

# The Netherlands

## RESILIENCY & MOBILITY TOUR



DELFT



THE HAGUE



ROTTERDAM



ZEELAND



City of Annapolis  
Special Work Session  
Friday, December 8, 2023



Mayor Gavin Buckley

# Netherlands Trip Overview

## LEARNING OBJECTIVES:

- **Resiliency Challenges:** See how a country that sits below sea level has adapted.
- **Best Practices:** To confirm that our current plan aligns with research and experience.
- **Public Transport:** Understand and see the return on investment on pedestrian and cycling infrastructure investments.
- **Multi-Modal Transit:** Making connections to microtransit to reduce cars on the road.
- **Funding:** Learn about innovating funding strategies and how the Dutch have avoided the politicization of resiliency







# Itinerary:

**MON., NOV. 13:**

## THE HAGUE

- Netherlands Water Partnership (Ministry of Infrastructure & Water)
- Dutch Cycling Embassy
- Dutch Cycling Tour to Scheveningen
- Bosch Slabbers



# Itinerary

**TUE., NOV. 14:**

## **ROTTERDAM**

- Arrival by train, walk to municipality
- Dutch cycling tour with stops at water storage parking garage, Central Station, and Urban Water Square Benthemplein

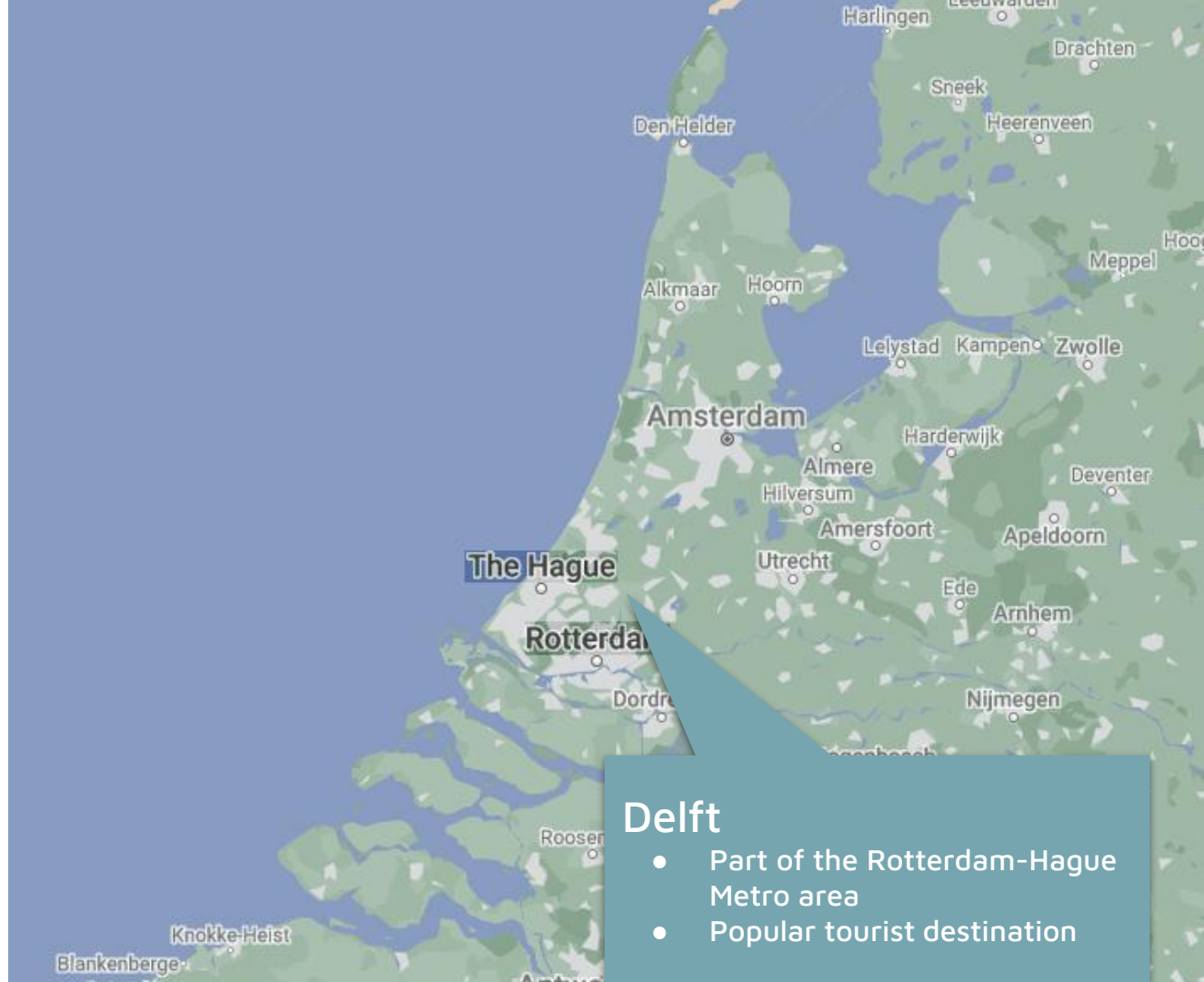


# Itinerary

**WED., NOV. 15:**

## DELFT

- Arrival by train at Central Station
- Visit to Hoogheemraadschap Delft and IHE Water Institute
- Visit to TU Delft Campus/Flood Proof Holland
- Dutch Cycling Tour Delft
- Alt: Walking Tour



