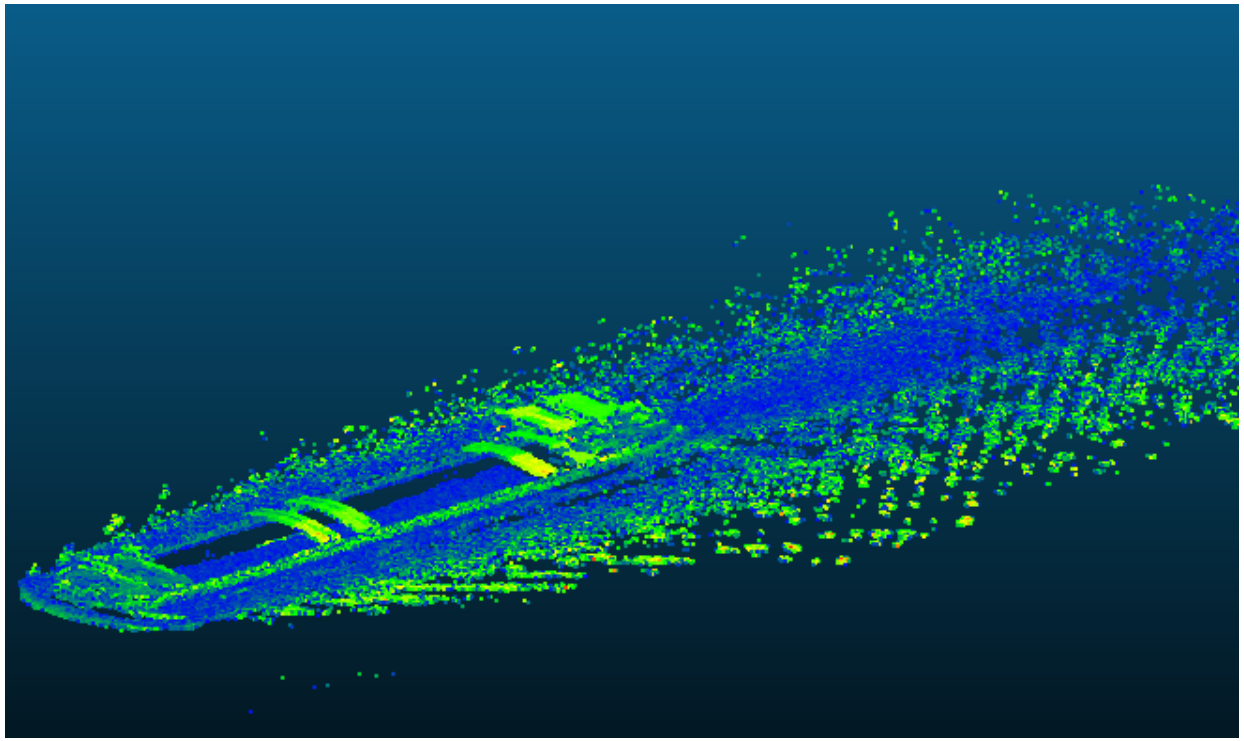
Rijkswaterstaat
Ministry of Infrastructure and Water Management



