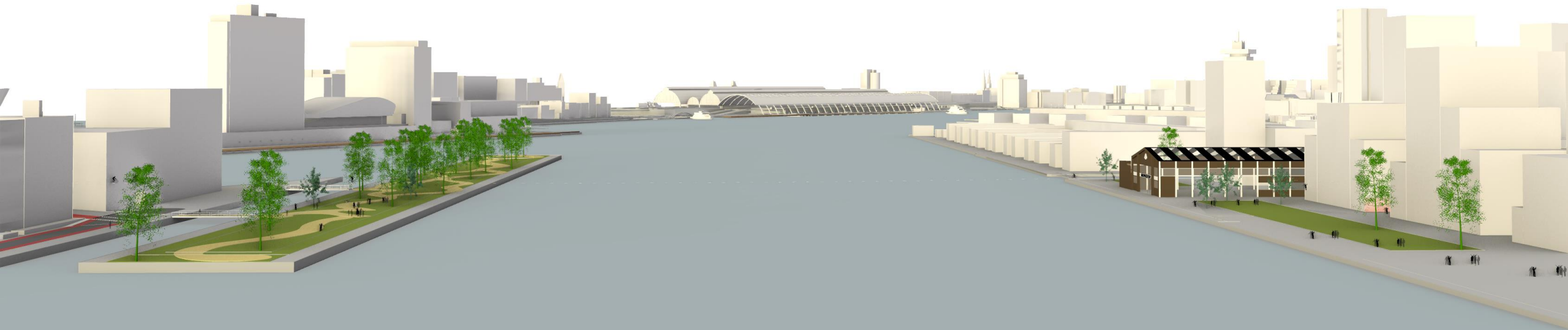


P5 presentation Noud Gorter
18/04/2019

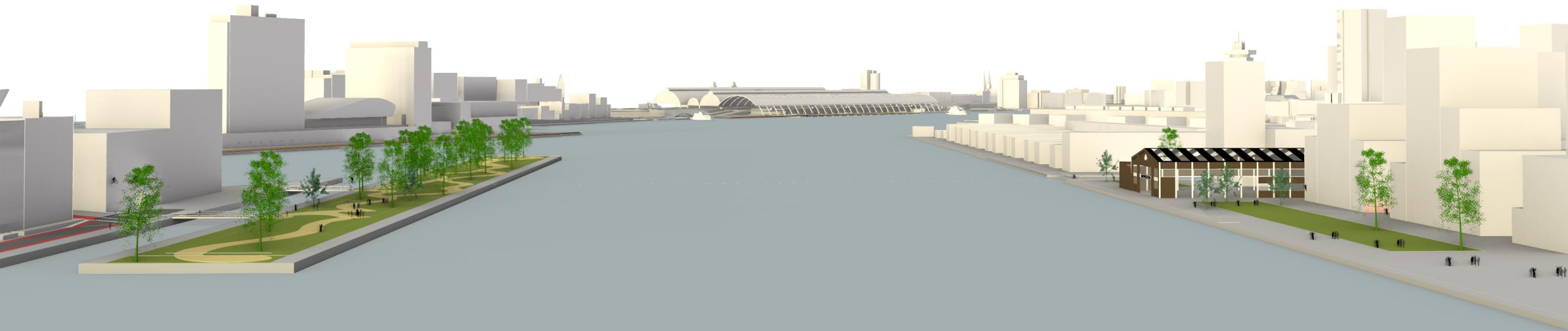
Leap over the IJ

Mentors:
Ir. Joris Smits
Dr. Ing. Marcel Bilow

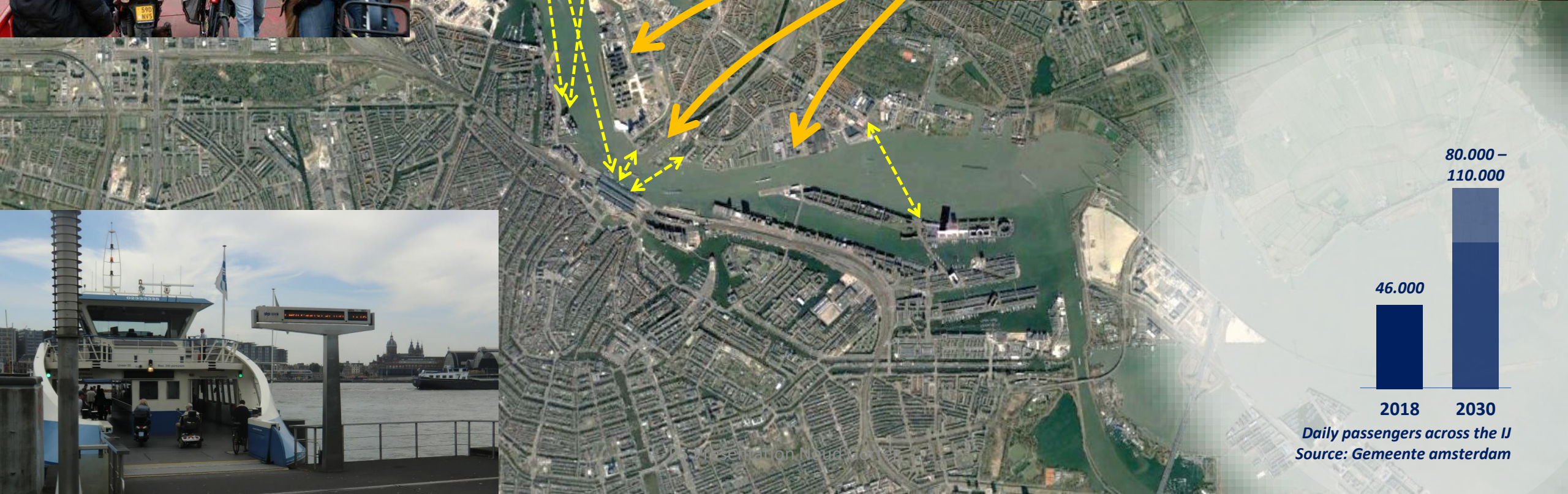
Delegate of the board of examiners:
Ir. Lidwine Spoormans



