

INTEGRATED

METHODS / TECHNIQUES / STRATEGIES

Transport and water infrastructure go far beyond engineering. When thoughtfully and cohesively planned and designed, infrastructure enriches society in an economic, social, ecological, and cultural way.

This design guide bridges disciplines – from transport planning and urban design to hydraulic engineering and landscape architecture, offering an integrated approach to shape roads, railways, bridges, flood defences, and mobility hubs which are well-embedded in our living environment.

INFRASTRUCTURE

PERSPECTIVES / FEATURED DESIGNS

DESIGN GUIDE

INTE
GRATED

METHODS / TECHNIQUES / STRATEGIES

**INFRA
STRUC
TURE**

PERSPECTIVES / FEATURED DESIGNS

DESIGN
GUIDE



5	FOREWORD
8	INTRODUCTION

	PLAN
10	DISCUSS WITH STAKEHOLDERS WHAT MATTERS AND WHY
12	SPACE AS COLLECTIVE GOOD DESIGNING FOR THE LAND VALUE OF THE NEIGHBOURS
30	SPOORZONE DELFT BRIDGING THE GAP
42	FEATURED DESIGN SPOORZONE DELFT
48	FLEMISH-DUTCH DELTA INTEGRATED LONG-TERM HARBOUR PERSPECTIVES
60	FEATURED DESIGN NIEUWE SLUIS TERNEUZEN
66	BLANKENBURGVERBINDING (A24 MOTORWAY) PARTICIPATIVE DESIGN FOR SPATIAL QUALITY AND ADDED VALUE
80	FEATURED DESIGN DE OVERSTEEK NIJMEGEN

86	METHODS TECHNIQUES STRATEGIES
88	Design of Hubs-Game
90	Integrated Transition Strategy
92	Land Use and Transport
94	Layer Approach
98	Life Cycle Management
100	Plan Review
102	Procurement of Infrastructure
106	Project Management for Integrated Infrastructure Design
108	Research by Design Framework
112	Stakeholder Analysis
114	Transit-Oriented Development

	ANALYSE
116	TURN UNKNOWNNS INTO KNOWNNS AND EXPLORE OPPORTUNITIES
118	A COMPARATIVE STUDY SOCIETAL BENEFITS OF MULTIFUNCTIONAL DESIGN
132	INTEGRATED DESIGN THE RECONCILIATION OF SPATIAL DESIGN AND ENGINEERING
146	FEATURED DESIGN COASTAL ZONE KATWIJK
152	BEYOND MOBILITY WHY STATIONS MATTER IN THE ARCHITECTURE DISCOURSE
166	FEATURED DESIGN TRAIN STATION ASSEN

172	METHODS TECHNIQUES STRATEGIES
174	Casco Concept
178	Environmental Indicator
182	Integrated Infrastructure Design Lenses
184	Morphological Analysis
186	Motorway and Railway Line Tracing
190	Multi-Criteria Analysis
194	Rainbow Model
196	Reliability Assessment
198	Risk Assessment
200	Social Cost-Benefit Analysis
202	X-Minute City Concept

	SYNTHESISE
206	ALIGN INDIVIDUAL STAKES INTO VALUE FOR ALL
208	SPIUKOM VLISSINGEN A PARADIGM SHIFT FOR FLOOD RISK MANAGEMENT AND DESIGN
218	FEATURED DESIGN OOSTERSCHELDEKERING ZEELAND
224	CONVERSION HOEKSE LIJN EXPRESSIVE FUNCTIONALITY BY REMOUNTABLE DESIGN AND CONSTRUCTION
238	FEATURED DESIGN HOEKSE LIJN SCHIEDAM - HOEK VAN HOLLAND
244	THE AFSLUITDIJK NORTH HOLLAND - FRIESLAND GENERATIVE AND SUSTAINABLE REINFORCEMENT AND RENEWAL OF A HYDRAULIC ENGINEERING ICON
256	THE HAGUE CITY CENTRE PEDESTRIANISING PUBLIC SPACE
268	FEATURED DESIGN ALBERT CUYP CAR PARK AMSTERDAM