AHN4 – MOERDIJKBRUG ZONE

Guest lecture: Rijkswaterstaat & IHN

CIV-IGA-Advies en Toetsing Geodata & TU Delft

Daan van der Heide

15 February 2023

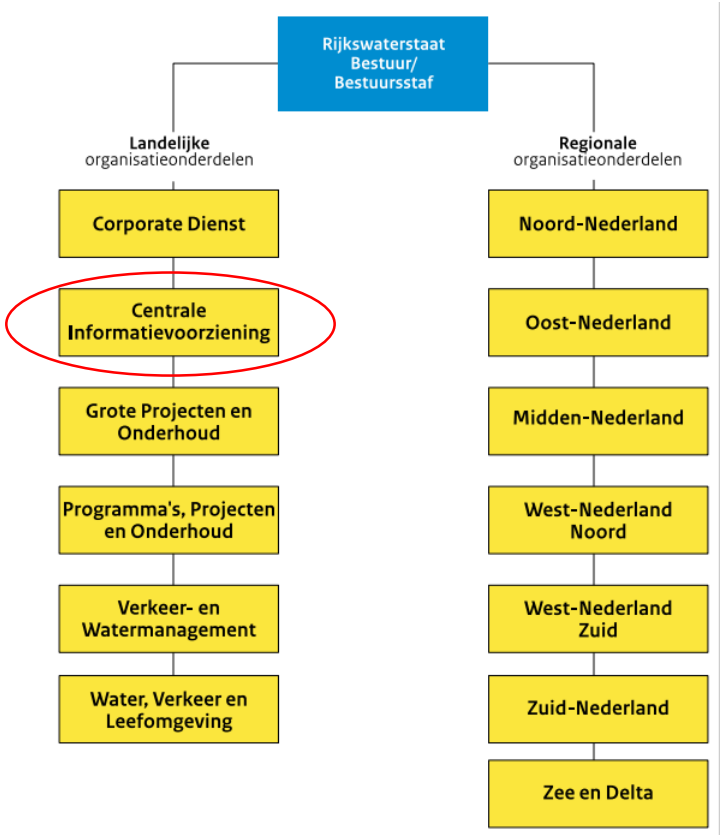
Rijkswaterstaat
Ministry of Infrastructure
and Water Management

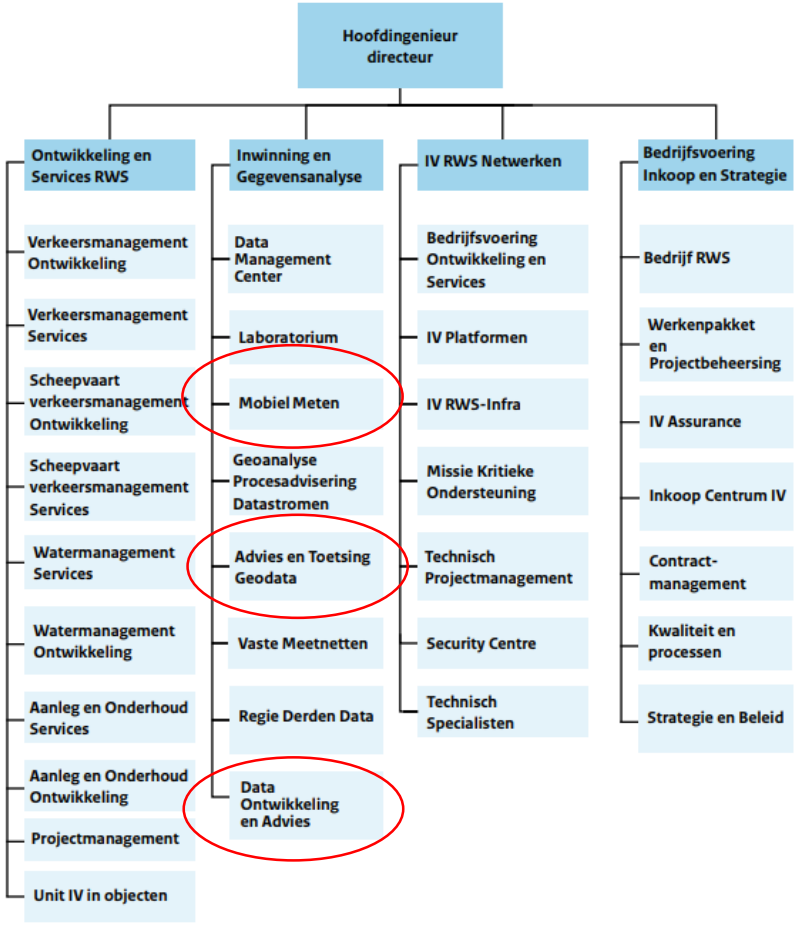
Rijkswaterstaat and geo-data acquisitions