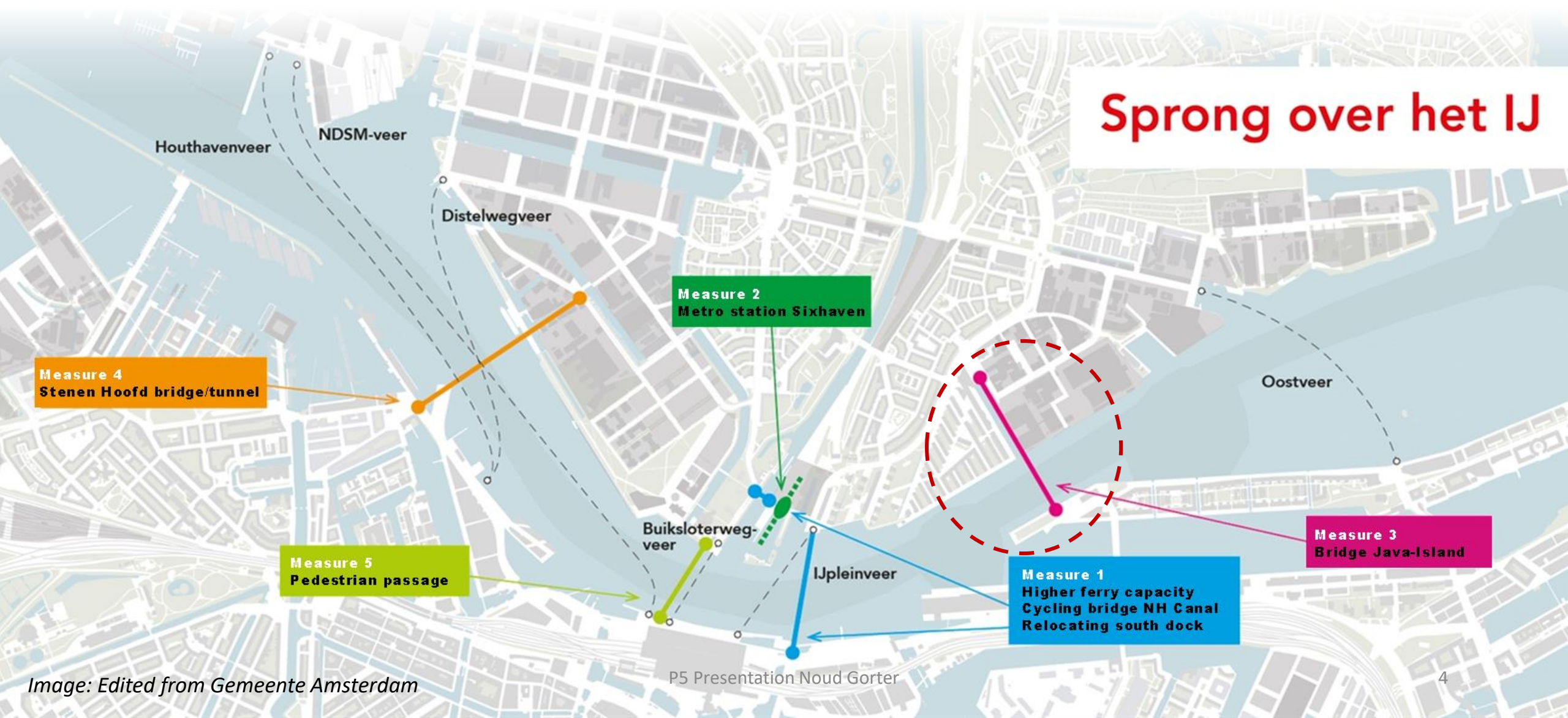
Problem statement



Problem statement

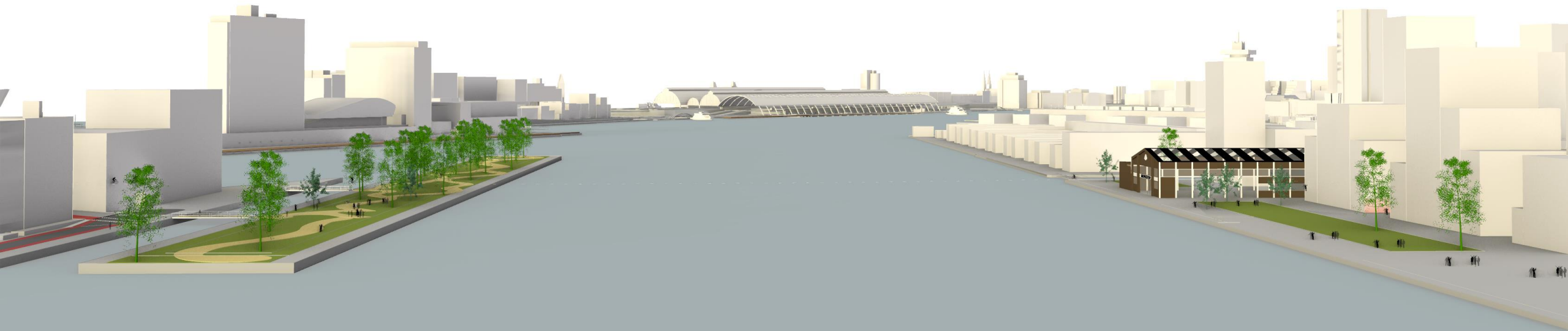


Problem statement

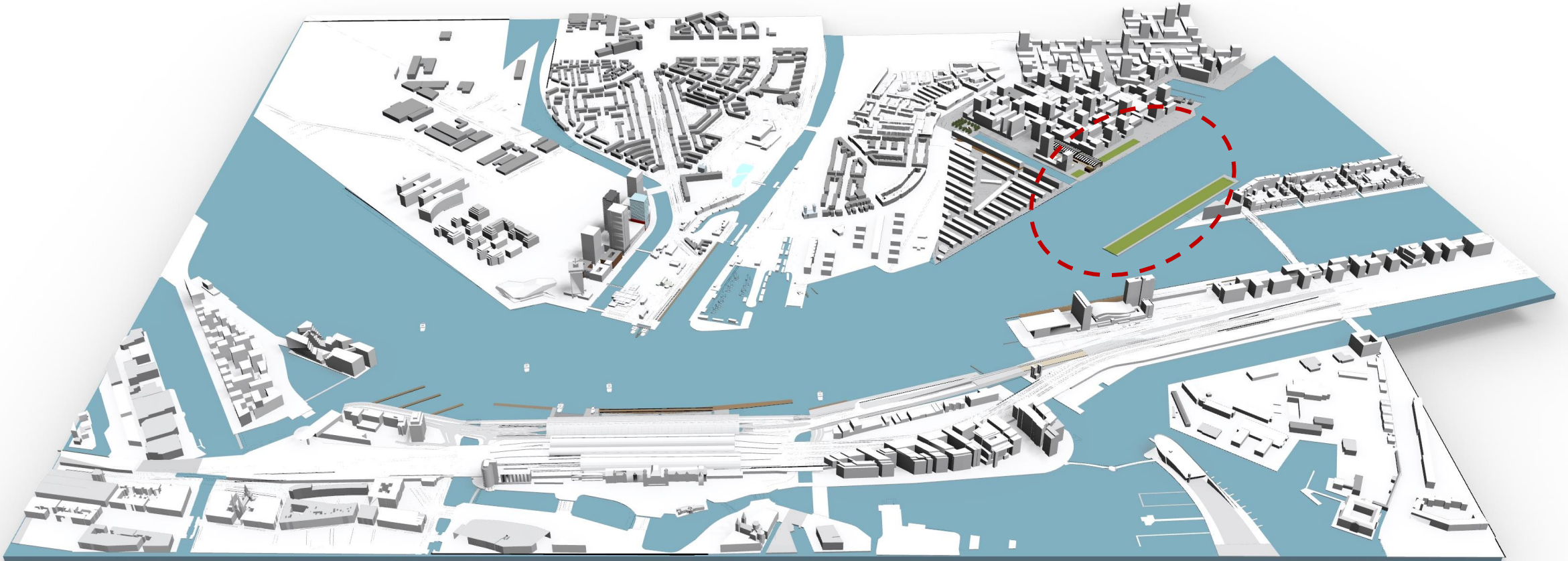


Sprong over het IJ

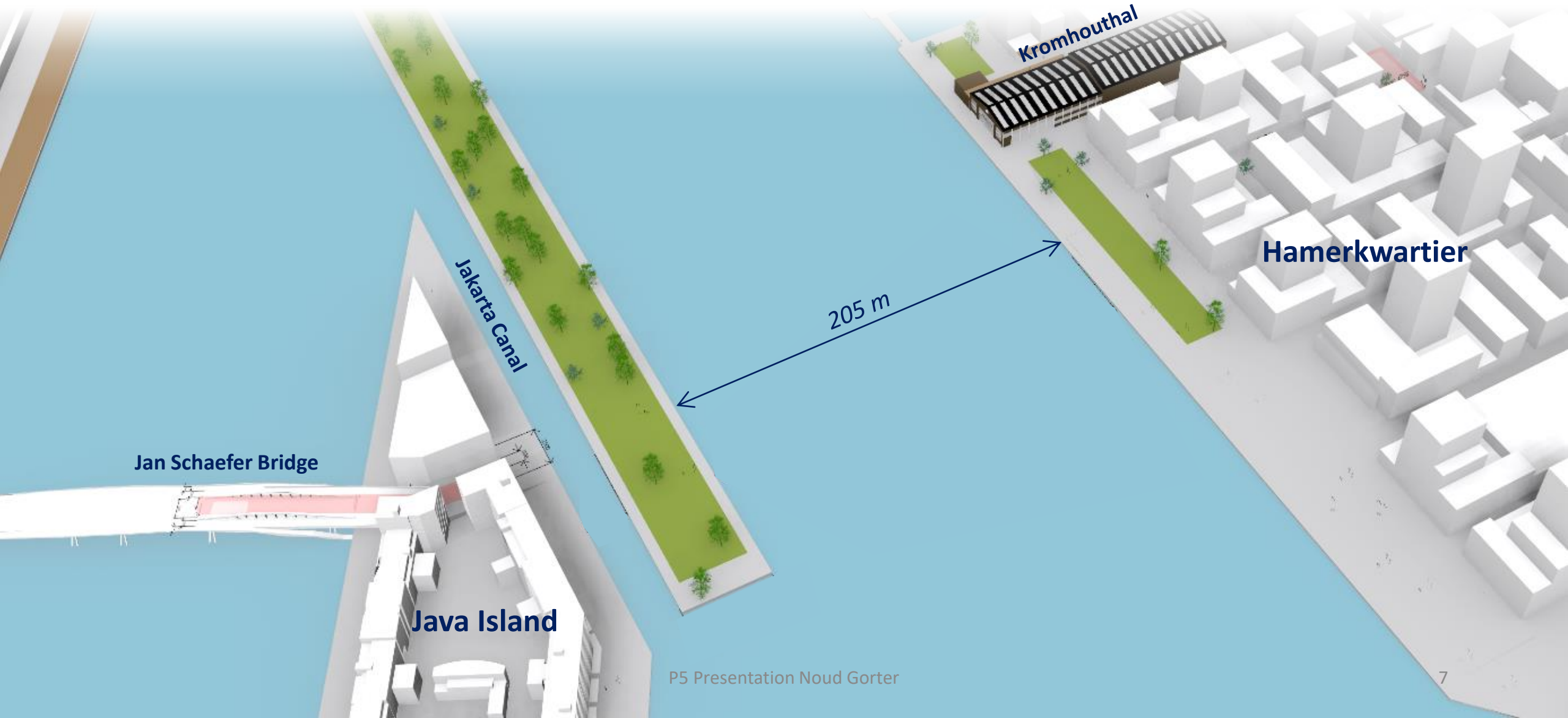
Local context



Local context



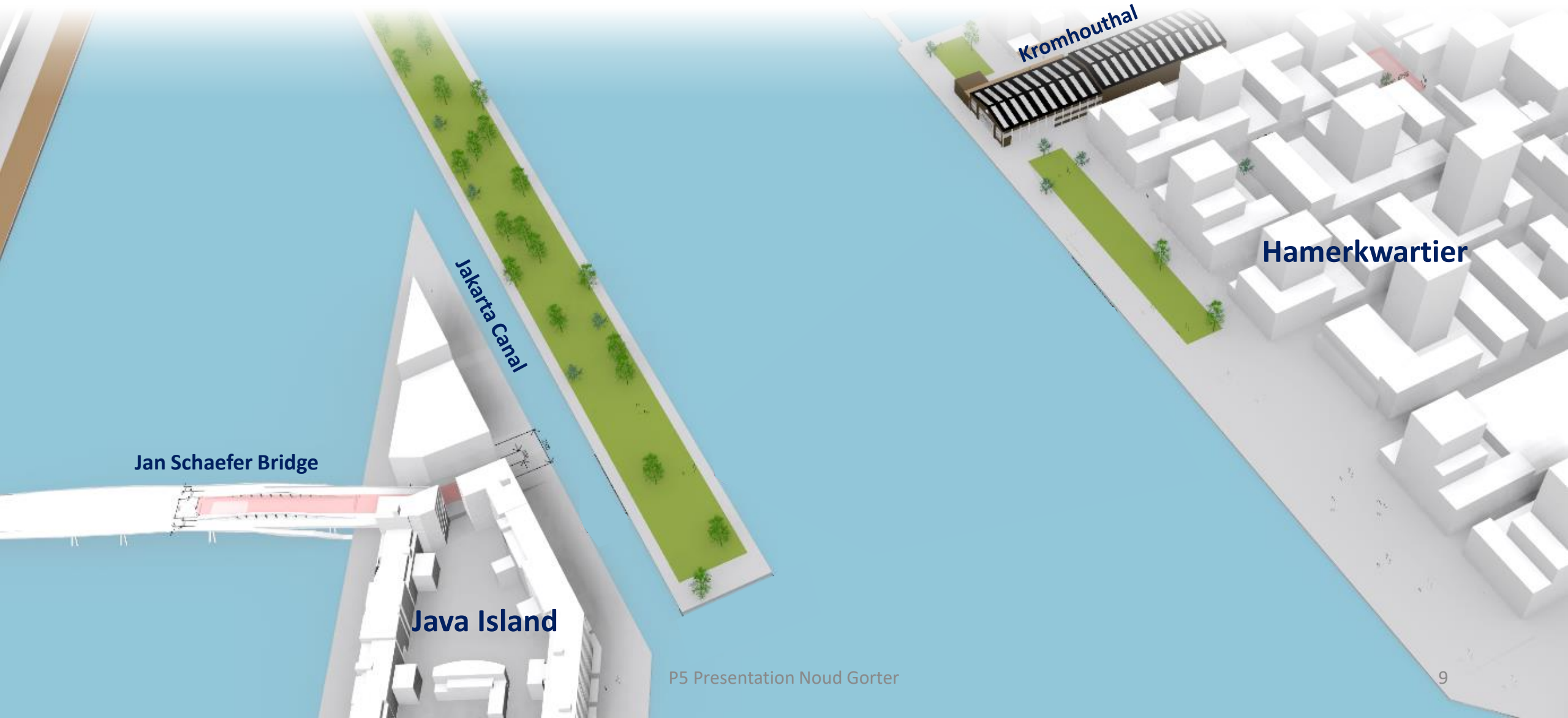
Local context



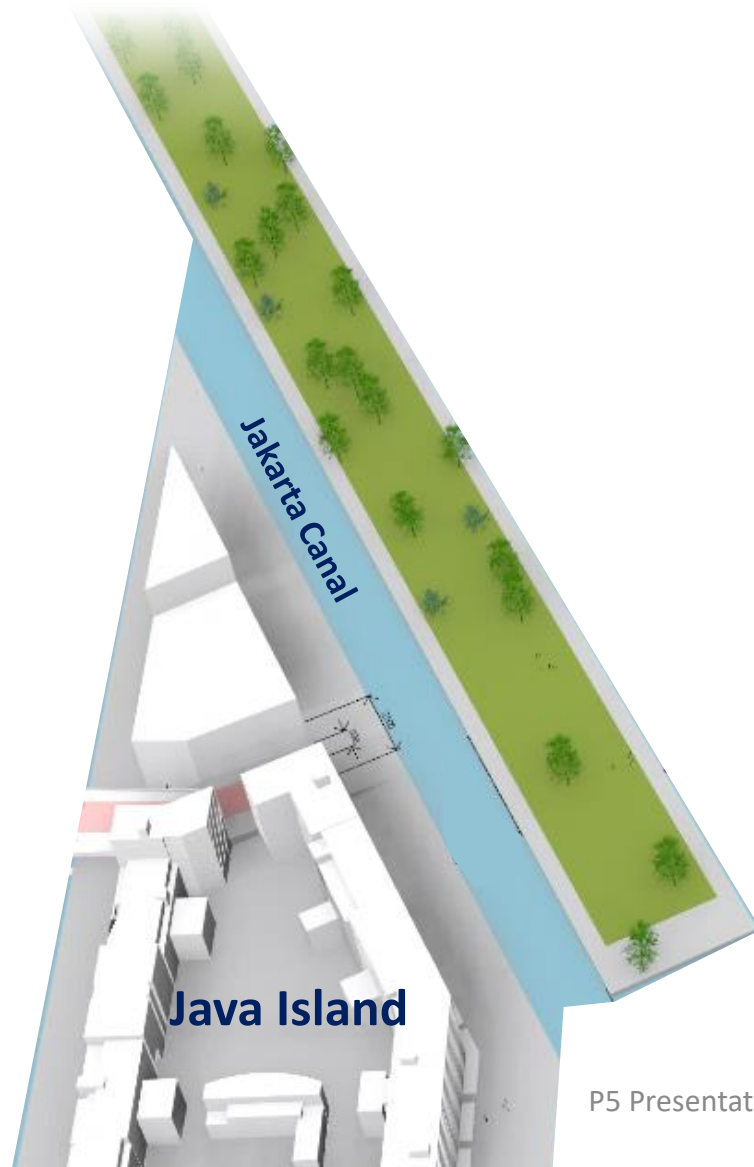
Local context



Local context



Local context



P5 Presentation Noud Gorter



Image: ANP

Local context

Java Island

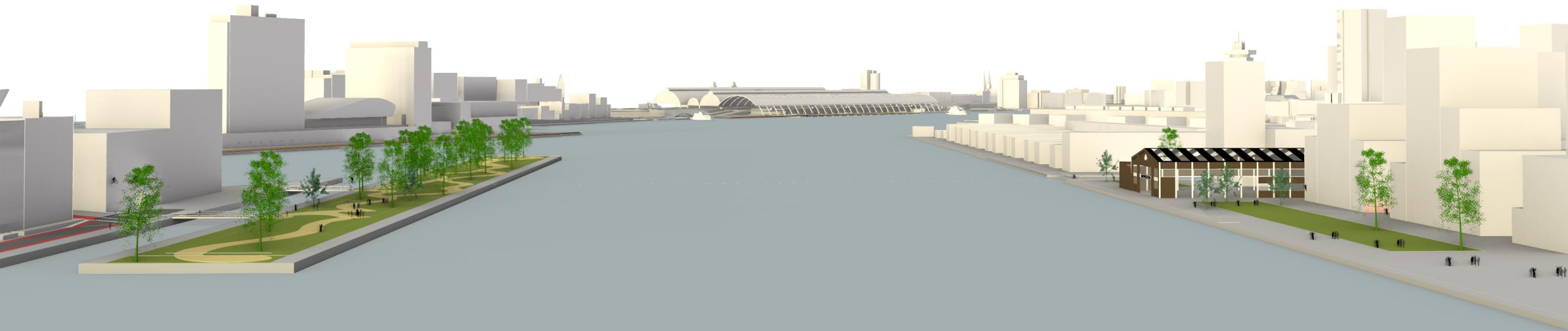


Image: Marco van middelkoop

P5 Presentation Noud Gorter

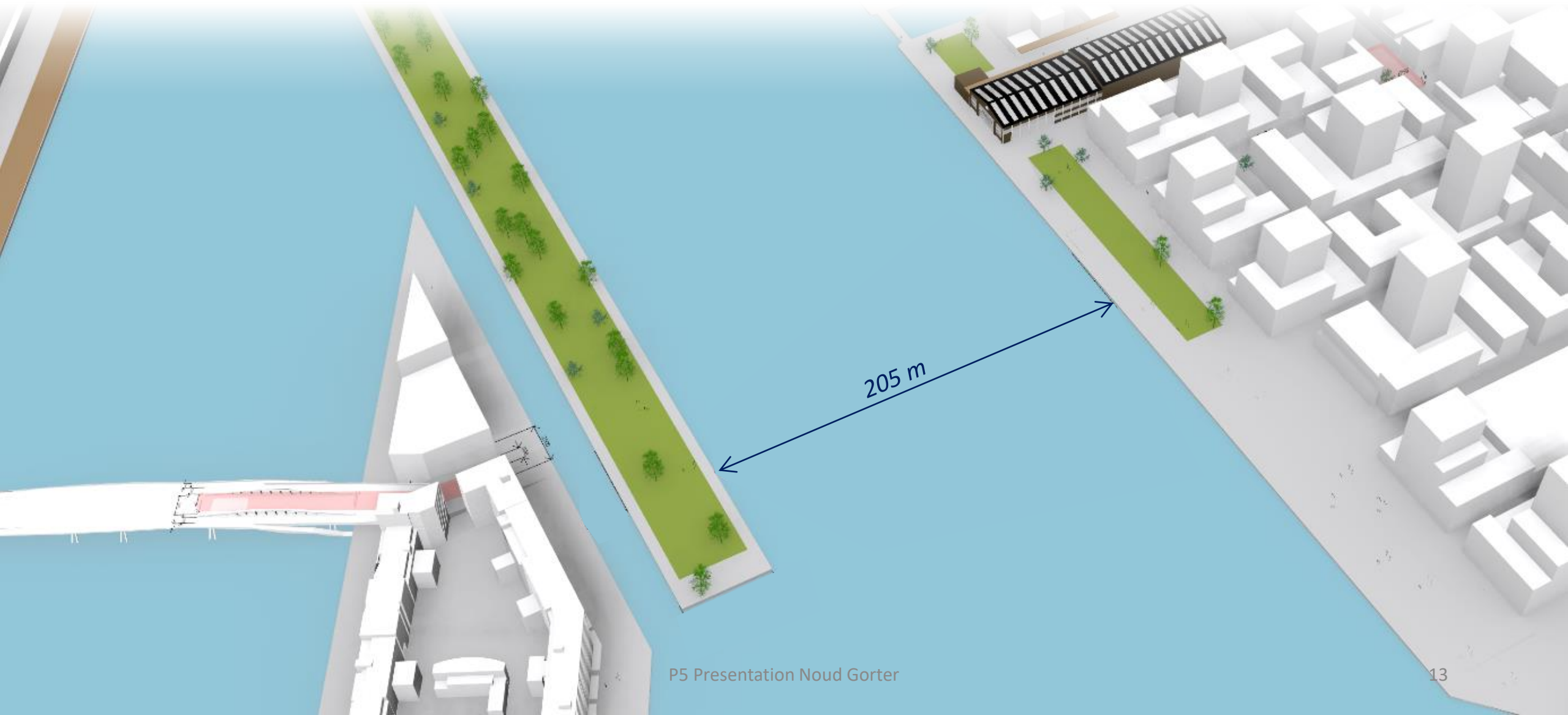


Program of requirements



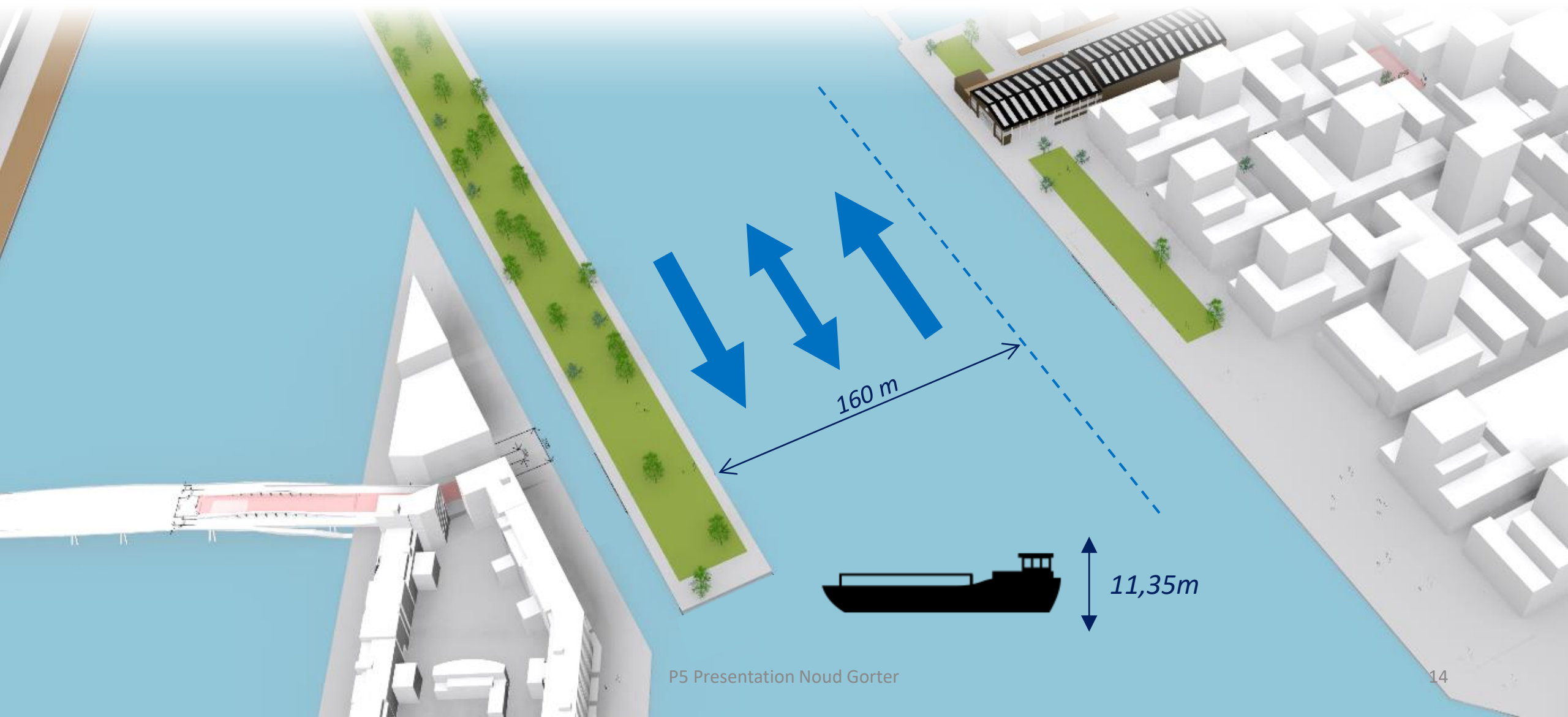
Program of requirements

River traffic



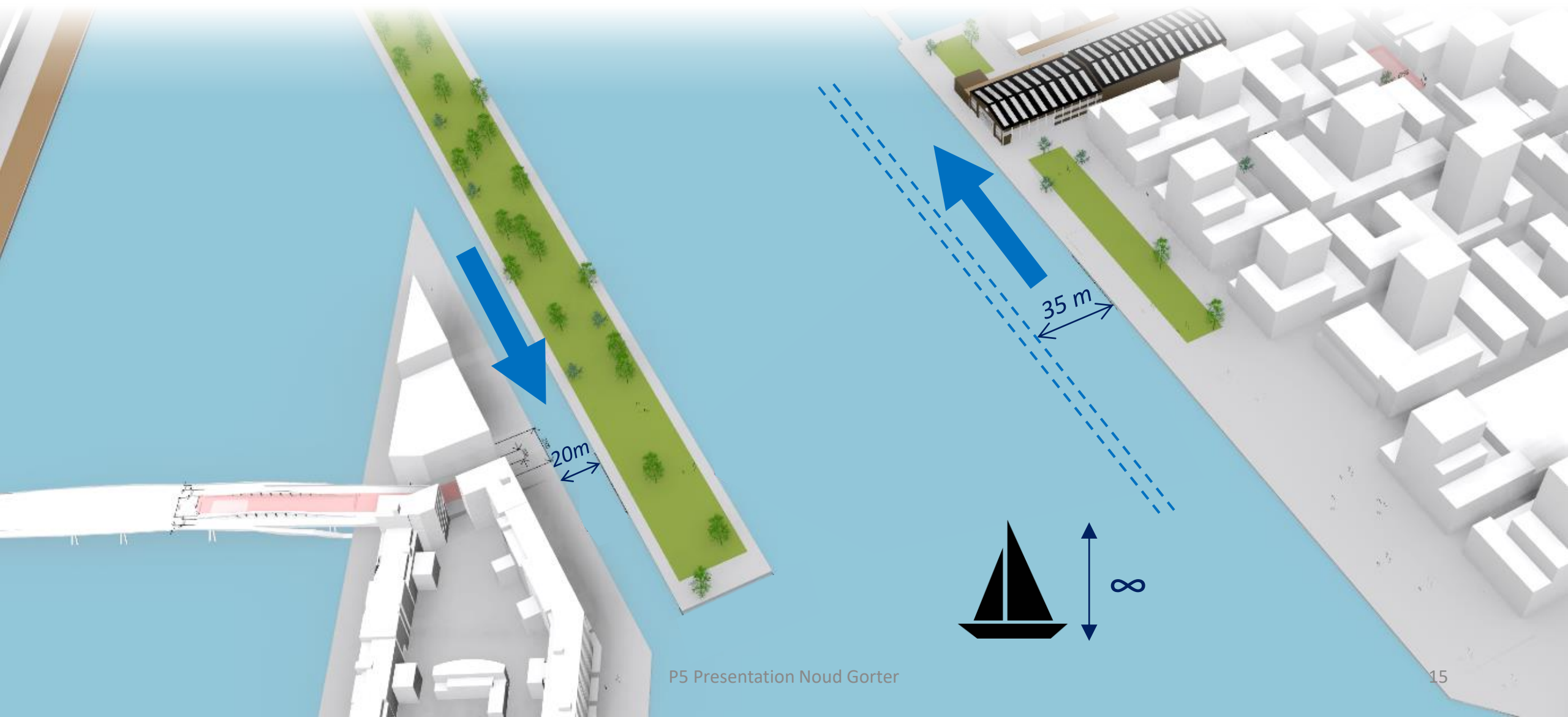
Program of requirements

River traffic



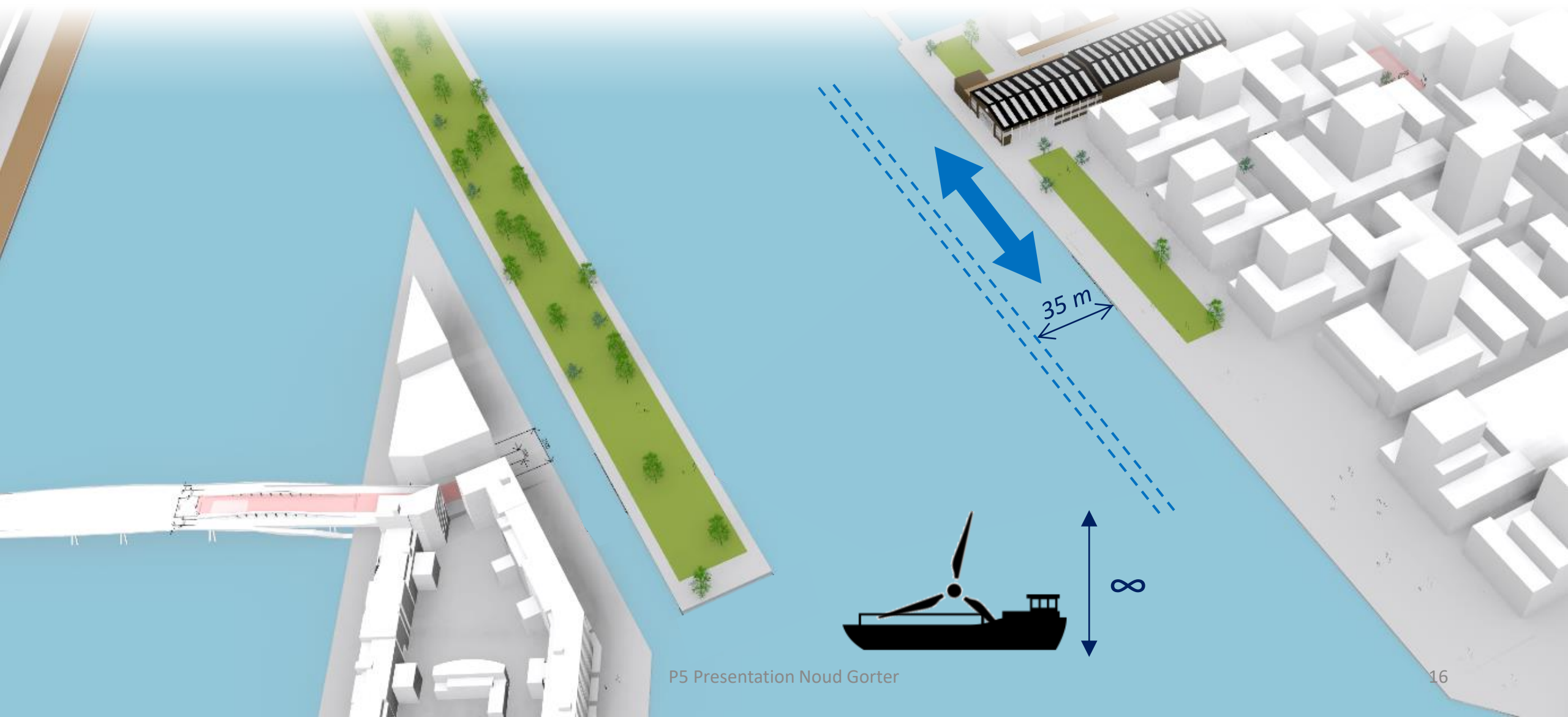
Program of requirements

River traffic