274	METHODS TECHNIQUES STRATEGIES
276	Benefit-Oriented Design
280	Flood Defences
284	Infratecture
286	Integrated Bridge Design
290	Integrated Infrastructure Design Method
292	Integrated Highway Design
296	Nature-Inclusive Infrastructure
300	Strategies for Infrastructure-Entangled Spaces
304	Systems Engineering
308	Train Station Design
312	Urban Pathway Design

	WHAT IS NEXT?
316	LOOK, THINK, AND ACT CONTEXTUALLY
	GOAL-BOUND PARADIGM AND VALUE-BOUND PARADIGM

320	COLOPHON

METHODS
TECHNIQUES
STRATEGIES

276	Benefit-Oriented Design
280	Flood Defences
284	Infratecture
286	Integrated Bridge Design
290	Integrated Infrastructure Design Method
292	Integrated Highway Design
296	Nature-Inclusive Infrastructure
300	Strategies for Infrastructure-Entangled Spaces
304	Systems Engineering
308	Train Station Design
312	Urban Pathway Design

Design strategies for Infrastructure-Entangled Spaces

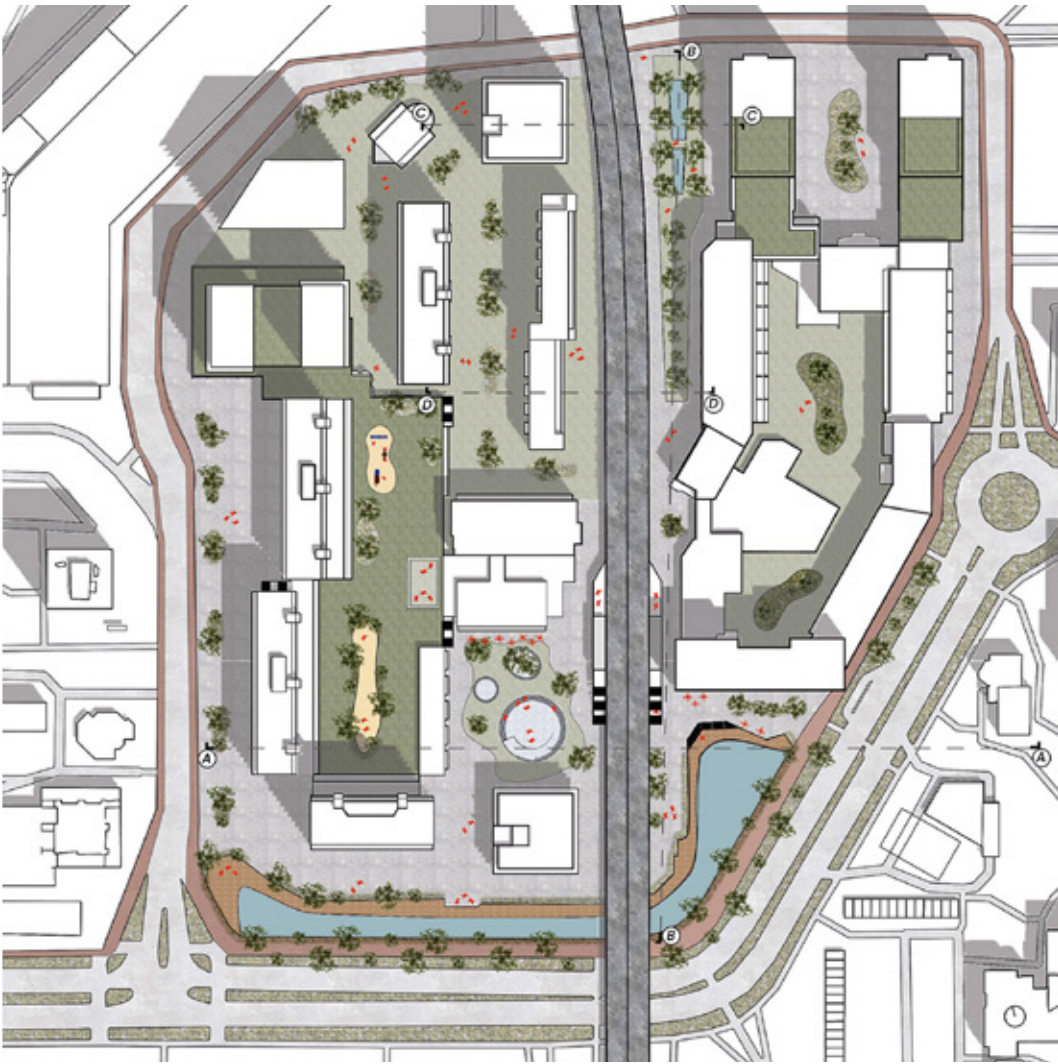
Metropolitan regions and large cities are shaped by extensive, multimodal transport infrastructures. While facilitating connectivity across multiple spatial scales, these networks often fragment the urban fabric, sever ecological corridors, and isolate neighbourhoods. This raises a pressing question: can the residual, interstitial, and overlooked spaces along mobility corridors be reimagined through design to restore continuity and generate new spatial, ecological, and social value?