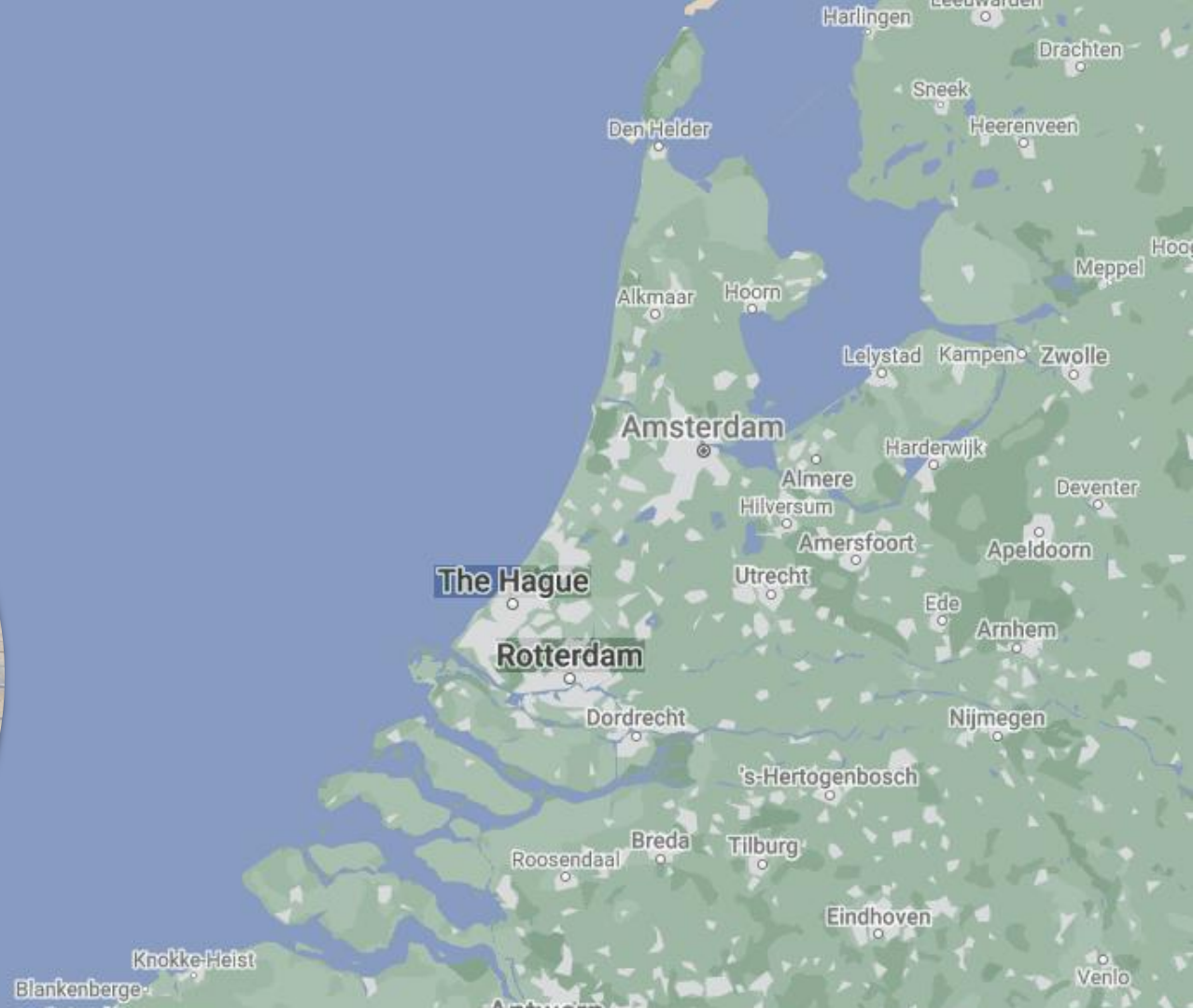
## Delft

- Part of the Rotterdam-Hague Metro area
- Popular tourist destination

# Itinerary

**THU., NOV. 16:**  
**THE HAGUE**

- International Cycling Safety Conference





# Itinerary

**FRI., NOV. 17:**

## **ZEELAND**

- Maeslant Barrier - Storm Surge Barrier
- Noordwaardpolder
- In-Dune Parking Garage Katwijk aan Zee
- Visit to Van Nelle Factory



**“Zuid-Holland”**

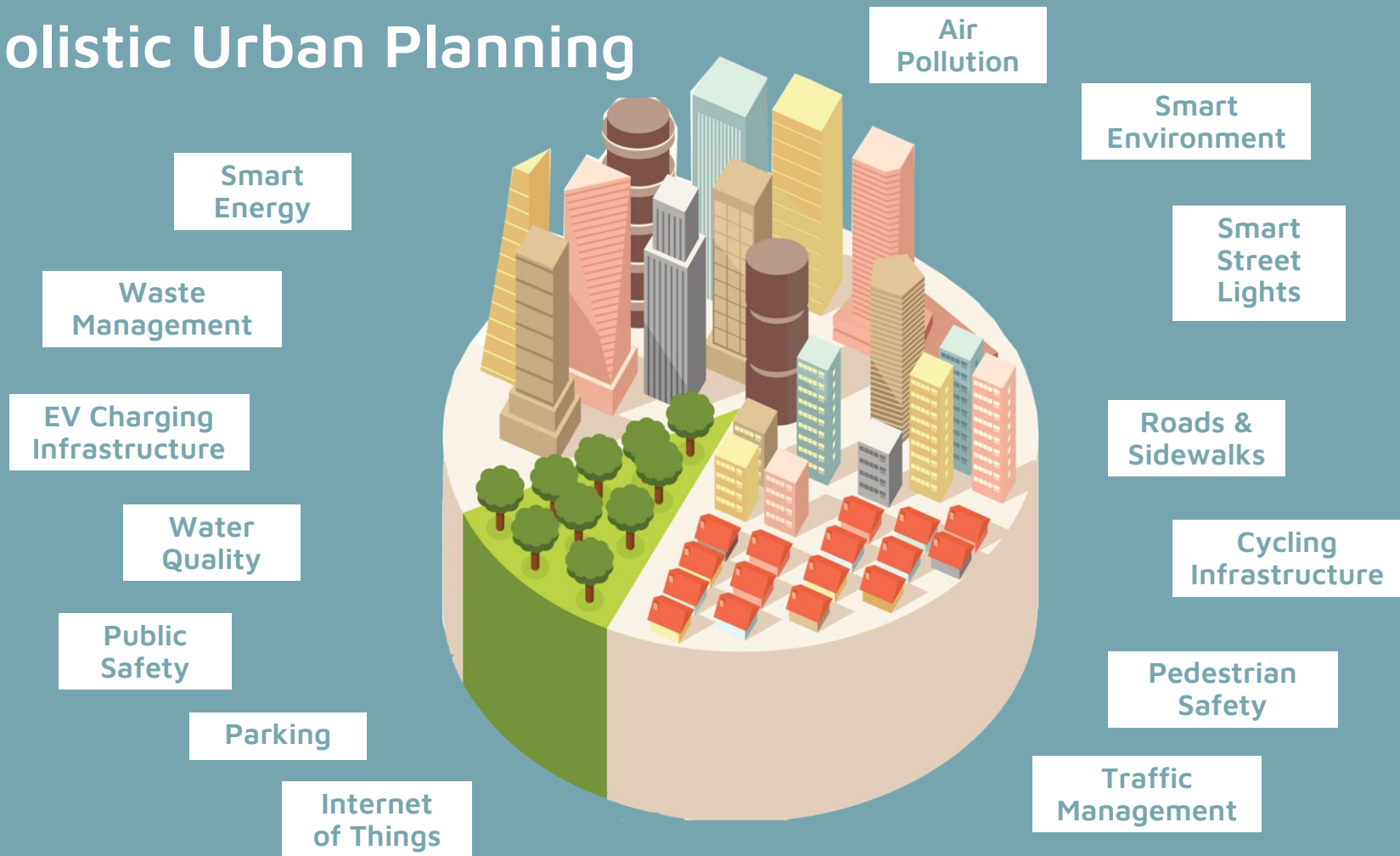
- Southernmost province in the Netherlands
- Large parts are below sea level.