Rijkswaterstaat

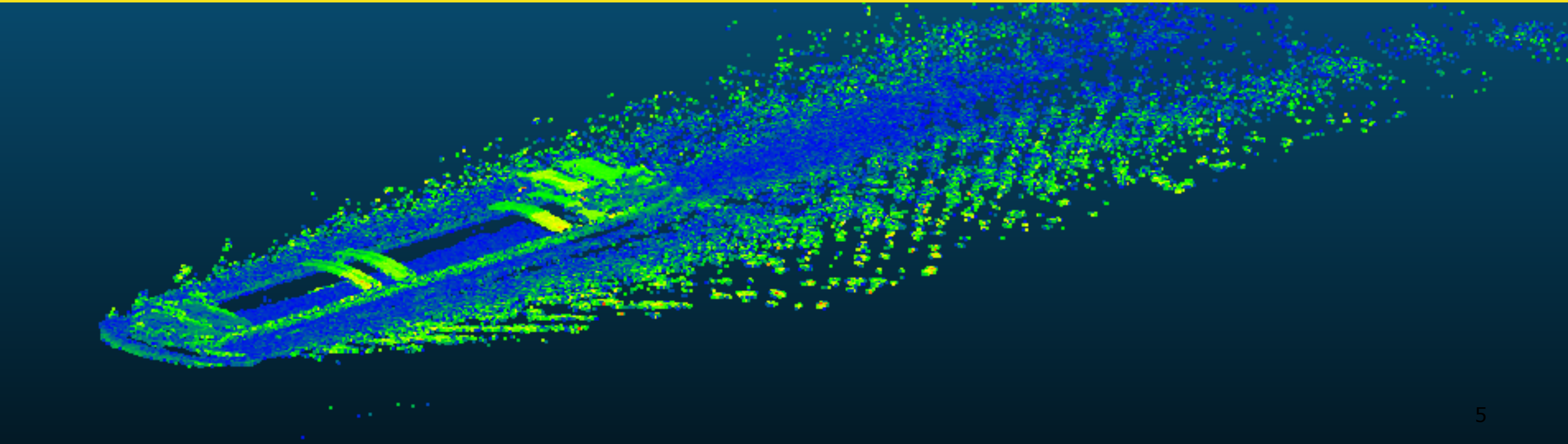
- Rijkswaterstaat is an executive organization of the Ministry of Infrastructure and Water Management.
- Maintaining and innovating the national roads, waterways, and open waters.
- Responsible for important assets in the Netherlands:
  - Stormvloed keringen
  - Afsluitdijk
  - Prins Claus plein → Highway flyover near the Hague