PURPOSE – Transition zones at the margins of metropolitan mobility infrastructures, such as ring roads, motorways, and railways, constitute a fragmented and frequently overlooked element within the contemporary urban environments. These in-between spaces, slumbering between heterogeneous systems of movement and the consolidated urban fabric, encapsulate both the constraints and the possibilities of more contemporary-wise approaches to urban transformations. Often emerging as an unforeseen consequence of the rigid functional model proposed within the ‘modern city’ of the CIAM approach, they represent pressure points where ecological fragility, spatial discontinuity, and socio-economic fragilities converge. Simultaneously, they present opportunities to reimagine the relationship between infrastructure and public space, between systems of flow and places of interaction. As urbanisation accelerates and sustainable sensitivity intensifies, the need to develop more virtuous design strategies for these fringes demands renewed attention, both as critical challenges and as catalysing sites for innovation.

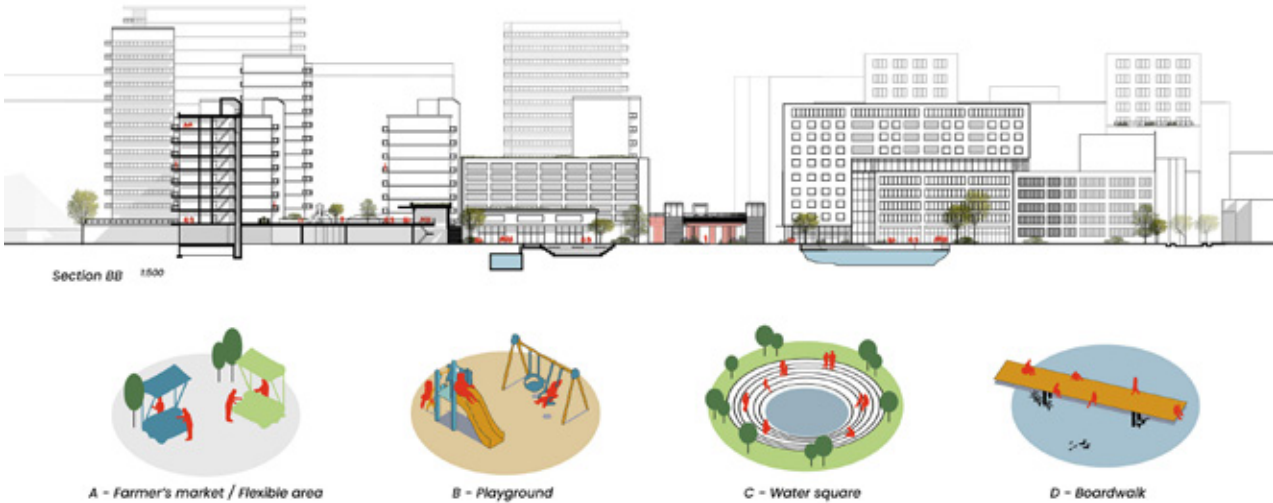
The MSc2 studio Architecture & Urban Design at the Faculty of Architecture & the Built Environment, TU Delft, has positioned these marginal conditions as an important subject of investigation. Through various projects, the studio consistently addressed the role of design, particularly focusing on the spatial performance of natural and built environments adjacent to mobility infrastructure like multimodal hubs and residual spaces. The developed method stimulates systemic thinking and cross-scalar coherence, combining urban and peri-urban reasoning with site-specific actions. It is embedded within a broader framework of transition values, including those promoted by the New European Bauhaus (NEB) initiative: sustainability (ecological balance and circularity), inclusiveness (accessibility and affordability), and aesthetics (inspirational and emotional power of design and beauty beyond functionality).