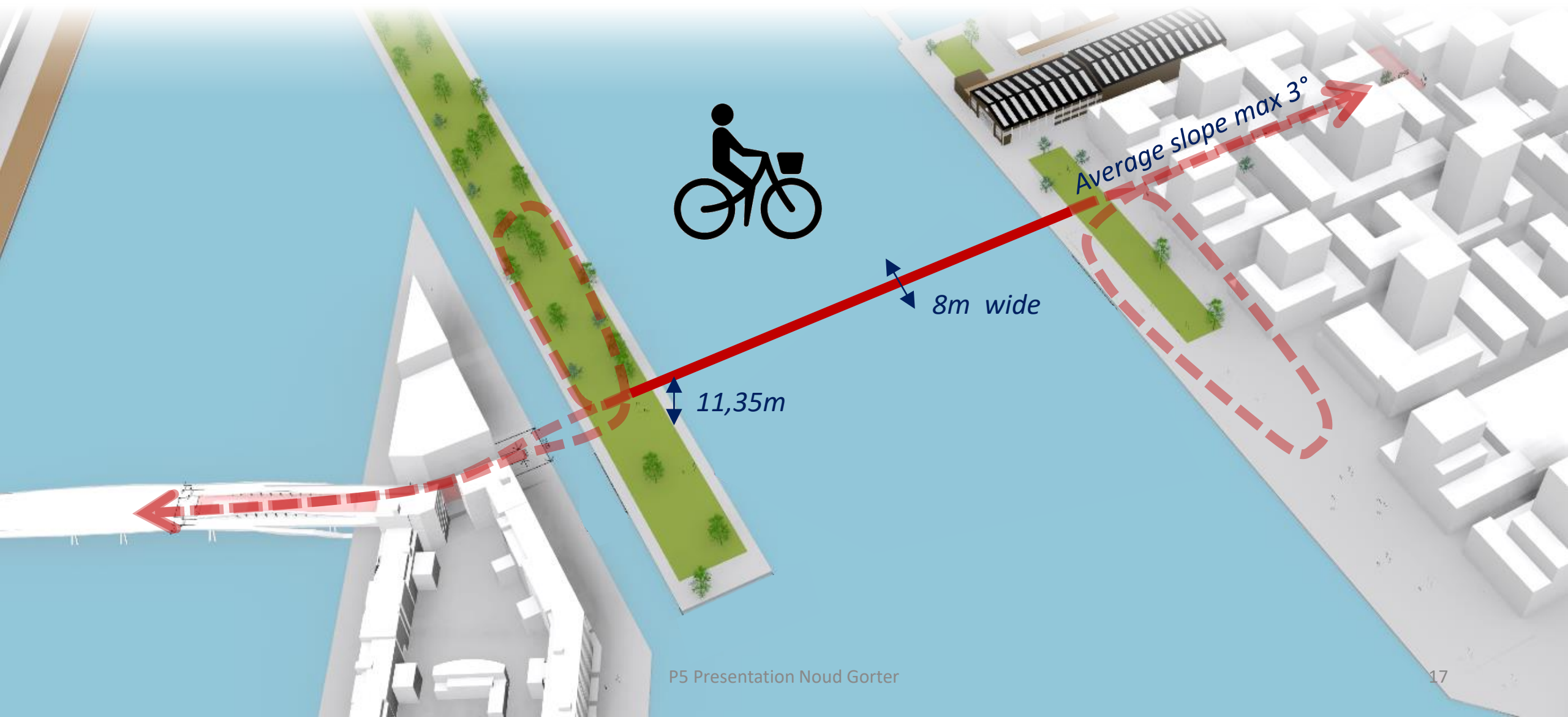
Program of requirements

River traffic



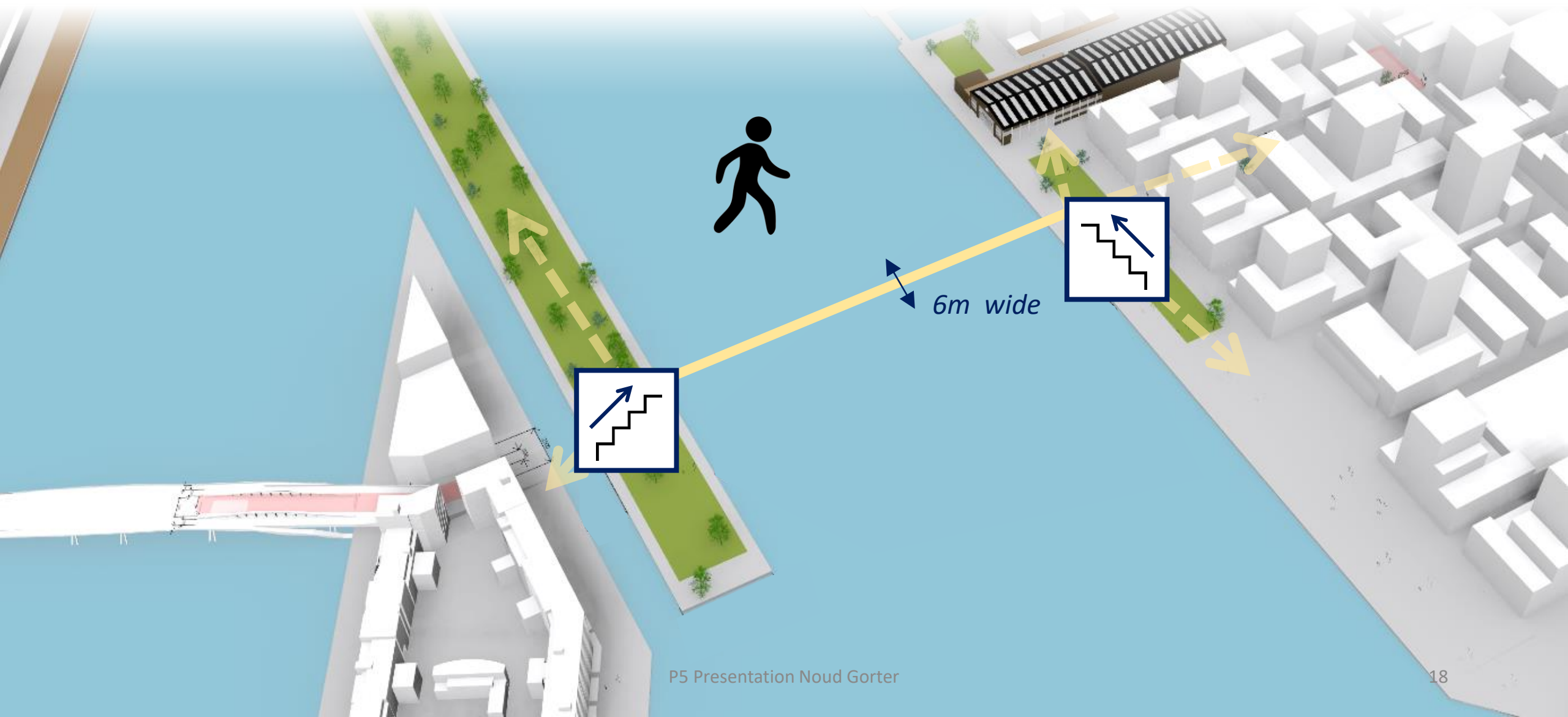
Program of requirements

Road traffic



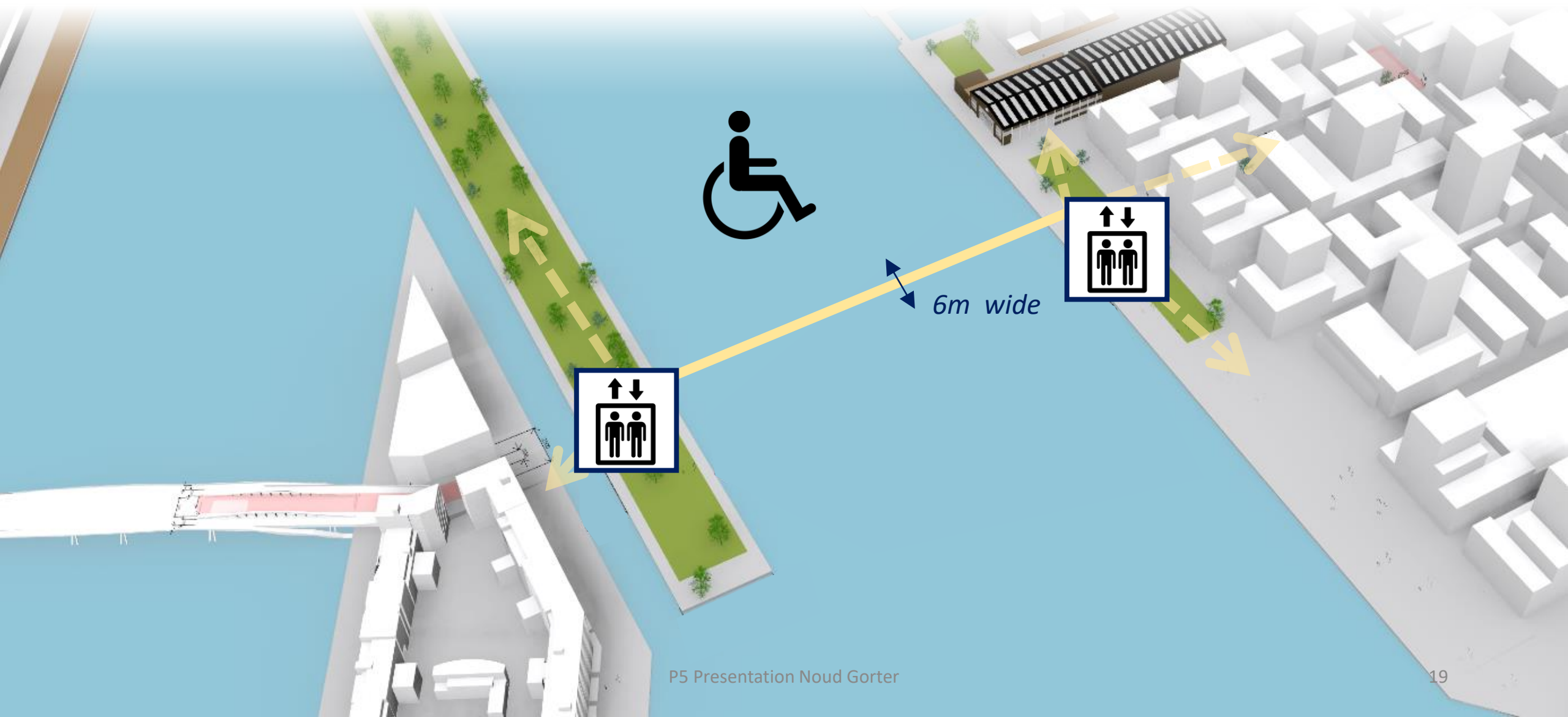
Program of requirements

Road traffic



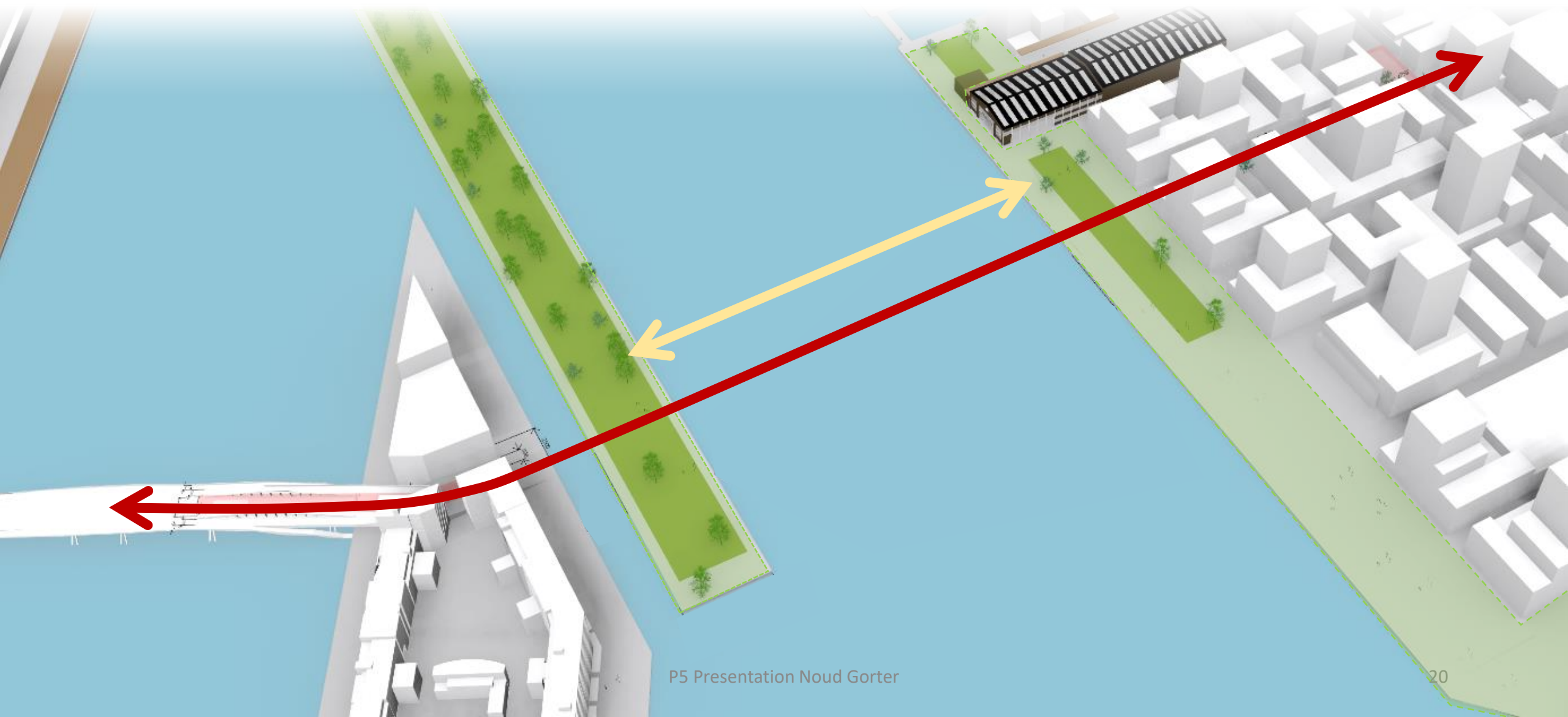
Program of requirements

Road traffic

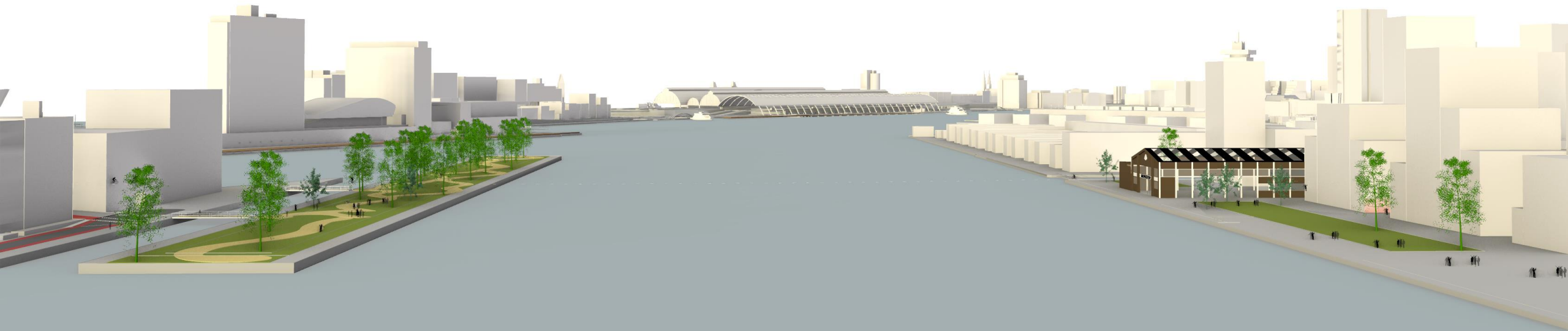


Program of requirements

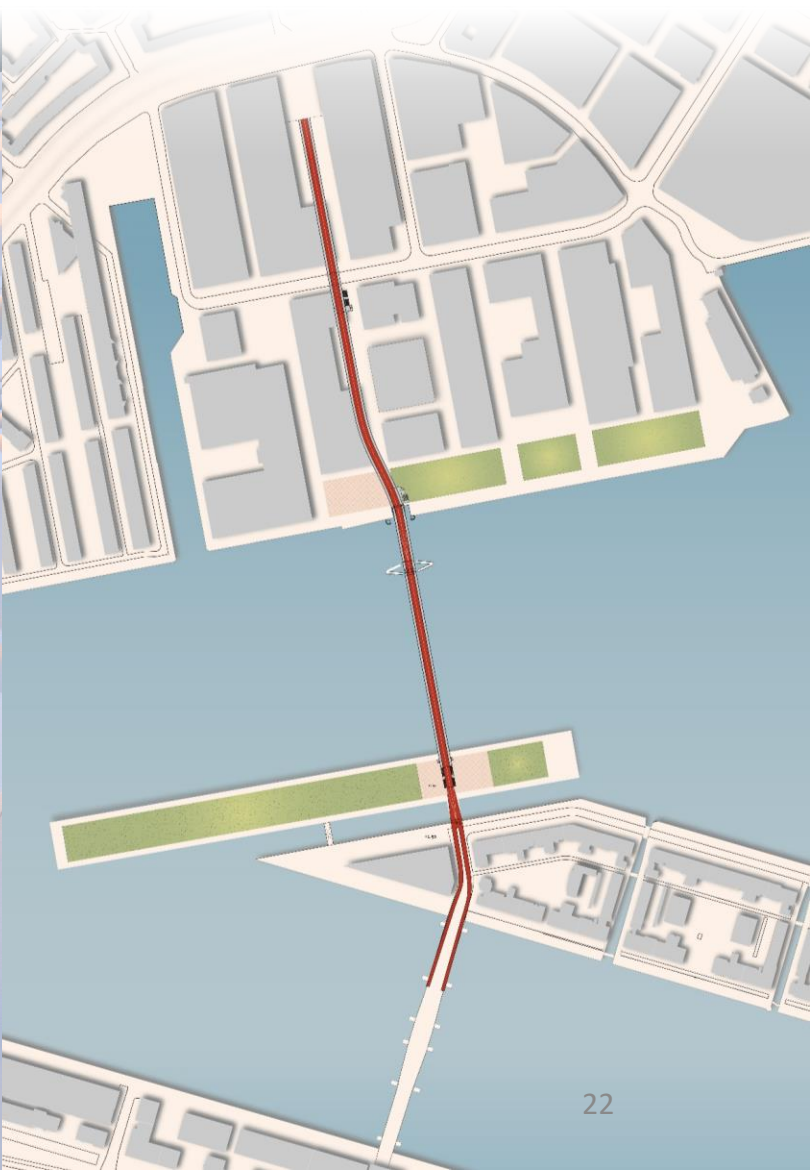
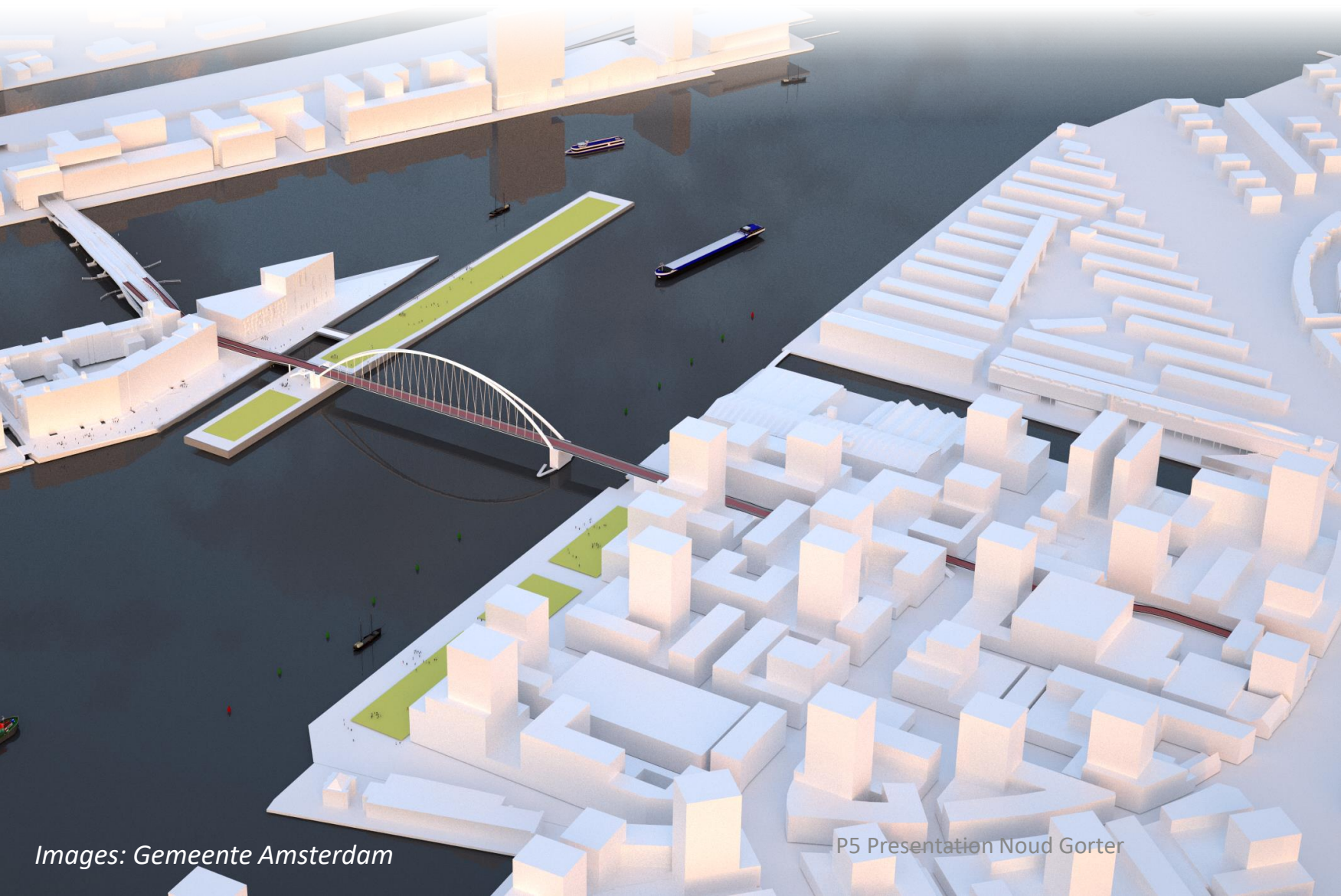
Personal ambitions



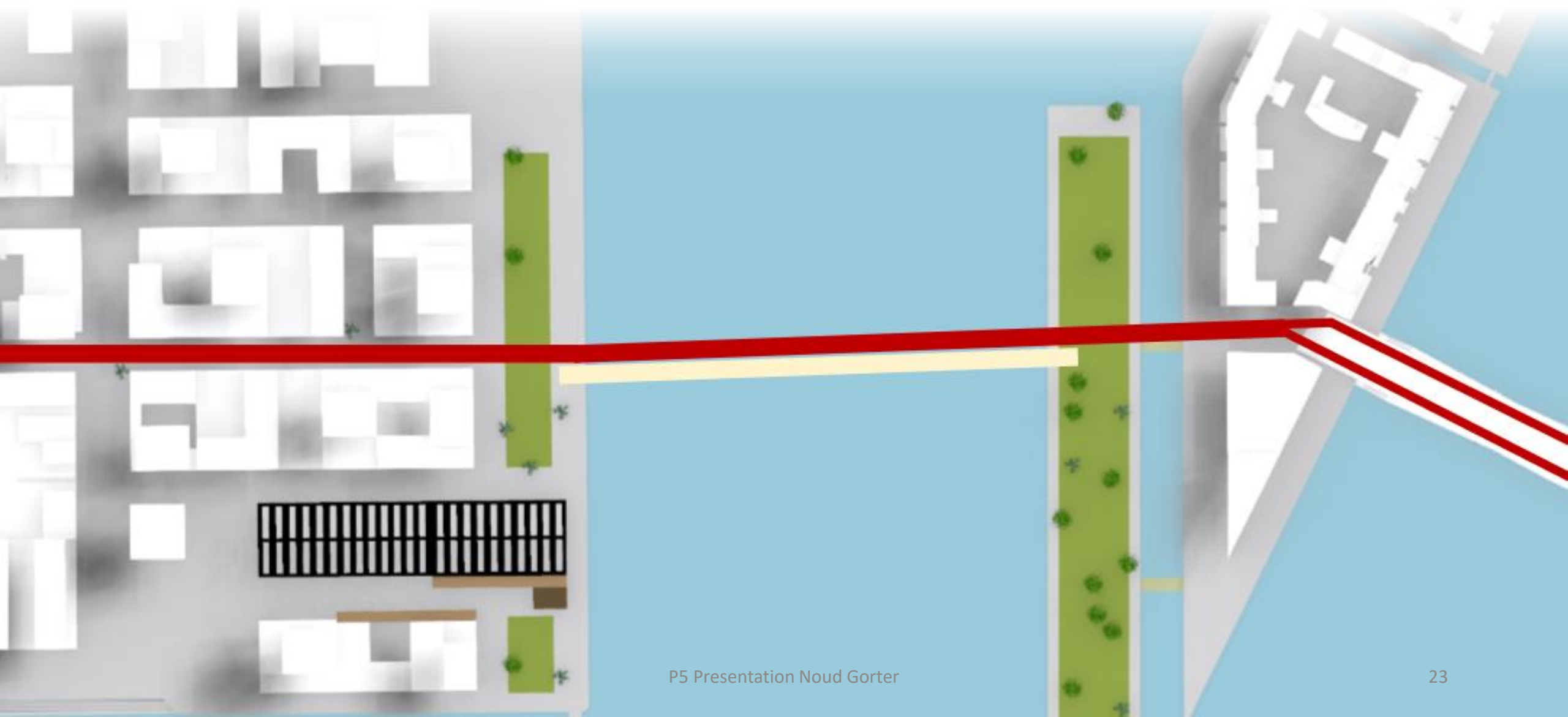
General layout



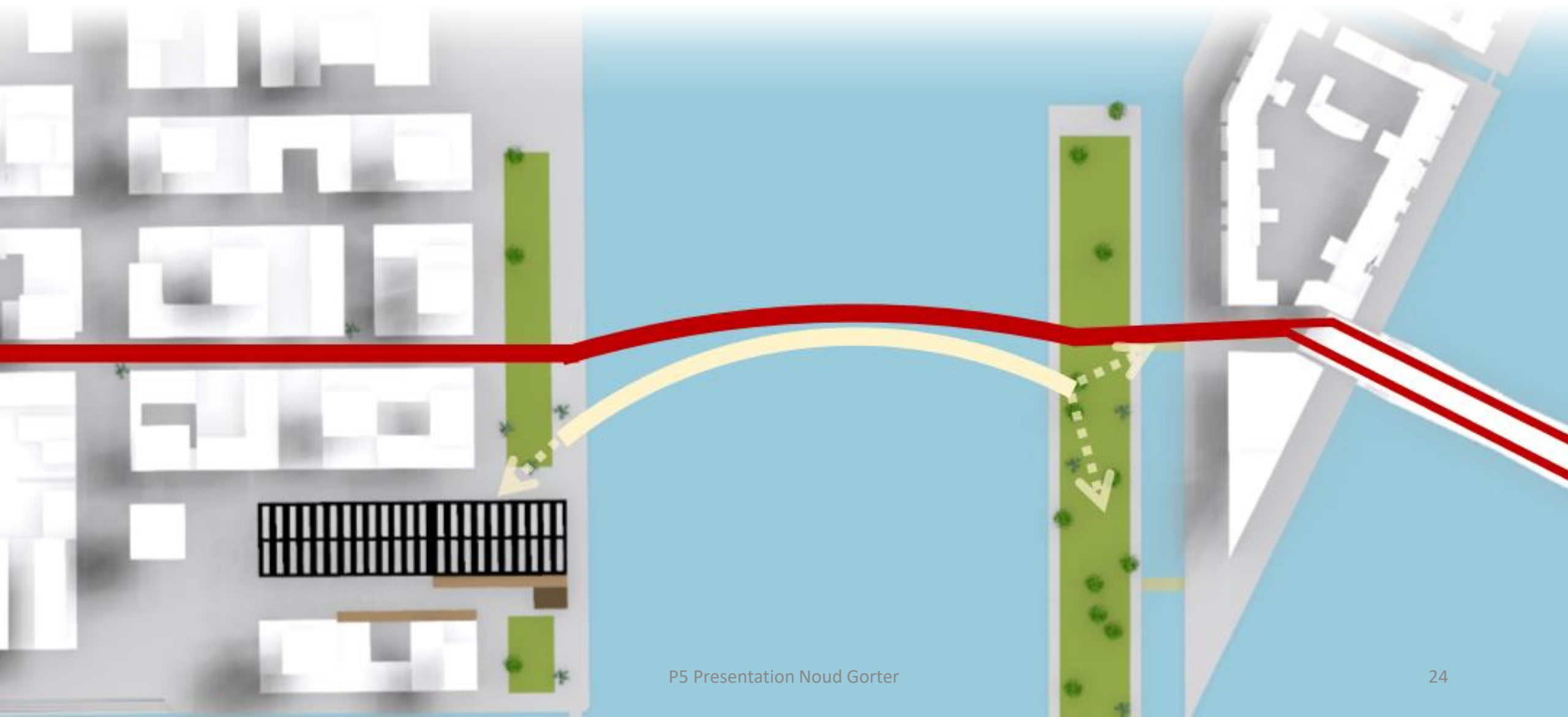
General layout



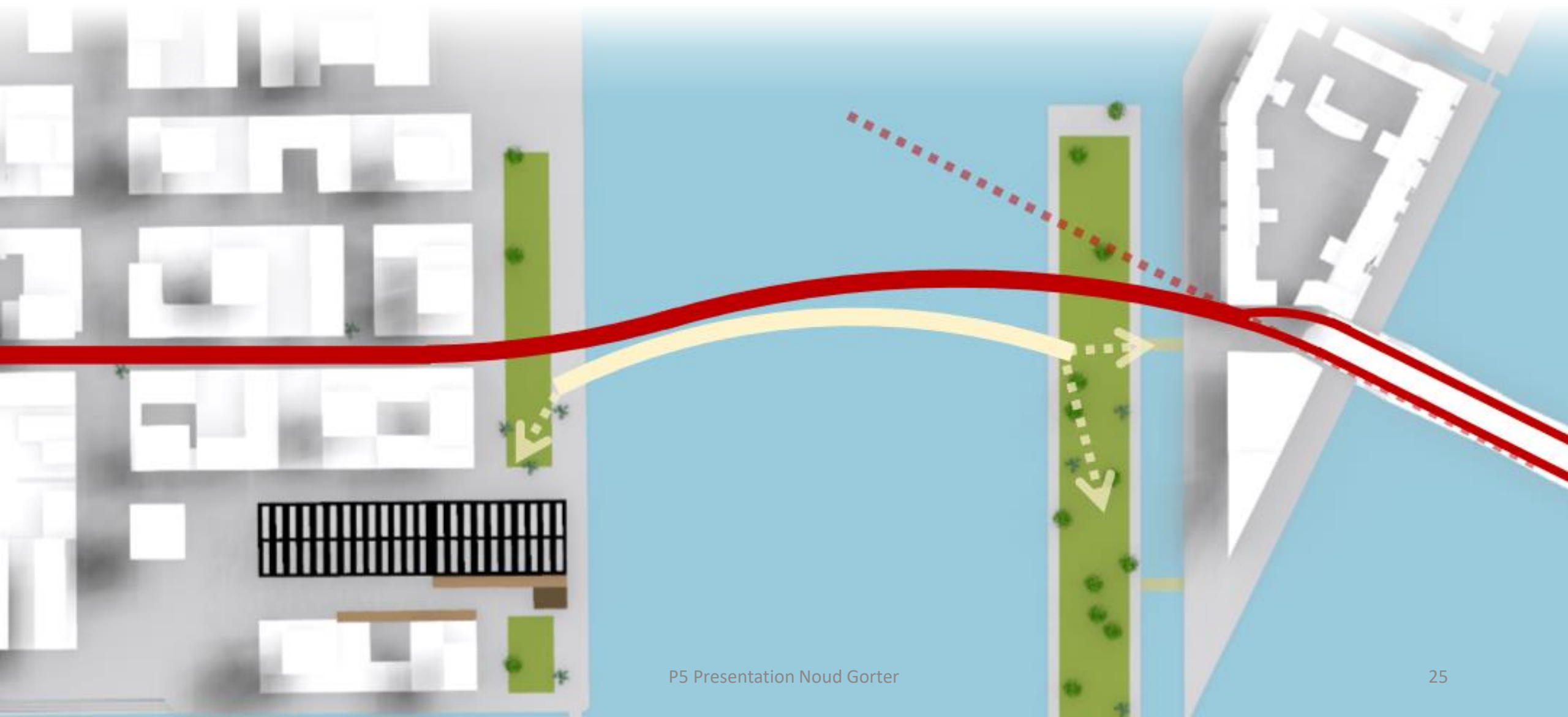
General layout



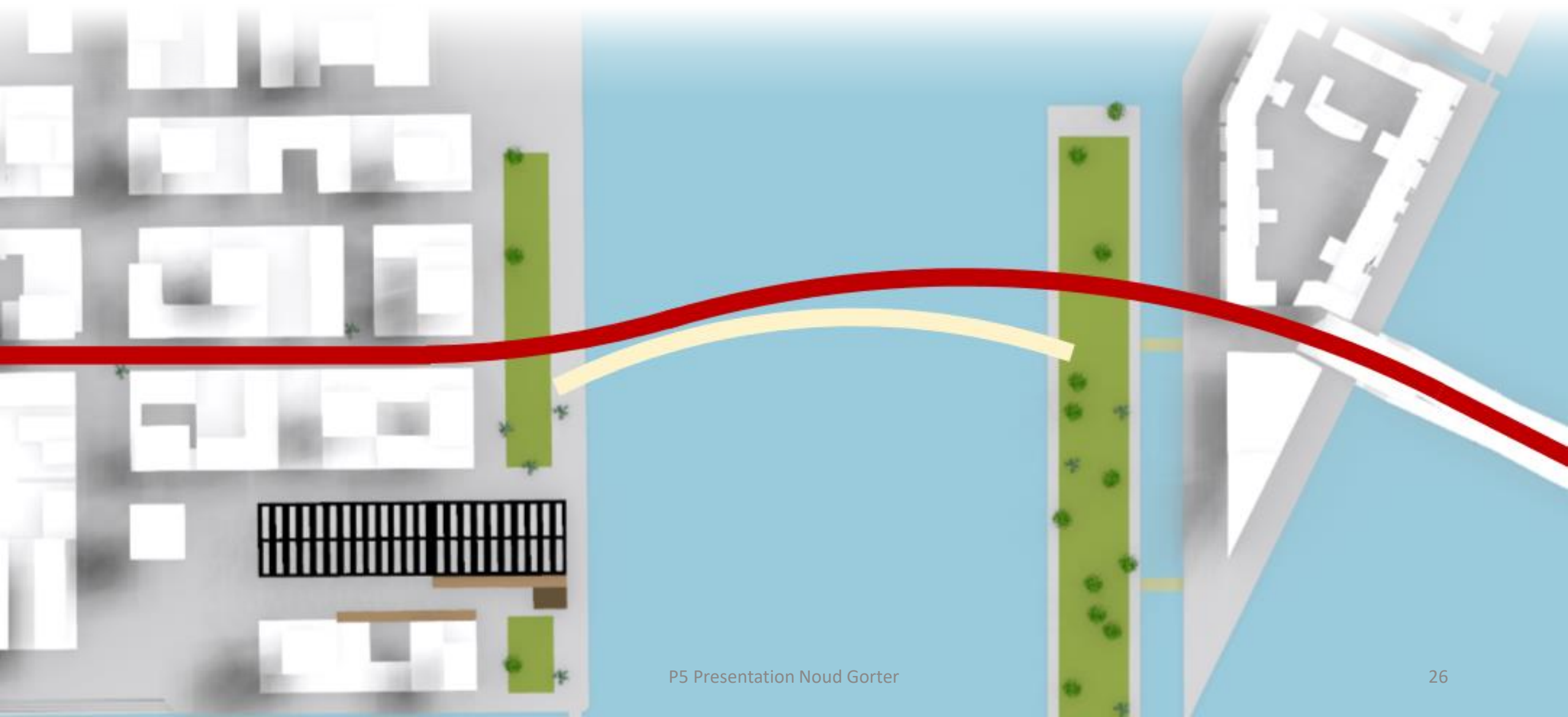
General layout



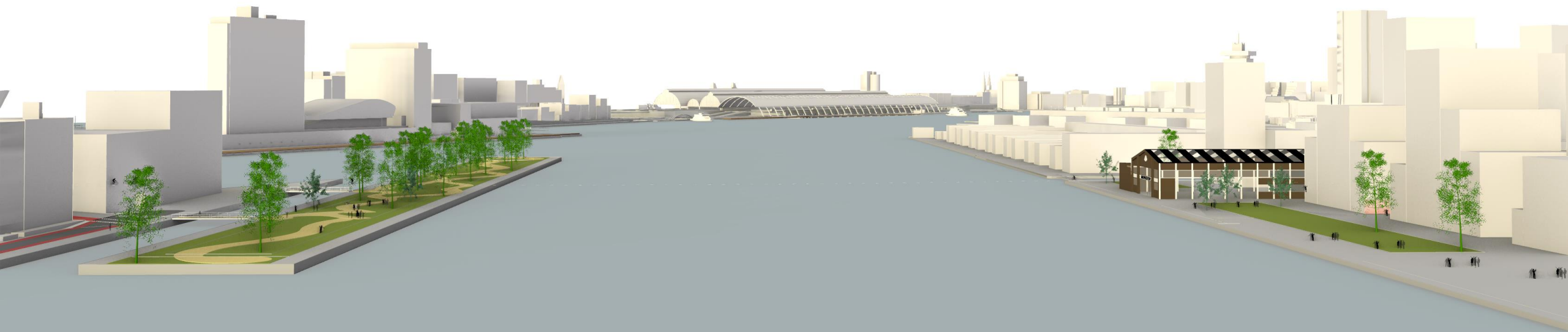
General layout



General layout

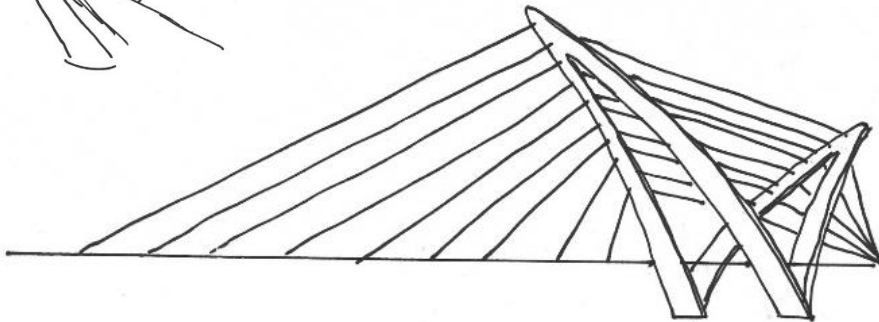
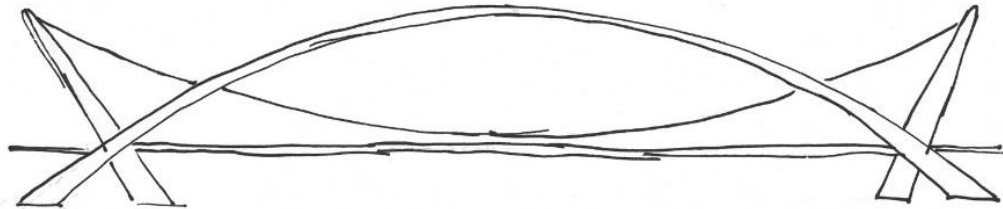
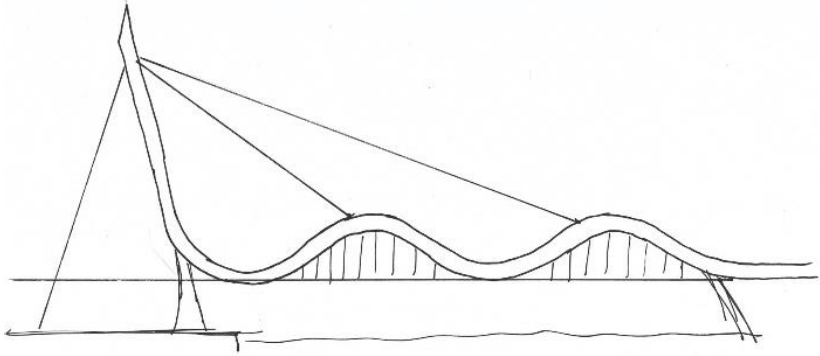


