Dortmund-Ems Landscape Canal

adjusting the post-navigable canal to the landscape system of Münster

Xinyi Zhang

first mentor: Steffen Nijhuis
second mentor: Daan Zandbelt
examiner: Egbert Stolk

Graduation study: Flowscape, Landscape Architecture, TU Delft
P5, June 29th, 2015
The traditional infrastructure in modern city: highway #40 Los Angeles, California, USA, 2019 (Courtesy of Edward Burtynsky)

WHAT IS REFLEXIVE INFRASTRUCTURE?
  # “The reflexive infrastructure”
  # Possibilities: what could it be?

WHY CONVERT REFLEXIVE INFRASTRUCTURE?
  # Site selection: a case study
  # Site introduction: the reflexive canal in Münster
  # Problem & possibilities of the post-navigable canal
  # Research goal & question

HOW TO CONVERT REFLEXIVE INFRASTRUCTURE?
  # City port introduction
  # Design overview
  # Deconstructing thematic layers
  # Summary of principles
  # Master plan
  # Thematic strategies
  # Development schedule
WHAT IS REFLEXIVE INFRASTRUCTURE?

# “The reflexive infrastructure”
# Possibilities: what could it be?

WHY CONVERT REFLEXIVE INFRASTRUCTURE?

# Site selection: a case study
# Site introduction: the reflexive canal in Münster
# Problem & possibilities of the post-navigable canal
# Research goal & question

HOW TO CONVERT REFLEXIVE INFRASTRUCTURE?

# City port introduction
# Design overview
# Deconstructing thematic layers
# Summary of principles

# Master plan
# Thematic strategies
# Development schedule
"the reflexive infrastructure"

According to Regine Keller (Infrastructural Urbanism: addressing the in-between), the current discourse on infrastructure is its "reflexivity".

One presentation of reflexivity is the relevant spaces that are on longer useable, or become harmful, and consequently shut down over time.

Urban infrastructure influenced, dominated and even defined these spaces as its context.

Thus the reflexivity is reflected in the infrastructure and its relevant domains.

These spaces are significantly marginal in big cities. Infrastructures such as railways, highways and drainage canals have this situation more or less.
# New possibilities of the reflexive infrastructure

*Highline* in New York,
a connector of people's life and emotion, providing programs for people from different ages and different social groups, in different seasons.

---

*Highline* north view from West 17th Street, 1934. Photographer unknown.

---

**UPCOMING EVENTS**

**Stargazing**

**EVERY TUESDAY, APRIL THROUGH OCTOBER, DUSK TO 9:00 PM**

You don't have to leave New York City to see the stars. Look at the stars, planets, and moons through the high-powered telescope of the American Astronomers Association, and chat with the experts about the sky as you see.

**AFTER SUNSET: Poetry Walk**

**APRIL 25, 2015 6:30 PM TO 9:00 PM**

Stroll the Highline at sunset and encounter a series of poetic performances along the way. Celebrate National Poetry Month with the work of local artists, spoken word, and live poetry.

---

Check the available activities at highline park at thehighline.org
# New possibilities of the reflexive infrastructure

*Madrid Rio* in Madrid,
a backbone of urban spaces, bridges enhance the connection of two sides along the route.

---

The old highway under converted into urban space. Photo via West8.

The new look of the riverfront. Photo via West8.

New possibilities of the reflexive infrastructure

Baana in Helsinki,
a low-speed traffic route for daily commute and leisure.

Baana is an old railway corridor in Helsinki, which was used for freight trains. This is the situation before converted. Photo via HBL.fi by Tor Wennström.

This Helsinki's new "Low Line" (as opposed to NYC's High Line) opened on June 12, 2012. It runs through the city centre, providing a safe bicycle and pedestrian route to many points in the city. Photo via HBL.fi by Tor Wennström.
New possibilities of the reflexive infrastructure

Bishan Park in Singapore,
a naturalized drainage stream, also acts as an ecological corridor in urban context.