APPLICATION
The method is most effective for transition zones along motorways, railways, and major urban roads which often suffer from spatial fragmentation, ecological discontinuity, and social detachment. Interventions need to operate across different scales – such as territorial, urban, and architectural – and need to find where a balance between environmental performance, spatial coherence, and urban-public space. This method is well-suited for interdisciplinary efforts involving spatial designers, urban policymakers, and infrastructure agencies aiming to reimagine the role of large-scale mobility systems in shaping the future city.

LIMITATIONS
The method may prove less effective in contexts marked by tight regulatory constraints, incremental spatial change, or siloed disciplinary practices. Its speculative and cross-scalar nature can appear misaligned with short-term engineering goals or narrowly defined planning agendas. In such cases, more focused tools – such as typological studies, participatory processes, or regulatory design frameworks – may better address context-specific challenges and implementation timelines.



Zoetermeer – Meerzicht 2070: master plan, section, and public space themes of the student project *Densify, Activate, Recreate* by Rysa Braganza and Desiré Verlaan. [Braganza & Verlaan, 2024, Studio theme Zoetermeer Railway and Highway Areas, academic year 2023-2024, MSc2 Studio Architecture & Urban Design]

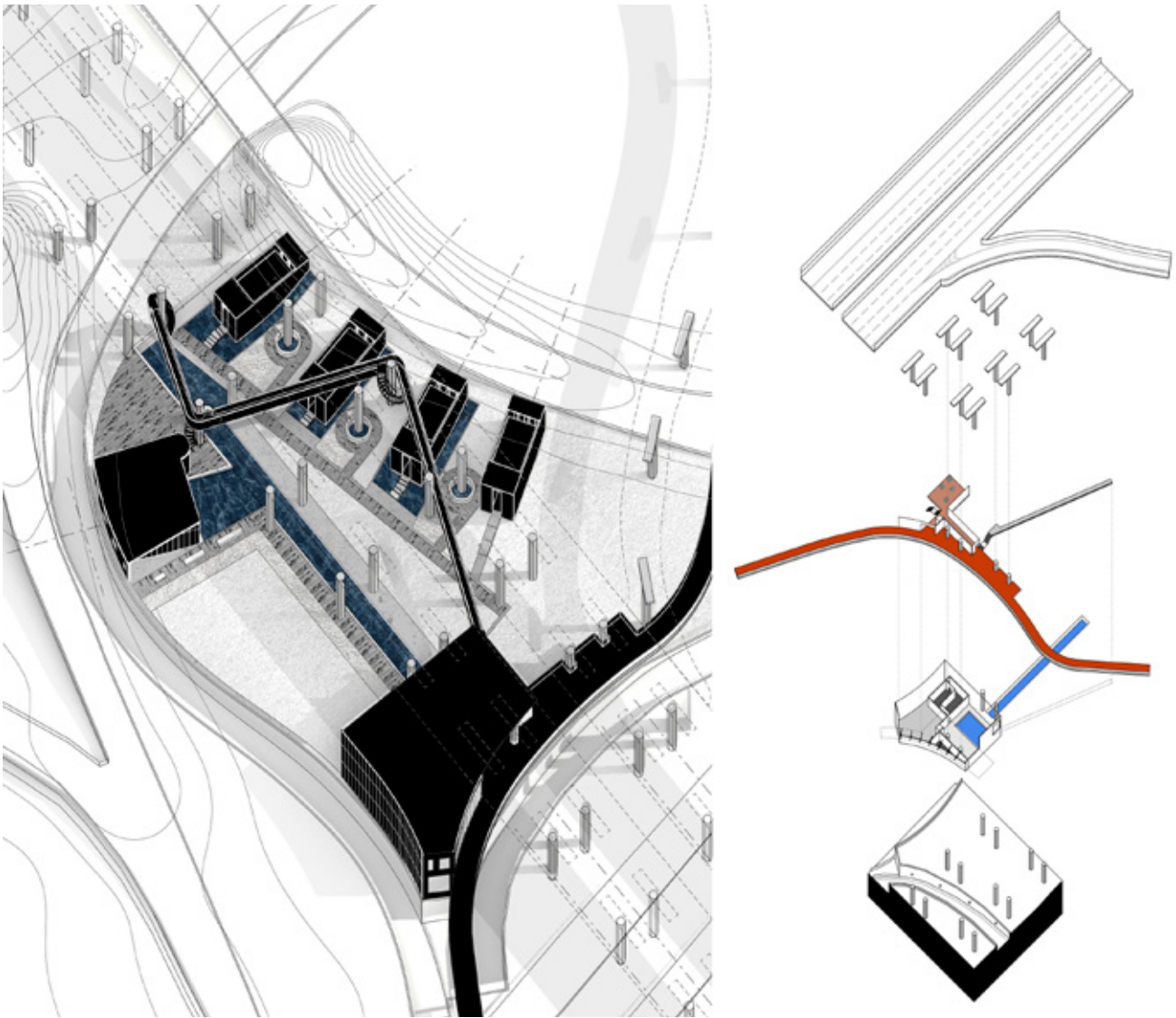


APPROACH – The method has been structured into three phases, integrating analytical and design practices and employing multiple scales. It enables a layered and responsive approach to transitional infrastructural spaces.

