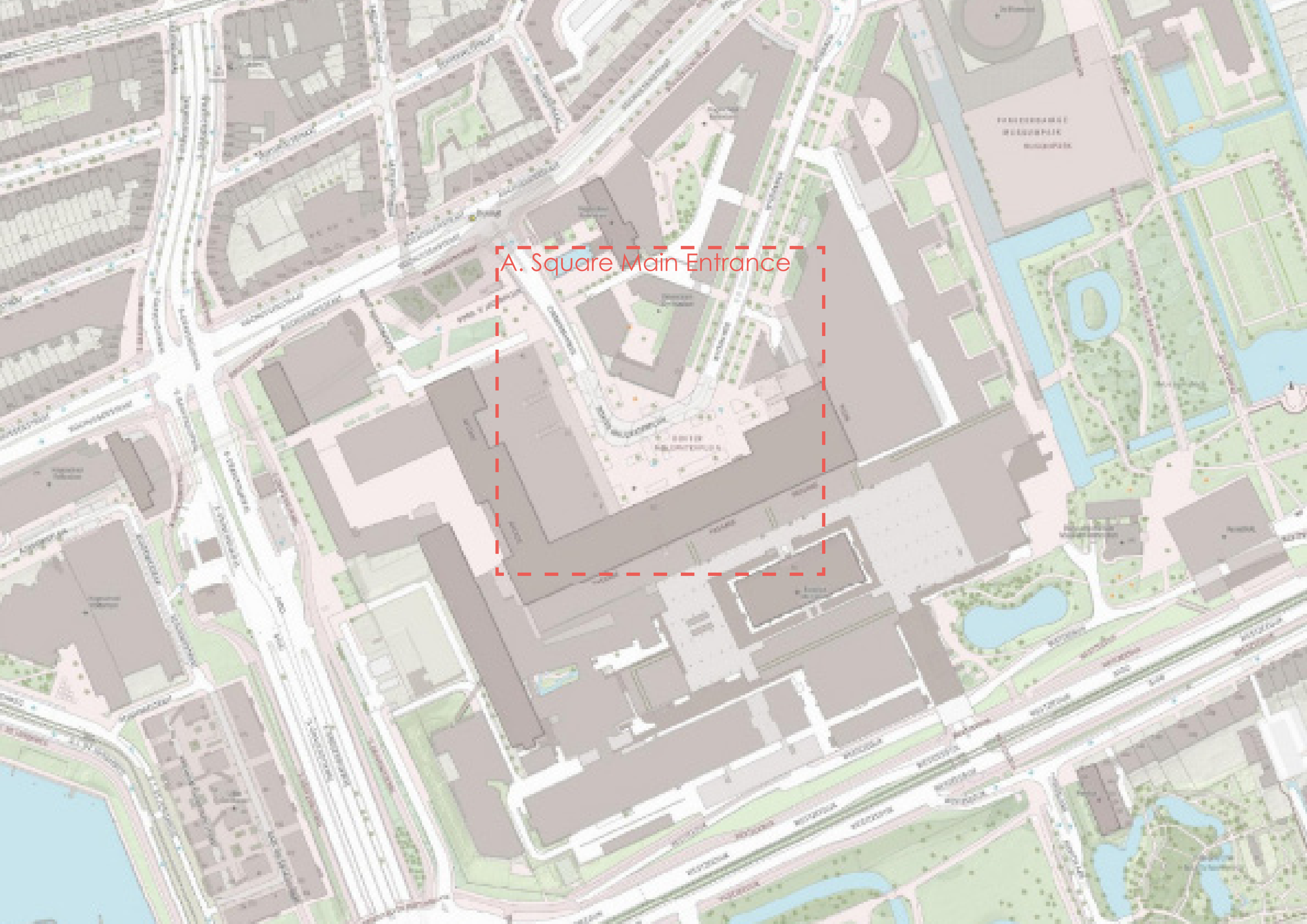


A3. Attractive planting around water p.59 (Roe & McCay, 2021)



A5. Attractive seating around water (p.59) (Roe & McCay, 2021)




A. Square Main Entrance

Main Entrance, Public Space

There is too little space for bikes and it is not clear where else to locate them when it is full.

Parked taxi busses in front of the entrance door blocking the way.

It is not clear what is pavement or a cycling path. Cars are everywhere and even the ambulance has a lane.