Central Information and departments

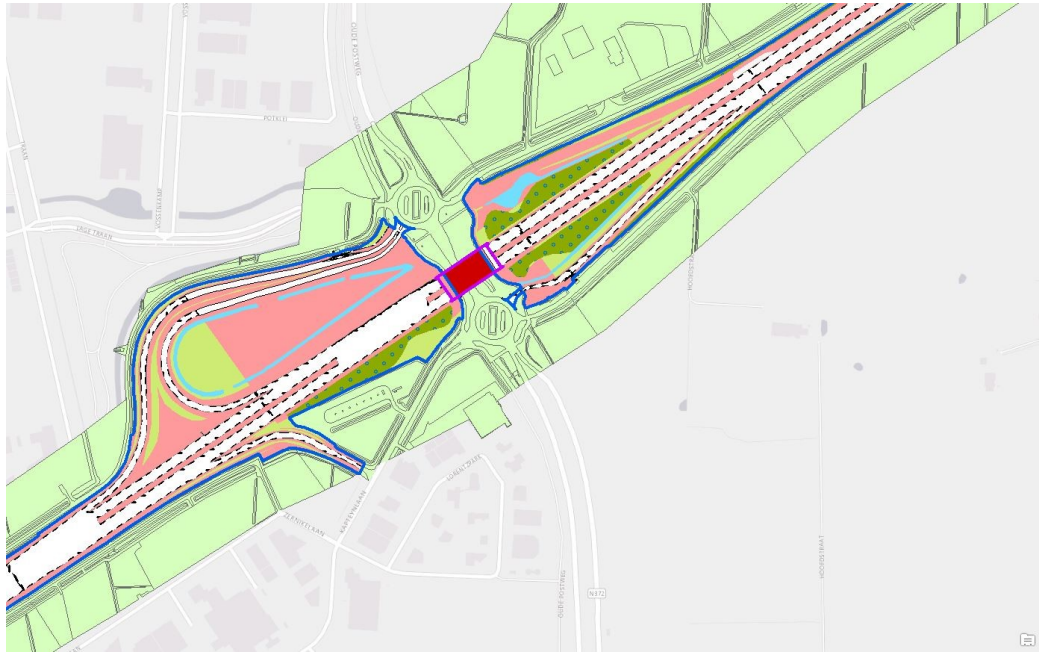




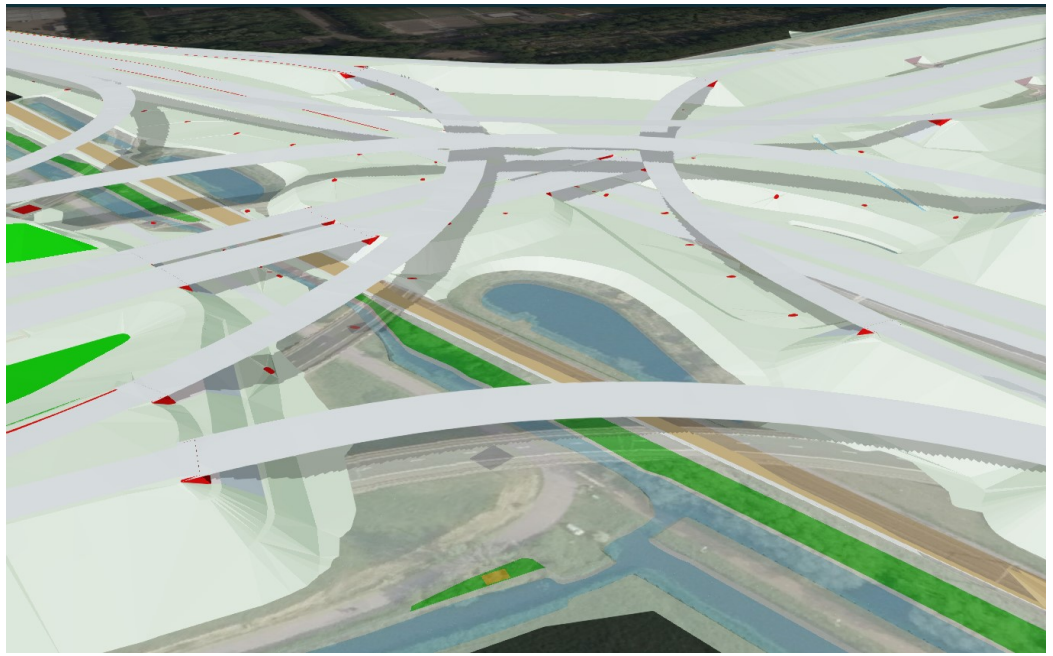
Use of geo-data at Rijkswaterstaat



BGT (Basisregistratie grootschalige topografie) & DTB (digitaal topografisch bestand)



BGT (2D)



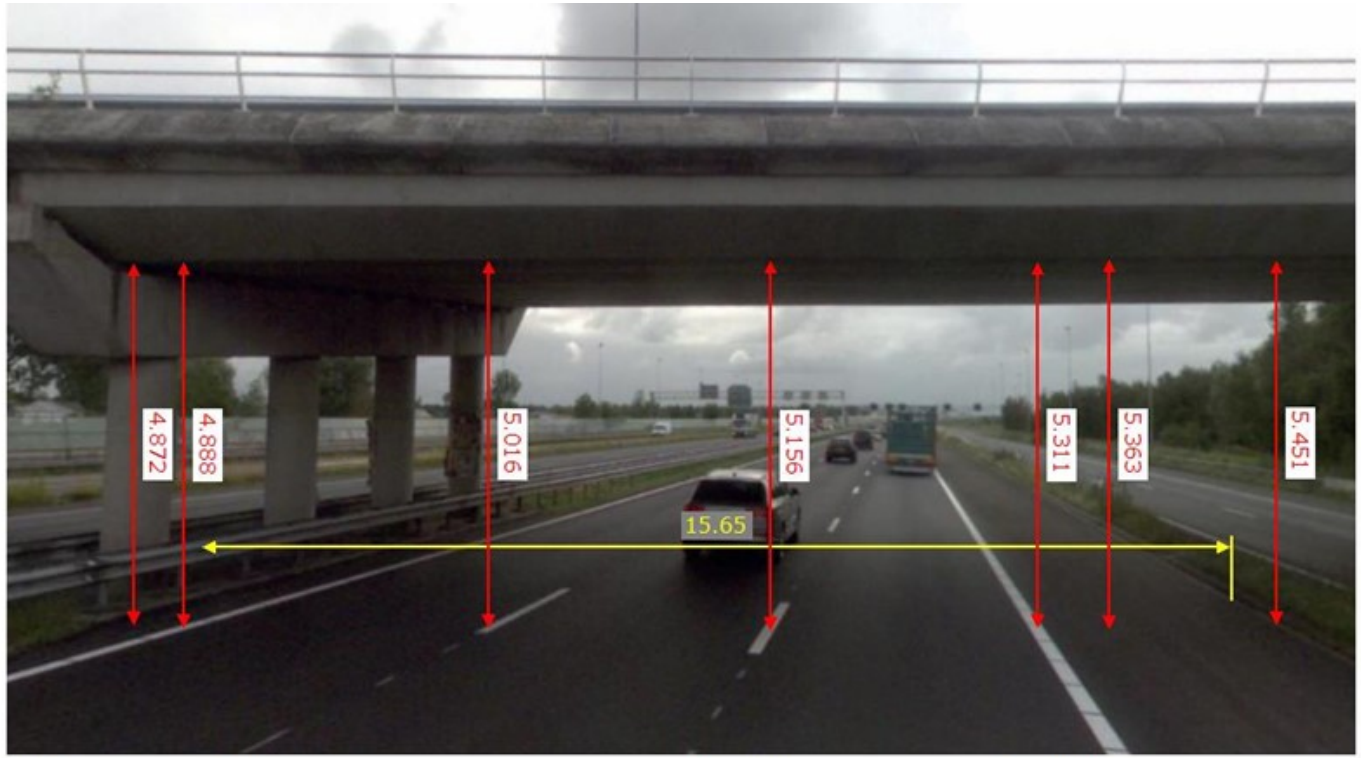
DTB (2.5D)