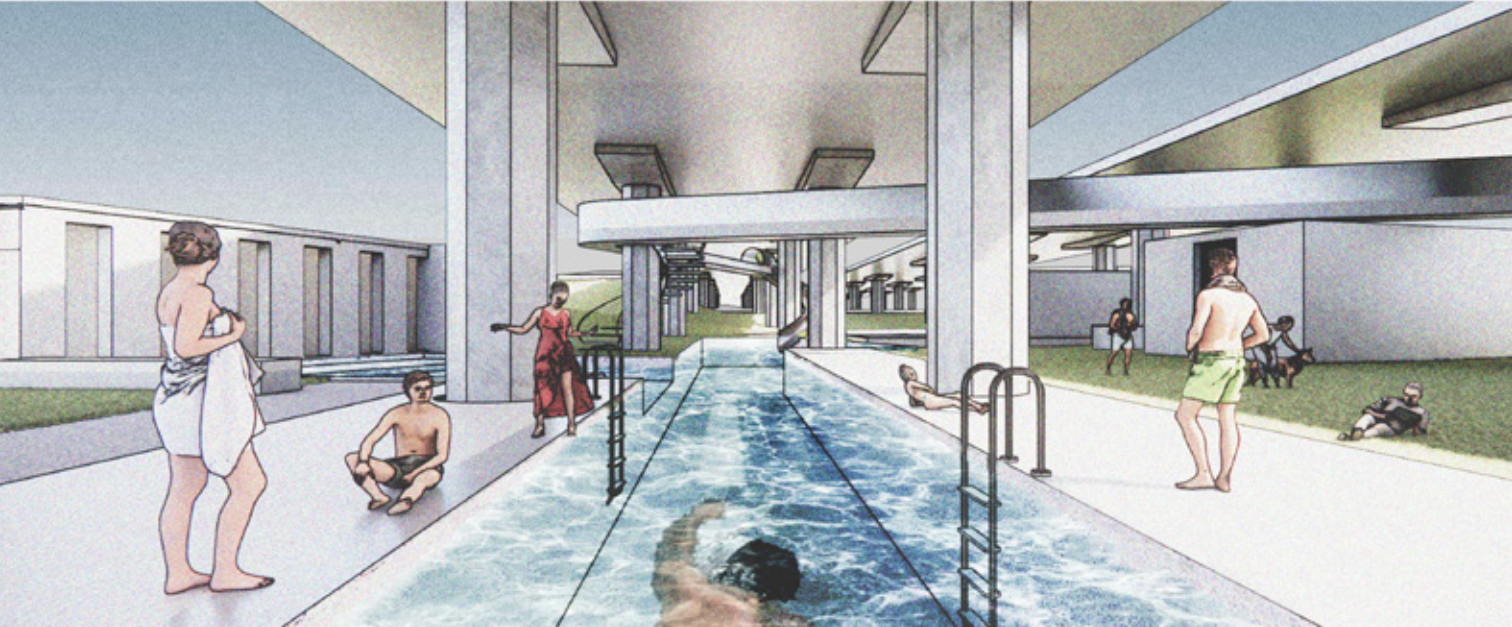
1. *Critical mapping & taxonomy of spaces*: the design-driven research begins with the production of layered spatial mappings and a structured taxonomy of residual spaces and potential opportunities. It is based on the analysis of the urban environment at multiple scales and focuses on the intersections between infrastructure and ecological systems, public space fragmentation, hybrid land use and edge conditions, and on the typologies of leftover, in-between, and transitional areas.
2. *Strategic scenario development*: urban and architectural design strategies are formulated in order to aim at reconfiguring the spatial dynamics of infrastructure-dominated areas, and to produce alternative visions and scenarios for future transformations. These strategies encompass the reinforcement of ecological corridors and blue-green infrastructures; the reimagining of multimodal nodes as urban polarities; the creation of new urban centralities within infrastructural interstices; and the articulation of spatial relationships between subterranean systems and their above-ground counterparts.