The old Kallang River is an artificial channel to collect and drain the rainwater from nearby urban surface. Photo via wikipedia.

Now it is a naturalized drainage canal. The new canal has the functions of purification, ecology and recreation. Photo via wikipedia.
WHAT  IS REFLEXIVE INFRASTRUCTURE?
  # “The reflexive infrastructure”
  # Possibilities: what could it be?

WHY  CONVERT REFLEXIVE INFRASTRUCTURE?
  # Site selection: a case study
  # Site introduction: the reflexive canal in Münster
  # Problem & possibilities of the post-navigable canal
  # Research goal & question

HOW  TO CONVERT REFLEXIVE INFRASTRUCTURE?
  # City port introduction
  # Design overview
  # Deconstructing thematic layers
  # Summary of principles
  # Master plan
  # Thematic strategies
  # Development schedule
# CASE STUDY
Dortmund-Ems-Kanal (DEK) in Münster, Germany

- 26.3 km long
- 40-140 m wide
- 2 times of alternate routings
- 2 locks (Zwillingschleuse)
- 1 city port
- 9 small docks
Sprawling to the Canal
A brief city development biography of Münster

---

What
Why
Site selection
Site introduction

---
The city's development was once tightly related to the canal. However, the canal has not kept the pace with the city's.

# Münster: “the international awards for liveable communities 2004”

Münster's history spanning more than 1,200 years is reflected by the medieval ground plan of the Altstadt (old part of the city) and numerous historical buildings. The Altstadt is an exceptional example of the European city tradition with its varied functions in an enroded space and high urban development quality. The Prinzipalmarkt with the Lammertkirche (church) and the Bahnhaus des Westfälischen Vereins as well as the cathedral and the cathedrals square represent just a few of the internationally significant constructions of the Altstadt spanning a period of eight centuries. Historical buildings, modern architecture, contemporary sculpture - this composition ensures the Altstadt is a stylish contact point of the city. In addition the outstanding qualities of Münster include the fact that the city is well given with the Provendal, a green ring around the Altstadt, and the fact it is embedded within the charming parks landscape of Münsterland.

The modern city of Münster, New the Westphalian metropolis presents itself as the city of the universities with outstanding international reputation, which accommodates approx. 95,000 students, and as the headquarters of innovative centres in the field of research and technology transfer. This academic potential forms an important basis for the future-oriented development of the economy. A lot of young people, numerous institutions attached to the university, a varied and exciting cultural life as well as the bicycle as the omnipresent form of transport characterize the city's unique atmosphere. In addition, the international exhibitions and the new Picasso Museum that have attracted a lot of public attention have helped Münster gain high profile as a cultural city.

The regional capital, Münster assumes important functions for a region with more than 1.5 million people - the service, trade, and administration centre of Westphalia. This is not least the reason why the city has also given the region - Münsterland - its name. Regional cooperation takes on an even higher status due to the varied links with the surrounding areas.

A city in Europe with links to the outside world. As a result of the open European state, Münster engages in close conner-cooperation with its Dutch partners, e.g. in the city triangle of “Münster – Groningen – Nijmegen”. At the same time the city is a member in several European city networks, such as CEBEECITIES and Clever.

Münster has partners throughout the world. The city has entered into eight global city partnerships since 1987.

Toward sustainability is a tradition in Münster. Urban development has been promoted with the objectives of sparing resources and environmental compatibility for a number of decades. The evolved city structure - compact city center with a lively Altstadt, attractive district centers and a virtually ideal green system - ultimately provides the ideal precondition to this end and simultaneously constitutes an obligation towards the future. In this process the most important role of potential are the active citizens as a lot of the success of the sustainable urban development would have been inconceivable without their commitment and their initiatives.