Use Case:
Pointclouds for the determination of clearance heights

Clearance heights (current method)

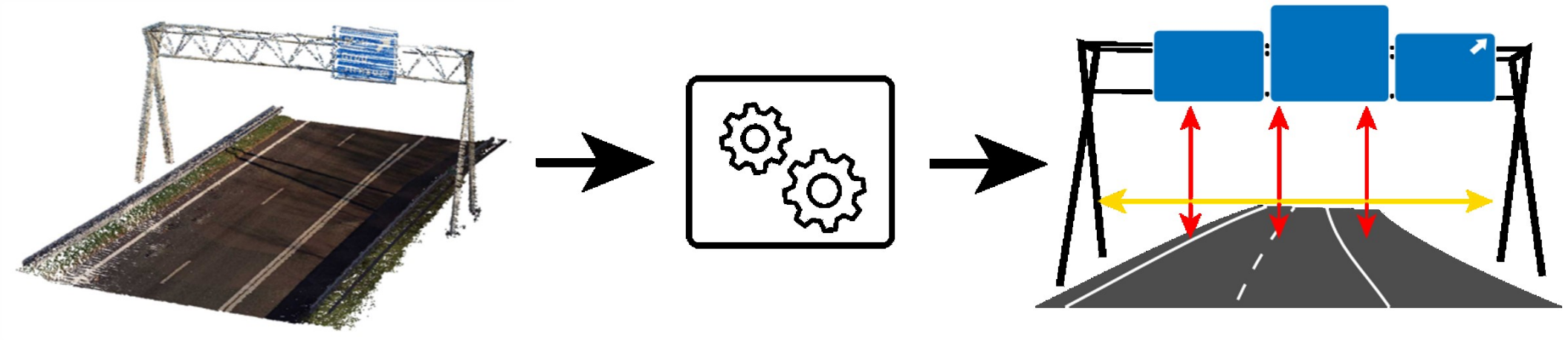
- Required for the movement of special objects (tanks, wind turbines, satellites, ships, etc.)
- Free space between a structure/gantry and the road surface
- Determined per lane with centimeter relative accuracy.

Clearance heights (current method)



Rijksweg:	A009	Meetdatum:	01-09-2021
Rijbaan:	HRL	Dwarsprofiel:	2
Kilometer:	038.620	Viaduct:	Raasdorp
Bijzonderheden:	geen	Minimale doorrijhoogte:	4.872