Sketch designs



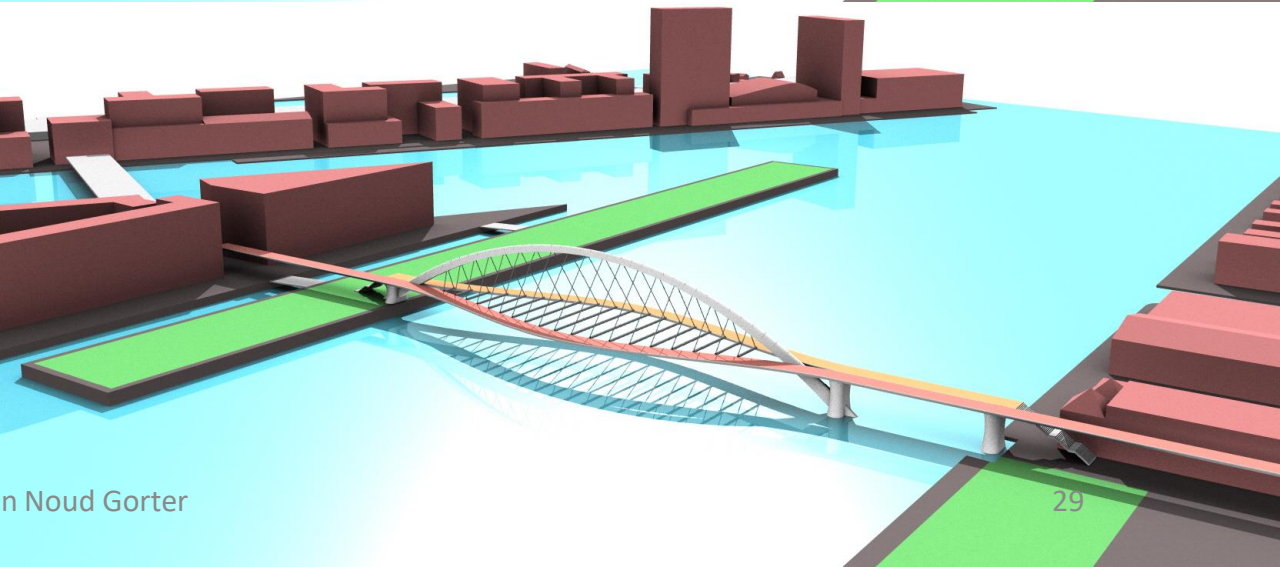
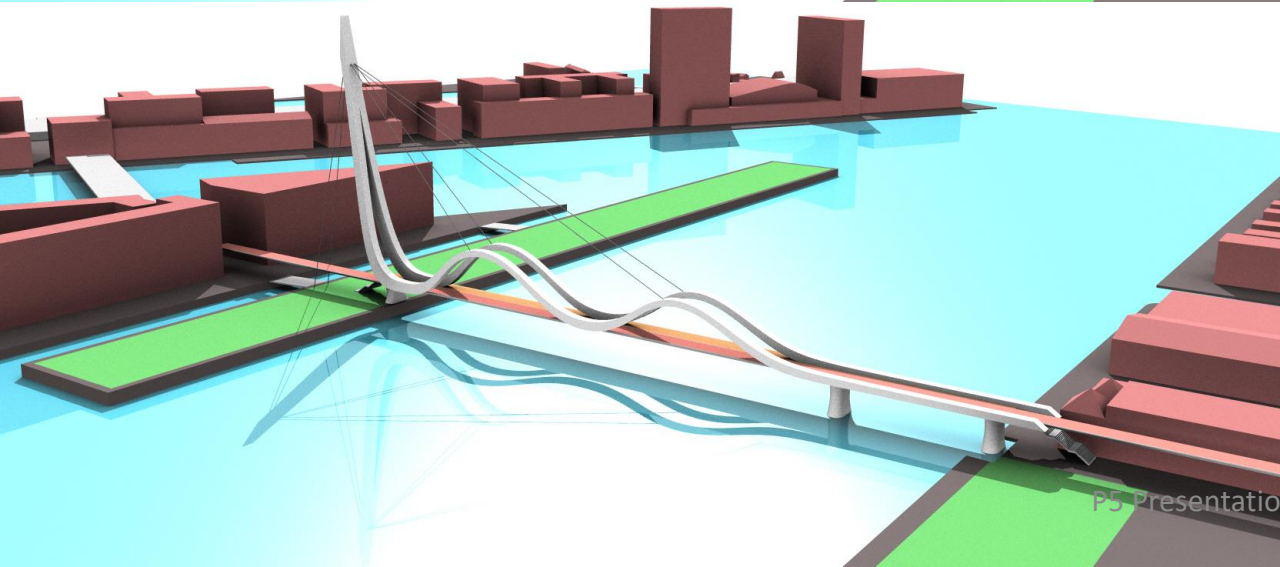
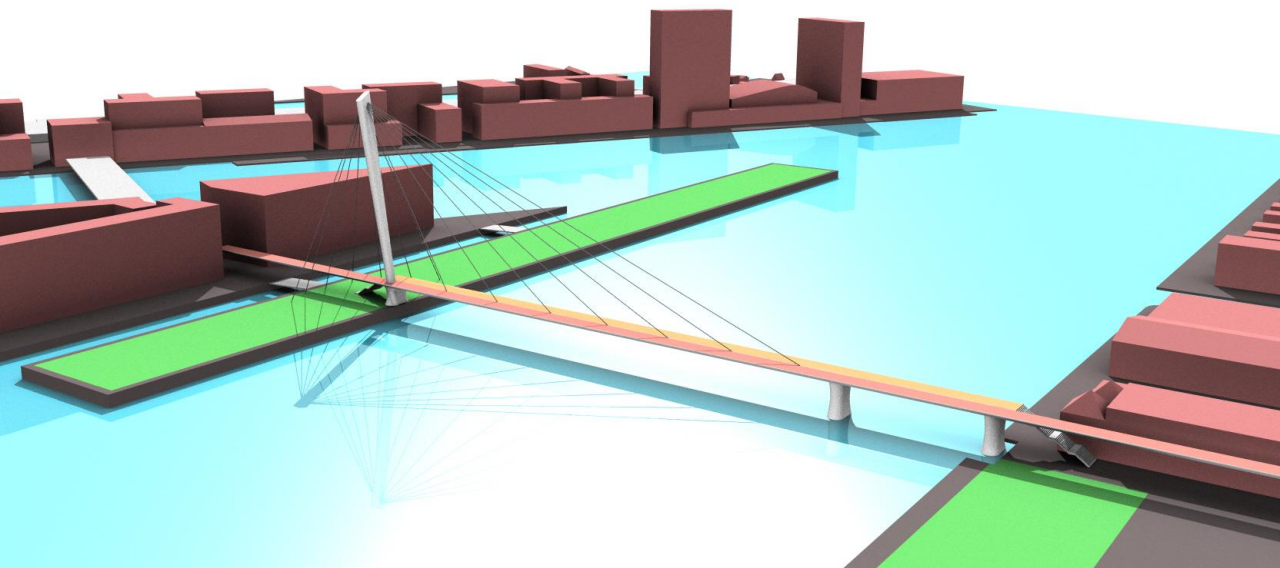
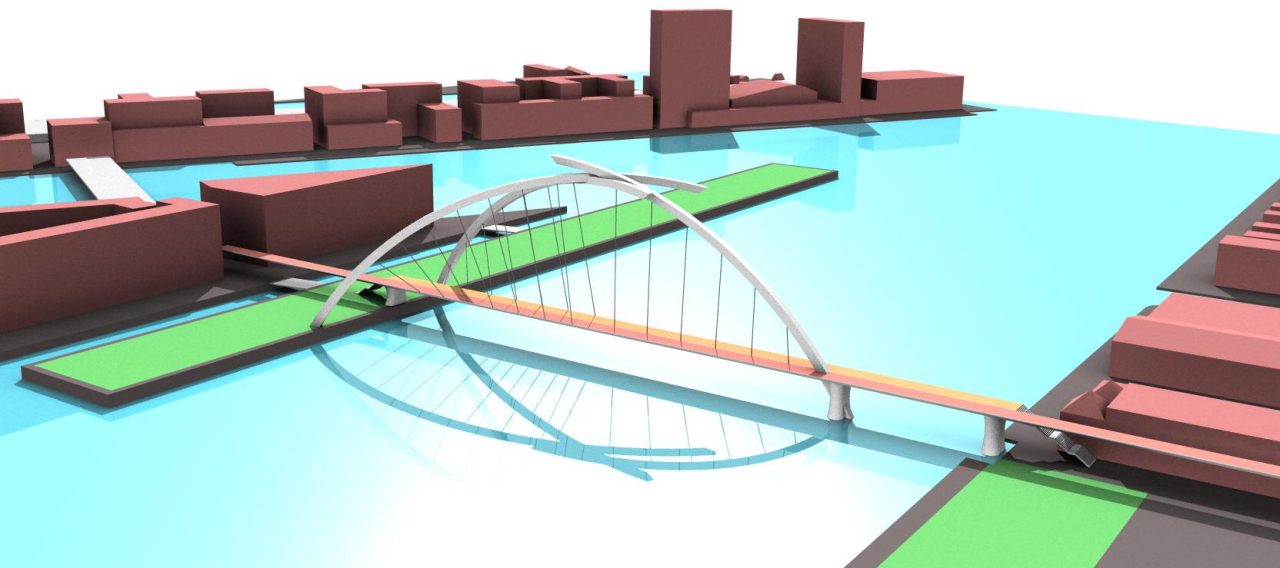
Sketch designs

Sketches

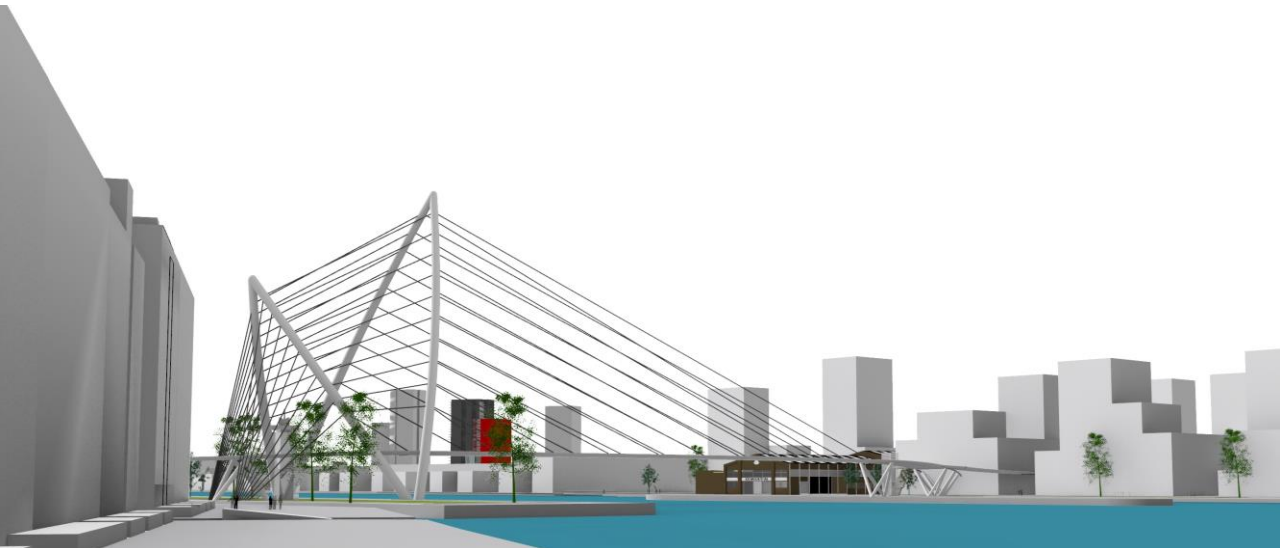


Sketch designs

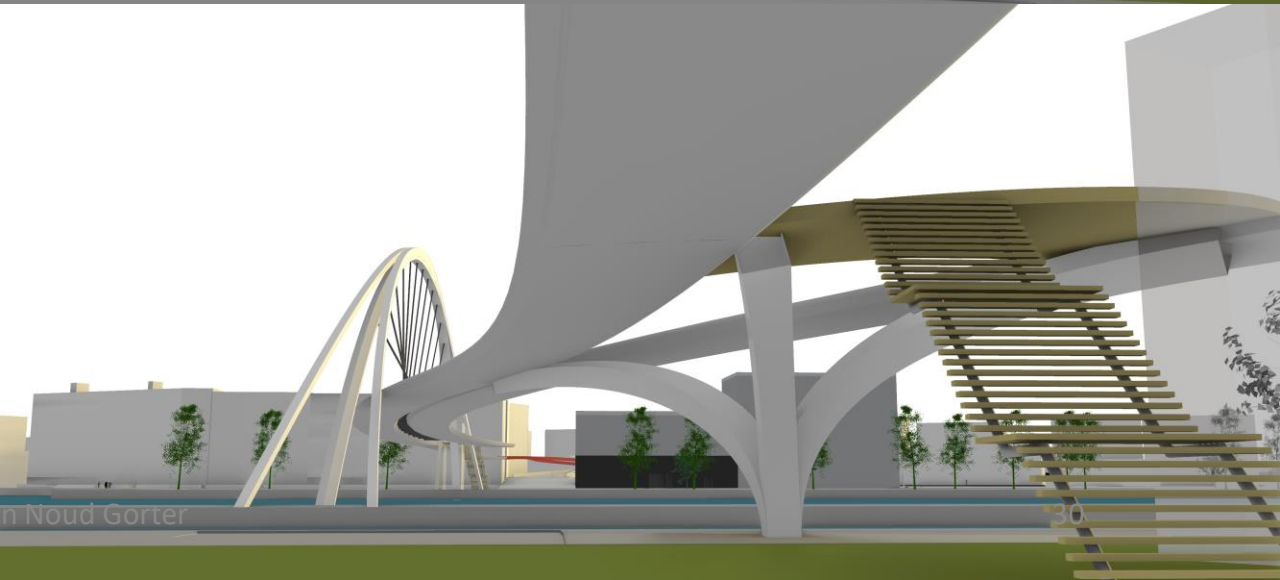
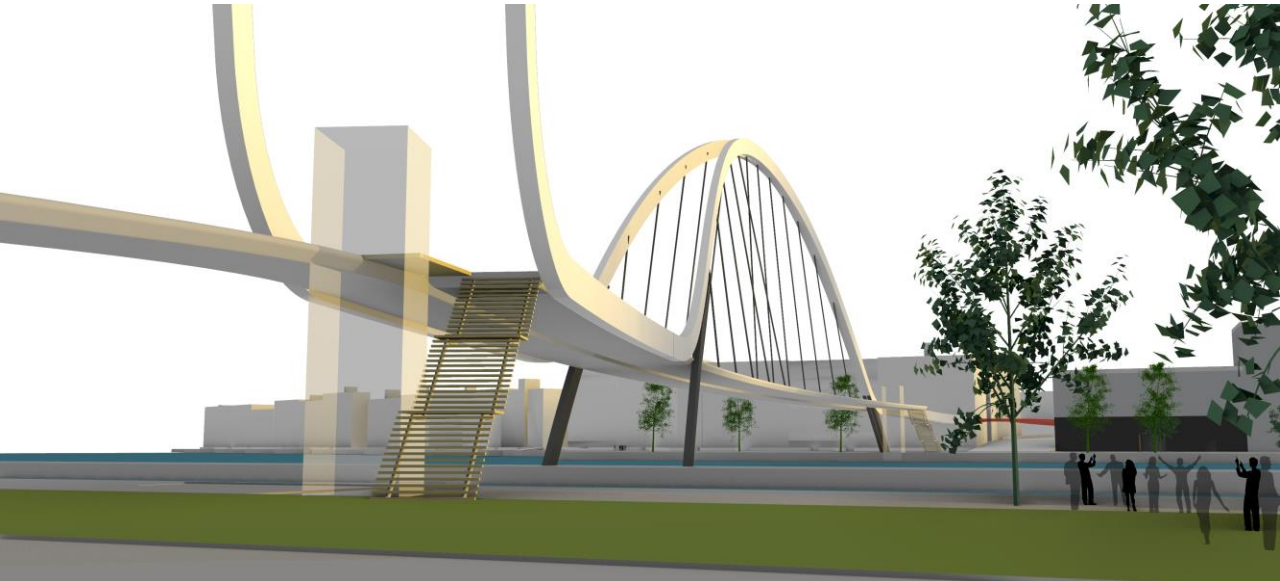
Sketch Models