Münster is a balanced city. This demand requires that economical, ecological, social and cultural objectives are observed simultaneously and with equal emphasis. The integrated approach of the urban development of Münster consistently takes account of these considerations and is explicitly pressed by the many awards and prizes won in national city competitions.

Awards and prizes
- 2004 The most child-friendly city in Germany
- 2004 (and 1993) Bicycle capital city
- 2004 Amongst the top ten "cities willing to make reform in Germany"
- 2004 and 2003 came second in the Solar federal state league of North Rhine Westphalia for cities
- 2003 Local Agenda Best Practice Project: Renovation of old buildings' subsidies programme
- 2003 Local Agenda Best Practice Project: Saving energy and waste at schools and day nurseries’ project
- 2003 Local Agenda Best Practice Project: Energy and climate protection inventory
- 2002 Gold medal in the national competition "Gardens in urban development": Almhorn Am Lammerbach
- 2001 National champion with the "mobiliarmobil" concept at the 13th ADAG cities competition with respect to the issue of the "Accessibility of city centers" in the field of "How approaches, visions, concepts"
- 2001 Gold badge in the state competition "Small gardens in North Rhine Westphalia": Almhorn Am Lammerbach, Silver badges: Alhorns Hansa and Leibfried-Park
- 2000 Award for the best advertising concept with respect to the climate protection 2000
- 2000 and 1995 several awards for the implementation of urban development projects
- 1999 International award for the "Local Agenda 21" process
- 1999 1st Prize in the "Customer information" assessment category within the framework of the VDB National competition "Royal conditions in trains and buses"
- 1998 Online capital
- 1998 Gold medal in the national competition "Gardens in urban development": Almhorn Münster Ost
- 1997 "Climate capital of Münster": National champion in the area of climate protection (189 applicants)
- 1997 1st prize as the most bicycle-friendly city
According to the Green Space Ordinance of Münster, there is a systematic approach during the planning of green areas. The ordinance defines a green system consisting of:

- three annular green rings;
- seven green corridors/wedges. The wedges run towards the city center in a radial manner from the open countryside.
# PROBLEM I

a marginal space
The urban spaces are separated by canals.

Programmes on two sides are also restricted by canals.

# PROBLEM II
A barrier between the two sides
Canal cuts off the water system

Species cannot circulate between habitats

PROBLEM II
A barrier between the two sides
# POSSIBILITY

_the canal is a new urban space  
_the port is the third urban frontier  
_the canal is a new habitat
# RESEARCH GOAL

The project will explore a comprehensive landscape approach with Dortmund-Ems-Canal in Münster. By integrating the canal into the context of Münster, I want to gain a capacity strategy to convert the post-navigable canal into a crucial component of the landscape structure in the modern city.

---

# RESEARCH QUESTIONS

Main research question:

As the navigable function is declining, how could we find Dortmund-Ems-Kanal's new effective and possessive role in Münster, as a component of the city's landscape system?

Sub research questions:

- What are the landscape opportunities between the canal and city?
- What principles could be used?
- How to apply the principles at local scale ...
- and at city scale?
**WHAT**

IS REFLEXIVE INFRASTRUCTURE?

- “The reflexive infrastructure”
- Possibilities: what could it be?

**WHY**

CONVERT REFLEXIVE INFRASTRUCTURE?

- Site selection: a case study
- Site introduction: the reflexive canal in Münster
- Problem & possibilities of the post-navigable canal
- Research goal & question

**HOW**

TO CONVERT REFLEXIVE INFRASTRUCTURE?

- City port introduction
- Design overview
- Deconstructing thematic layers
- Summary of principles

- Master plan
- Thematic strategies
- Development schedule
# A design test at a crucial spot

**the city port**

From the view of external, there are types of landscapes bordering here: industrial land, neighborhood, woods, suburban gardens, agricultural land, etc. On the other side of the central railway station is the old town of Munster. The port is also the conjunction point of infrastructural lines, canal, railway and highway, which cut the place into segments.
The port in 1902: a freight and industry center
a landscape structure at the city port

Commercial trees, parkways and country lanes are connecting the canal to the urban and landscape areas.