Worklflow automatic inspection



Classifications of the objects

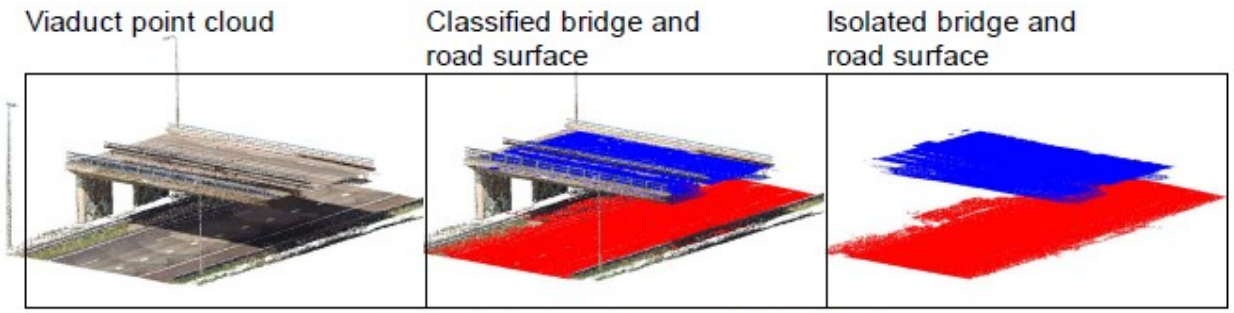


Figure 4.19: Classified road and viaduct surfaces.

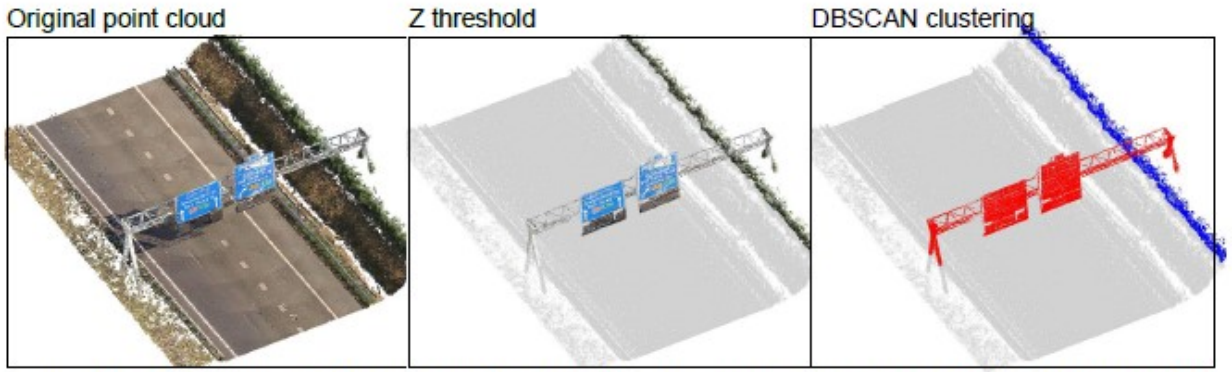
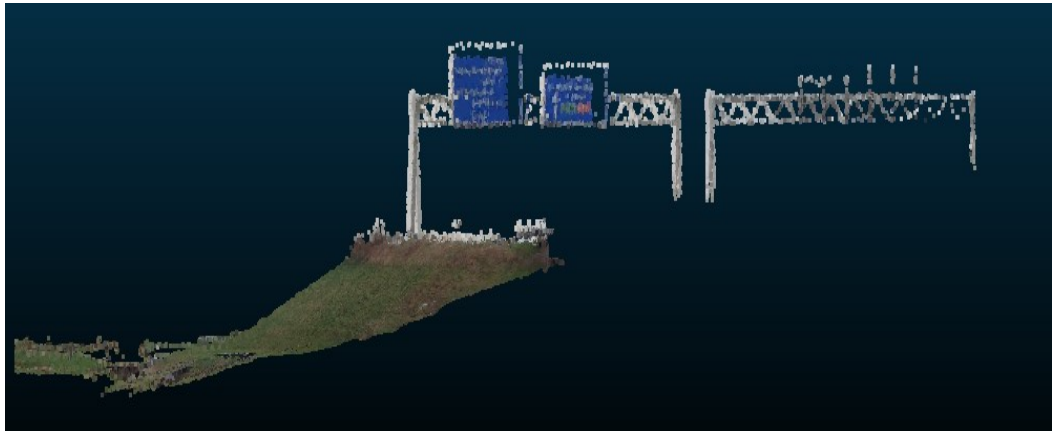
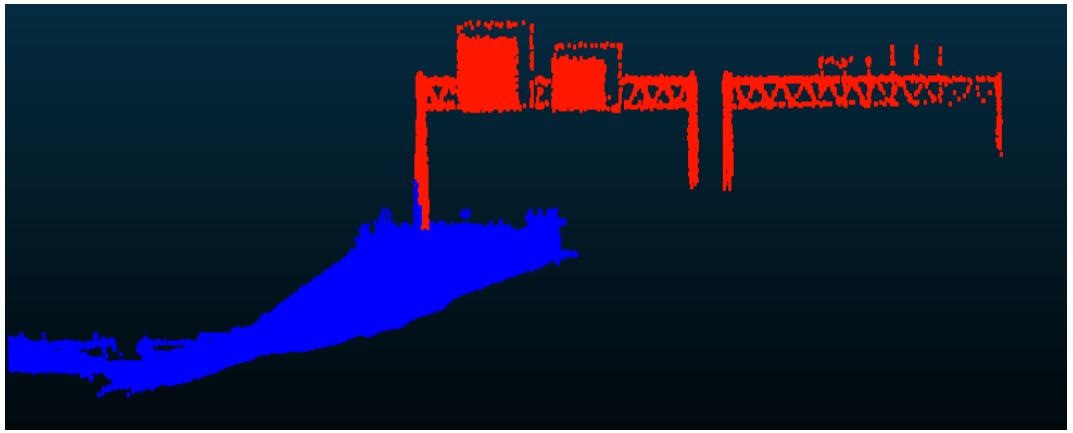