3. *Translation*: the strategies are ultimately translated into design proposals operating at both the urban and architectural scales. These interventions investigate new forms of public space emerging along infrastructural edges, reconfigure interfaces between mobility flows and local accessibility, explore the spatial materialisation of ecological infrastructures, and test programmatic hybridisations – such as the integration of transport, housing, and recreational uses.

Roberto Cavallo, TU Delft & Nicolò Chierichetti, Politecnico di Milano

FURTHER READING ■ Berkers, M., De Boer, H., Buitelaar, E., Cavallo, R., Daamen, T., Gerretsen, P., Hartevelt, M., Hinterleitner, J., Hooimeijer, F., Van der Linden, H., & Van der Wouden, R. (2019). *De stad van de toekomst: tien ontwerpvisies voor vijf locaties, verbeelding voor een vierkante kilometer stad* = *The city of the future: ten design strategies for five locations, visualizations for a square kilometre of city*. BNA Onderzoek, Uitgeverij Blauwdruk ■ De Boer, H., Van den Boomen, T., Chorus, P., & Hinterleitner, J. (eds.). (2014). *Onder wegl: vijftien ontwerpen voor Transit Oriented Development (TOD) aan de Zaancorridor*. BNA onderzoek ■ Triggianese, M., Cavallo, R., Baron, N., & Kuijper, J. (eds.). (2018). *Stations as nodes: exploring the role of stations in future metropolitan areas from a French and Dutch perspective*. TU Delft Open Books.