Around the port is a new urban frontier of Münster. There are art warehouse, clubs, shopping mall, bars and restaurants, office and apartment buildings. There are spaces such as parks, event squares, wetland park and castle.

The remained business and industry is restricted near the cross of highway and railway.
A rainwater discharge network
A well-known saying in Münster is “Entweder es regnet oder es läuten die Glocken. Und wenn beides zusammen füllt, dann ist Sonntag” (“Either it rains or the church bells ring. And if both occur at the same time, it’s Sunday.”).
"The rain water from oldtown area flows to the big lake "Aasee"
WHAT --- WHY --- HOW

City port Introduction _Design overview _Deconstructing thematic layers

lake "Aasee" near the old-town

the natural flood plain of Werse, the tributary of River Elbe
Opportunity

The culvert beneath the canal is connecting the urban drainage system with the natural streams. It is the opportunity to discharge urban water to natural river system.
HYDROLOGY

Design: climatic water discharge process...
A crucial section of natural habitat circuitry
Habitats

Rieselfelder Münster, 436.7 ha
Species: amphibians-2, birds-35, invertebrates-16, mammals-6
Habitats:
- 2.7% natural wetlands with Magnocaricion or Hydrocharition type vegetation, shrublands
- 4.0% old deciduous oak woods with Quercus robur on sandy plains
- 17.7% Aulensen oak-Platanus forests
- 5.5% Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padus, Alnion glutinosae, Salicion albae)
- 2.6% bog vegetation
- 2.7% Transition mires and peat bogs
- 14.6% Poplar-Cottonwood forests of Quercus robur, Ulmus laevis and Ulmus minor. Fraxinus excelsior or Fraxinus nigraefolia along the streams
- 2.9% Juniperus communis formations on heaths or calcareous grasslands
- 2.4% Eutrophic lake (e.g. peat bogs, Sphagnum officinale)
- 0.0% Watercourses of plain to maintain levels with the Rhynienbeker heathlands and Callitriche-Bulbocodium vegetation

Davert, 2227.6 ha
Species: amphibians-4, birds-9, invertebrates-7, mammals-0, plants-14, reptiles-2
Habitats:
- 2.9% Alluvial floodplain with Magnocaricion or Hydrocharition type vegetation, shrublands
- 60.4% old deciduous oak woods with Quercus robur on sandy plains
- 1.6% saline and brackish marshes
- 2.4% Bog vegetation

Nature2000
Habitats Directive Sites (SCI)
Scale above 1:100,000
- Habitats Directive Sites (SCI)

Bird Directive Sites (SPA)
Scale above 1:100,000
- Birds Directive Sites (SPA)

Nationally designated areas (CDDA)
CDDA - IUCN categories - large scale
- Strict Nature Reserve (I)
- National Park (II)
- Natural Monument (III, SG3)
- Habitat/Species Management Area (IV)
- Protected Landscape/Seascape (V)
- Managed Resource Protected Area (VI)
- Other (UA, NA, <Null>)

Map of habitats in Münster. Source: Arcgis. European protected sites (arcgis.com)
# Opportunity

Since it is the third main water way of the city, the canal could be seen as a possible habitat for the protected fauna such as birds, fishes, mammals, etc.

Here the culverts beneath the canal could also be used as fauna passage (for aquatic and terrestrial animals) to improve the ecological circuitry.
Stepping stone connectivity. Source: Landscape ecology principles in landscape architecture and land-use planning.
Stepping stone connectivity. Source: Landscape ecology principles in landscape architecture and land-use planning.

A perspective collage of future habitat steppingstone
1. rainwater (eutrophic) lake
2. oligotrophic
3. culvert passage
4. mammal exit
5. tunnel for aquatic and territorial animals
SPACE

# Problem: the canal is an urban backyard...

WHAT---WHY---HOW
City port Introduction Design overview Deconstructing thematic layers
There are streets, spaces and buildings directing and marking the spacial form.