Sketch designs

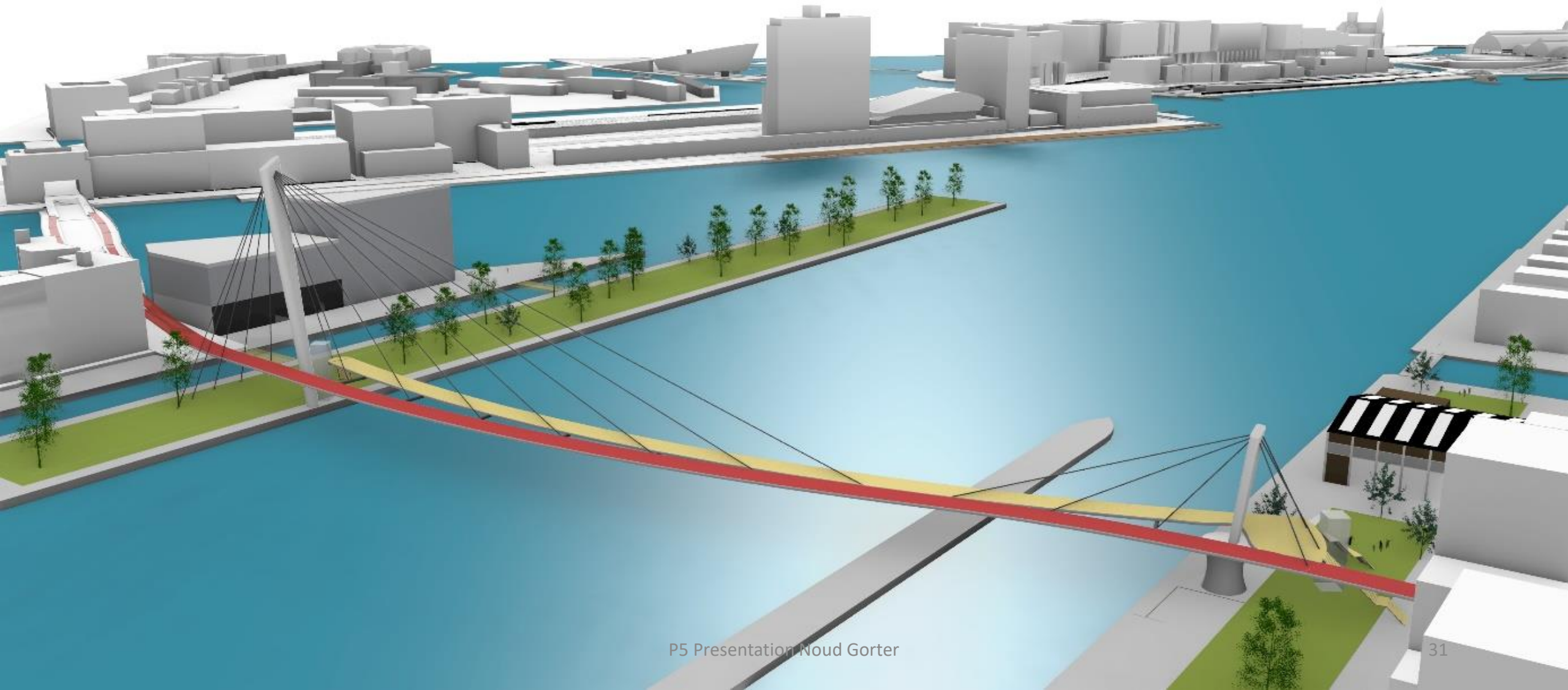


Developed designs

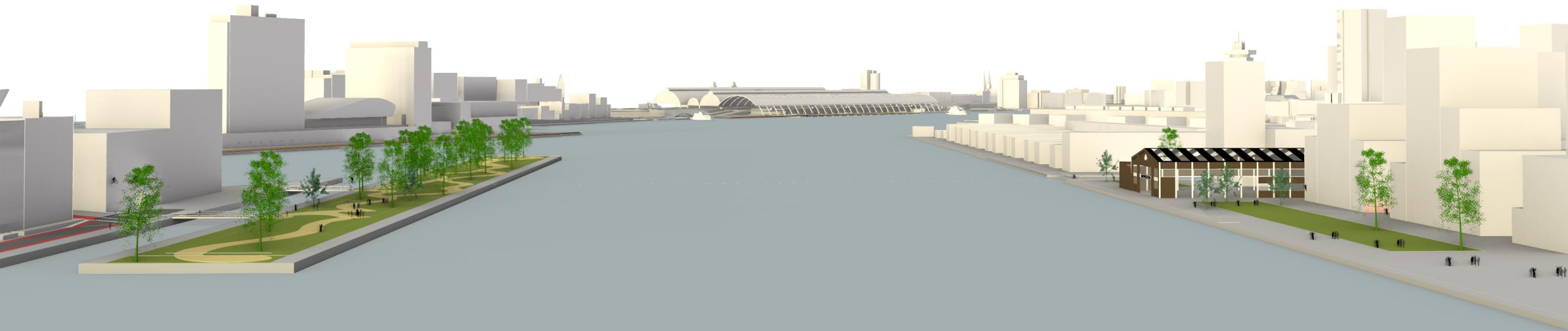


Sketch designs

Selected base design

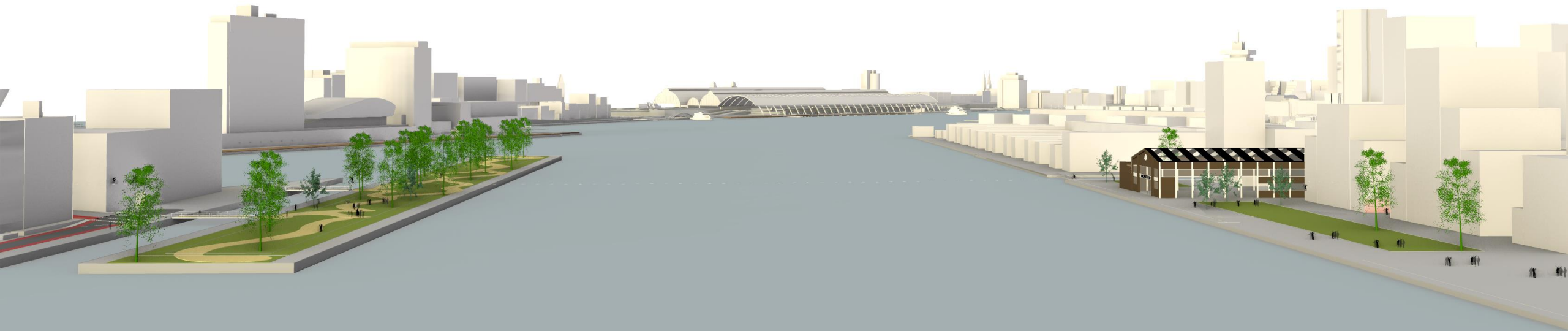


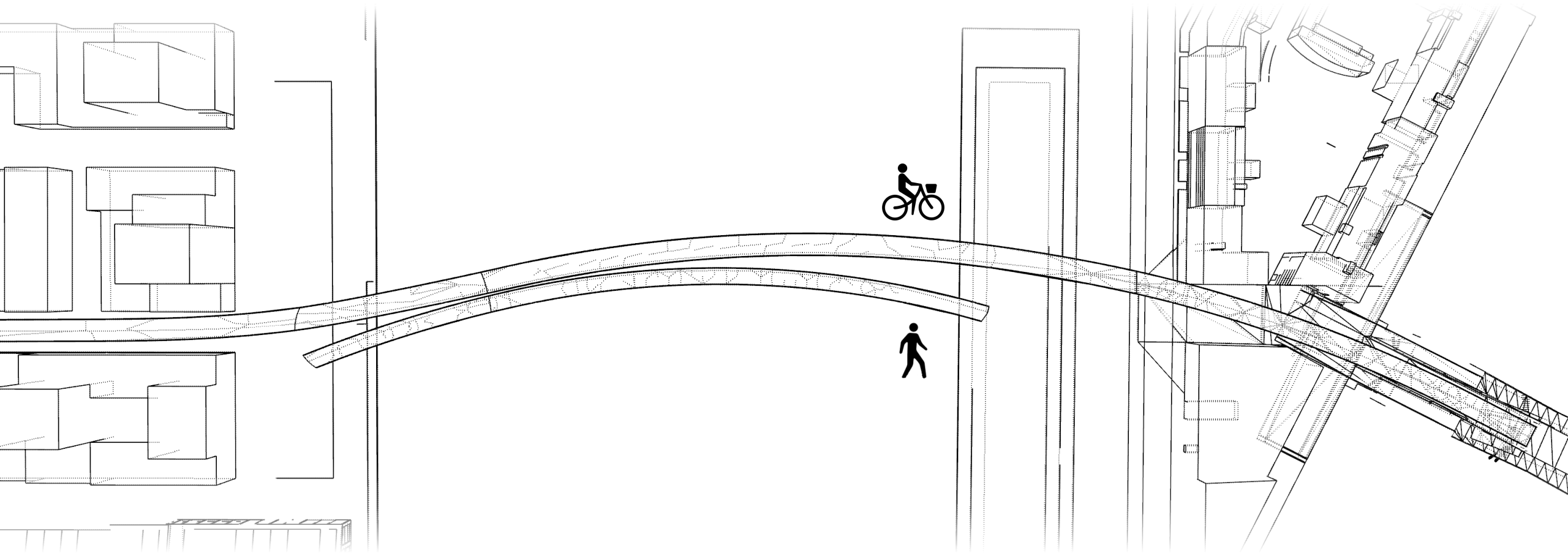
Design study

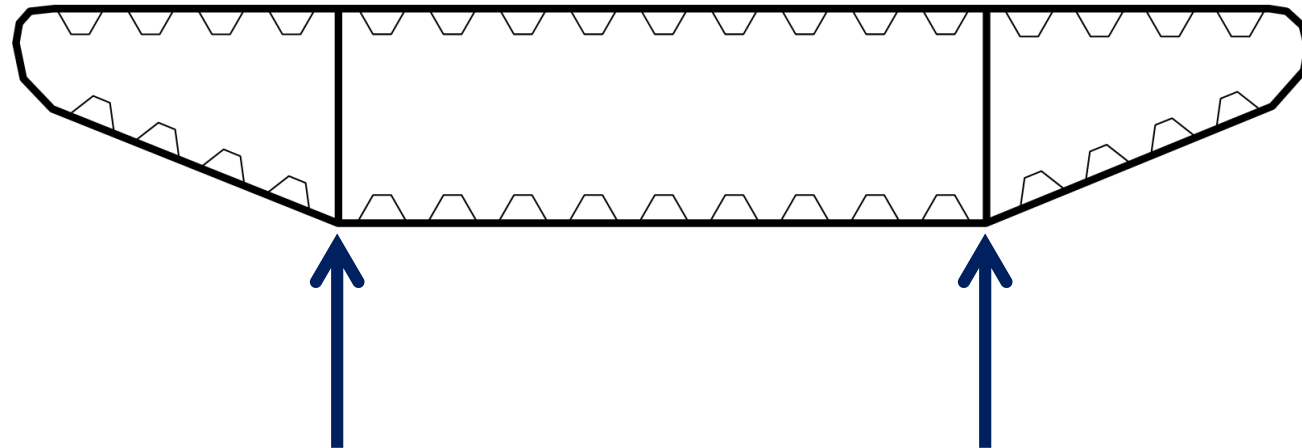


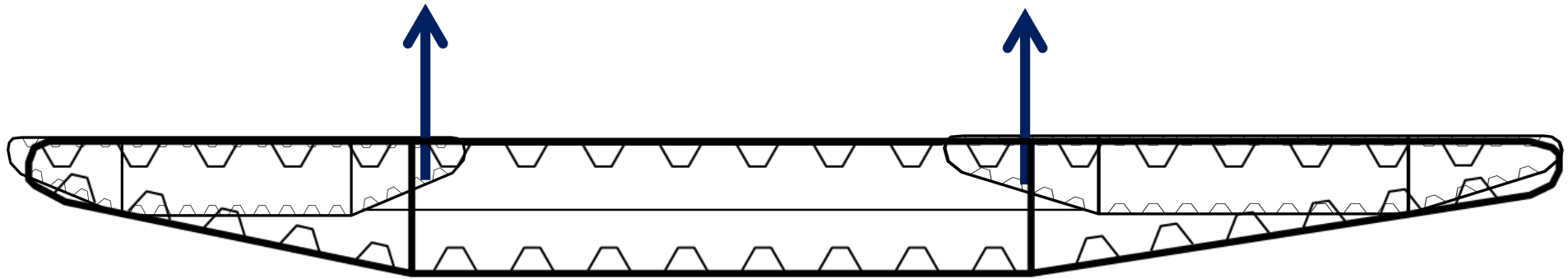
Design study

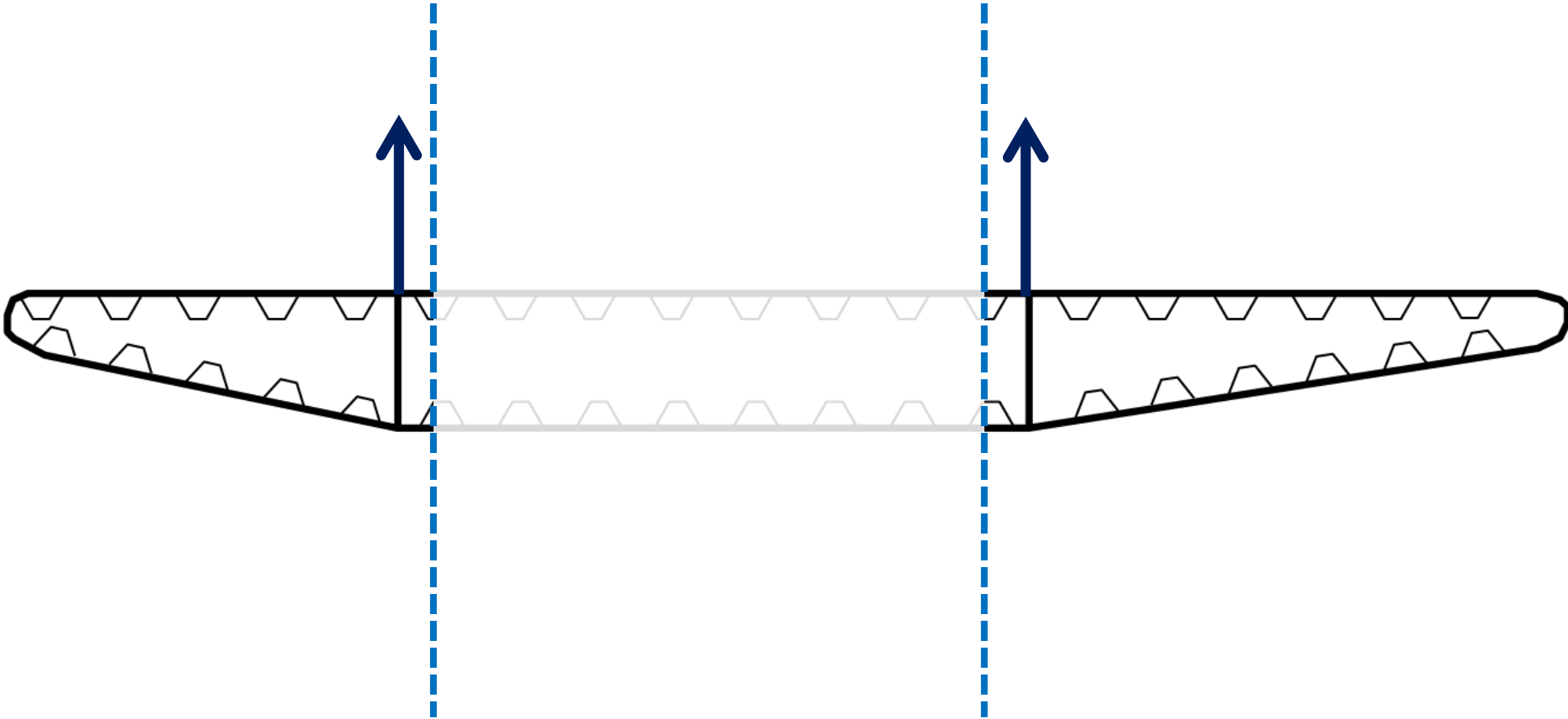
Bridge deck

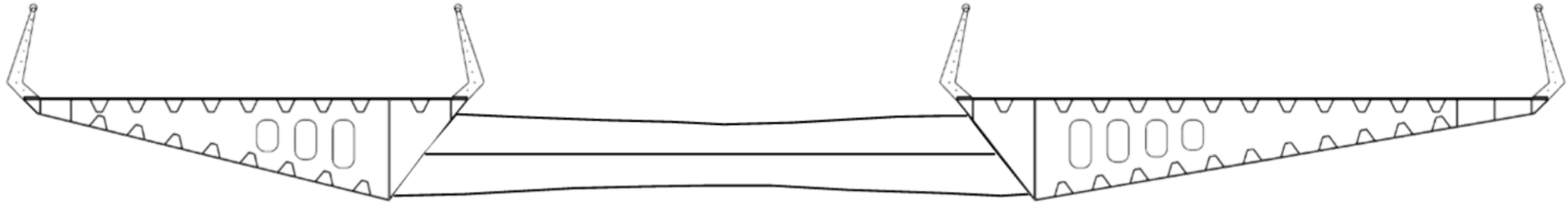


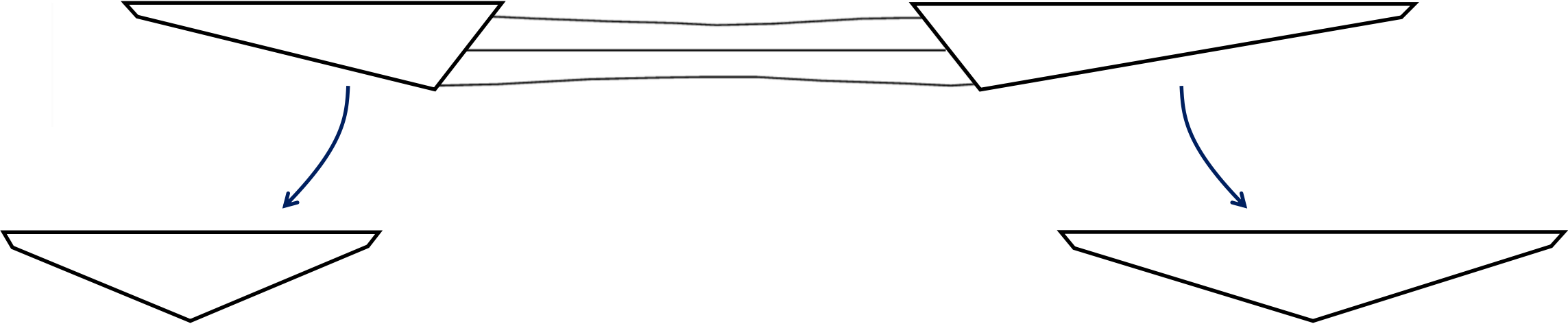




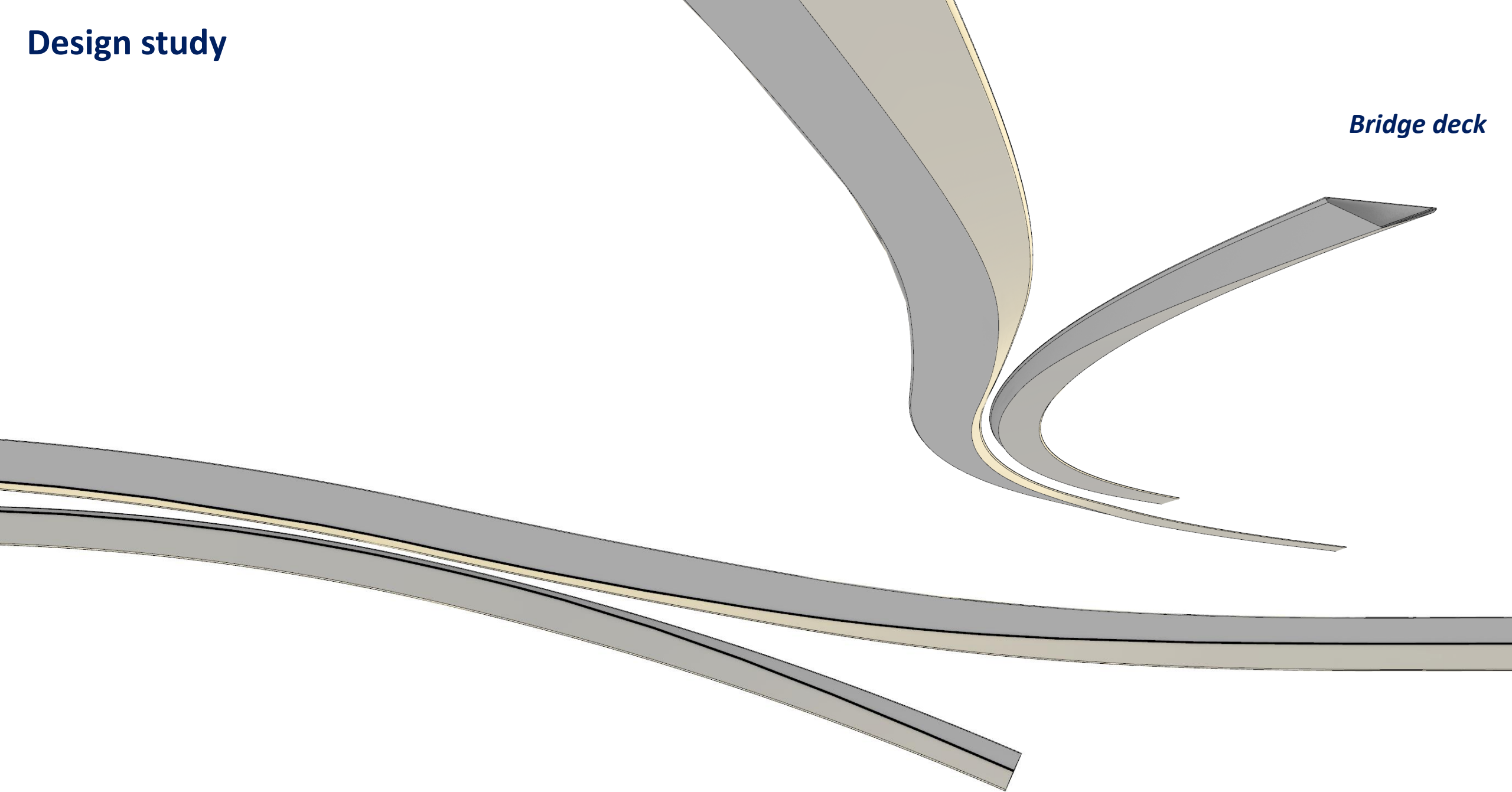


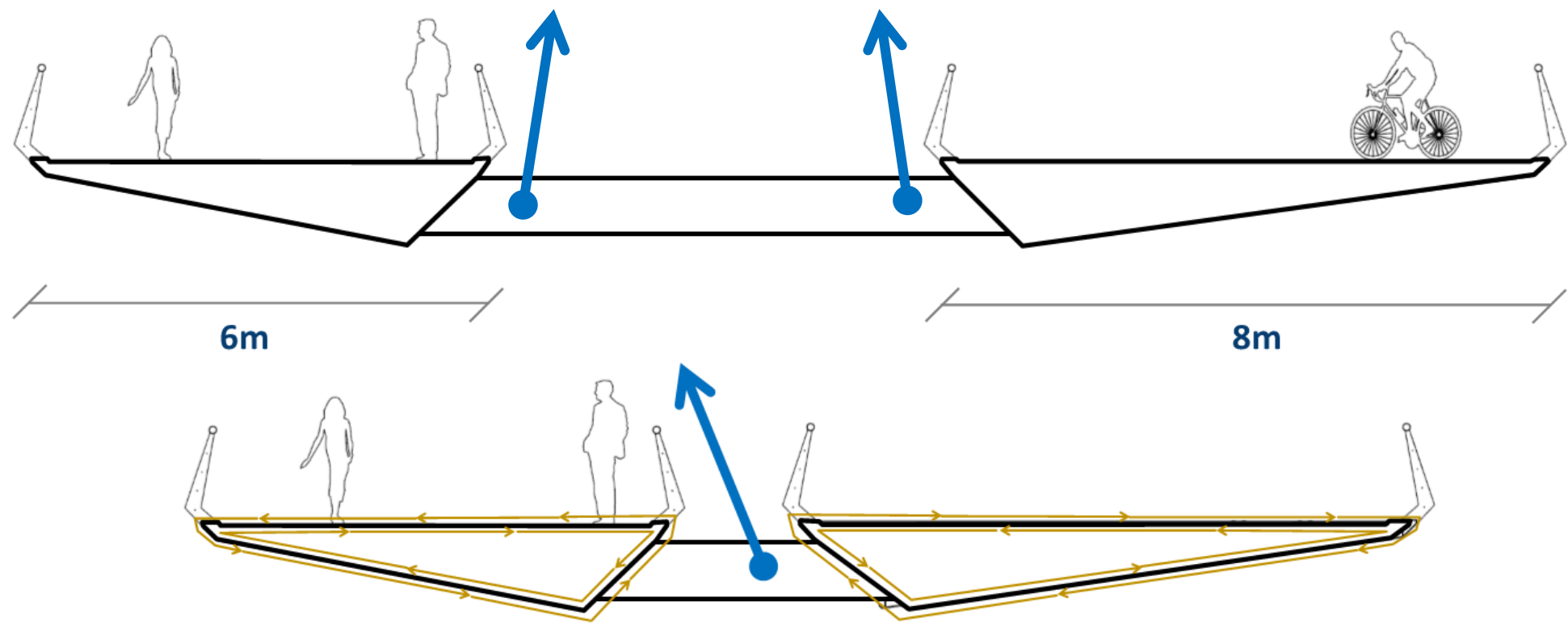






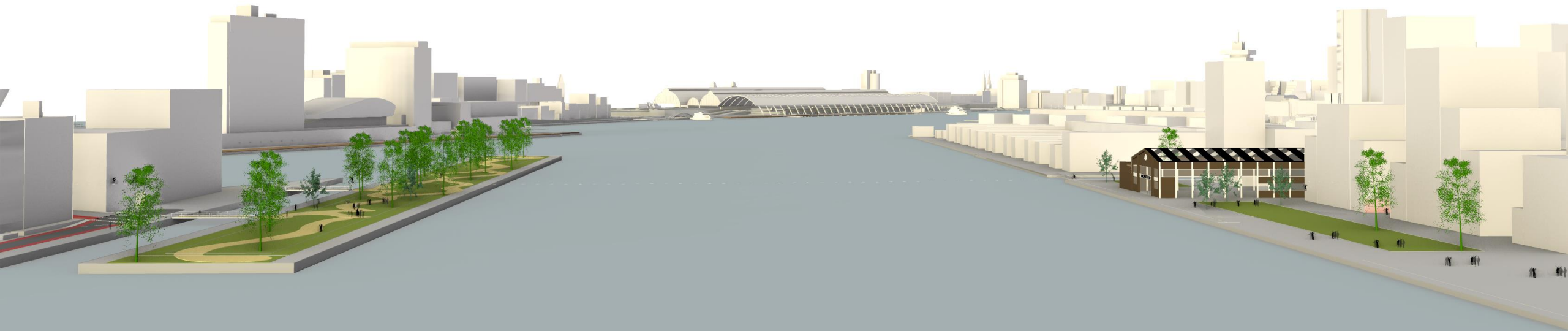
Bridge deck

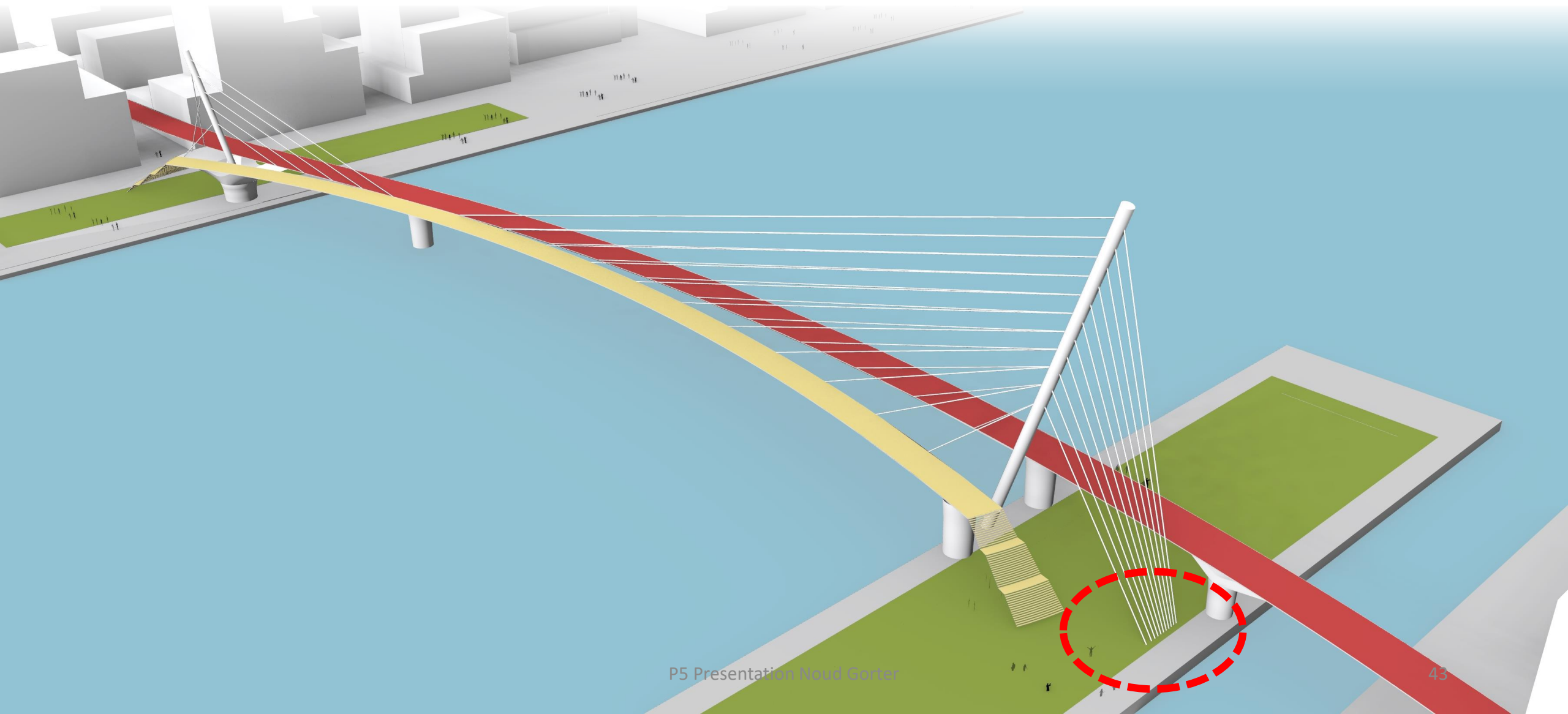


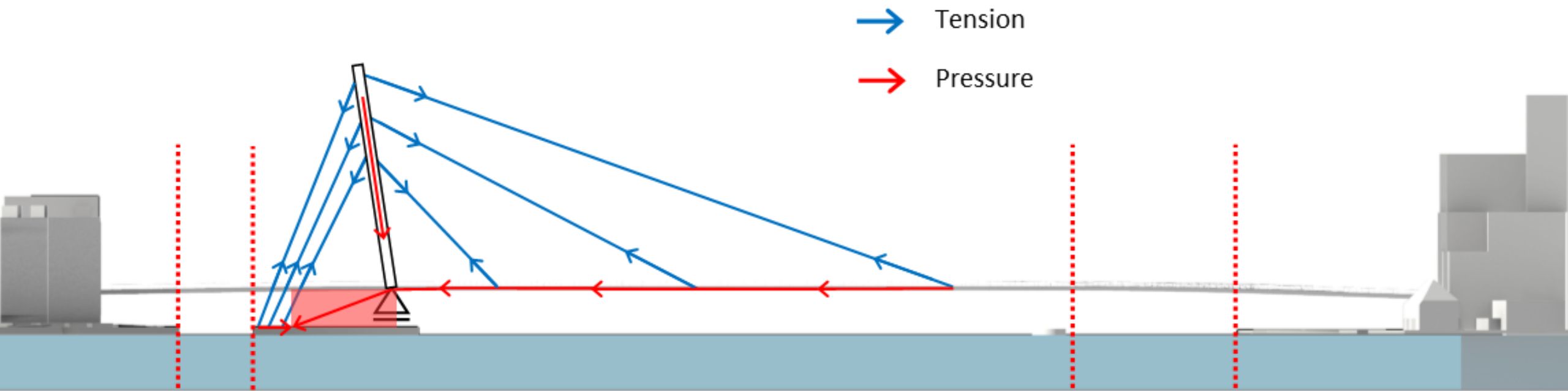


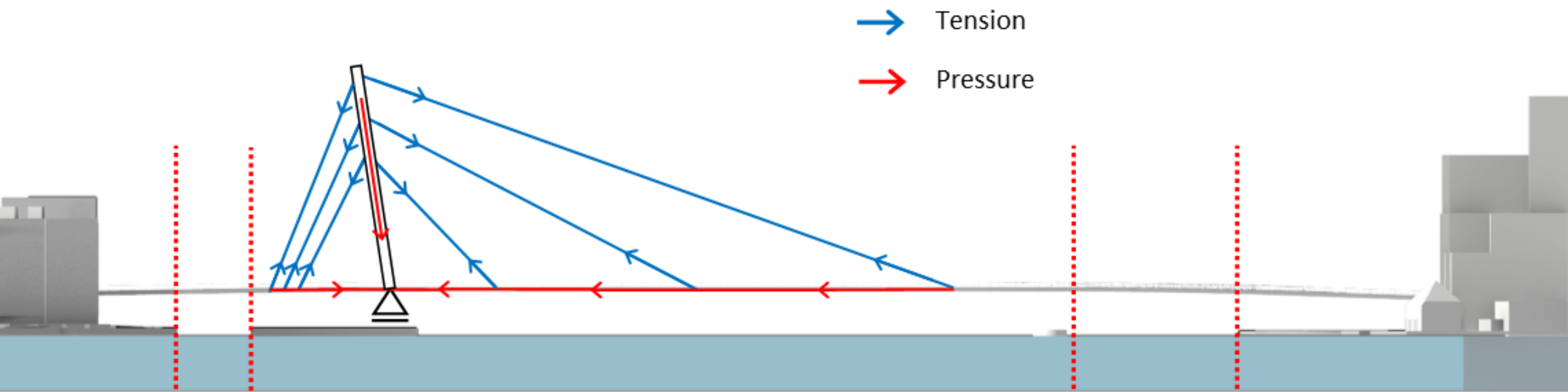
Design study

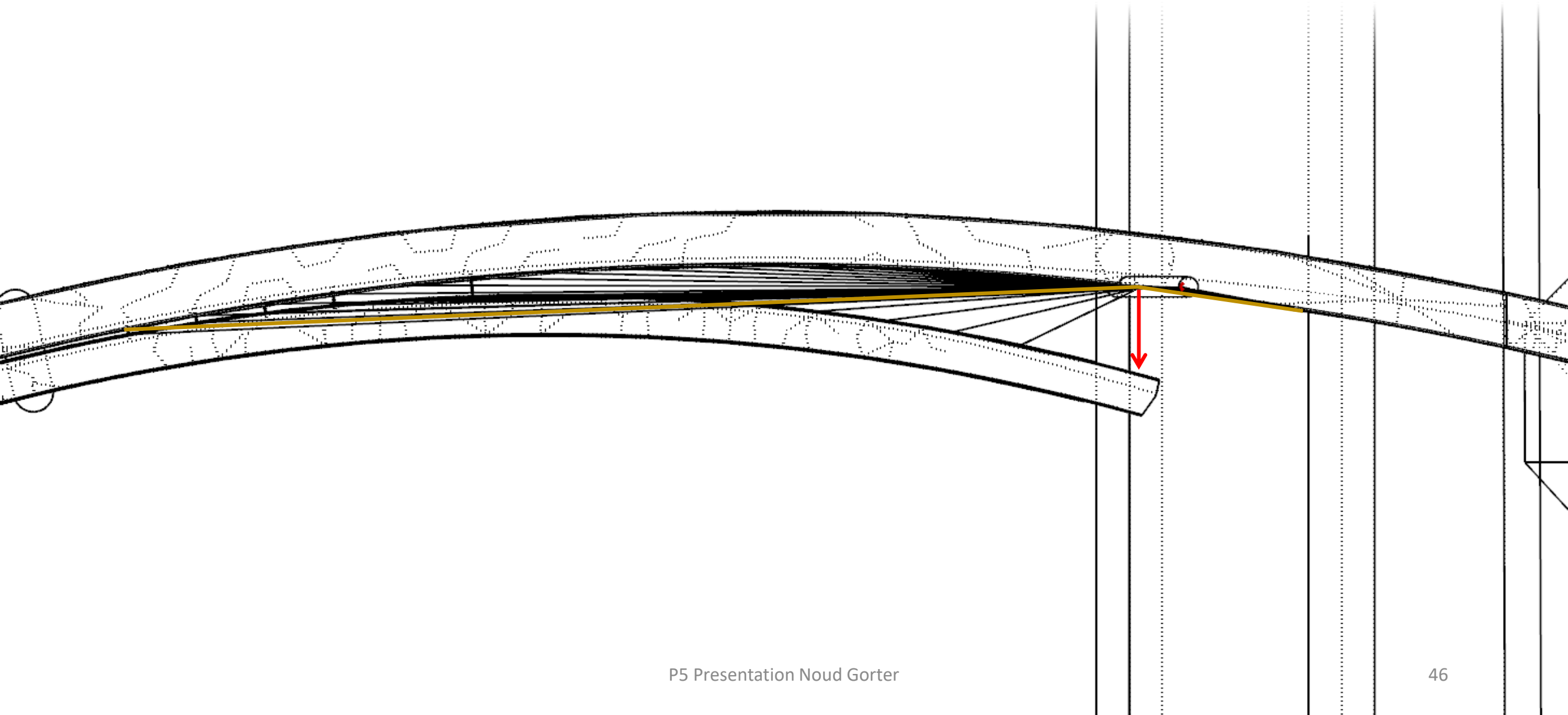
Cables & pylon

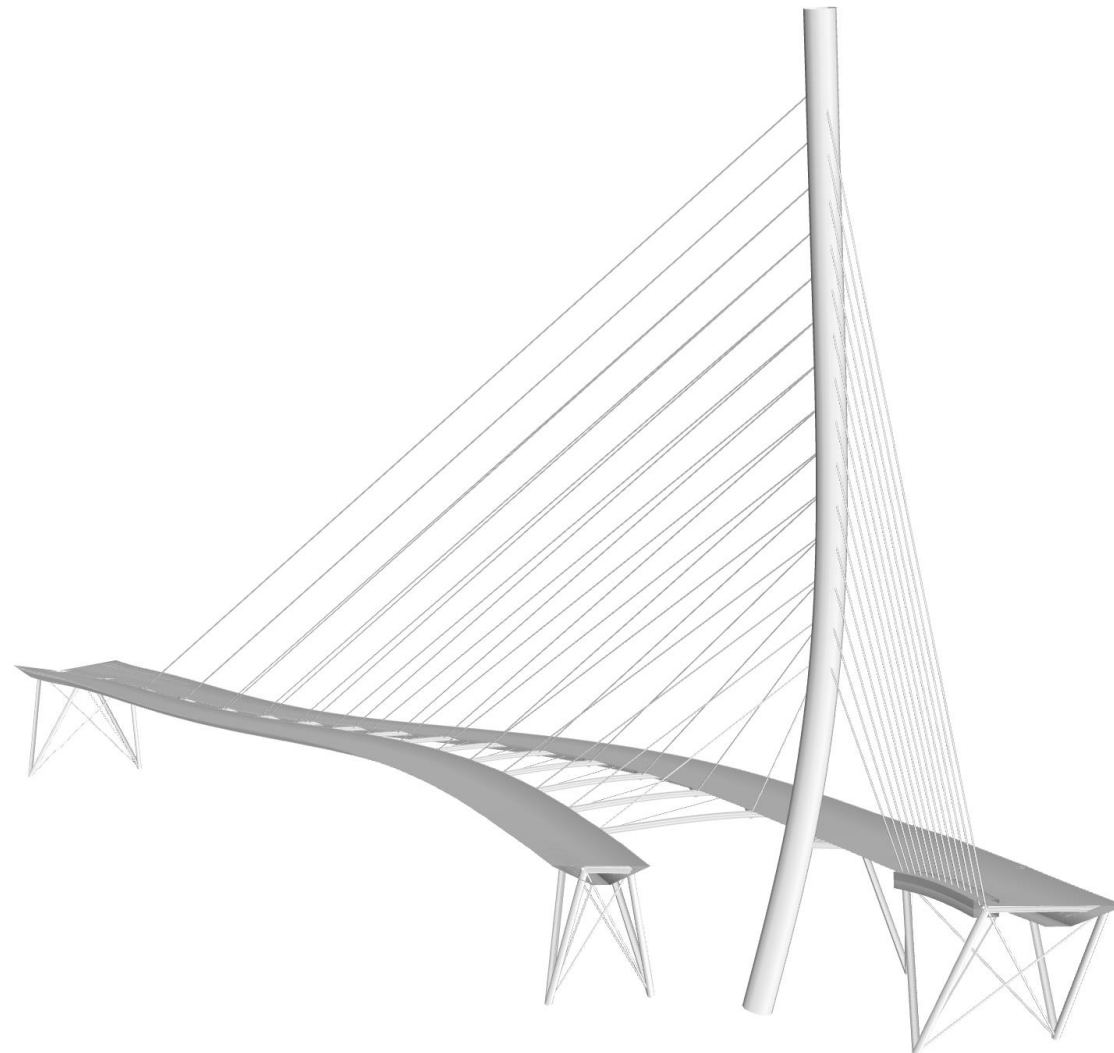




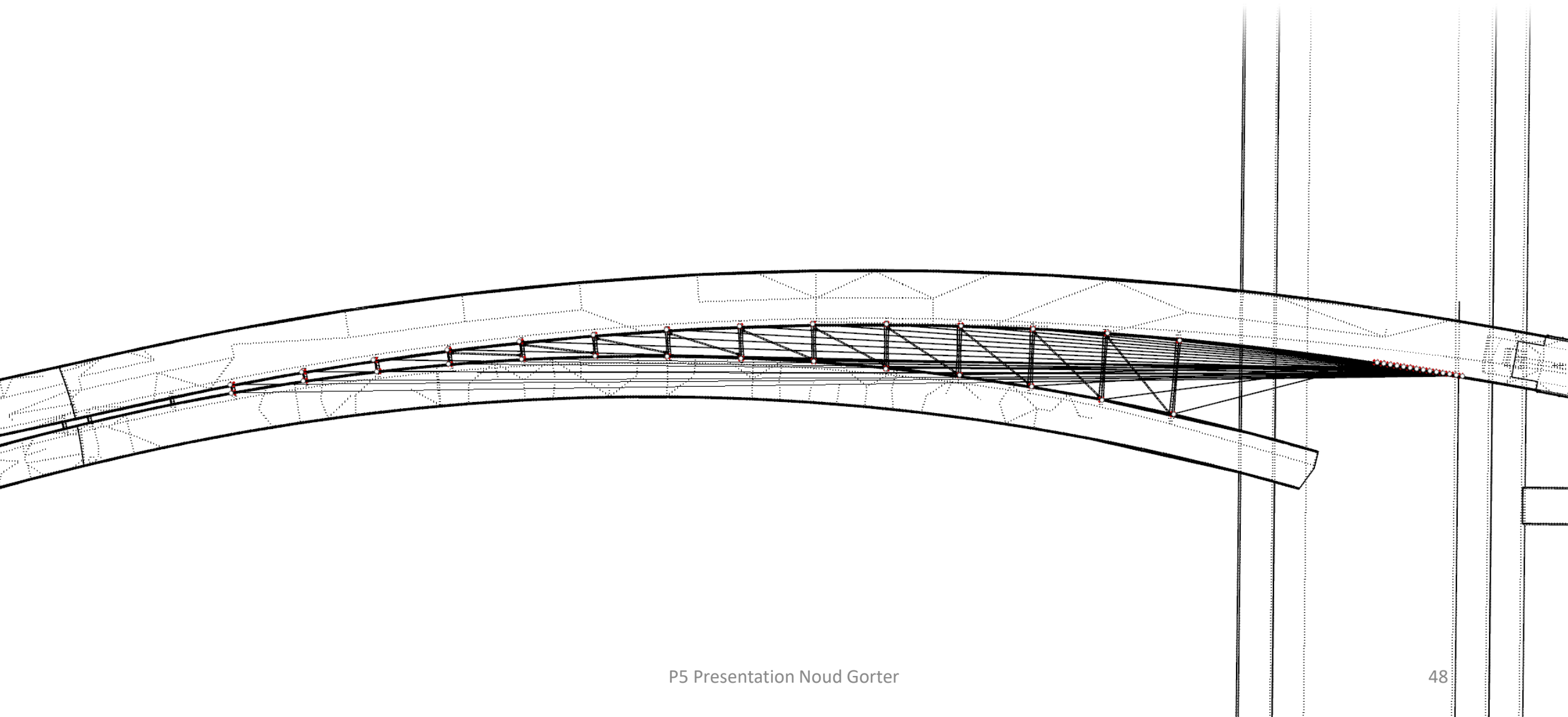


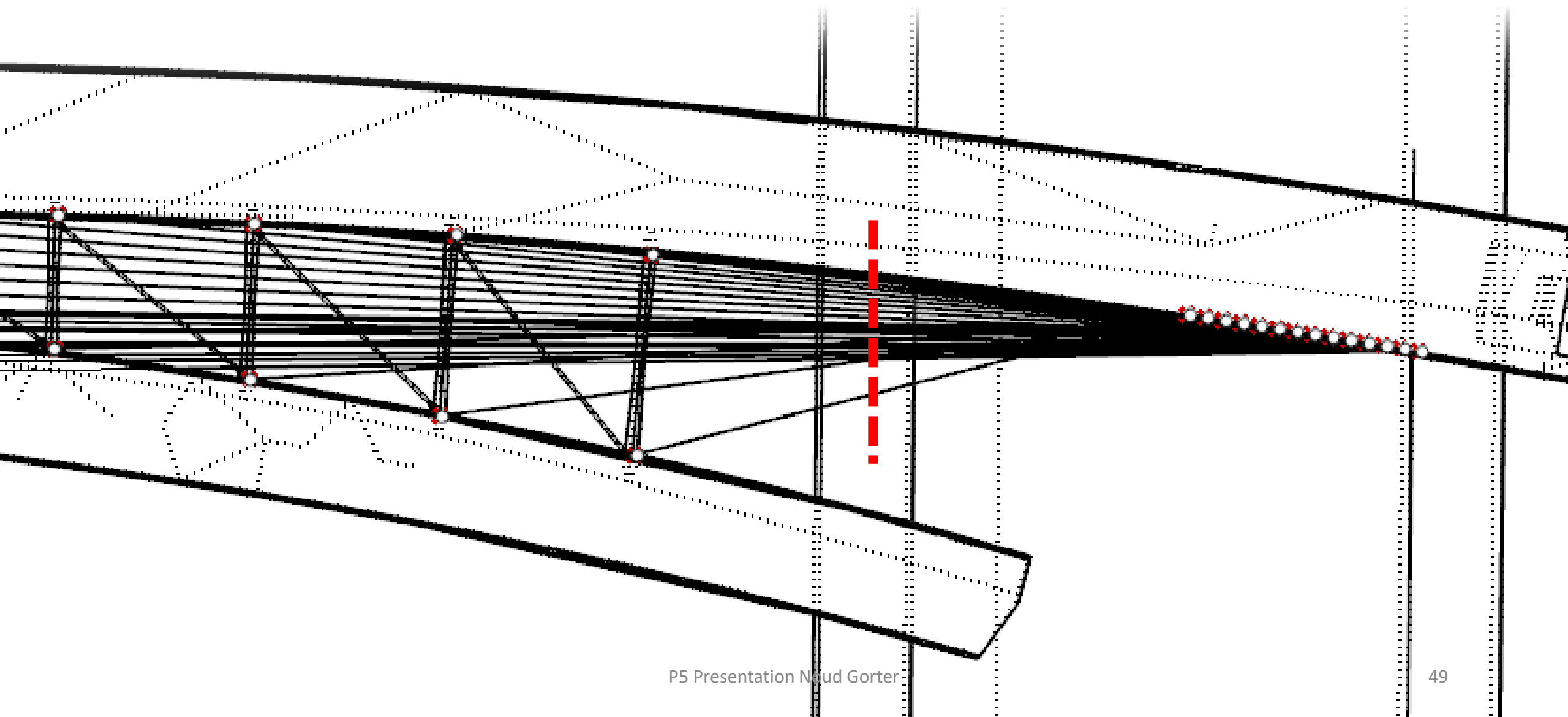


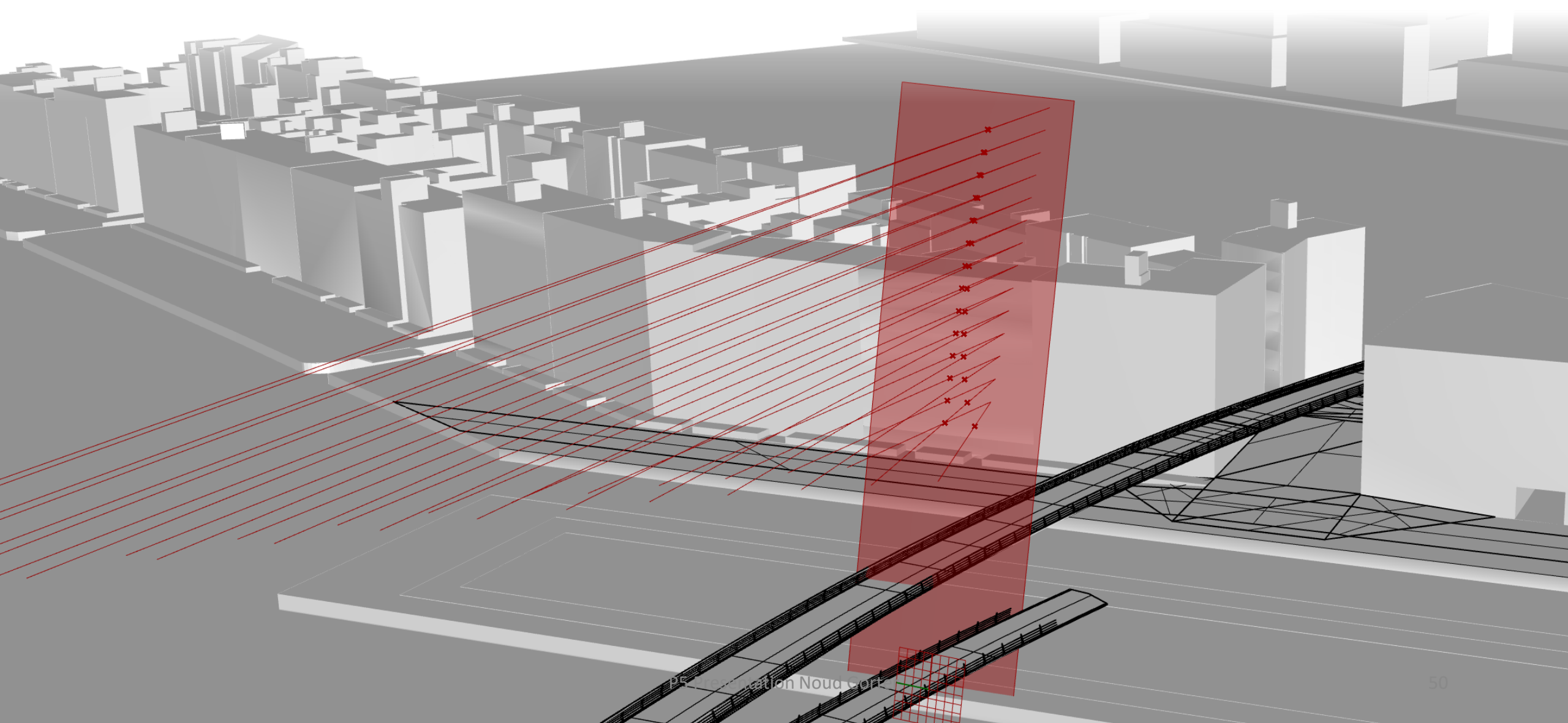


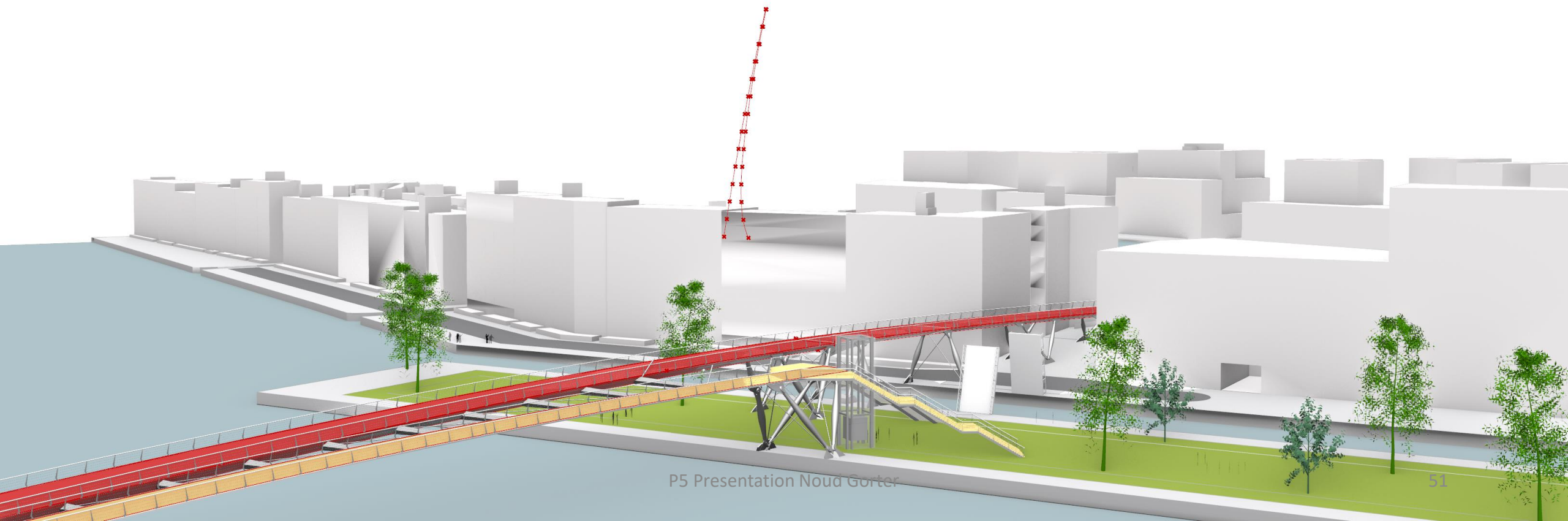


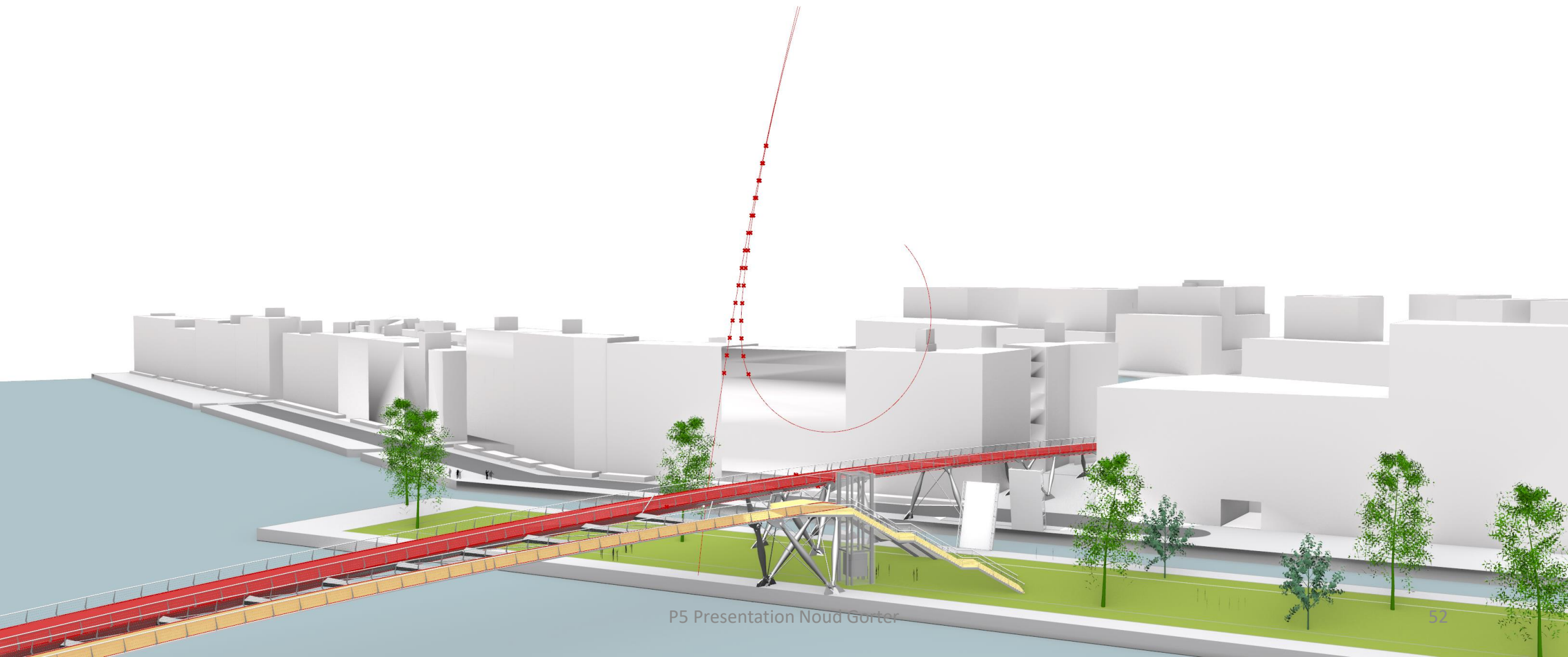
Straight pylon analysis
2m diameter
5x deformation