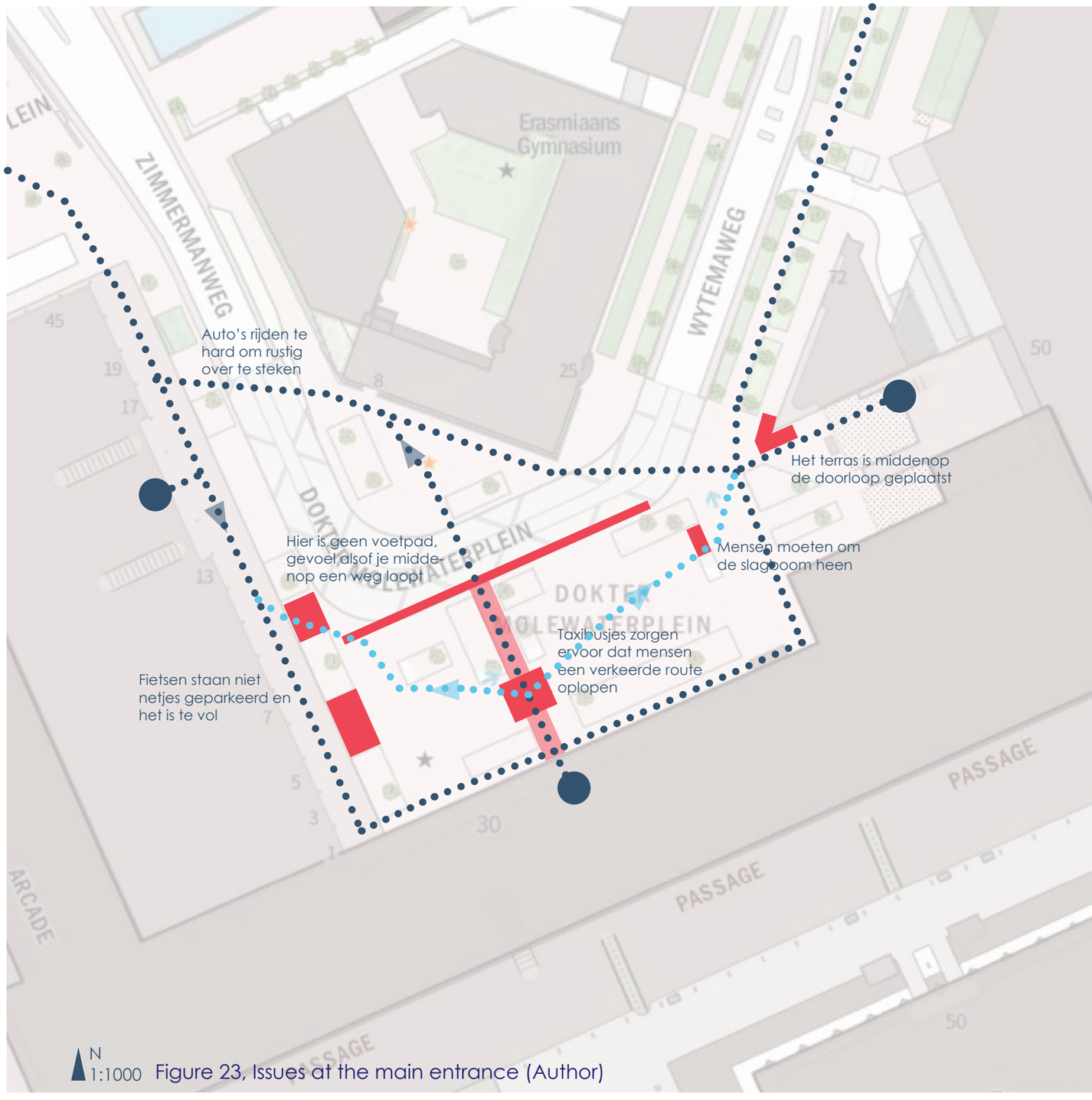


Figure 23, Issues at the main entrance (Author)


Erasmiaans
Gymnasium
ZIMMERMANWEG
WITTEMANWEG
DOKTER MOLEWATERPLEIN
DOKTER
MOLEWATERPLEIN
PASSAGE
PLEIN
45
19
17
13
7
5
3
1
8
25
72
50
30


ZIMMERMANWEG
Erasmiaans
Gymnasium
WYTEMAWEG
DOKTER MOLEWATERPLEIN
DOKTER
MOLEWATERPLEIN
PASSAGE
PLEIN
45
19
17
13
7
5
3
1
8
25
72
50
30


Erasmiaans
Gymnasium
ZIMMERMANWEG
WYTEMAWEG
DOKTER MOLEWATERPLEIN
DOKTER
MOLEWATERPLEIN
PASSAGE
PLEIN
45
19
17
13
7
5
3
1
8
25
72
50
30