# Itinerary: Sat., Nov. 18

City Manager Michael Mallinoff



# Holistic Urban Planning





# Bruges/Brugge, Belgium



Guide: Bart Slabbinck  
 Project coordinator  
 Mobility City of Bruges

A World Heritage City

A Cycling City (in the making)



Population of downtown area:  
**20,000**



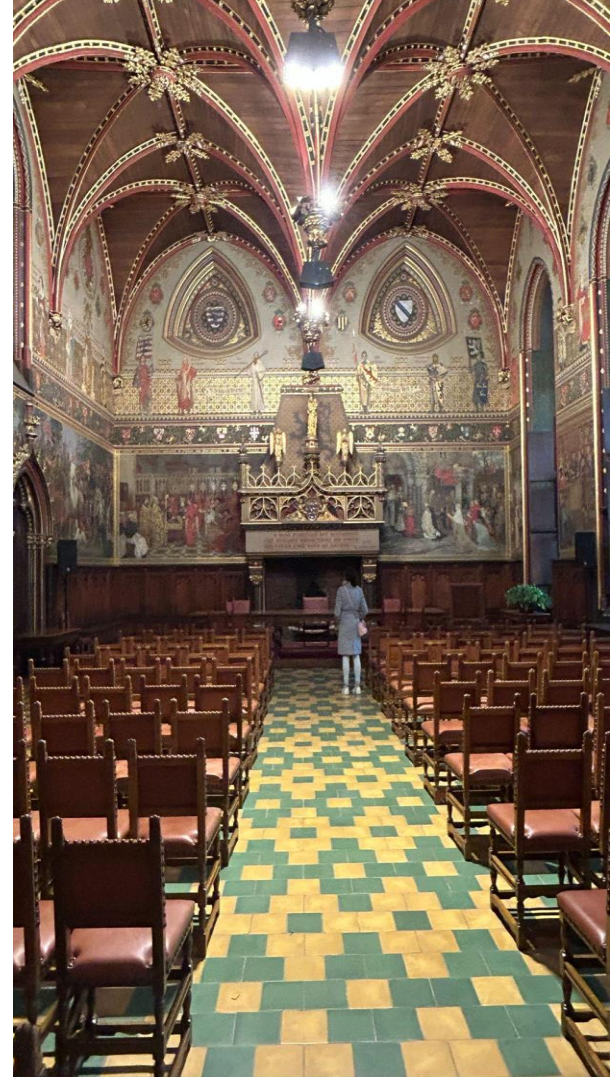


## City Hall, Bruges

Built in the 1300s (plaza was a parking lot)



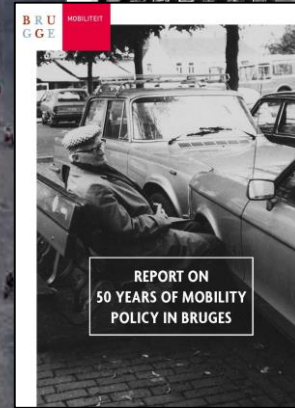
Even the City  
Maintenance  
person uses a  
bike for his work.





# BRUGE MOBILITY

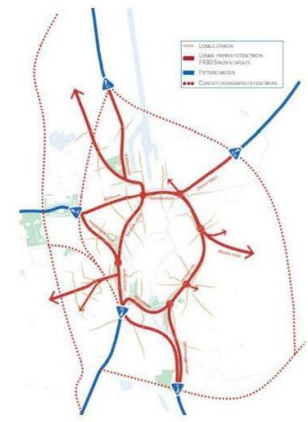
City Squares to Parking Lots  
to Gathering Spaces