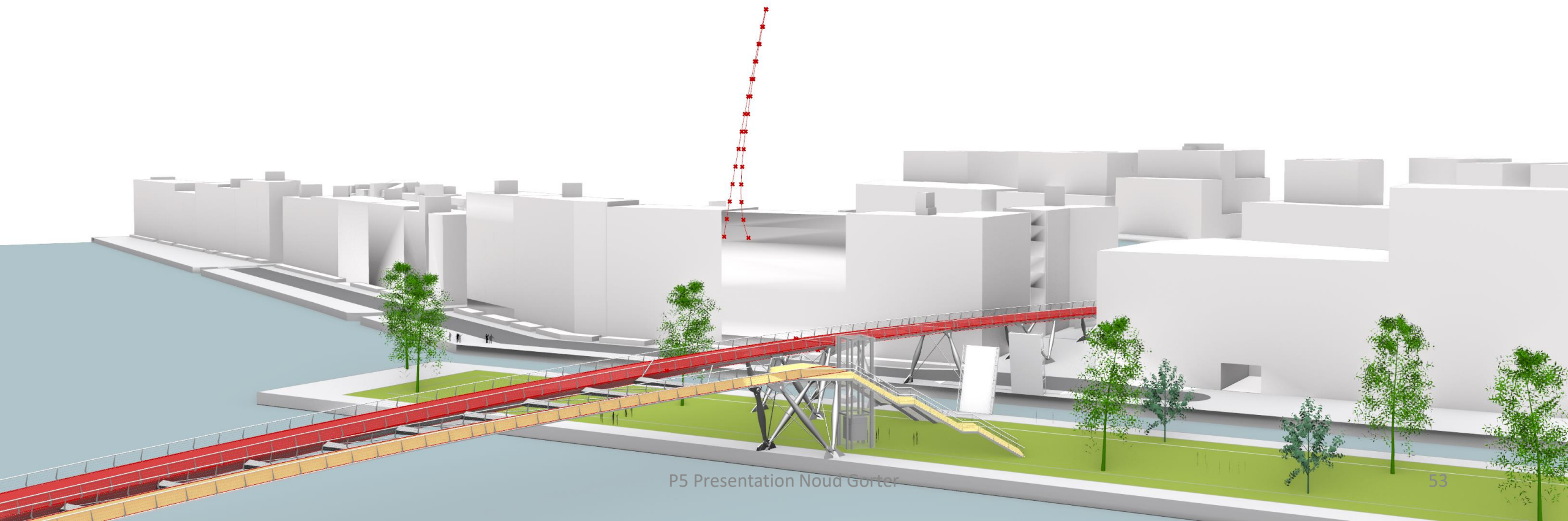


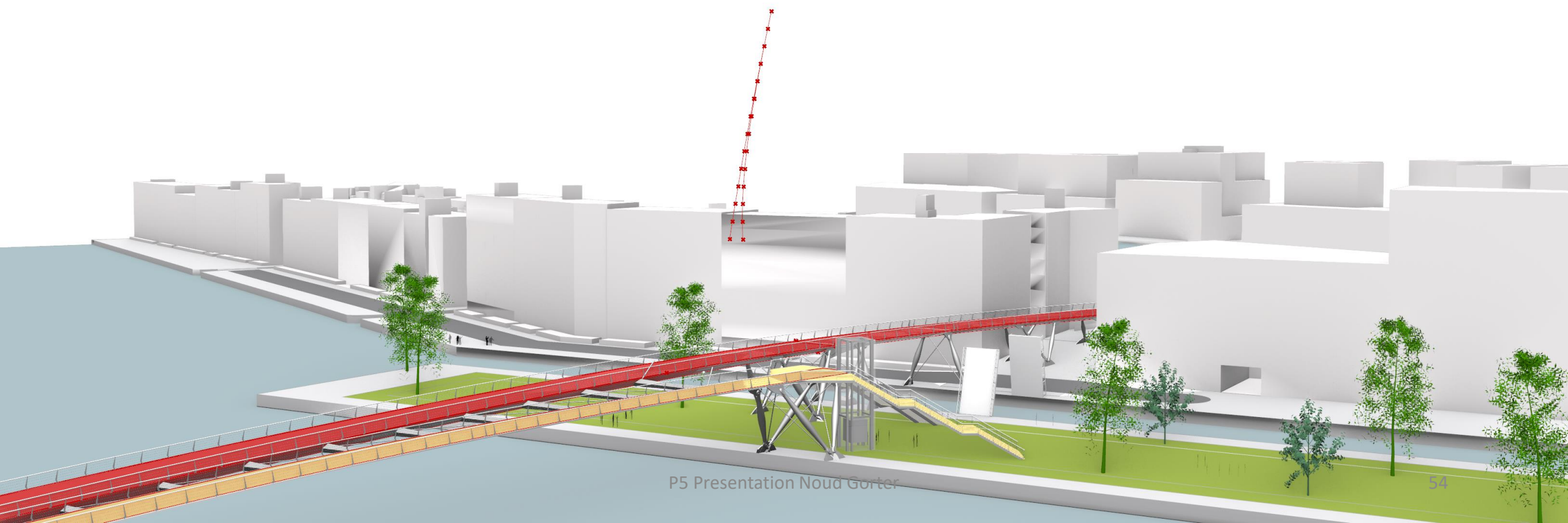




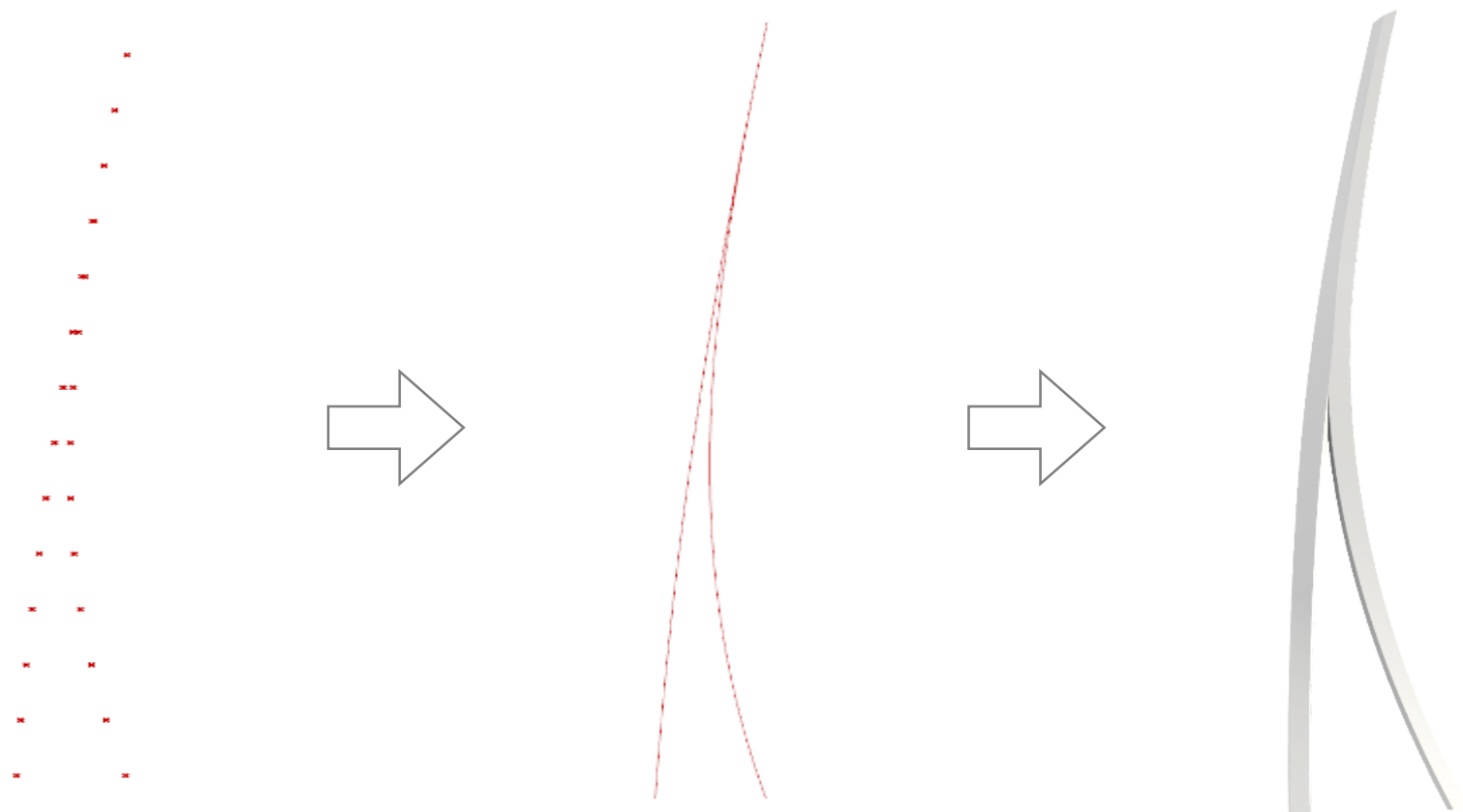


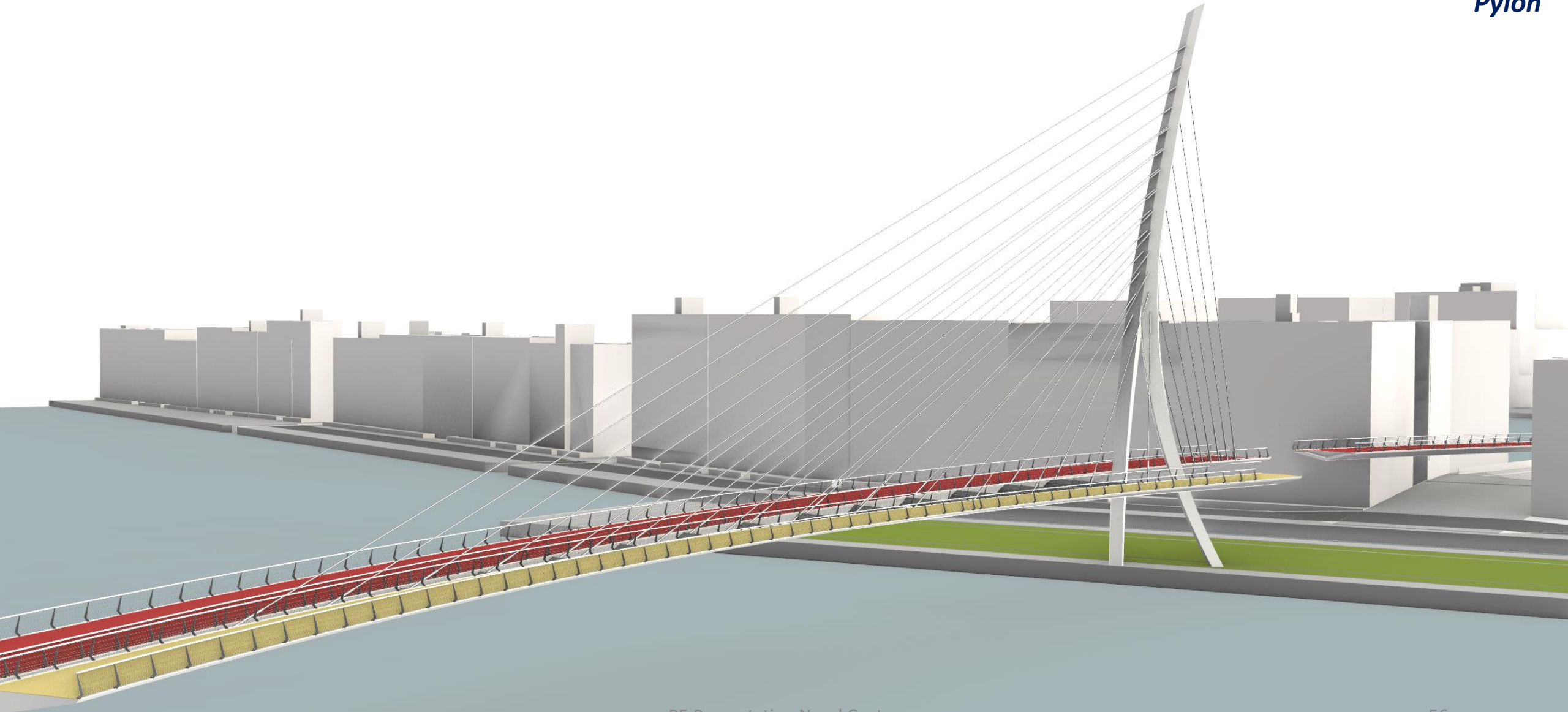
P5 Presentation Noud Gorter

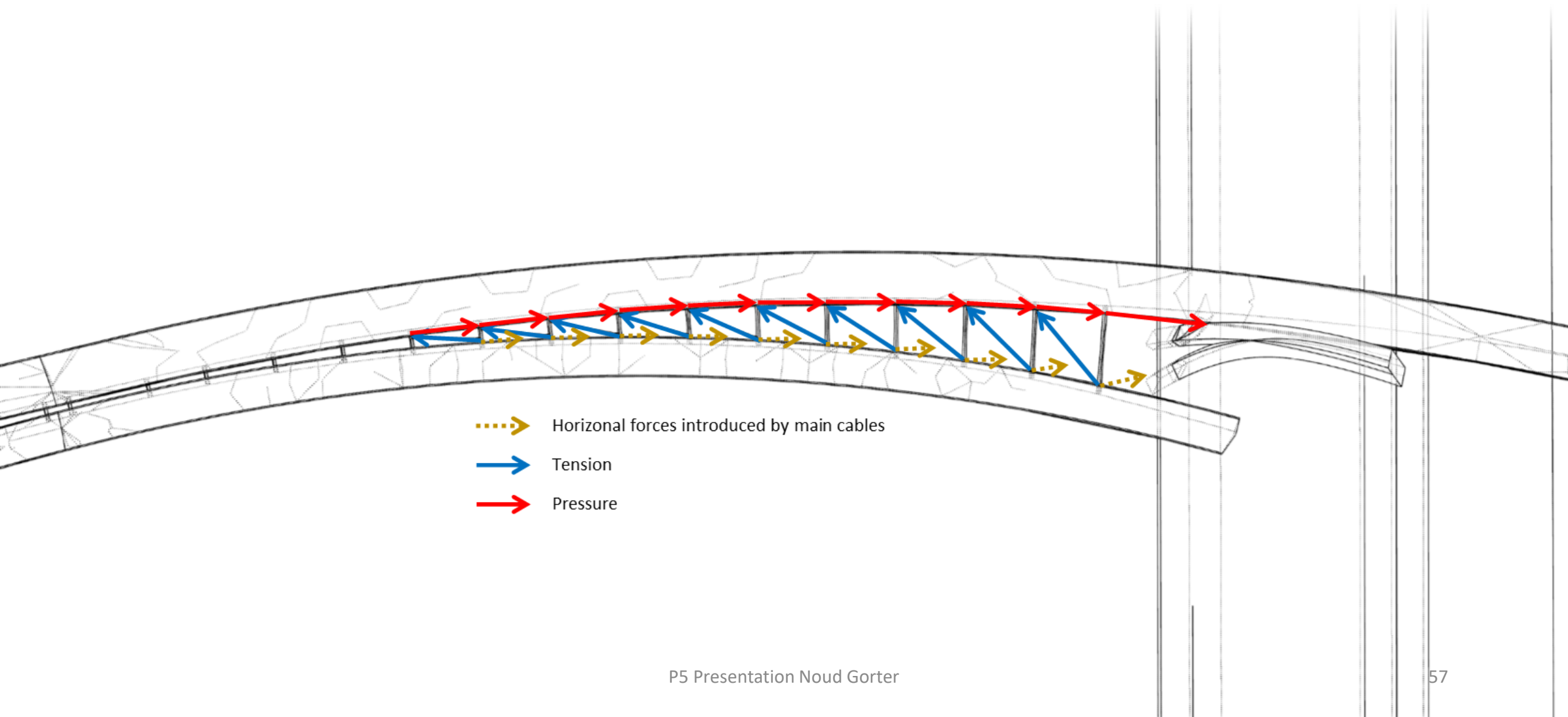




P5 Presentation Noud Gorter

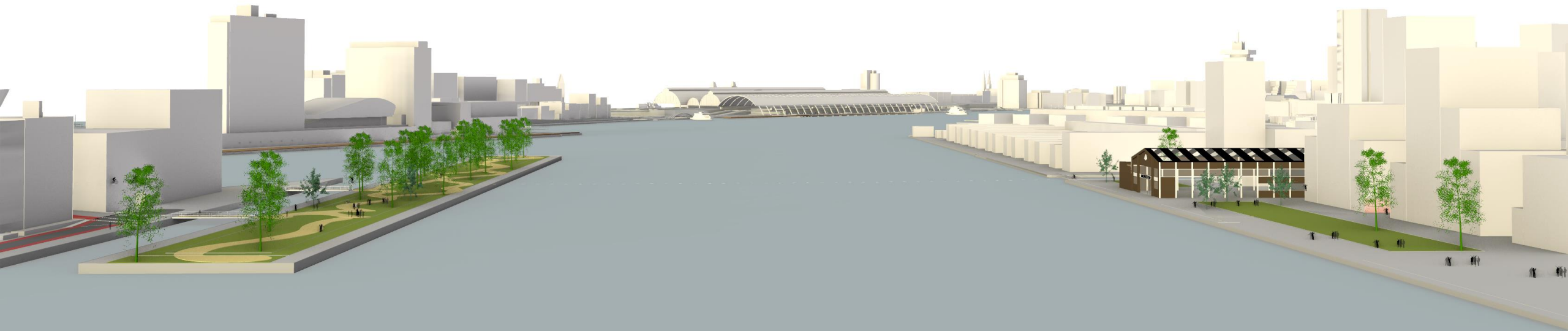


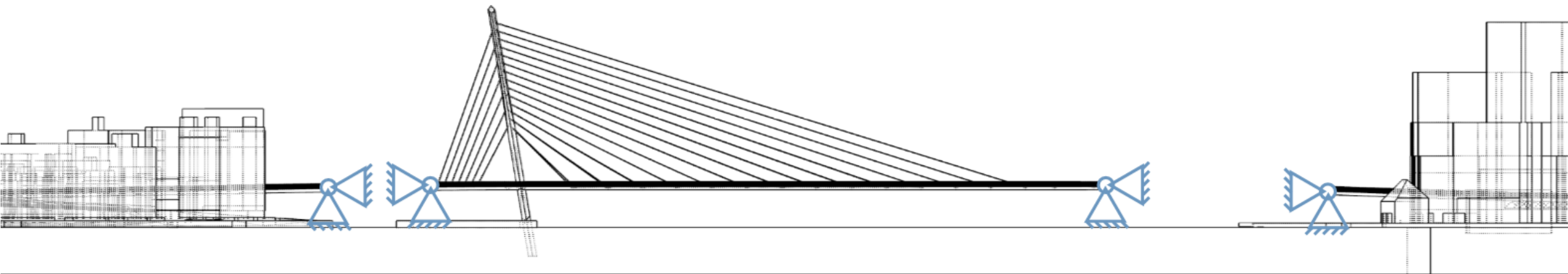


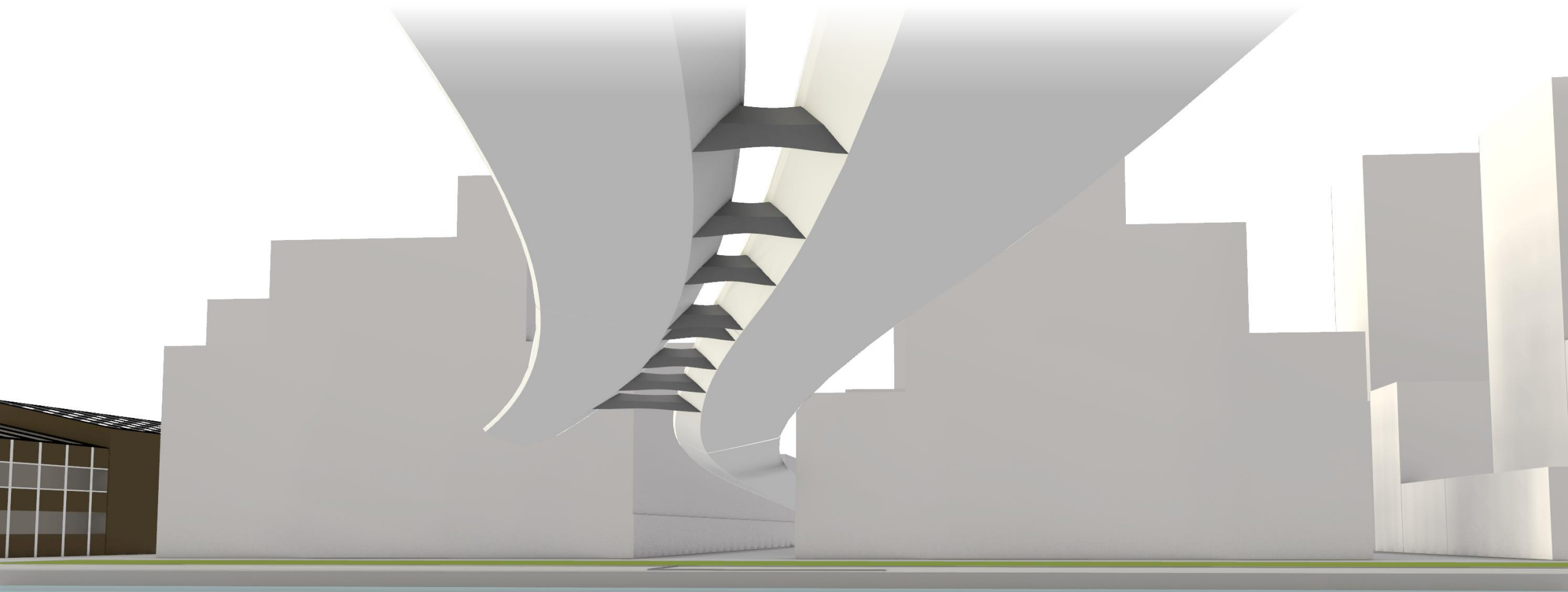


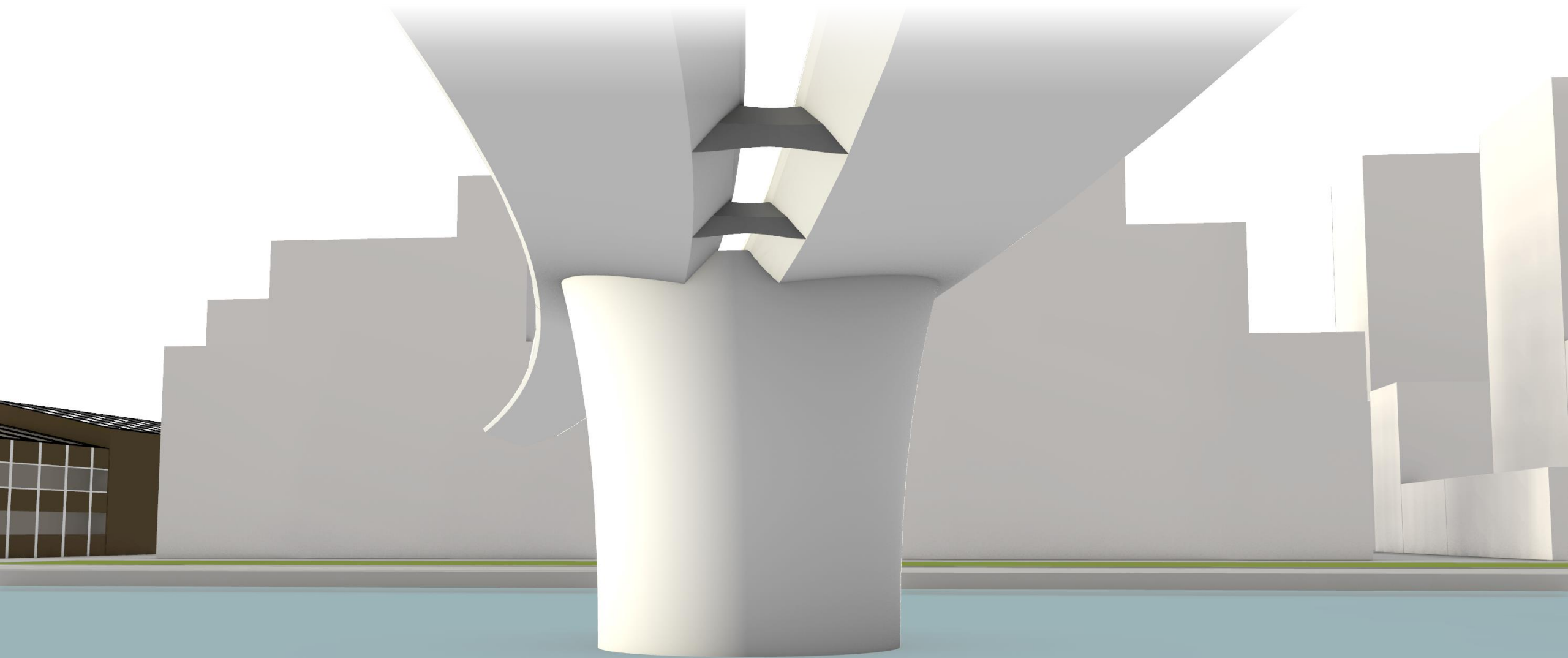
Design study

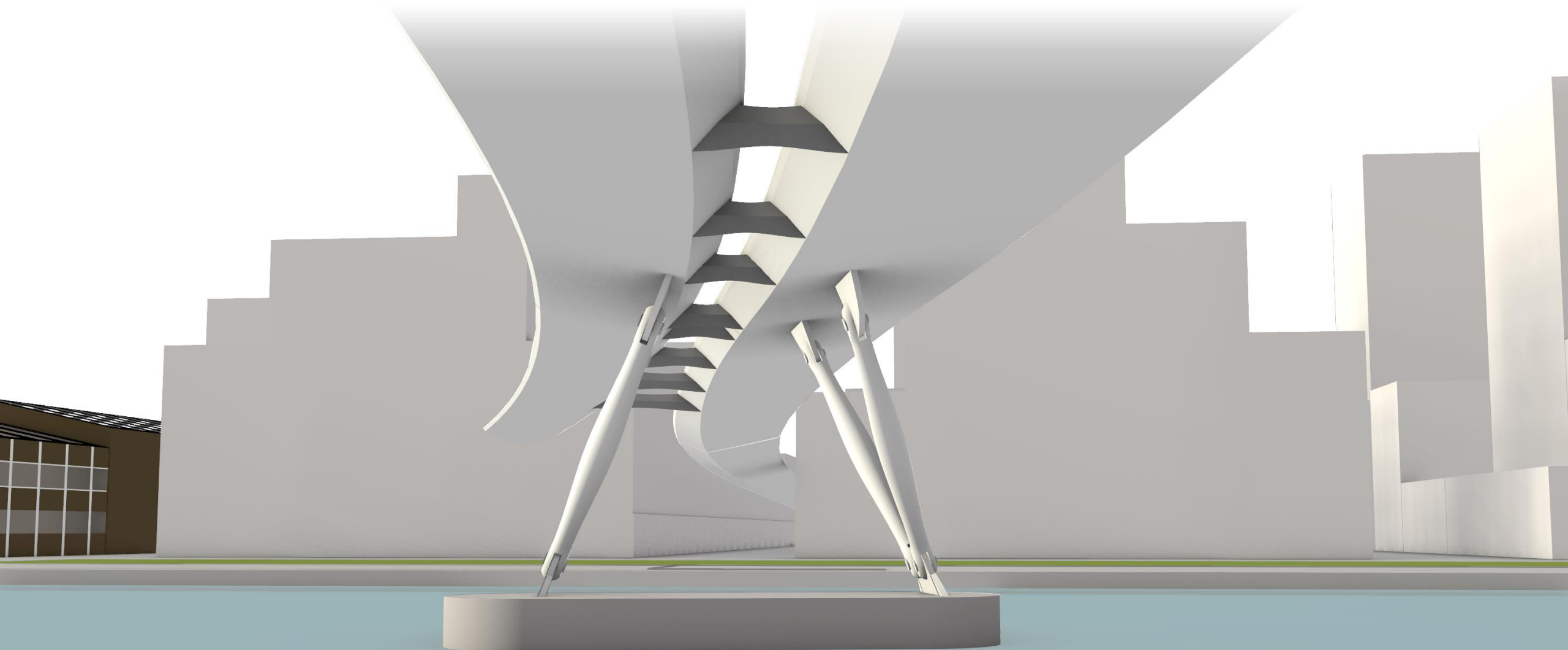
Supports

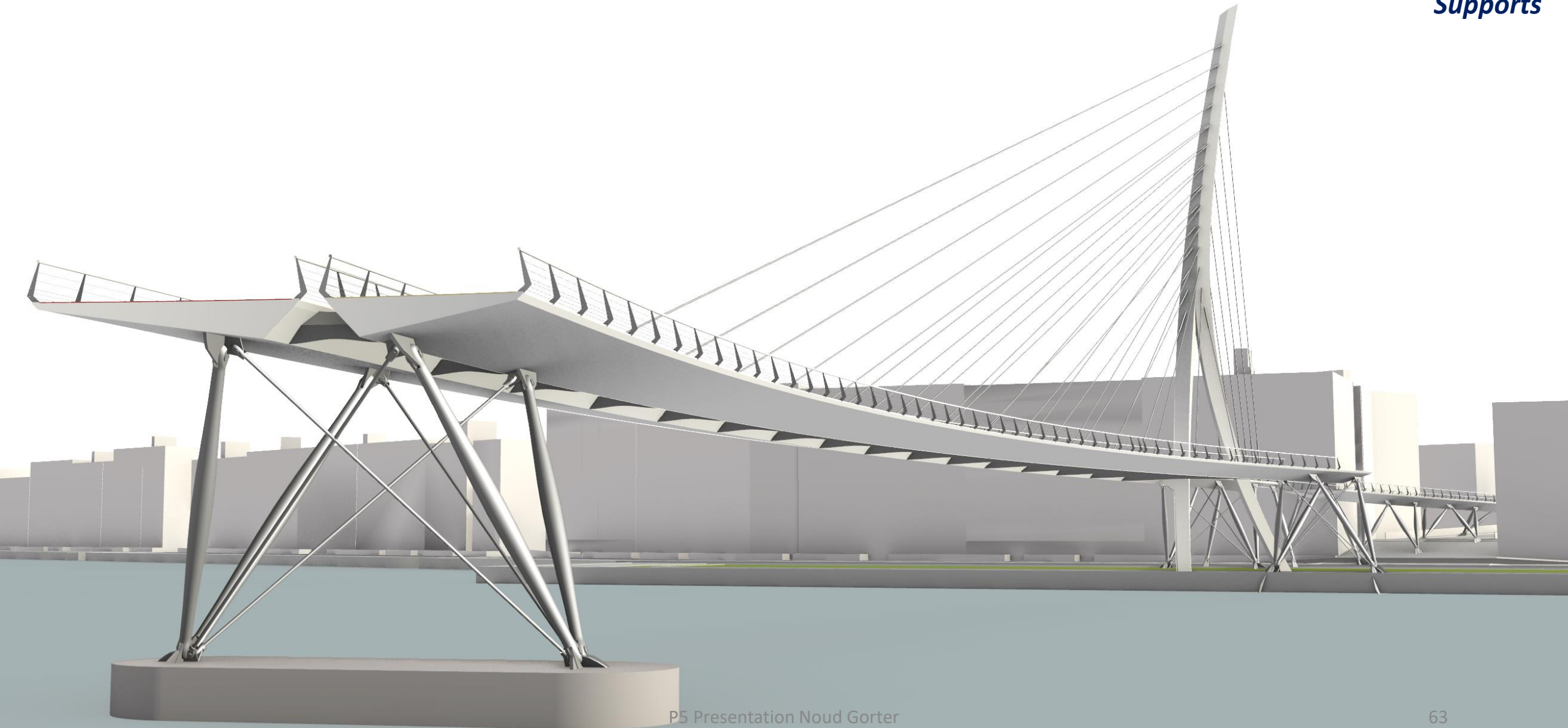




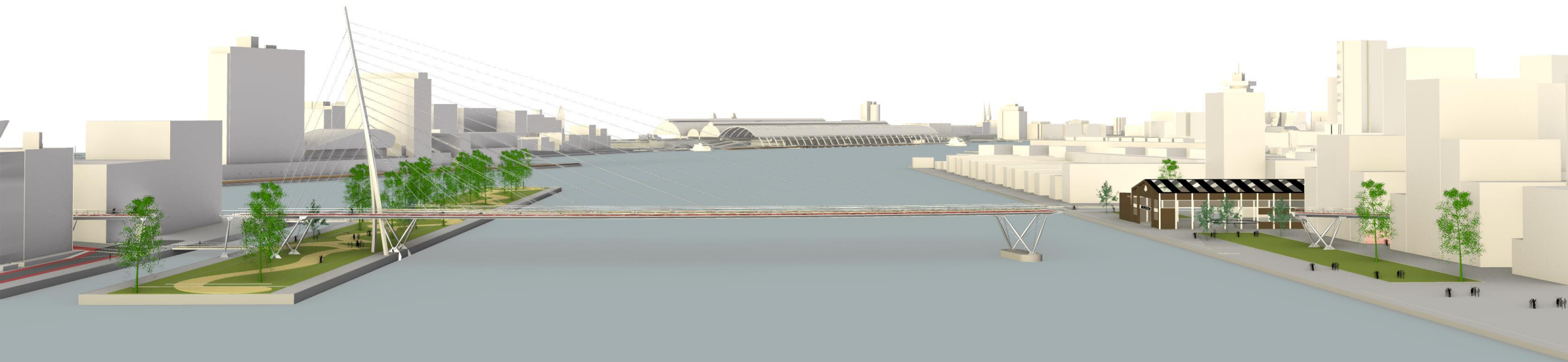




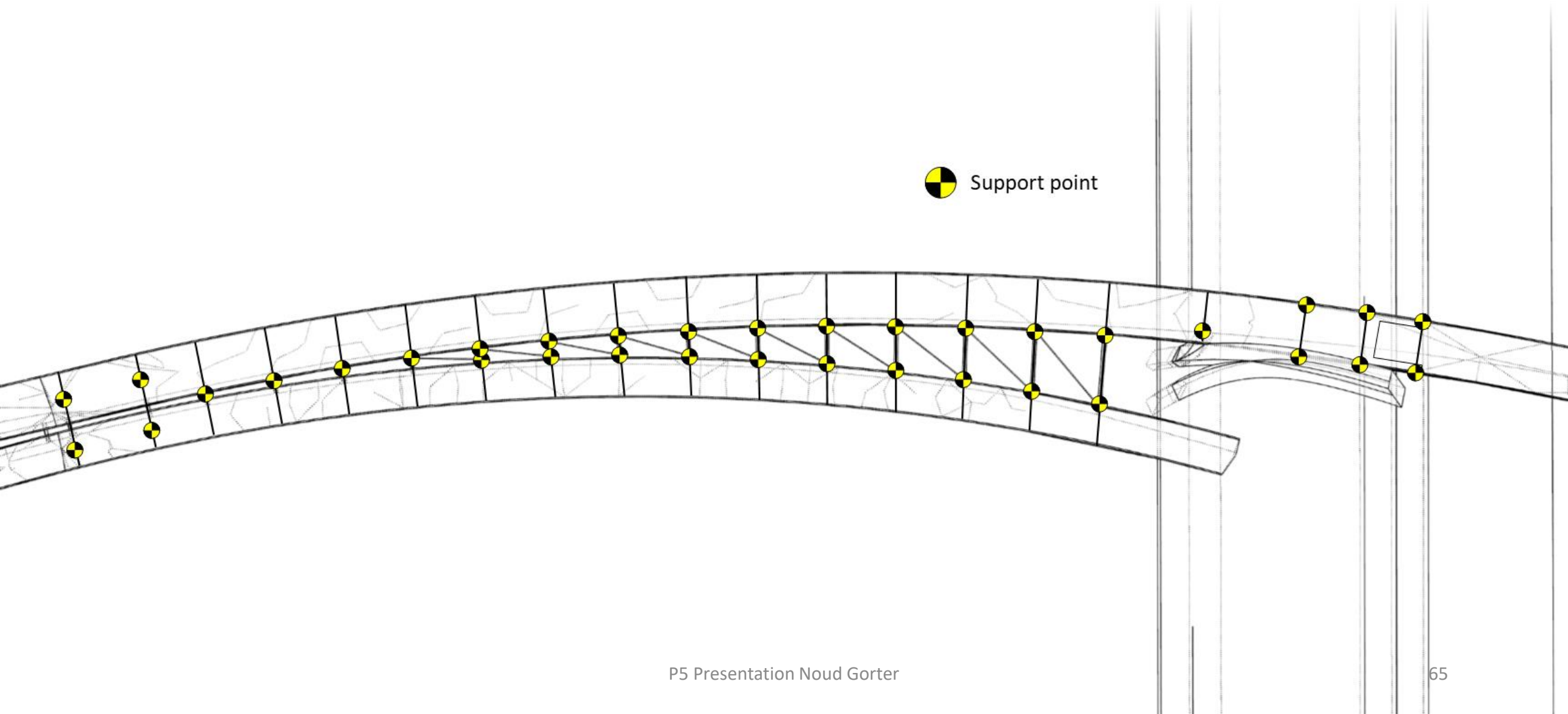




Structural design

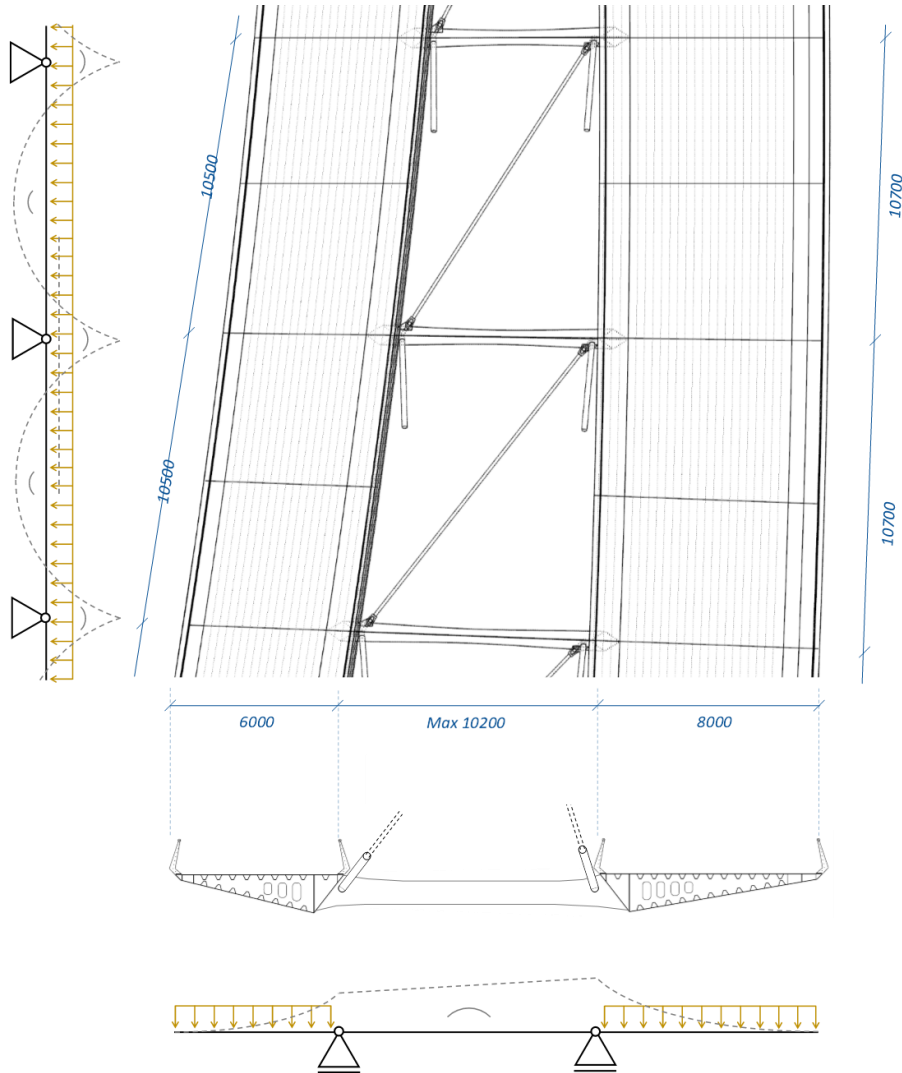


Structural design



Structural design

Loading

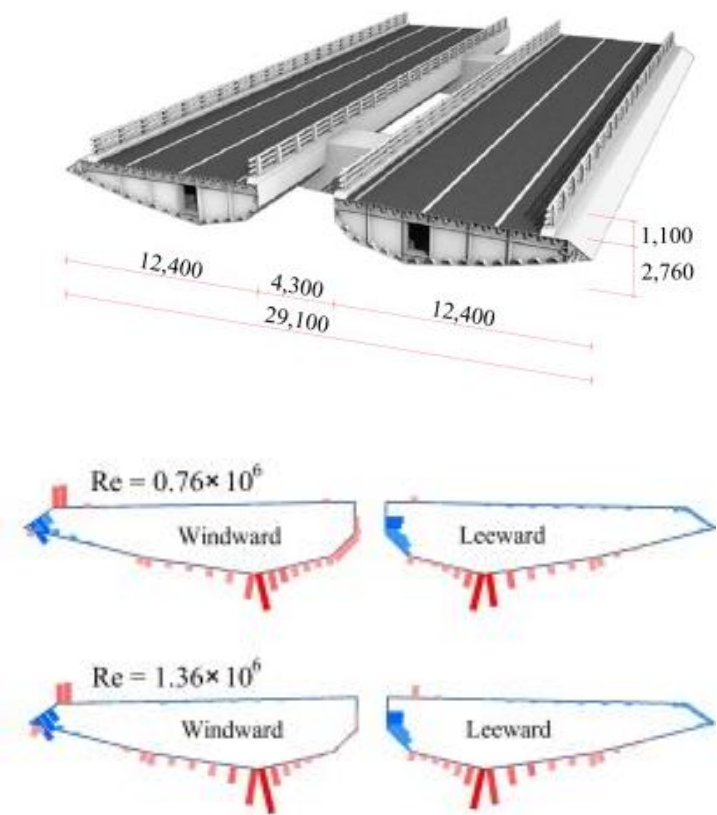
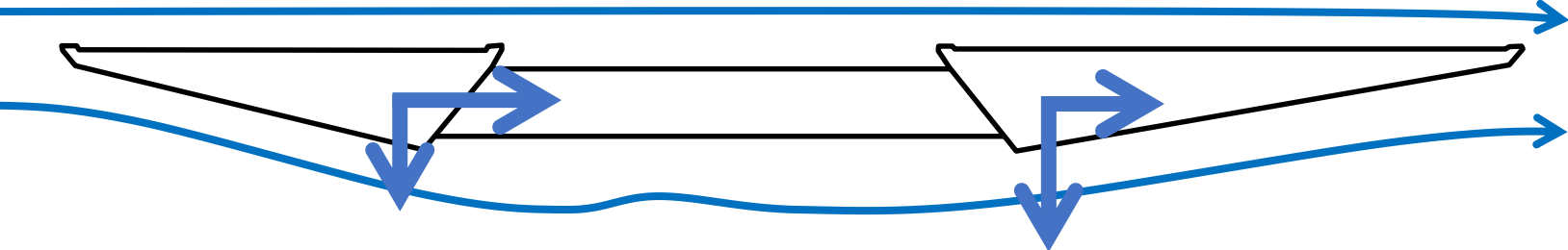


Loads:

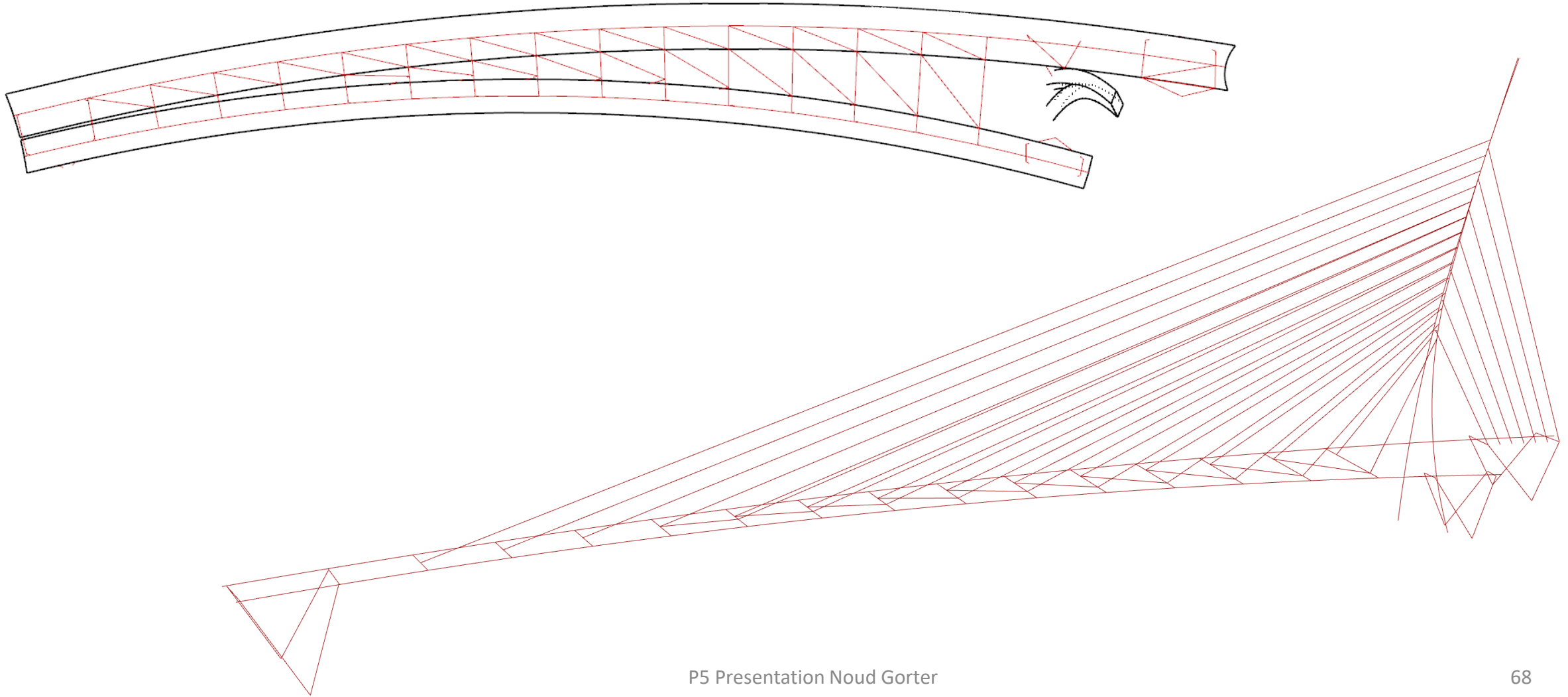
<i>Dead load cycling bridge</i>	<i>15,1 kN/m</i>
<i>Dead load footbridge</i>	<i>12,0 kN/m</i>
<i>Permanent loading factor</i>	<i>1,3</i>
<i>Distributed variable load</i>	<i>5,0 kN/m²</i>
<i>Effective width cycling bridge</i>	<i>7,6 m</i>
<i>Effective width footbridge</i>	<i>5,6 m</i>
<i>Concentrated variable load</i>	<i>10,0 kN</i>
<i>Wind load (horizontal)</i>	<i>2,0 kN/m²</i>
<i>Variable load factor (traffic)</i>	<i>1,50</i>
<i>Variable load factor (wind)</i>	<i>1,65</i>

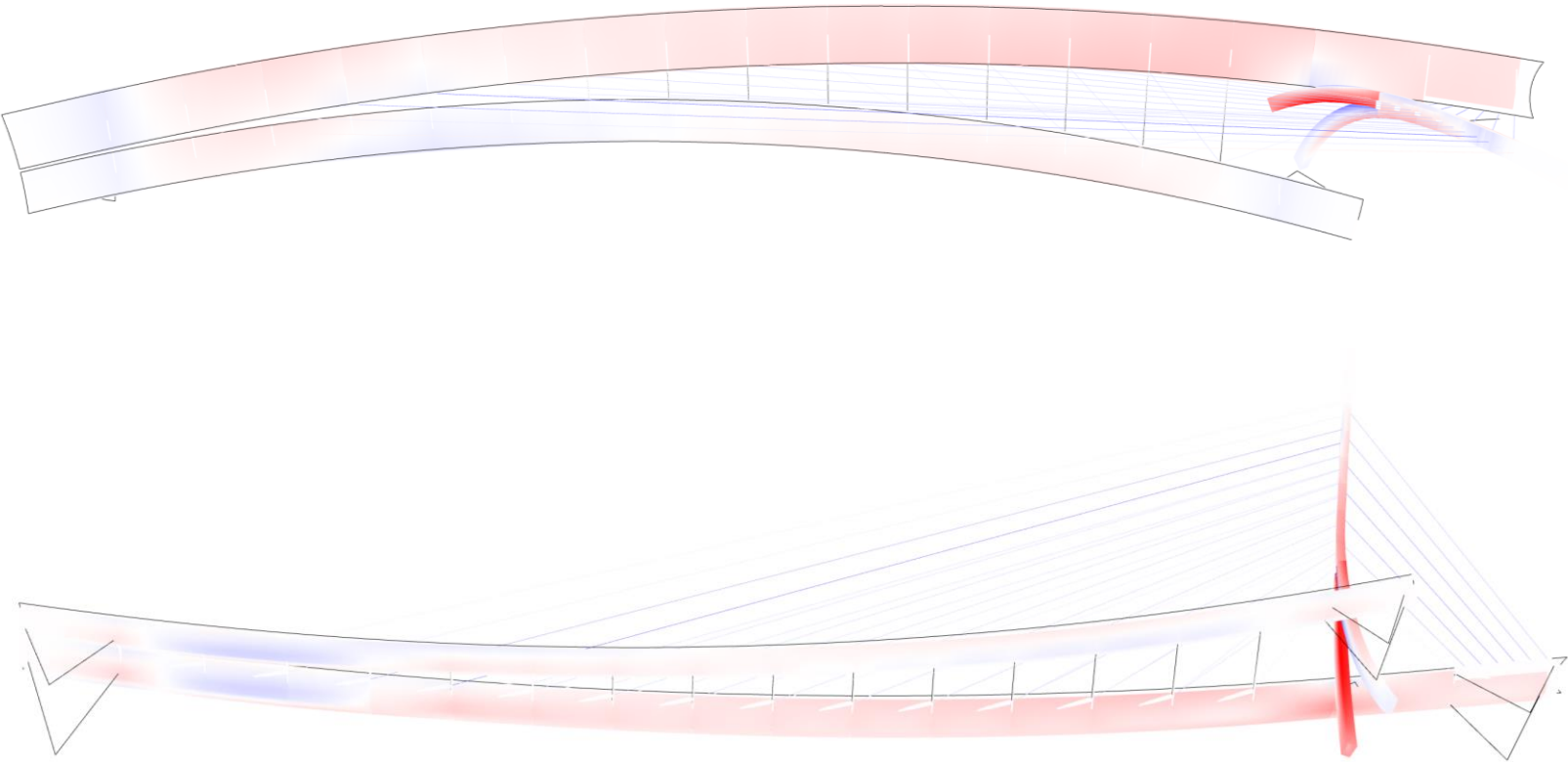
Structural design

Wind loads



Images: Lee, Kwon & Yoon

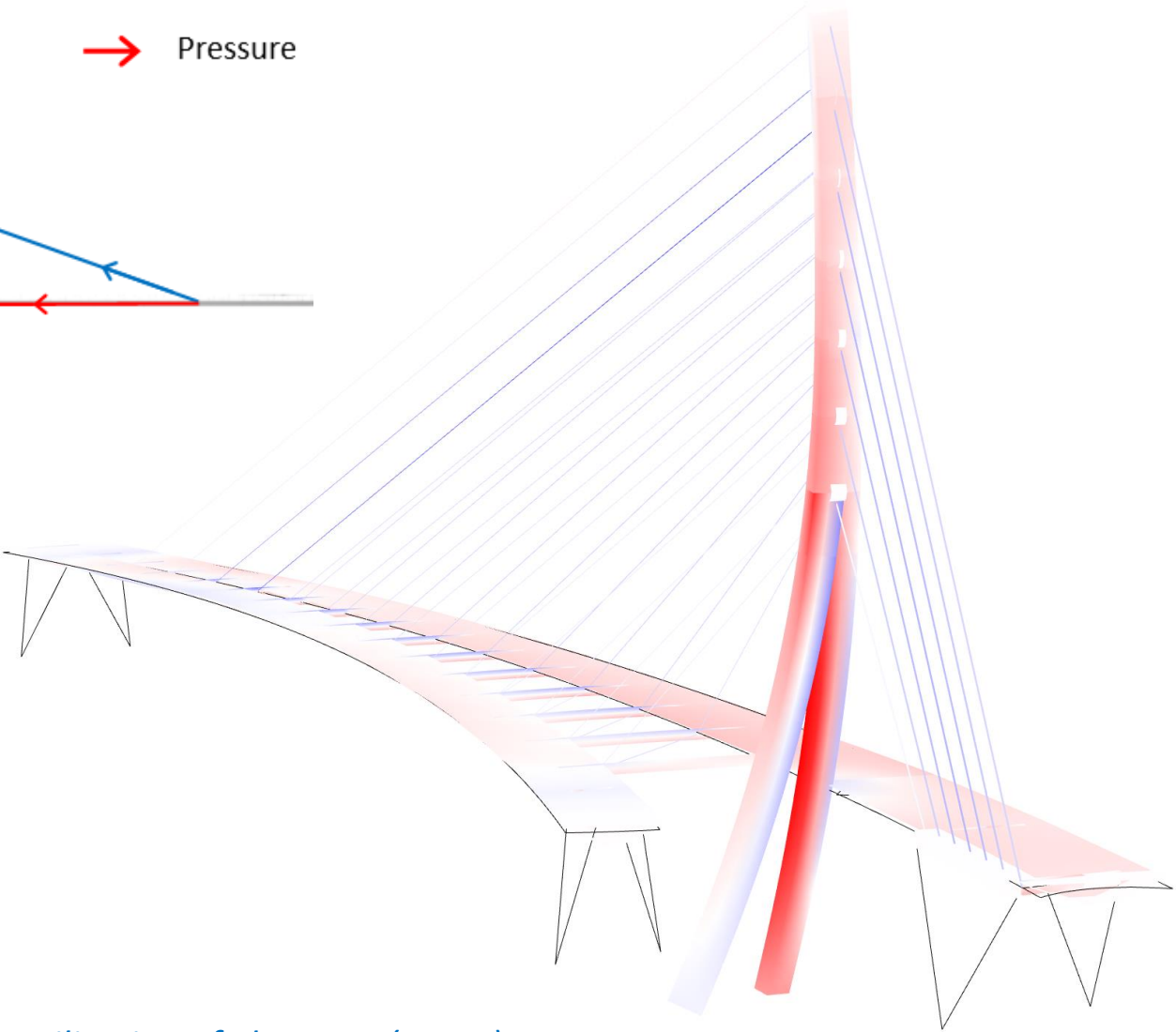
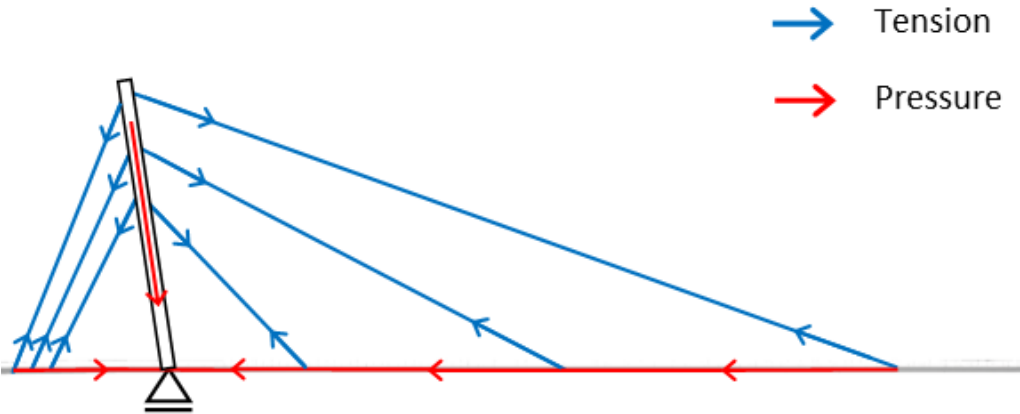




utilization
-34.7%
-30.4%
-26.0%
-21.7%
-17.4%
-13.0%
-8.7%
-4.3%
0.0%
3.8%
7.5%
11.3%
15.0%
18.8%
22.5%
26.3%
30.0%

Load case 1: Traffic loads on both decks – Utilization of elements (stress)

Structural design



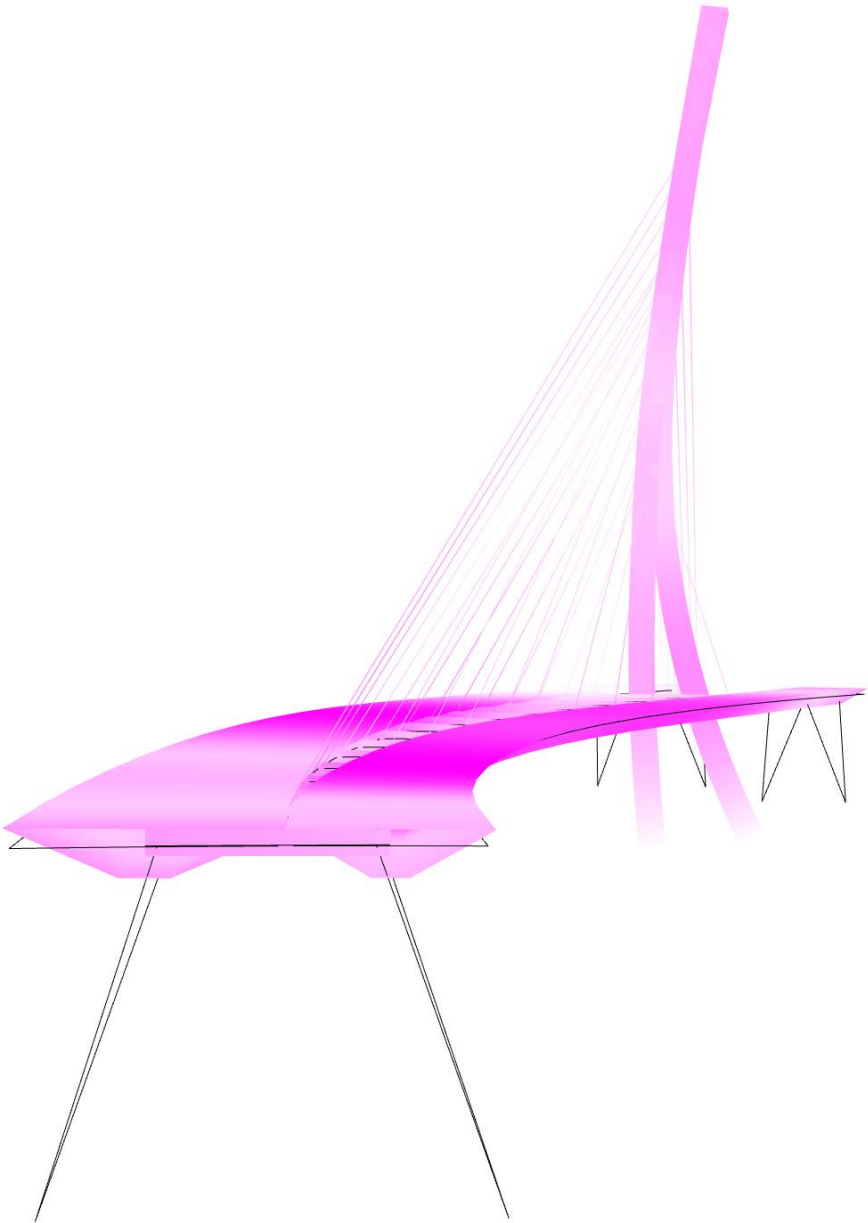
Results

utilization
-34.7%
-30.4%
-26.0%
-21.7%
-17.4%
-13.0%
-8.7%
-4.3%
0.0%
3.8%
7.5%
11.3%
15.0%
18.8%
22.5%
26.3%
30.0%

Load case 1: Traffic loads on both decks – Utilization of elements (stress)

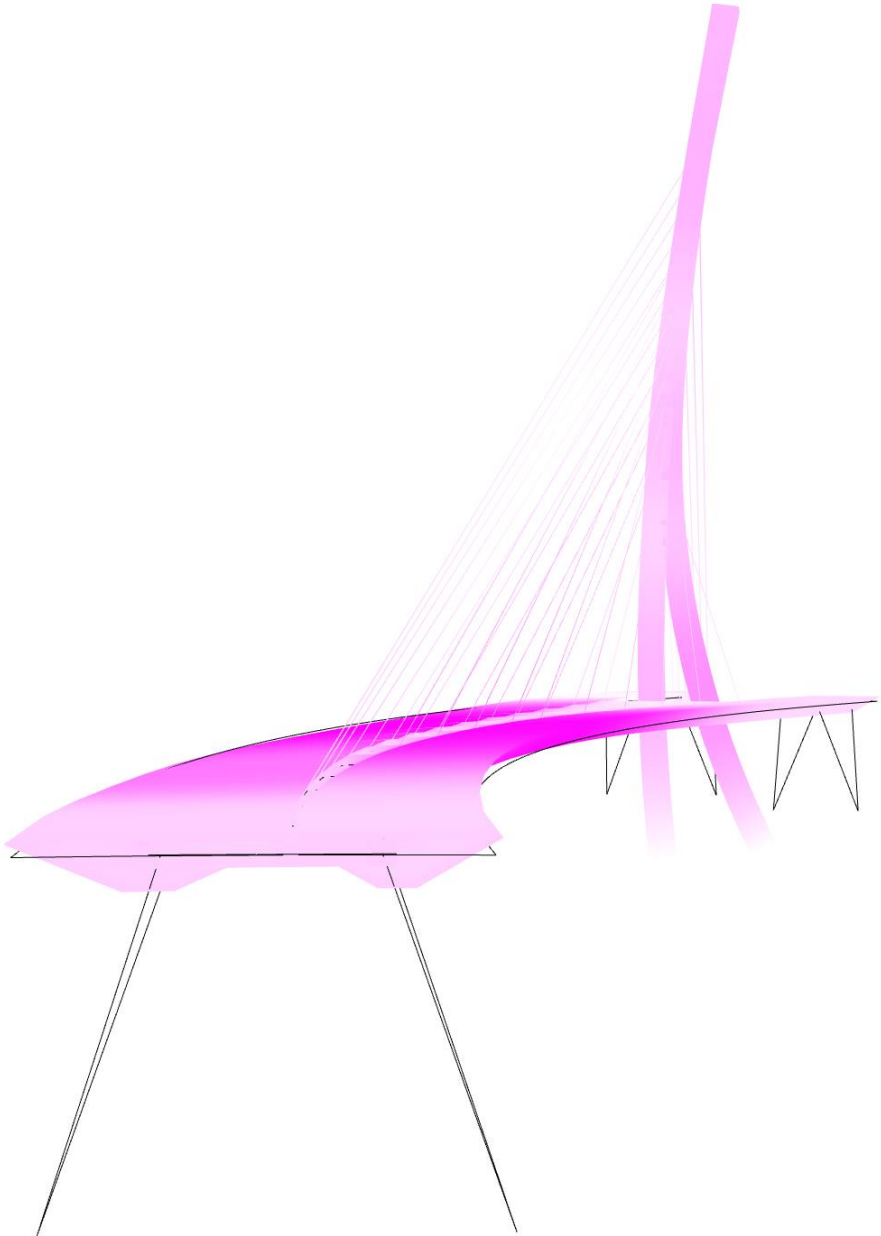
Structural design

Results



res.disp.[cm]
0.00e+00
1.64e+00
3.28e+00
4.92e+00
6.57e+00
8.21e+00
9.85e+00
1.15e+01
1.31e+01
1.48e+01
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2.13e+01
2.30e+01
2.46e+01
2.63e+01

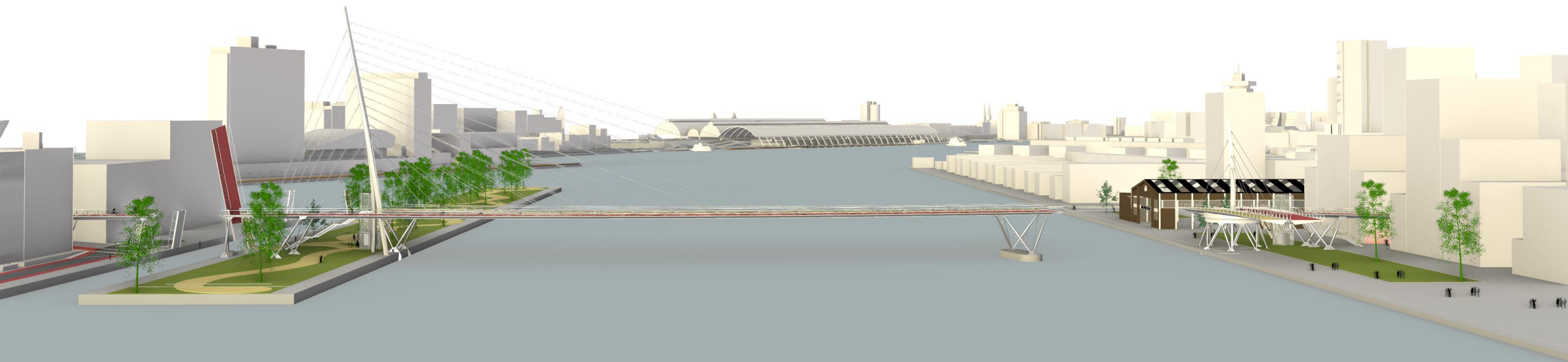
Load case 3: *Traffic loads on footbridge deck*



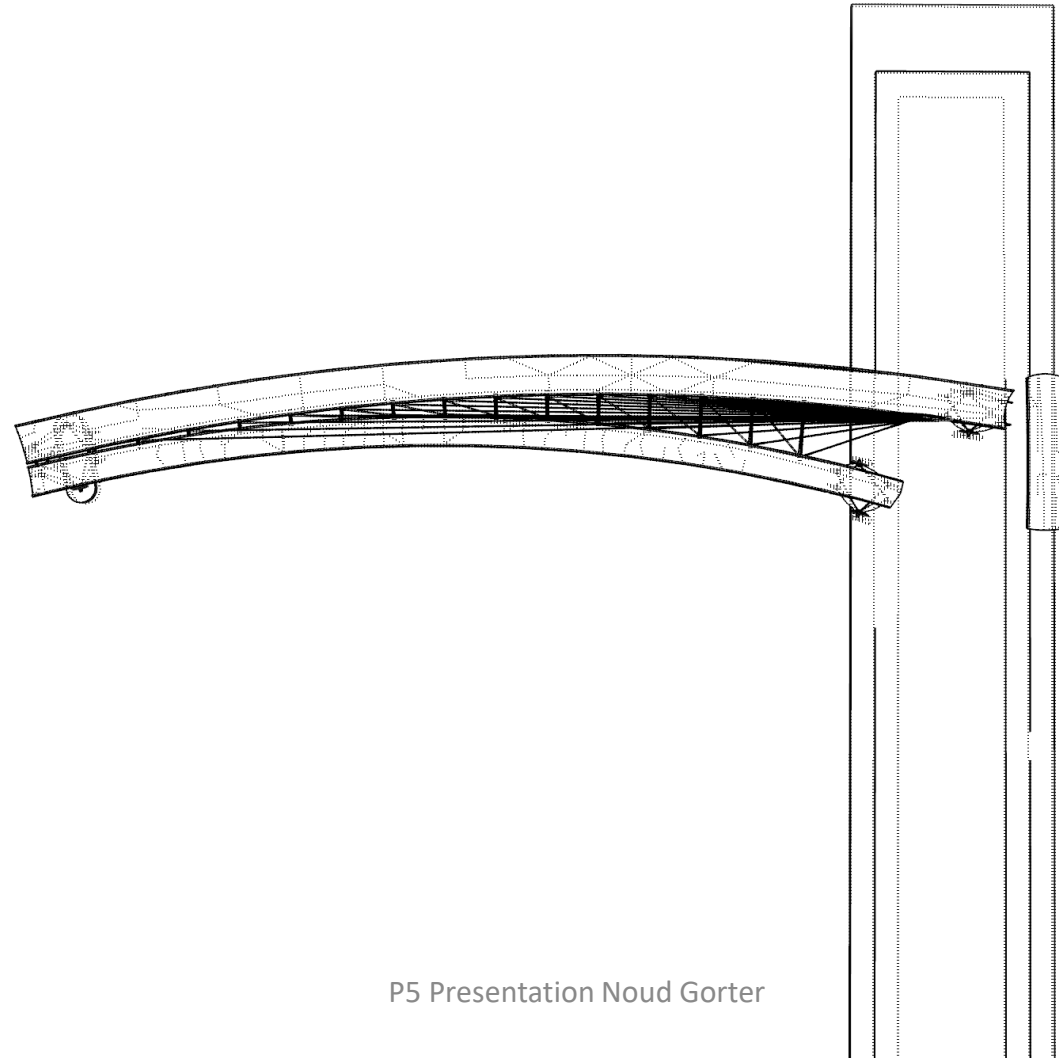
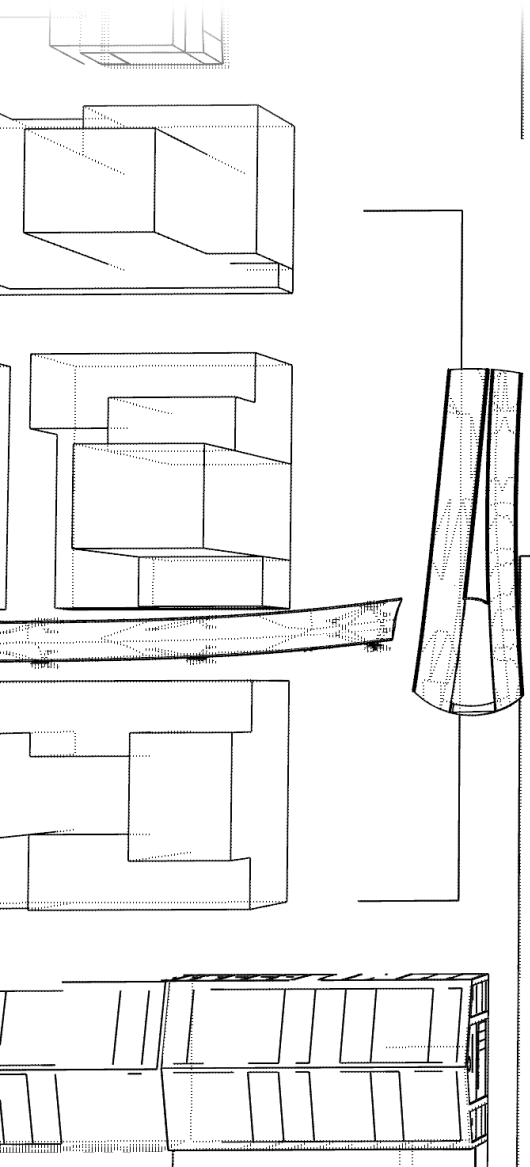
res.disp.[cm]
0.00e+00
1.62e+00
3.23e+00
4.85e+00
6.46e+00
8.08e+00
9.69e+00
1.13e+01
1.29e+01
1.45e+01
1.62e+01
1.78e+01
1.94e+01
2.10e+01
2.26e+01
2.42e+01
2.58e+01