Milan: a design intervention aiming to rethink flows and public space, integrally redesigning infrastructure as a place for interaction: *Under Current* by Julia Zhu. (Zhu, 2025, Studio theme Milan East Ringroad Area, academic year 2024-2025, MSc2 Studio Architecture & Urban Design)



COLOPHON

EDITORIAL BOARD: Hans de Boer, Mark Voorendt, Maurice Harteveld, John Baggen (TU Delft).

AUTHORS: Maarten Van Acker (University of Antwerp), Jan Anne Annema (TU Delft), Jaap Bakker (Rijkswaterstaat), Jochem van Berne (De Zwarte Hond), Like Bijlsma (Netherlands Environmental Assessment Agency - PBL), Leo Bus (Policy analysis and interim solutions for transport and spatial issues), Hans de Boer (TU Delft), Marian Bosch-Rekvelدت (TU Delft), Roberto Cavallo (TU Delft), Yawei Chen (TU Delft), Nicolò Chierichetti (Politecnico di Milano), Maurice Harteveld (TU Delft), Marcel Hertogh (TU Delft), Fransje Hooimeijer (TU Delft), Stijn Joosten (Ney & Partners), Kees Maat (TU Delft), Cong Mai Van (TU Delft), Walter Manshanden (Netherlands Economic Observatory), Jan Nederveen (Municipality of Delft), Sander van Nederveen (TU Delft), Rob Nieuwkamer † (Witteveen+Bos), Anne Loes Nillesen (TU Delft), Johan Ninan (TU Delft), Hans Ramler (TU Delft), Elisabeth Ruijgrok (Witteveen+Bos), Joris Smits (Ney & Partners), Maike van Stiphout (DS landscape architects), Laurens van Tiel (Rijkswaterstaat), Manuela Triggianese (TU Delft), Marc Verheijen (Municipality of Rotterdam), Carlita Vis (Rijkswaterstaat), Mark Voorendt (TU Delft).

BOOK AND GRAPHIC DESIGN: Yvo Zijlstra, Antenna-men.com / TEKST EDITOR: Roselaar Tekstadvies.

PUBLISHERS: Public Space, Mechelen, Belgium and TU Delft OPEN Publishing, Delft, the Netherlands.

PRINT: Grafistar, Lichtenvoorde.

ACKNOWLEDGEMENTS: Miranda van Ark, Koen Bakker & Marije de Man (BoschSlabbers Landschapsarchitecten), Jochem van Berne & Rosanne van Tilburg (De Zwarte Hond), Anne van den Berg (Ziegler Branderhorst stedenbouw en buitenruimte), Jean-Bastien Billiard, Arie Bleijenberg, Jorijn Bleijs, Marc Blommaert Photography & Film, Thijs Blomberg, Arjan den Boer (retours.eu), Stijn Bolleart, Fotografie Jacqueline van den Boom, Rysa Braganza, Ibrahim Bouzeya, Jeroen Breukel, Joeri De Bruyn (Public Space), Sybille Buhl Karottki (Schmidt Hammer Lassen), Cees Busé (Busé Communications), Esmee Buursink (DP6 architectuurstudio), Bas Cornelissen (Max Bögl Nederland B.V.), Peter Dauvellier, Nikki den Dekker (Stadsarchief Delft), Bas Dijkhoff & Martijn Onderwater (Arcadis Nederland B.V.), Onno Dirker & Rudy Luijters (Atelier Veldwerk), Jan Hendrik Dronkers, Michel Duinmayer & Karel Feenstra (Ministry of Infrastructure and Water Management), Robert Duzijn & Kees van der Velden (Province of Gelderland), Roger Frei Achitectur Fotografie, Adriaan Geuze, Jack Petch & Füsün Tekin (West 8), Steven van der Heijden (Koen van Velsen architecten), Carla Herrewijnen (DE URBANISTEN), Marcel Hertogh, Sandra Schuchmann & Danielle Hellendoorn (TU Delft), Thea van den Heuvel Fotografie, Hanneke Hollander & Eliano Felicio (mecanoo), Kasper Hoogkamer, Petra Houmes (BGSV bureau voor stedenbouw en landschap), Jan Willem Huurneman (Gumtree Creatives),