OBPLEIN
ZIMMERMANWEG
Erasmiaans
Gymnasium
WYTEMAWEG
45
19
17
13
7
5
3
1
8
25
72
50
30
DOKTER MOLEWATERPLEIN
DOKTER
MOLEWATERPLEIN
PASSAGE
PLEIN

Arrival EMC
Current situation

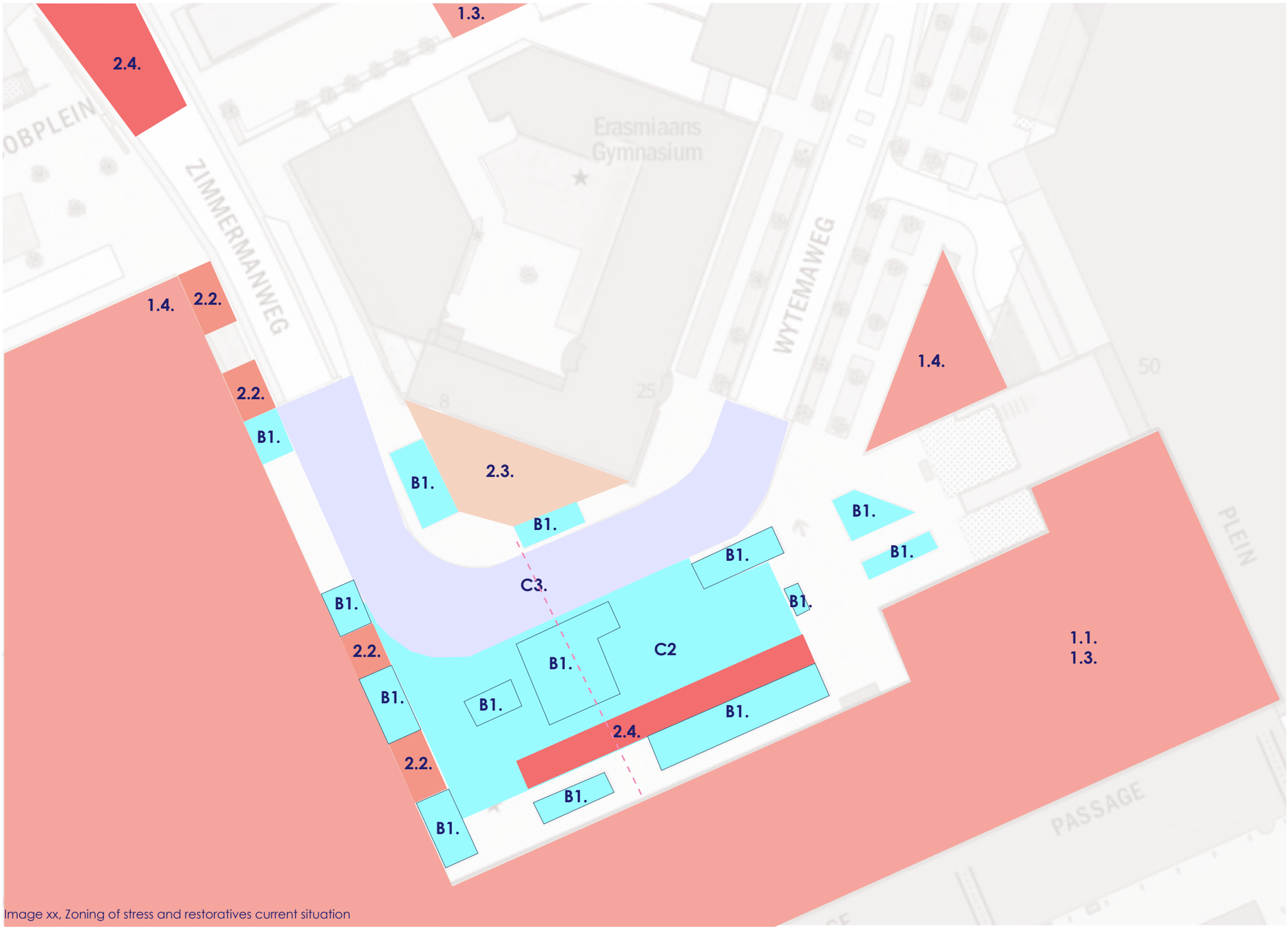


Image xx, Zoning of stress and restoratives current situation

Urban Stressors

Urban Design Aspects
1.1. Density
1.2. Round architectural edges
1.3. High-rise
1.4. Sharp architectural angles

City Life
2.1. Crowding
2.2. Garbage (not neat parked bikes)
2.3. Brick public space
2.4. Traffic