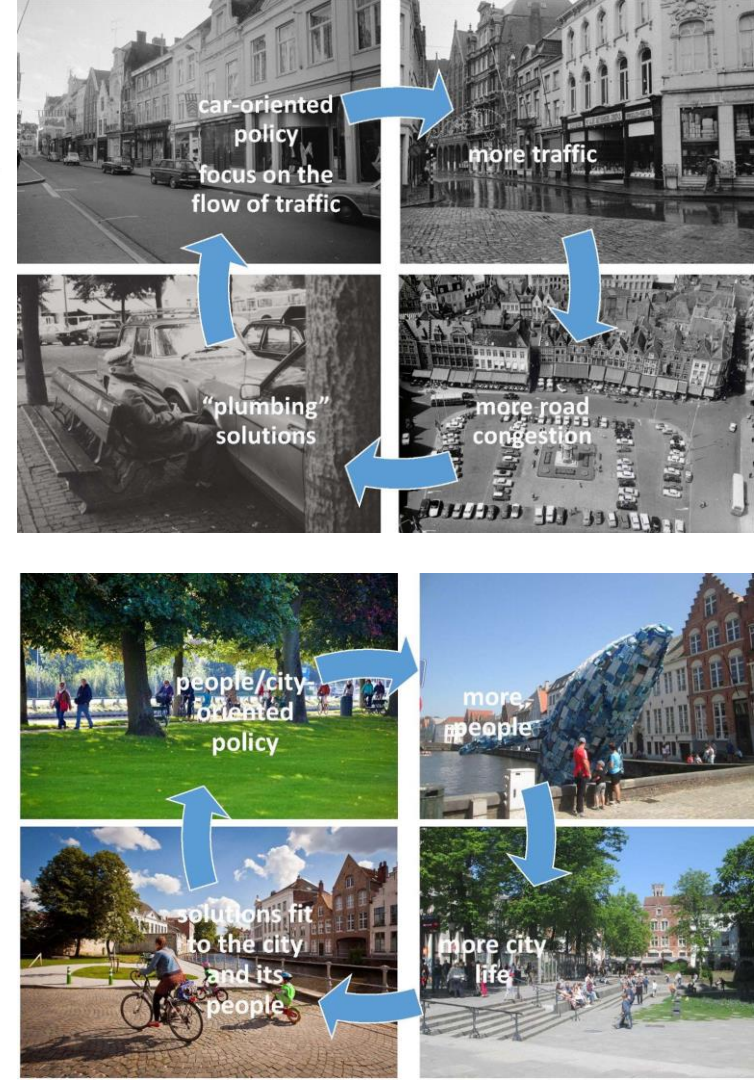
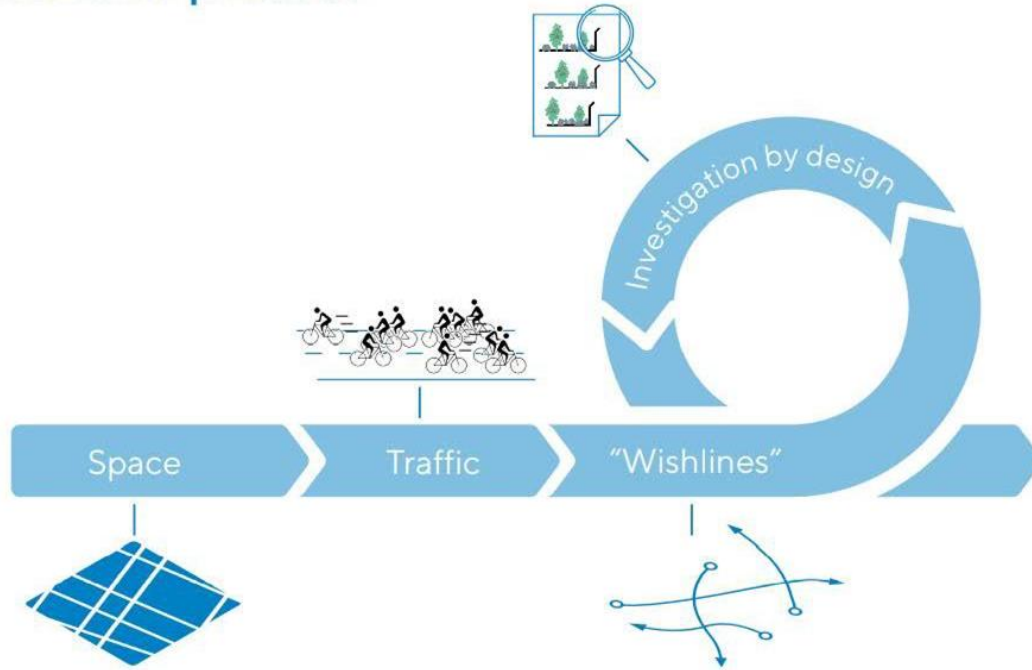
From Car  
Centric to  
**Quality of Life  
Planning**  
Building to 40  
minute bike  
commute

# Bruges is now referred to as "THE 15 MINUTE CITY"

The City is planned to get riders anywhere in the city by bicycle in 15 minutes



# Iterative process





# Working with Different Groups

## KEEPING SAFETY IN MIND



- Budejstven zozbe vootzen in het nieuw puzeebarku
- ❶ Kowłeż (woonstree) wordt fietstree
- ❷ Nieuwe vascndegeneuntenr bedrujt (fietabndiek)
- ❸ Enkelefcindigefebeg van Kowłeż naar Bajon Kuszelebark + voojgandegeneuntenr
- ❹ Enkelefcindigefebeg van Bajon Kuszelebark naar Kowłeż (woonstree)
- ❺ Besebnde doozteek door de middeberem
- ❻ Van 2 naar 1 rijk kenz puzennummer eoc Kowłeż