Load case 4: Traffic loads on cycling deck

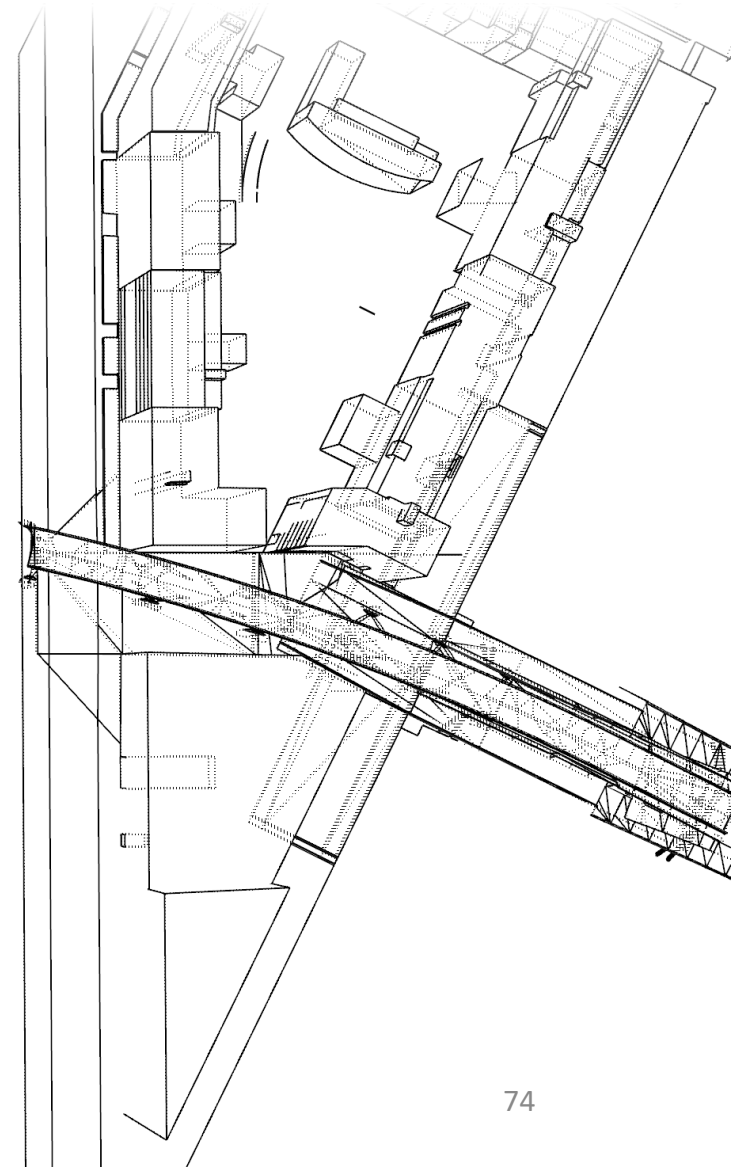
Movable bridge parts



Movable bridge parts

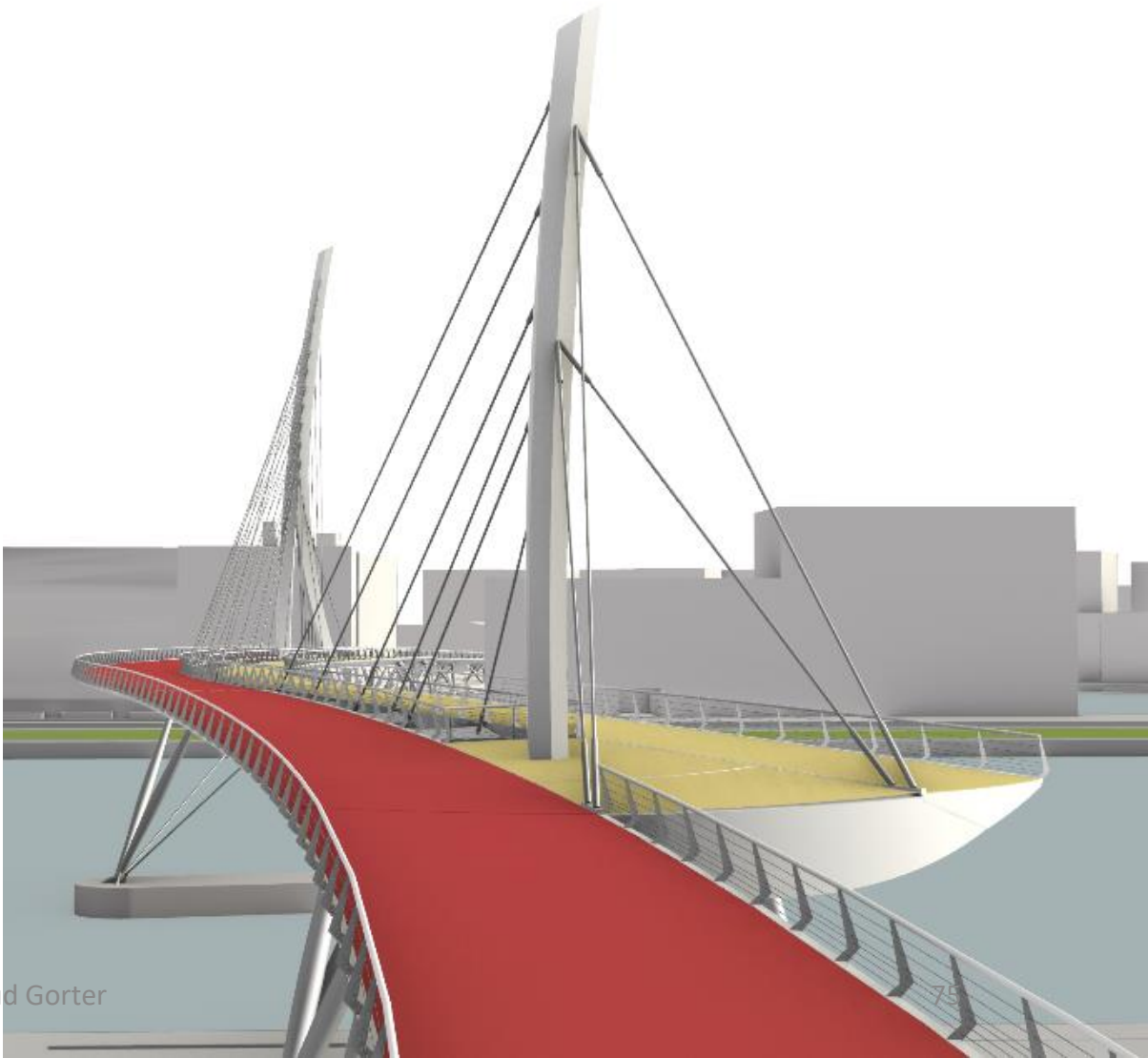
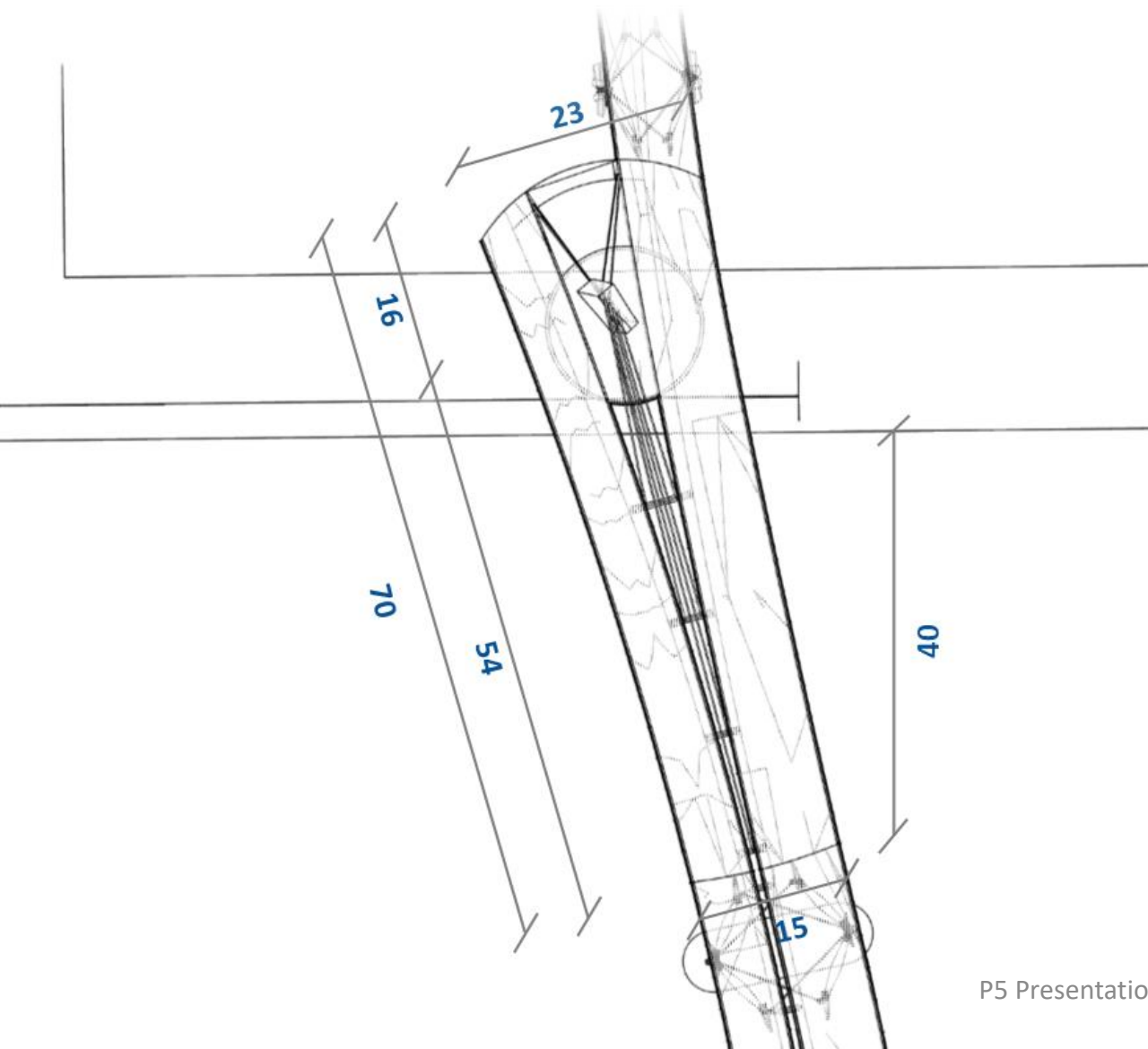


P5 Presentation Noud Gorter



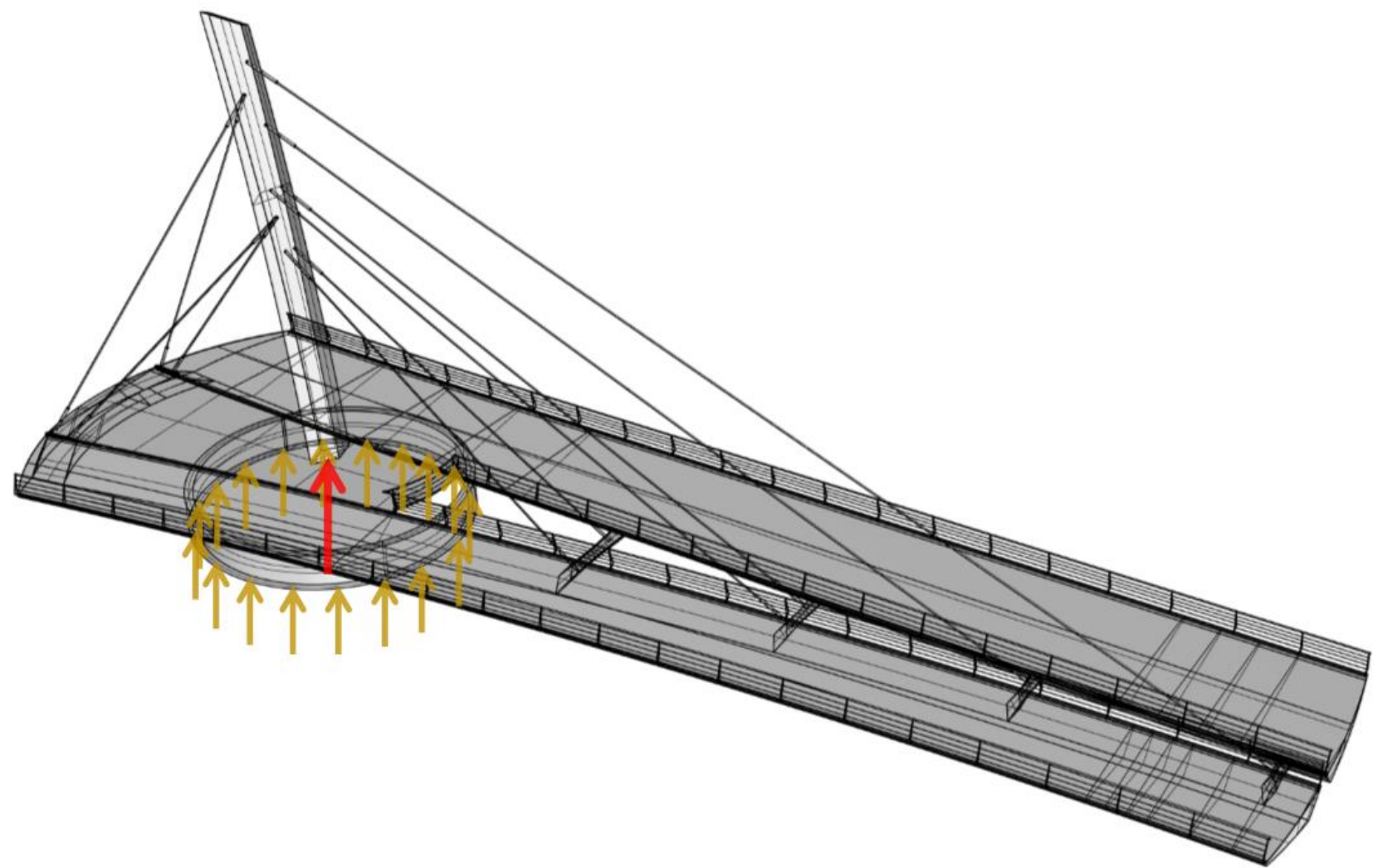
Movable bridge parts

North Bank



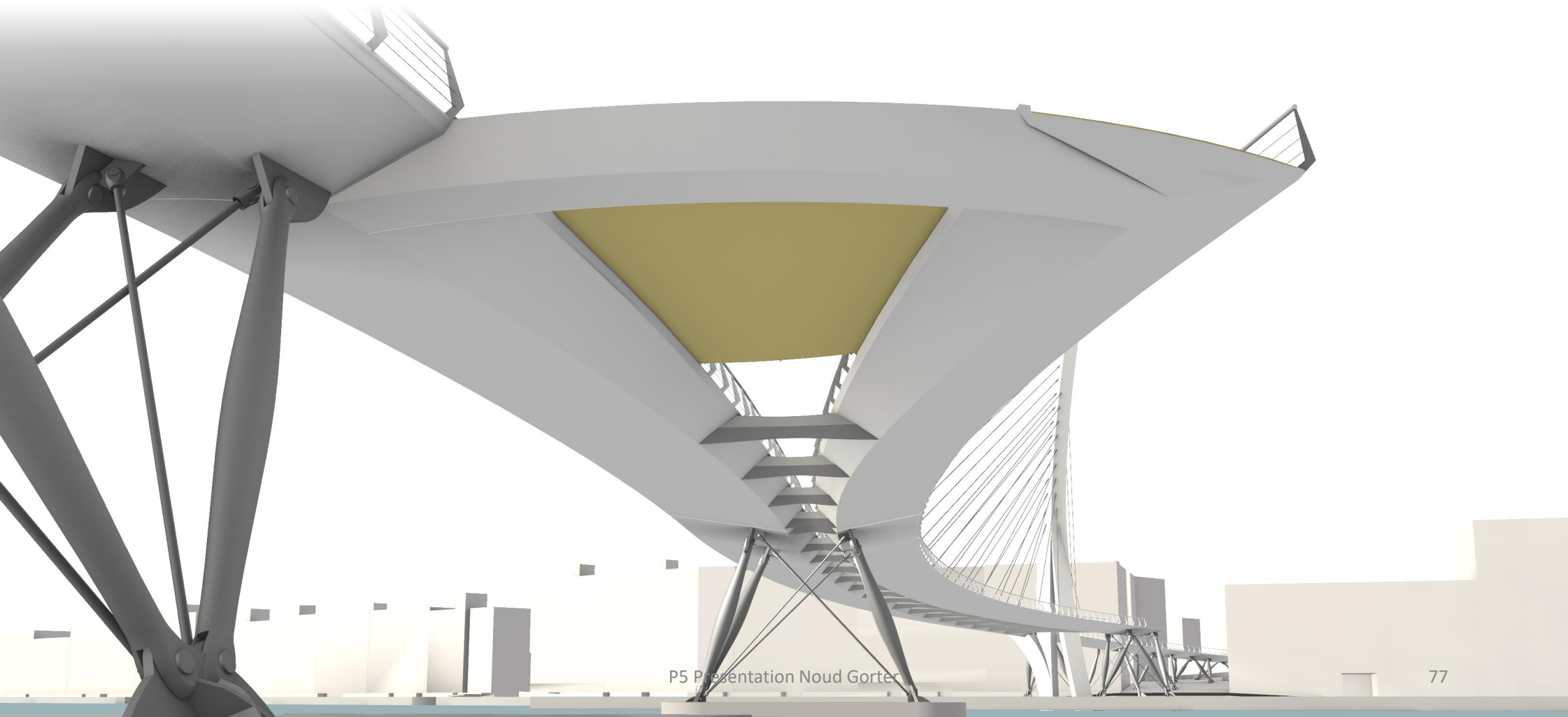
Movable bridge parts

North Bank



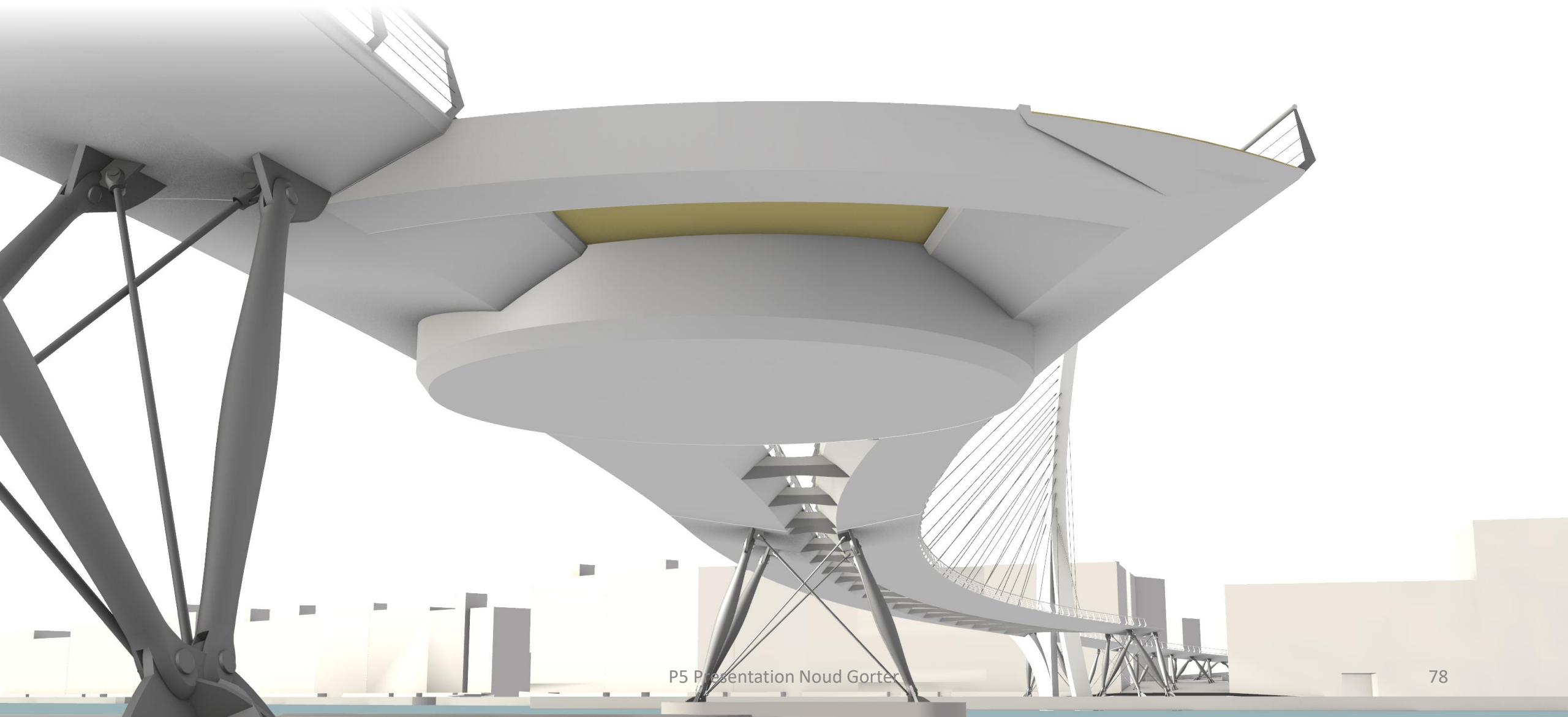
Movable bridge parts

North Bank



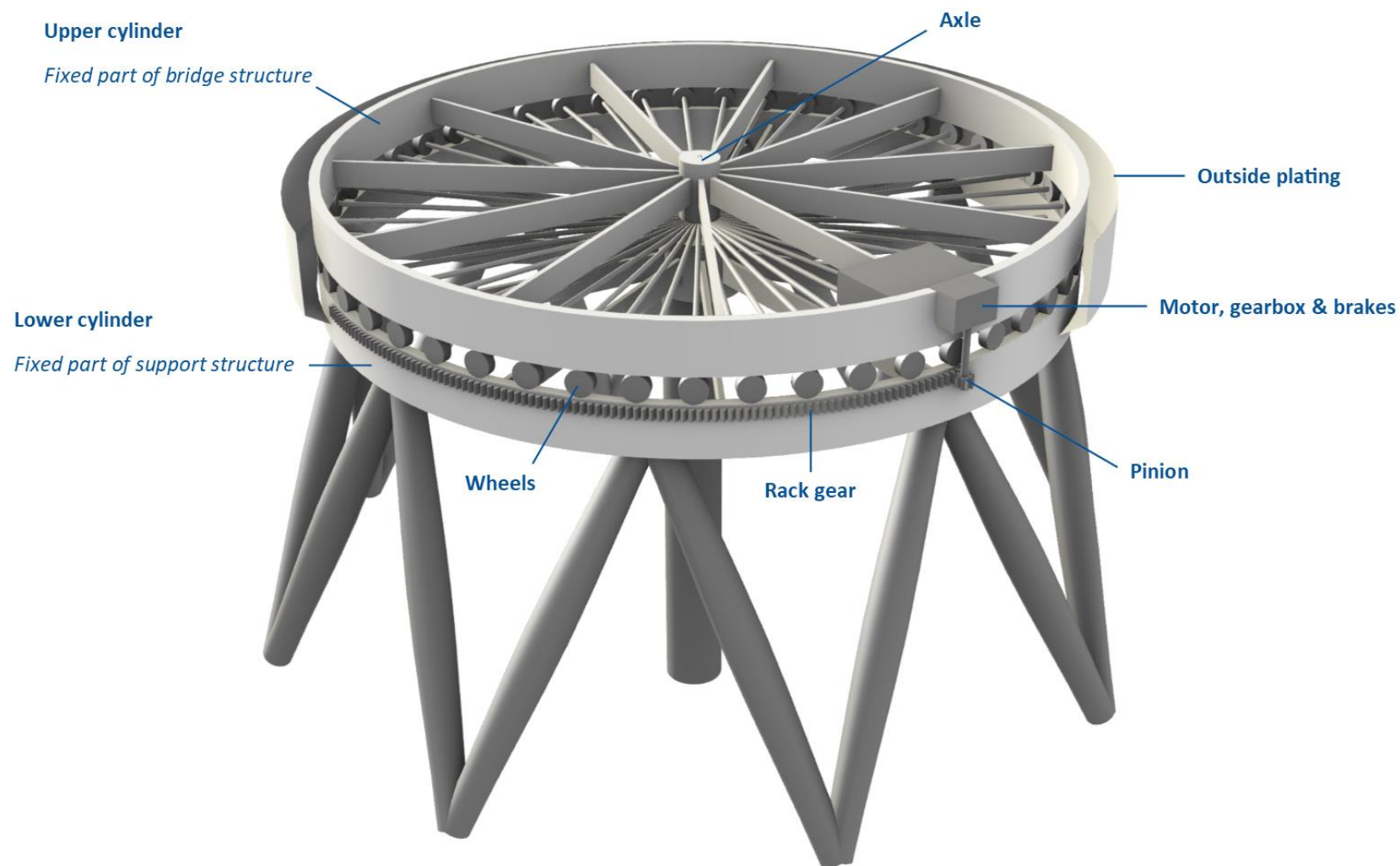
Movable bridge parts

North Bank



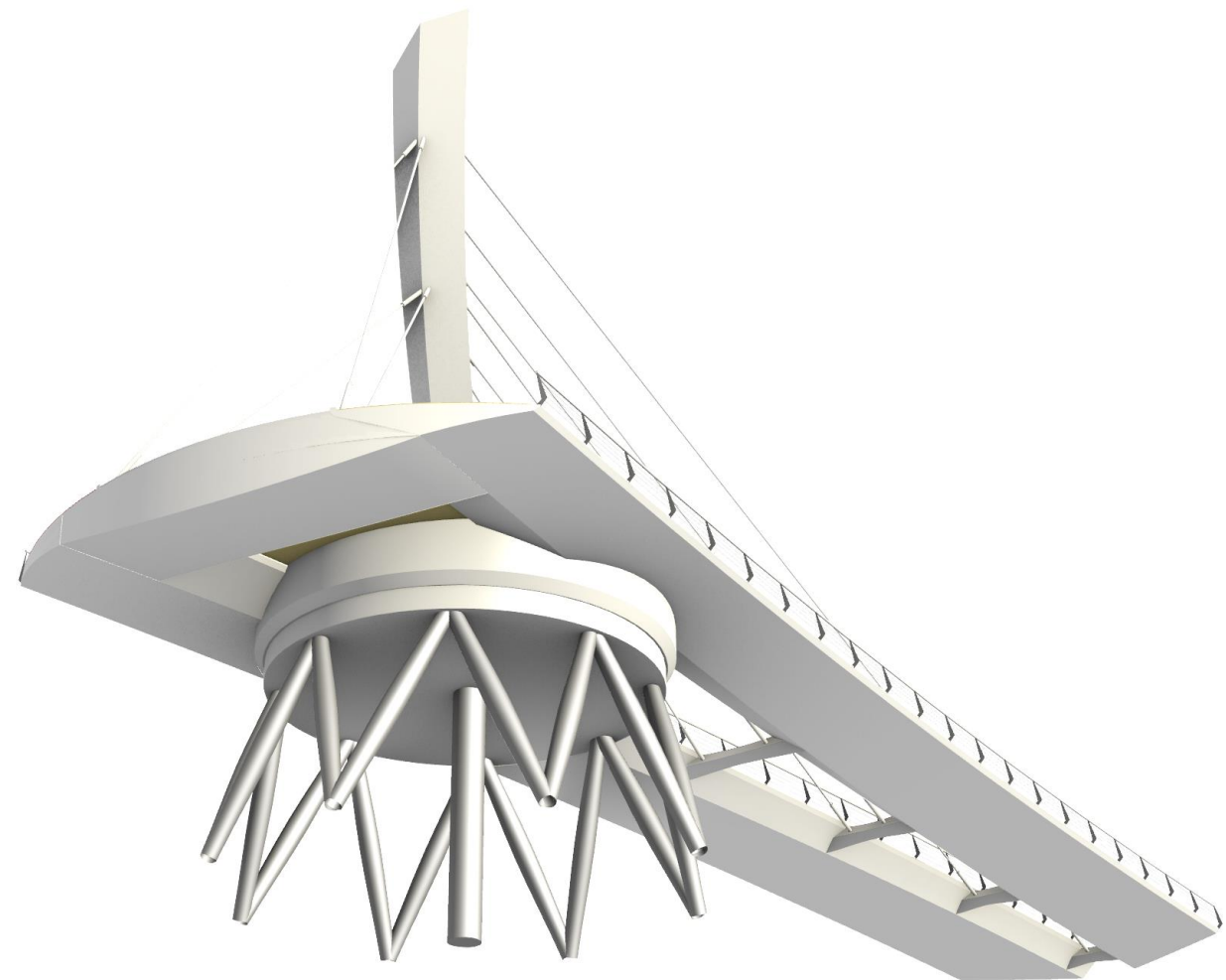
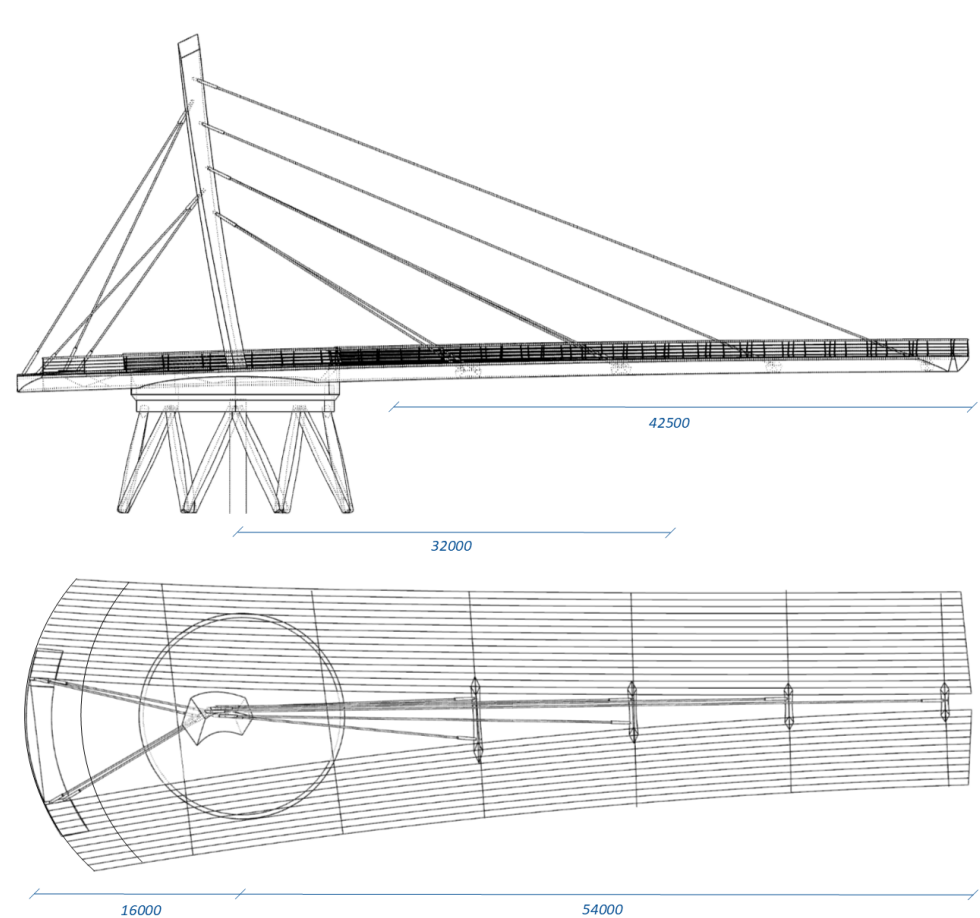
Movable bridge parts