Lorraine Iweins (Bureau Bas Smets Landscape Architecture), Roel de Jong (Nieuwe Sluis Terneuzen), Marijne Kreulen (H+N+S Landschapsarchitecten), Kengo Kuma & Associates, Chiara Liastro (OKRA landschapsarchitecten), Jannes Linders Fotograaf, Katrien Van der Marliere (Ney & Partners), Jonathan McDowell (matter architecture), Marcel van der Meijs (Palmbout Urban Landscapes), Jacqueline Michielen-van de Riet & Just de Leeuwe (TU Delft OPEN Publishing), Bart Mispelblom Beyer & Lejla Duran (TANGRAM), Sarah Olde Monnikhof (MRDH), Adam Mørk Architectural Photography, Jeroen Musch Fotograaf, Sebastien Nagy, Martijn Noordermeer (LOF Landschapsarchitecten), Ossip Architectuurfotografie, Bo van Plateringen (Level), Simon Pronk (Ballast Nedam Development), Rocco Reukema (Municipality of The Hague), Ernst van Rijn (wUrk architectuur stedenbouw landschap BV), Jelle Rinsema (Moederscheim Moonen Architecten), Inez van Slooten (Witteveen+Bos), Dennis De Smet Photographer, Timothy Soar, Margot Stoete, StudioXR, Cayetana Talledo (MVRDV), Gus Tielens (Korth Tielens Architecten), Ronald Tillemann Photography, Martijn Tjassens Keiser & Ton Venhoeven (Venhoeven CS), Alexis Traussi (UNS), Greg Verhoeven (Lantis), Desiré Verlaan, Martine Verkaik (BAM), Ruedi Walti, Stan Wanders (Rijkswaterstaat), Imke Wassink (Bentham Crouwel Architects), Else Wissink & Bas Symons (ZJA Architects & Engineers), René de Wit Architectuurfotografie, Julia Zhu.

PUBLIC SPACE



Deltas, Infrastructures & Mobility Initiative



PUBLIC SPACE: ISBN 9789491789489 D/2026/13.171/2 (hardcover)

TU Delft OPEN Publishing: ISBN 978-94-6518-316-9 (online, <https://doi.org/10.59490/mt.259>)

Backcover: Harderwijk, Gelderland: Aqueduct Veluwemeer crossing the N302 motorway. [© Sébastien Nagy]

COPYRIGHT: This work is licensed under a Creative Commons Attribution 4.0 International (CC BY 4.0) license unless otherwise stated. Photos with the © mark are provided by architectural and engineering firms and/or professional photographers who have given permission to use their images (see Acknowledgements). They are not covered by the textbook's CC BY license and may not be used further. Photos or images with another, more restrictive Creative Commons Attribution may only be used in accordance with their license. Photos/images with the PD mark are in the public domain. Some photos and images with a CC mark are under a different CC license. Under CC BY 2.0: 47 Rob Oo, 48 Frans Berkelaar, 91 Kees Torn, 115 A4-Nieuws, 264 A4-Nieuws, 289 Rob Oo, 299 Nanda Sluijsmans, 315 Pline. Under CC BY 3.0: 24 Florent Abel, Wiesenpinguin, Michiel1972, 48 ESA, 107 Dbsheajr, 115 Michiel1972, 156 Hektor, Joop Kieft, 295 Baenziger Partner AG - Theiler Druck AG, 247 ESA, 311 Jean-Marc Rosier.

Not all copyright holders of the illustrations used could be traced. Interested parties are requested to contact Public Space, Frans Halsvest 82, 2800 Mechelen, Belgium. www.publicspace.be or TU Delft OPEN Publishing, TU Delft Library, Prometheusplein 1, 2628 ZC Delft, the Netherlands, books.open.tudelft.nl.