2fop kowłeż – Bajon Kuszelebark



**DESIRE LINES**  
**WAITING TO BE FOUND**

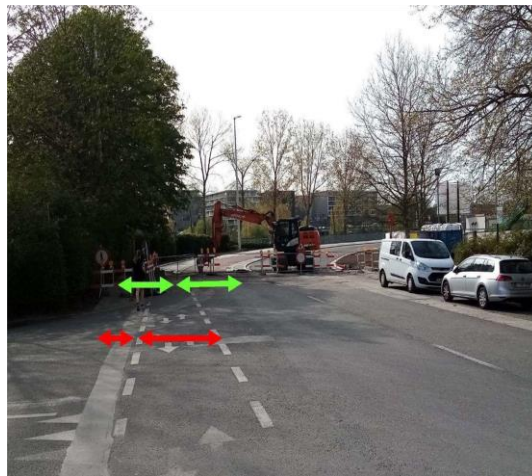
Before



After



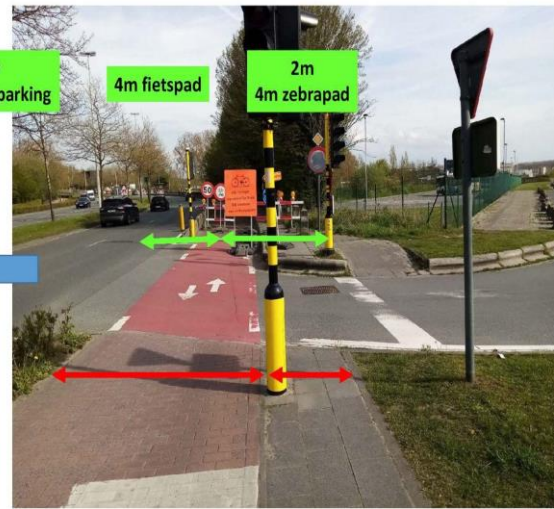
# Build to Design

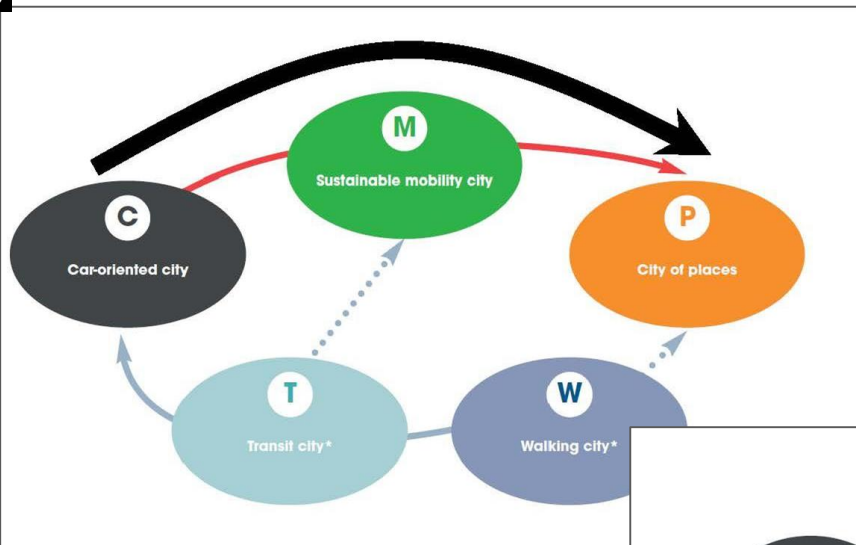


opschuiven R30  
schrappen Ketsbruggeparking

4m fietspad

2m  
4m zebraapad





# Creating an integrated City



- Road building
- Car parking
- Lower density
- Dispersion



- Public transport
- Cycle networks
- Roadspace reallocation



- Public realm
- Street activities
- Traffic restraint
- ToD/mixed use developments



Supporting different city visions, based on:

- Sustainability
- Efficiency
- Equity
- Health and vitality
- Happiness

# Pavement to Nature

## SPACE MAKING & CONSERVATION

- Pavement to pathways
- Conserve habitat and link parks and forests
- Bring people to the water & parks
- Add **vegetation EVERYWHERE**



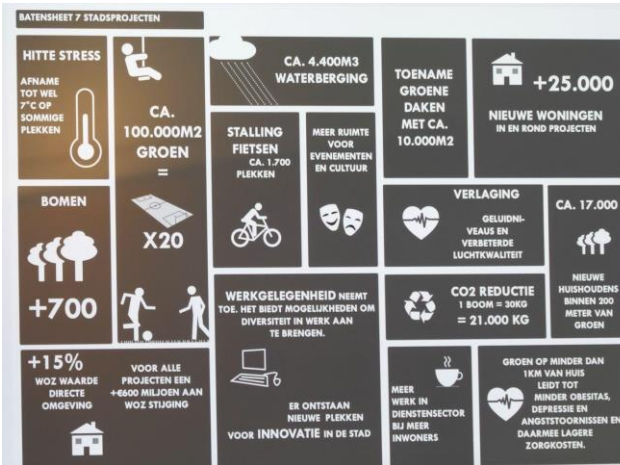


# Holistic Planning Housing

Alderman DaJuan Gay

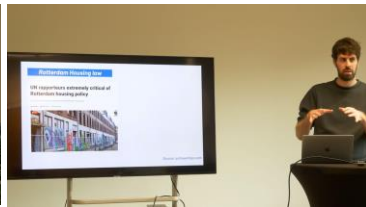
## Key Takeaways:

- Mixed Use
- Mixed Income
- Integrated Into the Neighborhood





“Social Housing” makes up 29 percent of the total housing stock in the Netherlands



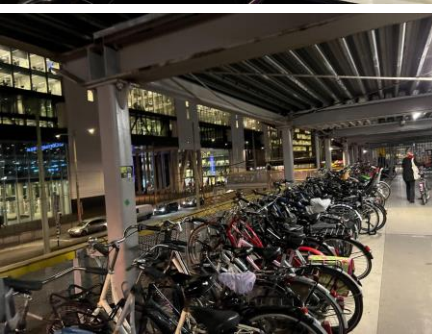
Source: centraal bureau statistiek



Source: woonstadrotterdam.nl

# Biking & Alternative/Sustainable Transportation

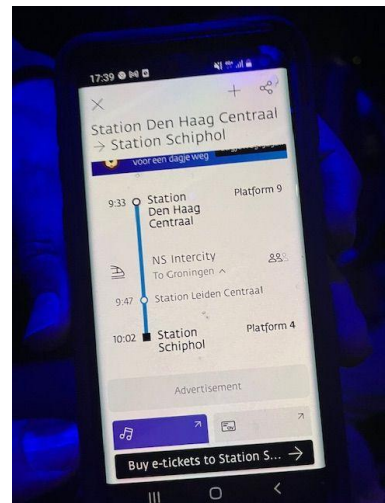
Alderman Brooks Schandelmeier & Transportation Director Markus Moore





# INTEGRATED TRANSPORTATION SYSTEMS

- Trains
- Trams
- Bikes
- Buses
- Scooters





**EXAMPLE: HOFPLEIN SQUARE**, an intersection where pedestrians, bicycles, cars, buses and trams all safely interact.





## BIKE STORAGE

The holistic approach to urban planning requires convenient storage for users.