North Bank



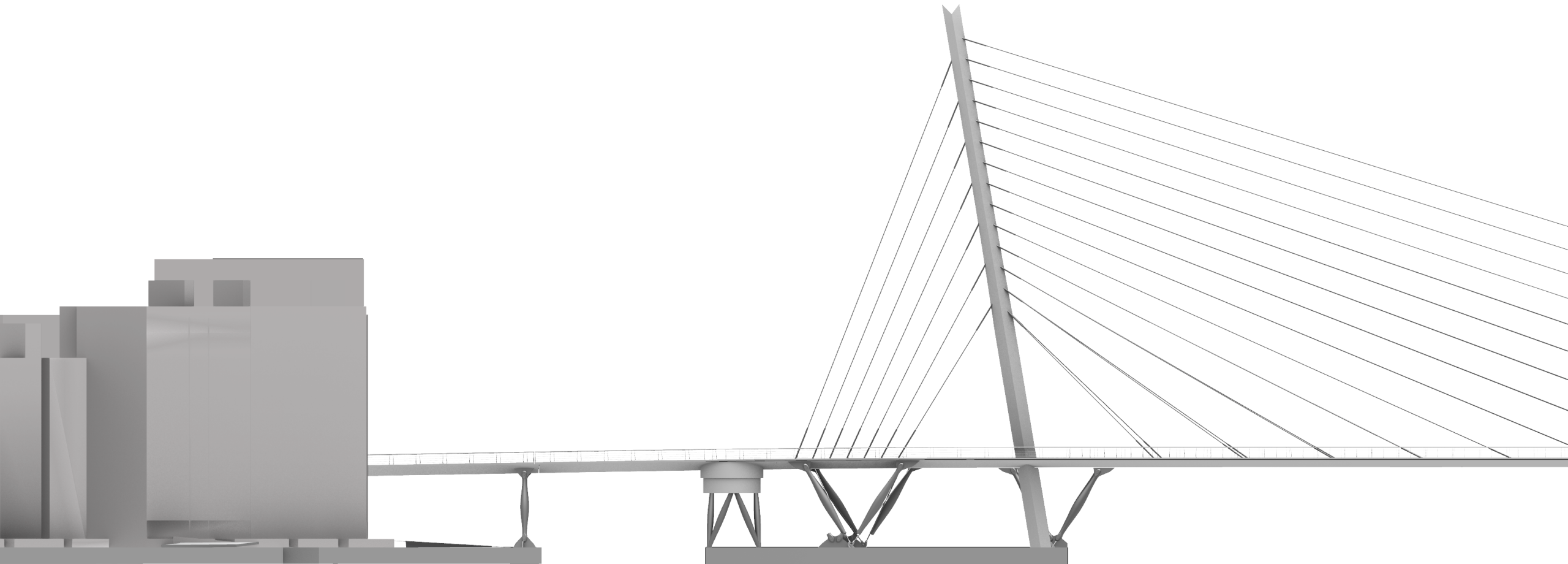
Movable bridge parts

North Bank



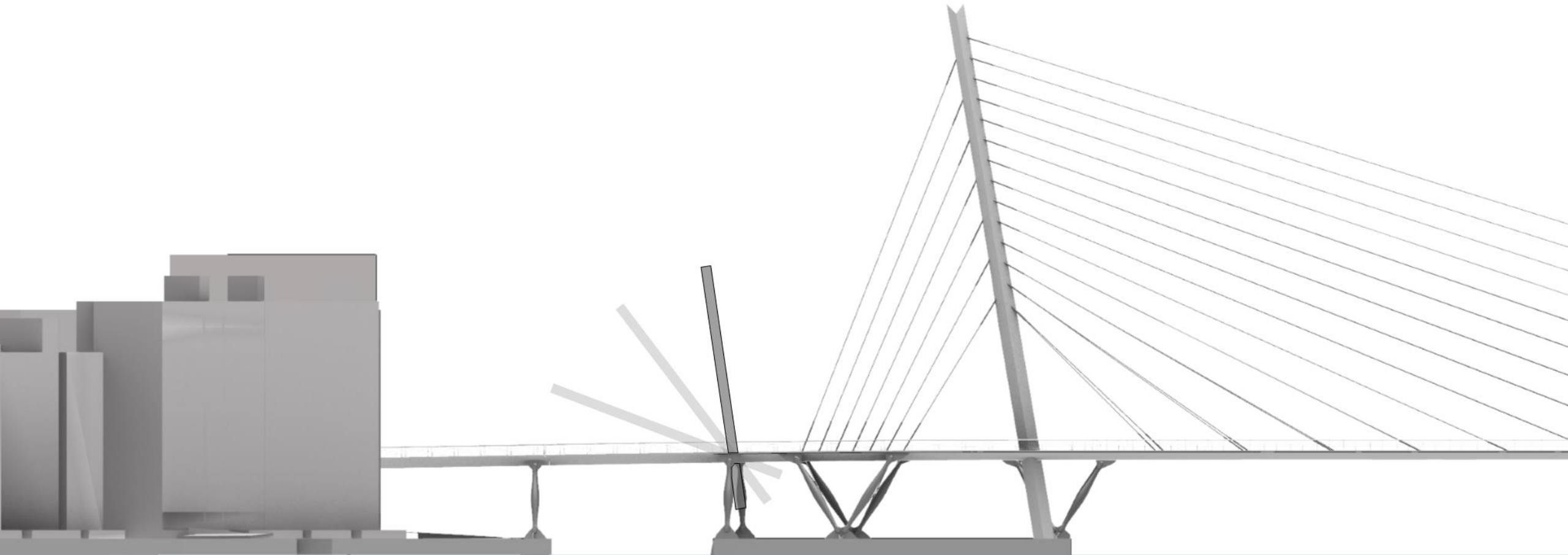
Movable bridge parts

South Bank



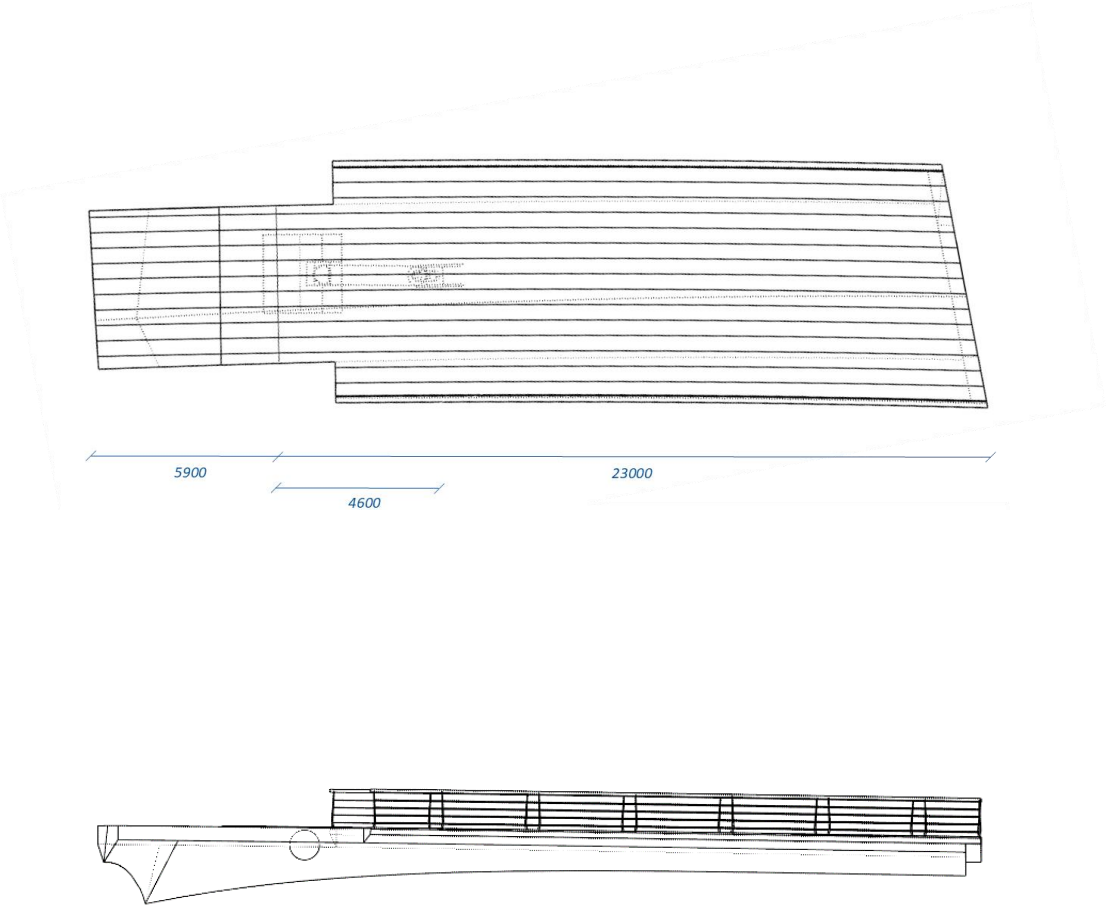
Movable bridge parts

South Bank



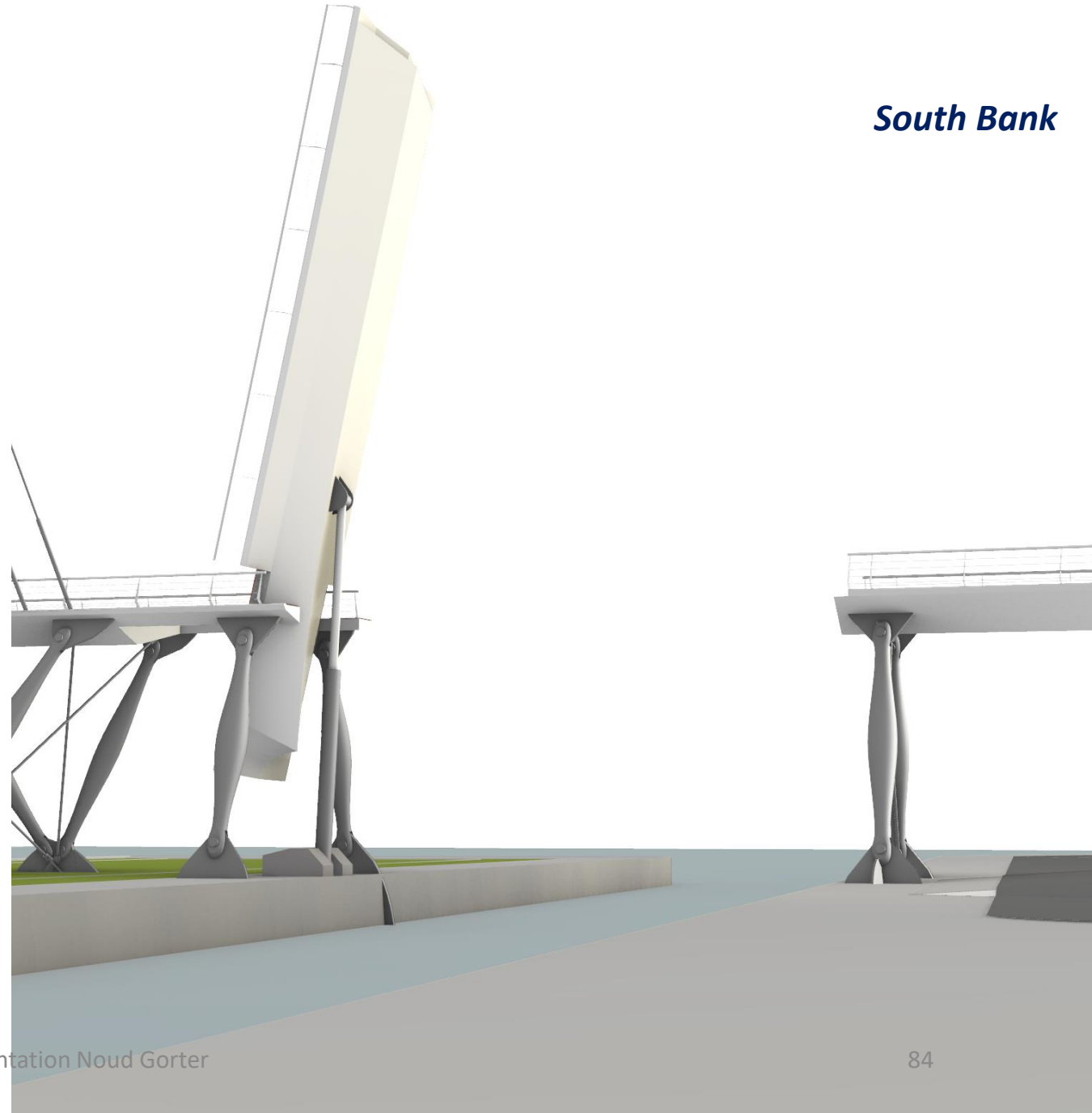
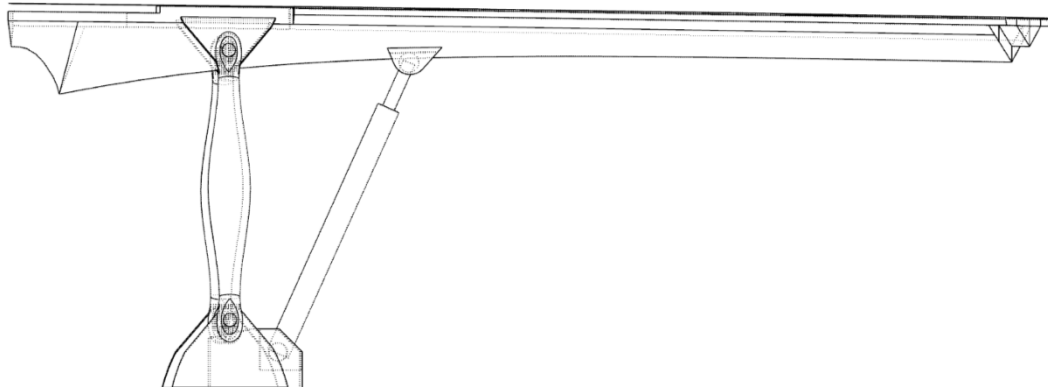
Movable bridge parts

South Bank

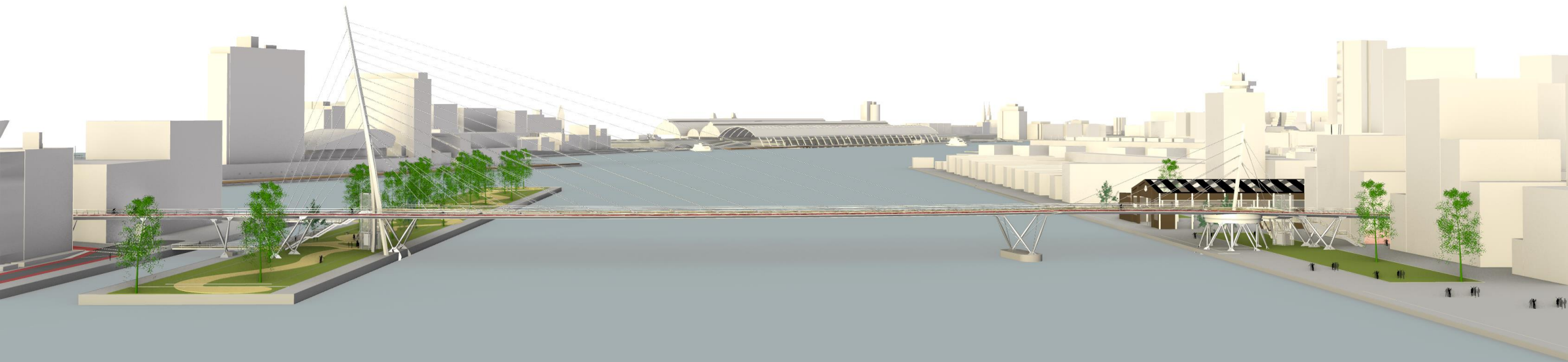


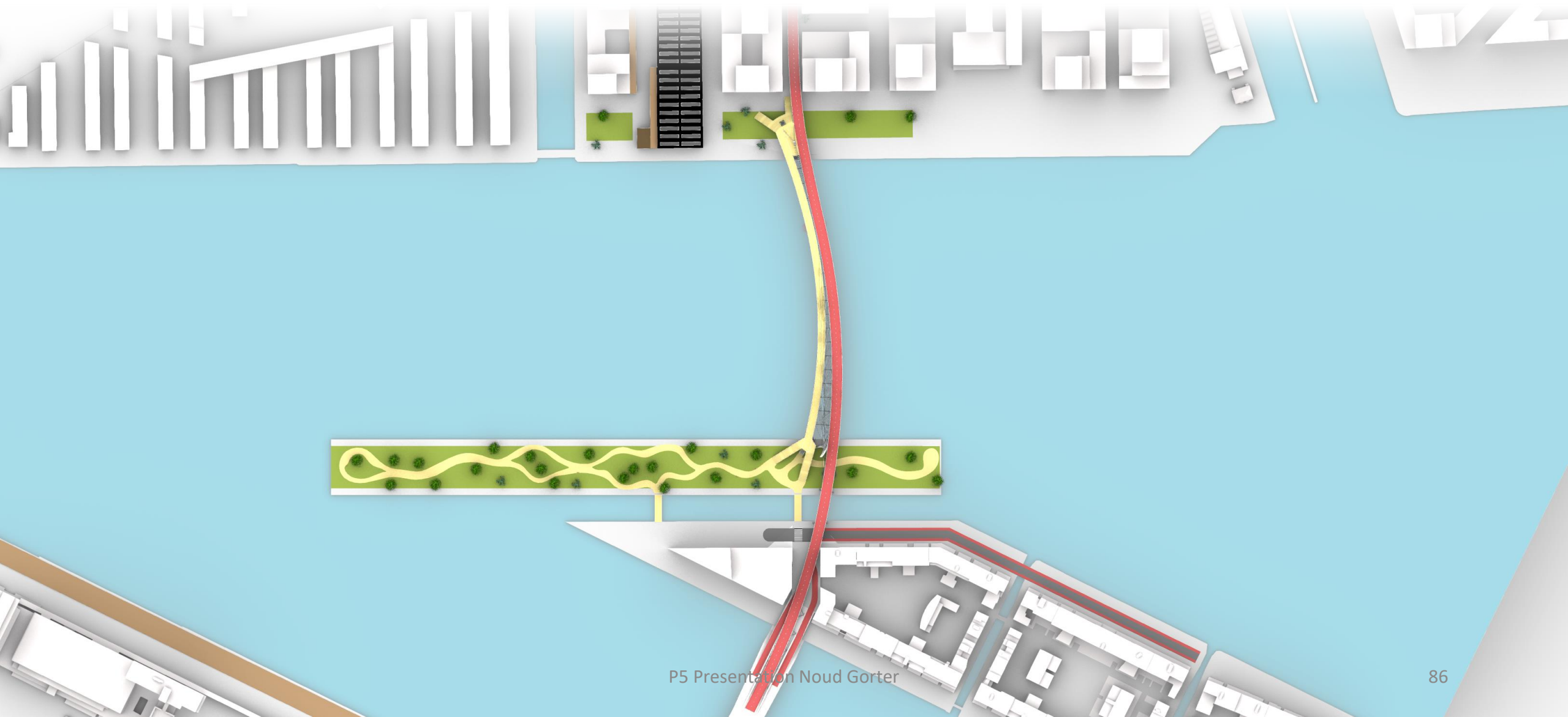
Movable bridge parts

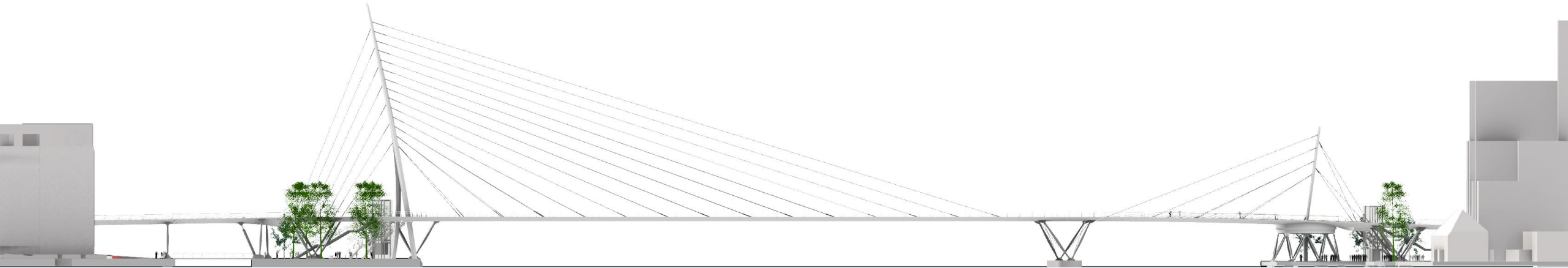
South Bank



Definitive design







Definitive design

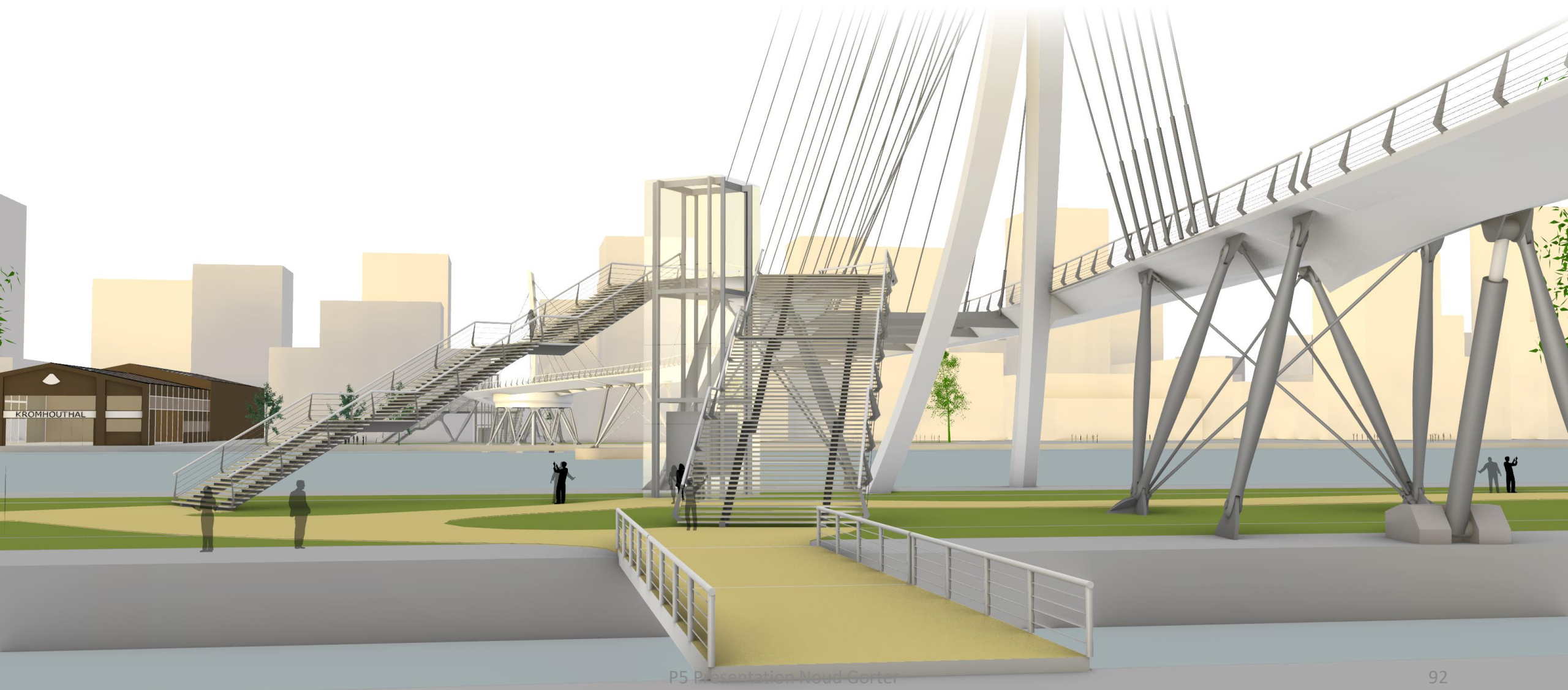
Overview from north bank





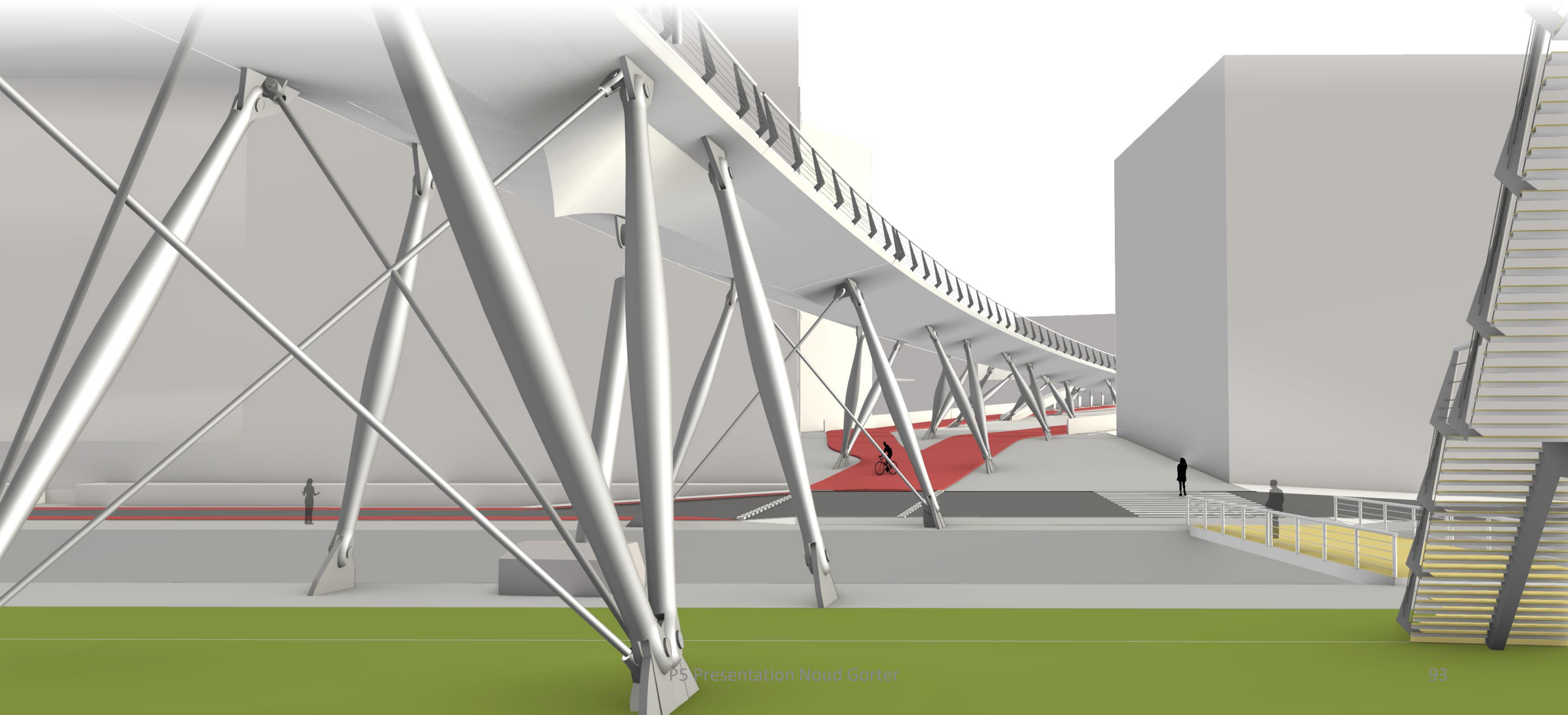






Definitive design

South view towards Jan Schaefer Bridge



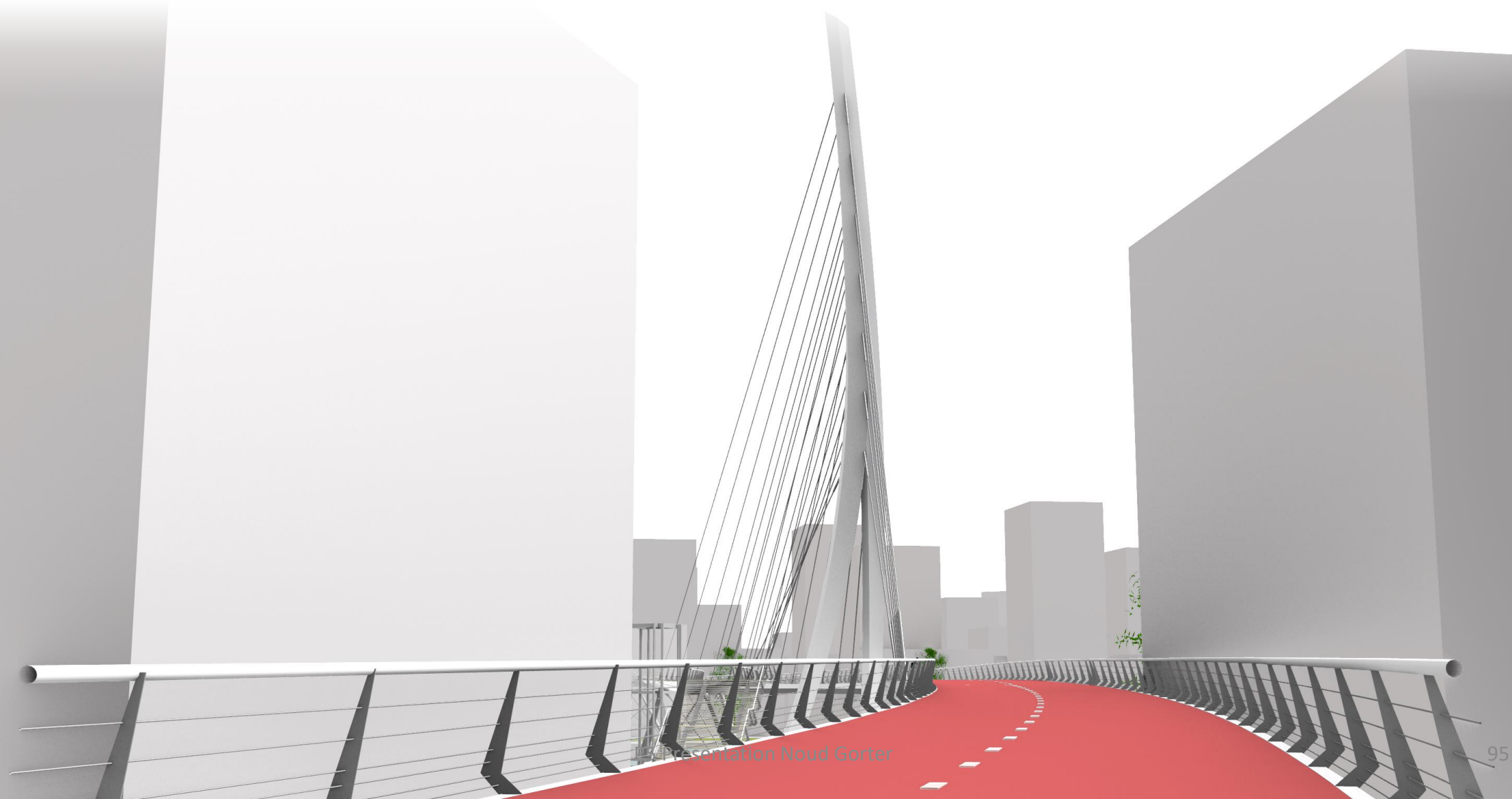
Definitive design

Cycling bridge, north to south



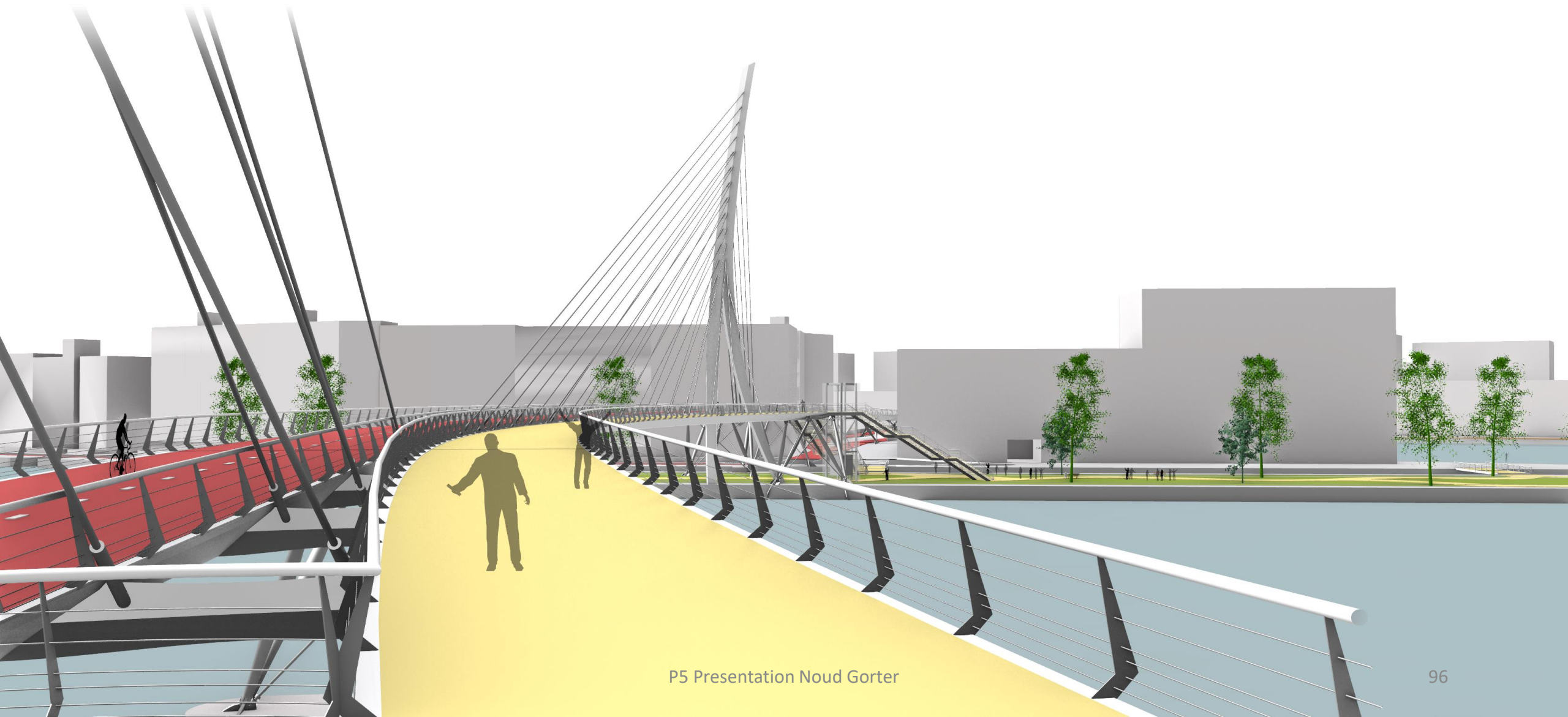
Definitive design

Cycling bridge, south to north



Definitive design

Footbridge, north to south



Definitive design

North movable bridge, closed



Definitive design

North movable bridge, open



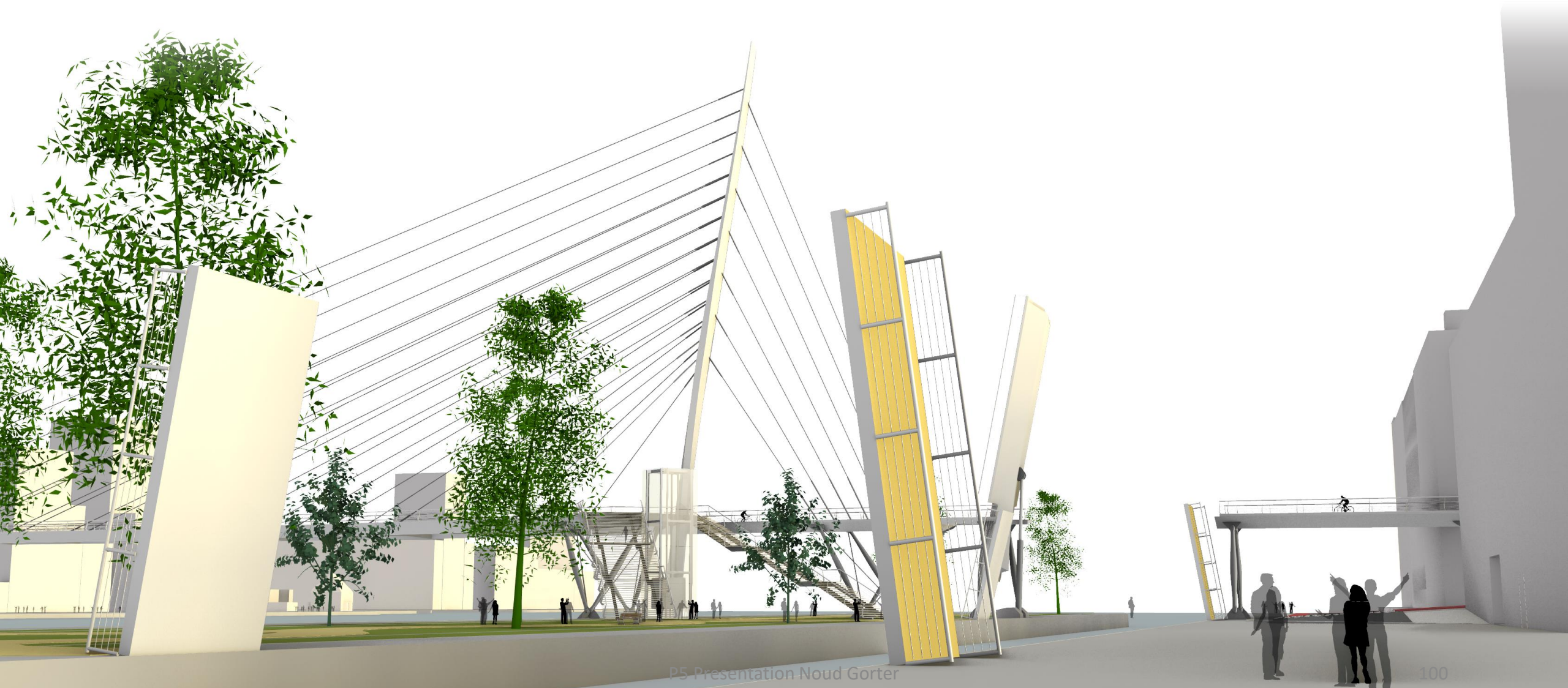
Definitive design

South movable bridge, closed

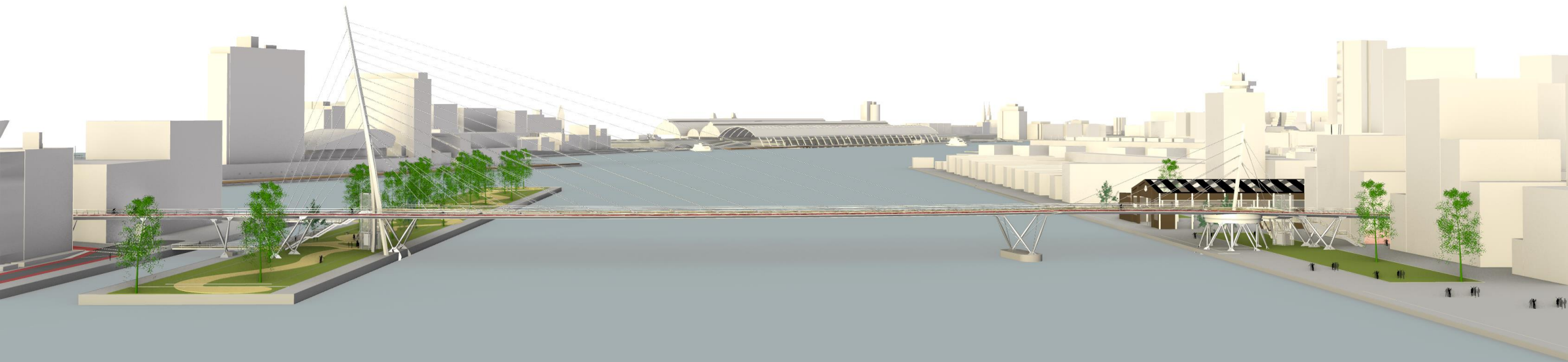


Definitive design

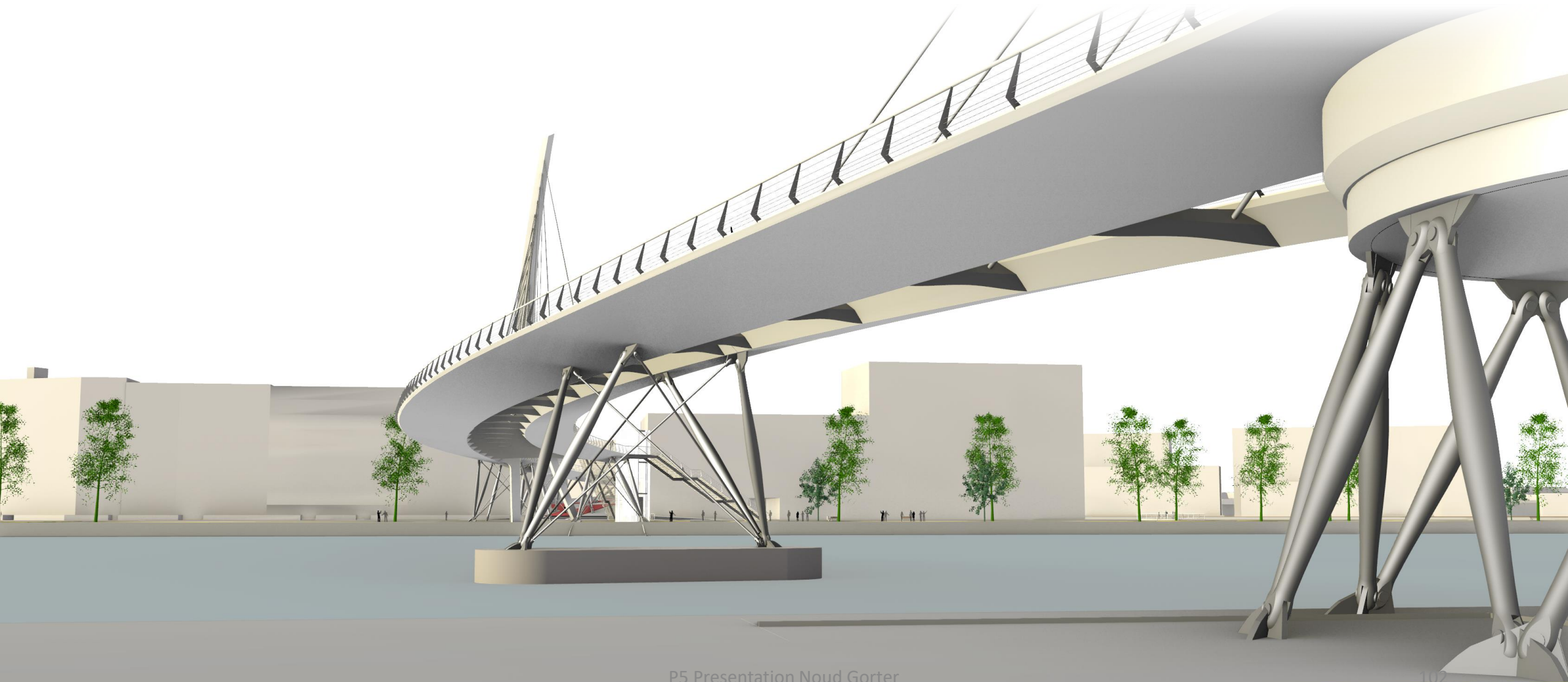
South movable bridge, open



Conclusions



Conclusions



Conclusions



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