There are spaces in, on and beside the canal.
# Design: to extend the urban & rural spaces to canal; to define and connect the urban space & canal space.

### EXTEND by path
- street
- parkway
- country lane
- arcade

### EXTEND by node
- traffic cross
- urban park
- important building
- landmark

### DEFINE / CONNECT - removing
- remove fence
- remove dense trees
- remove bushes

### DEFINE / CONNECT - exit
- ramp
- stairs

### DEFINE / CONNECT - opening
- ground floor semi-open
- ground floor open

### DEFINE / CONNECT - canal space
- floating platform
- floating swimming pool
- boat cafe / restaurant
- waterball
- trampoline bridge
A multi-used urban center
The old town

- It is now a heritage with many cathedrals, houses and fortresses, attracting tourists during the year.
- It is also the center of citizens daily shopping and living life.
- So there is a conflict of people's daily life and tourism. The old town is too crowded.

Aasee

- The lake is the best recreation destination for local people in holidays. Besides the lake, there are parks, parkways, zoo, yachting clubs and so on.
- It is also serving the nearby neighborhood.
The city port

- The cultural activities take place in some discard industry buildings, mixed with some industrial activities.
- Other programs in this area are mainly neighborhood retail shops.
- This area also lacks outdoor activities.
Principles

The port's objective is becoming the future center of citizens' modern life. There are principles need to follow:

Cultural potential is promoted. Commercial program is also developed at the port, to distract the load of old town. Recreation programs are also necessary to increase the area's competitiveness in the whole city's development. Business & industry programs are constricted in particular place.

Application

The program corridors integrate the port into the citizen's social life.
A crucial junction of passenger traffic network
Opportunity

- The port is next to the central railway station.
- Münster is developing its “bicycle capital” designation. So there are bicycle paths, the most famous one called “promenade” around the old town. There are also bike renting and parking stations around (biggest at the railway station).
- There is a short waterbus route on the lake of Aasee for tourism and recreation. It could be applied on the canal.
The existing industry and routing are dispersed.

The proposed industry and routing are concentrated at the junction of railway and highway.
The existing bicycle path is fragmented, and not permeable enough.

The proposed bicycle path
The existing busline is not permeable enough.

the proposed bus and waterbus line
HYDROLOGY Principles
To collect, to infiltrate, to store, to retention, to discharge, to get rainwater go to landscape.

HABITAT Principles
To diversify habitat; to connect the separated habitat.

SPACE Principles
To extend the urban & rural spaces to canal; to define and connect the urban & canal space.

PROGRAM Principles
To promote cultural potential; to develop commercial & recreation program; to constrict business & industry.

TRAFFIC Principles
To decrease the freight transport; to complete the bicycle path; to add waterbus as a means of public traffic.
# Four steps of “landscape base -- green space -- traffic -- new urban development”

Local development schedule (at the city port)

Regional development schedule (the city of Münster)
"the reflexivity of early infrastructure"

_Early infrastructures could cause _problems _while provide _potentials._

_No matter inter-local transportation networks, military defence systems, or dikes, their relationships with city evolve through time. Now they keep the structural traces from the interlocal or separate fundamental origin. And the existing linear, curve, or loop shape is convenient to transform into crucial landscape intervention in cities (or a component of landscape system)._ 

_Landscape architecture intervention is also necessary to gain comprehensive proposal for the infrastructures' problems and potentials, from spacial, social and ecological view. My project explores a applicable way to transform the early infrastructure into a landscape infrastructure in modern city. _No matter at local or regional scale, an operative landscape structure could be developed on the base of the canal trace. And the structure works in various thematic layers, while our object is playing a complex role with no neglecting._

**Past: canal as infrastructure**

**Now: canal as structure**

**Opportunity: canal as landscape infrastructure**