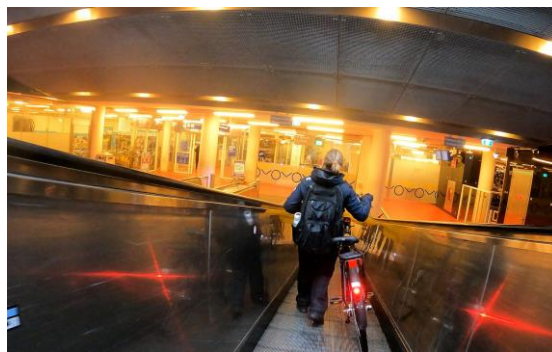


# Holistic Planning - Parking

Alderwoman Karma O'Neill

## Parking - Too Much or Too Little?

- We often hear complaints in Annapolis about a lack of parking. We don't have a lack of parking - we have a parking complex. People want quick and easy access and convenience.
- Effective rates: parking access closest to downtown should be the highest price.
- Street parking should be for short, quick in-and-out trips, moving longer parkers (1hour +) to garage and surface lots



# BIKE PARKING VS. CAR PARKING VS. PUBLIC TRANSPORTATION



- In the Netherlands, they have been working on a **20 percent increase** of bike use since 2010.
- They added **convenient bike parking** areas, close to public transportation and businesses.
- **Parking garages** are often for visitors and tourists.
- **Public transportation** is convenient, cheap and easy to find/use.



The Dutch  
Have Built  
Communities  
Where Bikes,  
Trains & Cars  
Co-Exist



Tiered system of permitting: 1st car: \$25, 2nd car: \$45, 3rd car: \$450. Purchase a bank of visitor parking funds(\$550) to use for guest passes, any amount of time



## Form and Function

A garage, built 100 yards from the sea, is underground and landscaped into the surrounding dunes.

- On Day 5 5 we visited Kawijk aan Zee, an underground parking garage built into the sand dunes.
- **USERS:** mainly tourists, some local residents
- Street parking = residential parking.



# Why is Stormwater Management Important?

## Annapolis City Dock Resiliency Design-Build Project North Pump Station Design Summary

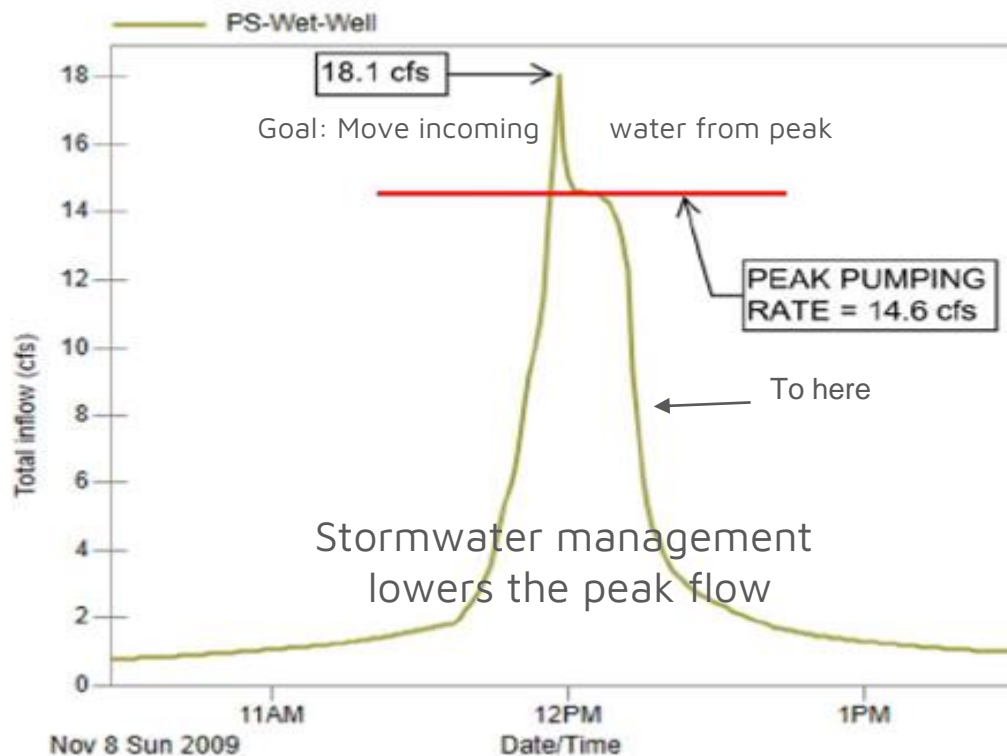
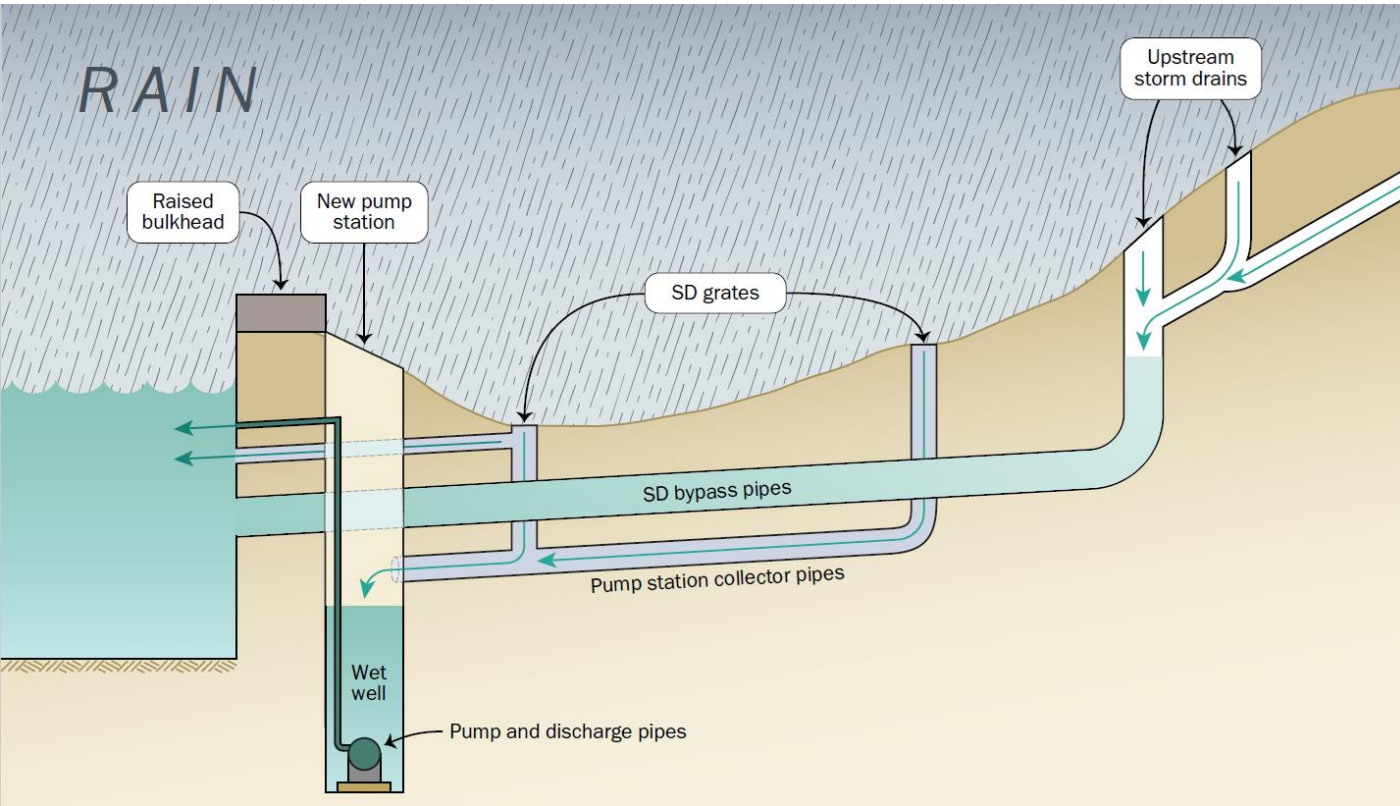