Very Stressful
Not Stressful

Restoratives

Water
A1. Without blue water (comparison)
A2. High quality clean water
A3. Attractive planting around water
A4. Dramatic waterfalls
A5. Attractive seating around water

Green
B1. Urban park with a few trees
B2. Tree canopy of at least 30 percent
B3. Rich biodiversity like animal species
B4. Green walls

Sensory Paving (category by author)
C1. Wayfinding by color organization
C2. Paving without separated functions
C3. Cycle tracks separated (functions)
C4. Textural variation, surface structure

Elements of Facades (category by author)
D1. Facade with large storefront
D2. Fine-grain storefronts
D3. Varied facades
D4. Local character, historic fascination

Very Relaxing
Not Relaxing

Arrival EMC

Possible Situation

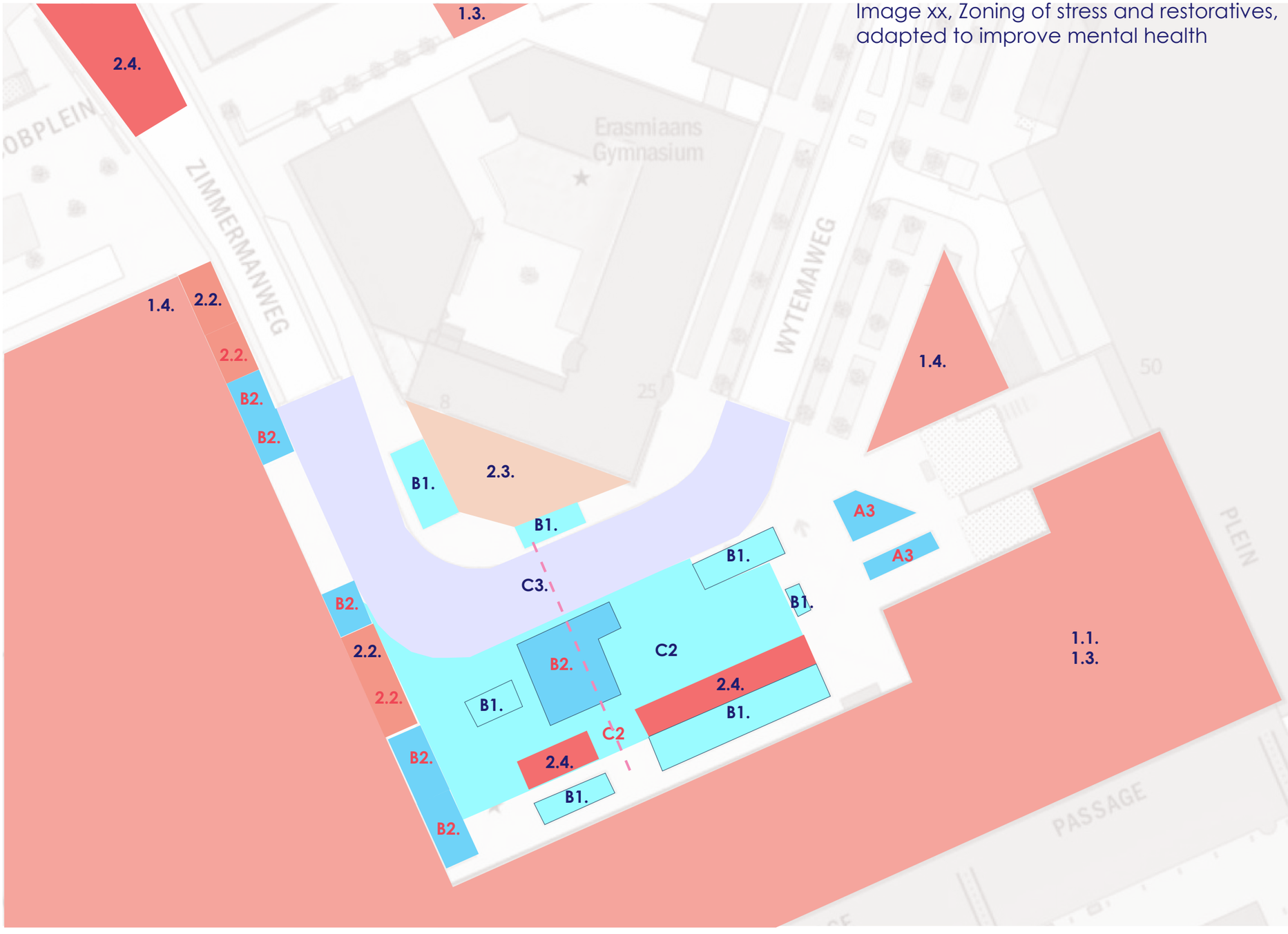


Image xx, Zoning of stress and restoratives, adapted to improve mental health