Fig 3. NPS Wet Well Total Inflow and Peak Pumping Rate for the Check Storm



**Why is  
Stormwater  
Management  
Important in  
Flood  
Control?**



**Alderman  
Rob Savidge**

## Stormwater Management:

- Multi-use facilities
- Integrated functions
- Water storage



## Multi-use stormwater facilities

- recreation space when empty
- located near school

# STORMWATER STORAGE FACILITIES



Water  
Roof

## ZOHO Letters

Rainwater is not led into the sewer but into the ZOHO letters where it is buffered and when necessary released into the surrounding garden. The built-in smart system looks at the weather forecast via internet. As soon as a heavy rain shower is expected, the tanks release water automatically and create buffer capacity for the coming rain. This sustainable system works on solar energy.



# GREEN Roofs



**INTEGRATED COMMUNITY GARDENS**

# TREES IN PUBLIC PLACES AND WATERFRONTS



- Mature trees in event spaces
- Co-exist with parking
- Serve as green “walls”
- Provide ecoservices - stormwater filtration & capture, reducing temperatures, carbon capture
- Preserves viewscape



# Trees, Tents, and Outdoor Dining. OH MY!



# Building Resiliency & Controlling Stormwater



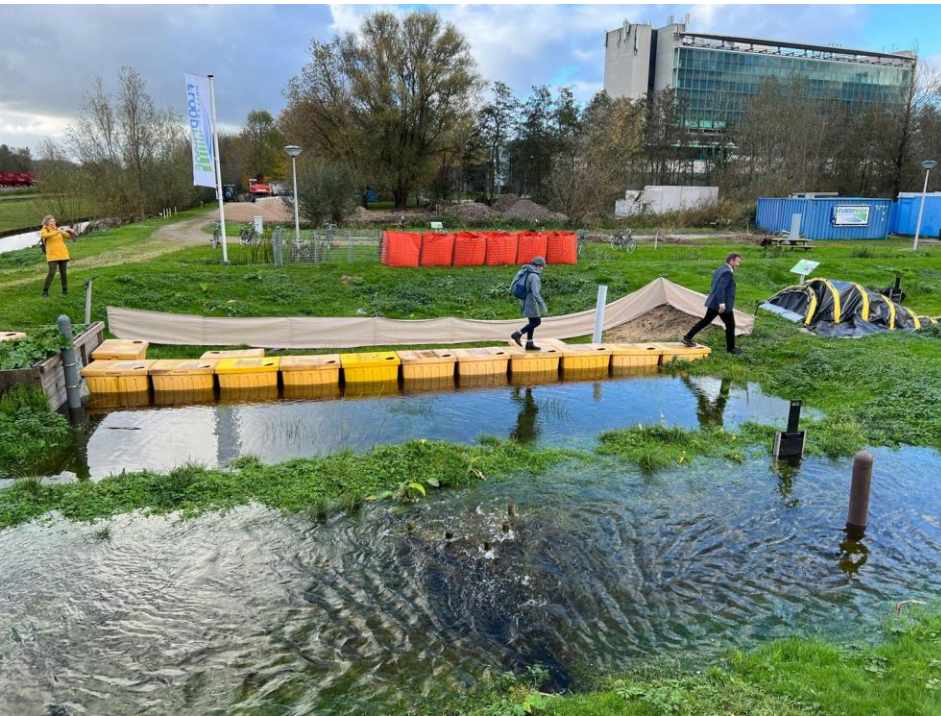
## Netics Geowall



- Hosts and coordinates **Flood Proof Holland II** (FPH II), a test and demonstration site (polder) where alternatives to traditional sandbags are tested for efficacy.
- Civil, hydraulic and offshore engineering students often utilise the facilities to practically apply, providing a unique learning tools.
- Professor for flood risk Matthijs Kok believes that FPH II allows students to **“see what is at stake during floods; to discover how different measures are helpful in reducing the damage [of floods].”**

# IHE Delft Institute for Water Education - Box Barrier

- Can hold back 80% of water
- Folds for storage and quick deployment



# IHE Delft Institute for Water Education





# Briposan Geosynthetic Textile Polymer Liner

THE DELFT INSTITUTE FOR WATER EDUCATION



When hydrated, performs better than 3 meters of compacted clay



# Demountable Systems: an Option for COMPROMISE STREET BULKHEAD



System not in place



System deployed

# Rotterdam Underground Storage Basin & Museumpark



- **Limits flooding** in urban center of Rotterdam
- **Stores 2.65 million gallons** when canals reach their limits

# Using Dredged Material for BEACH REPLENISHMENT

- Ostend, Belgium: suction hopper barge with floating pipeline
- Allows continuous work = almost 1 mile of beach restoration/7 hrs = 5 week project
- Bulldozers/ excavators filter systems reduce fine dust and nitrogen emissions by 80%



# Clean Energy - North Sea Wind Farm

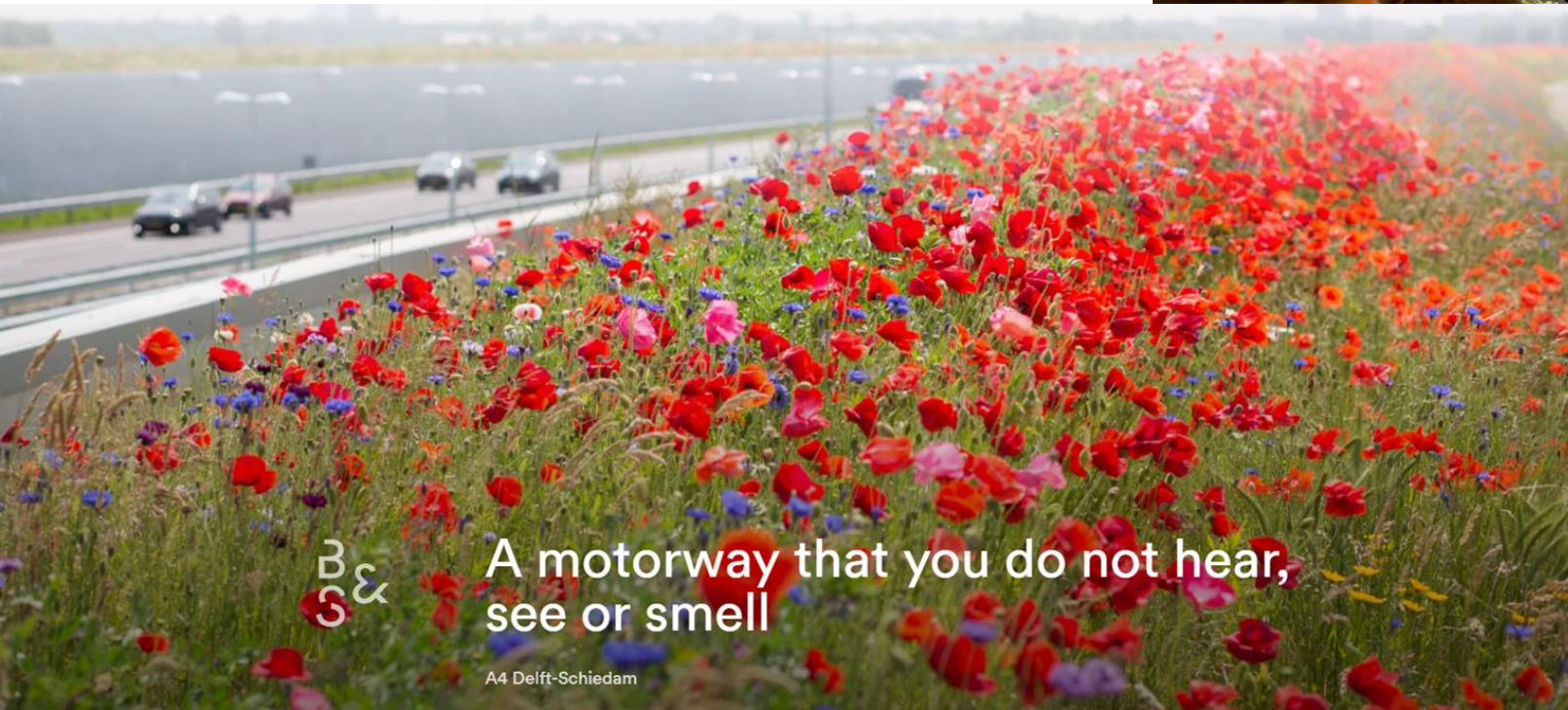
487 MW SeaMade offshore wind farm - Ostend, Belgium

8 wind farms produce 13% of Belgium's electricity needs

Goal to provide all Belgians with green power



# A4 Motorway Delft-Schiedam BOSCH SLABBER



A motorway that you do not hear,  
see or smell

A4 Delft-Schiedam

# Biesbosch National Park & Deliberate Floodplain



Private land  
into public  
downstream  
control





## Maeslant Barrier:

- Storm Surge Barrier
- Two 689-foot gates with two 777 feet steel trusses holding each





# Takeaway S



Attend Educational Sessions

Bring Knowledge Back

Meet with Suppliers

Building Networks and Resources

Investigating New Technologies

**Q&A**