Urban Stressors

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Arrival EMC
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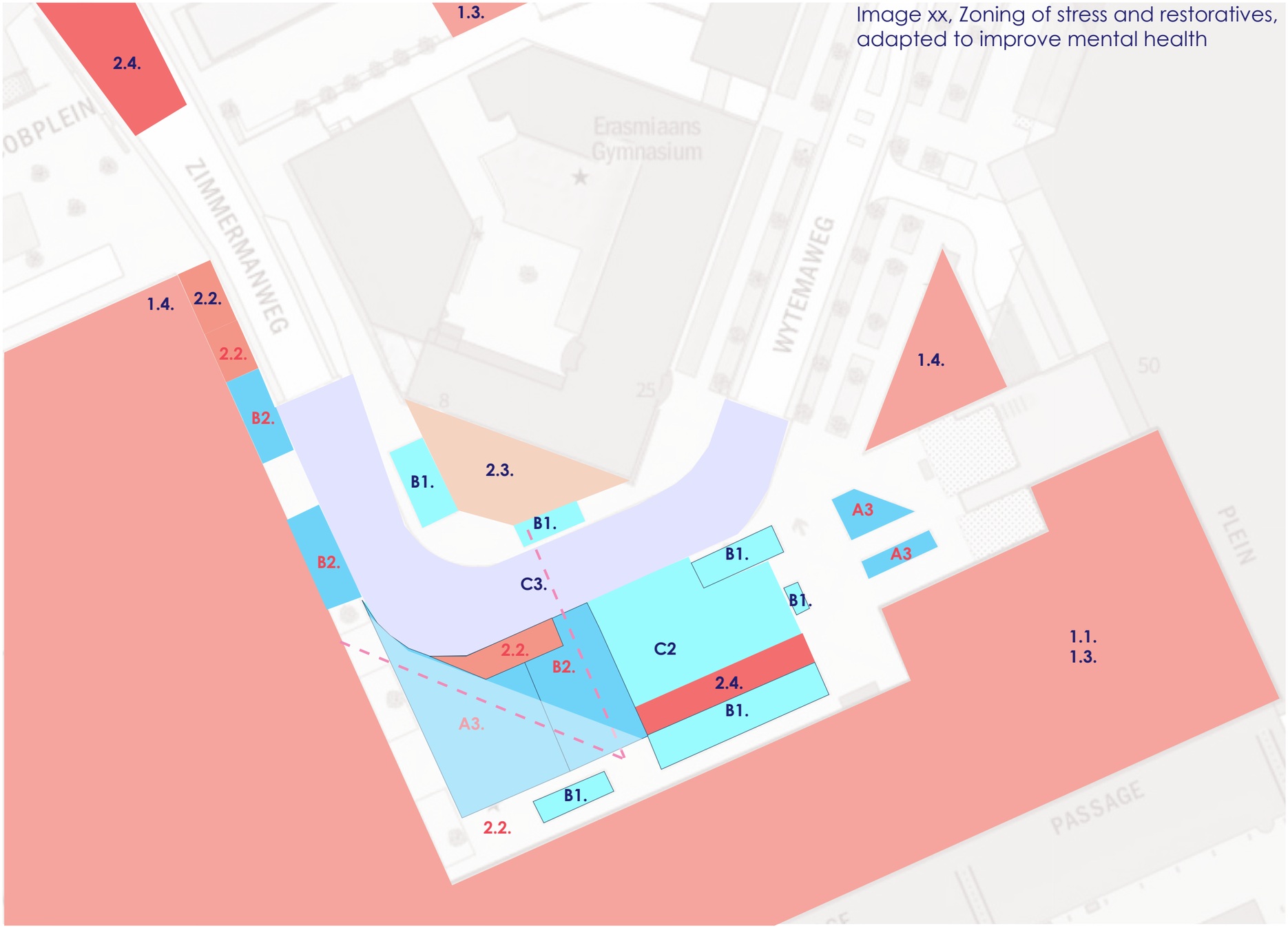

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Very Relaxing
Not Relaxing

General implementation

- For Example, Ikazia Hospital in Rotterdam

- The larger its urban scale, the more sufficient it will work

- Approachable from different directions

- More than one building

  - Amount of entrances to the campus space

A restorative last mile towards the Erasmus Medical Center, Rotterdam

Improving the quality of last mile reachability and arrival,
by assessing societies opinion on urban stress and restoratives,
and digitally researching scenarios by the use of personas.

P5 Presentation 23-06-2022

Rosalie Moesker 4898613

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