Figure 4.27: Initial clustering of the point cloud to obtain the gantry superstructure after a height threshold is applied.

Inspection of gantry





Using for instance the DTB or Deep/Machine learning

Classification of the underside of the gantry

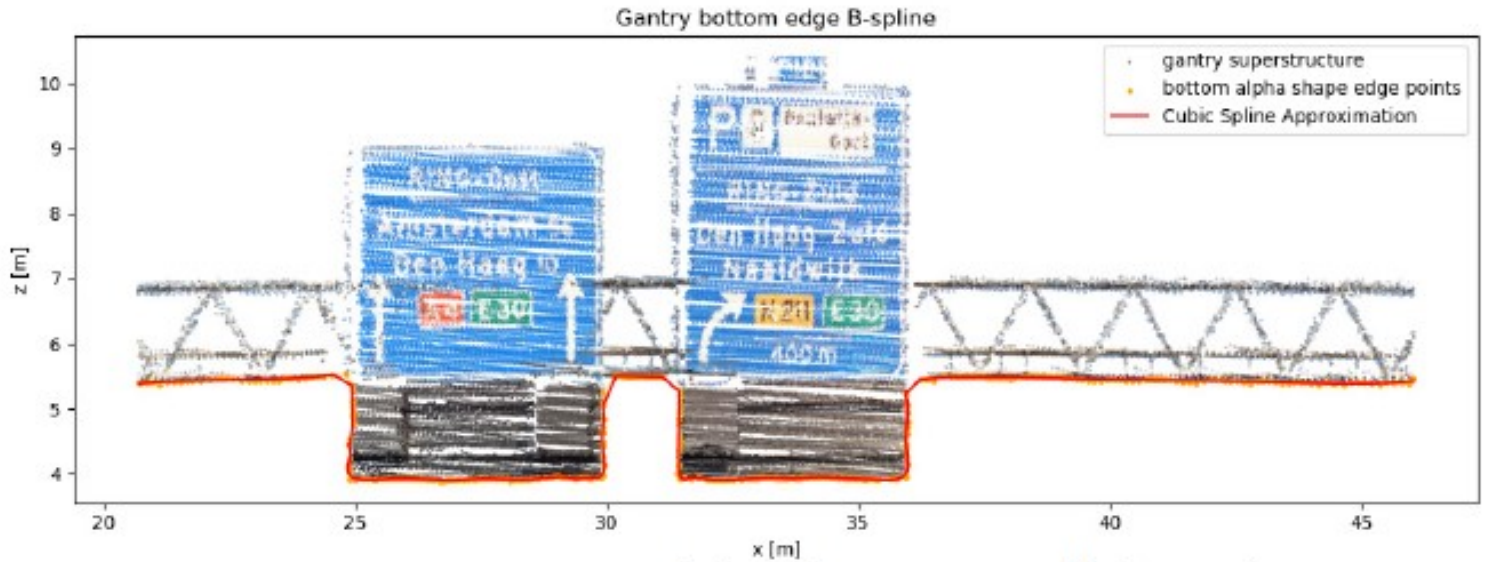


Figure 4.33: Gantry superstructure with the B-spline approximation of the bottom edge.

Classification of road markings

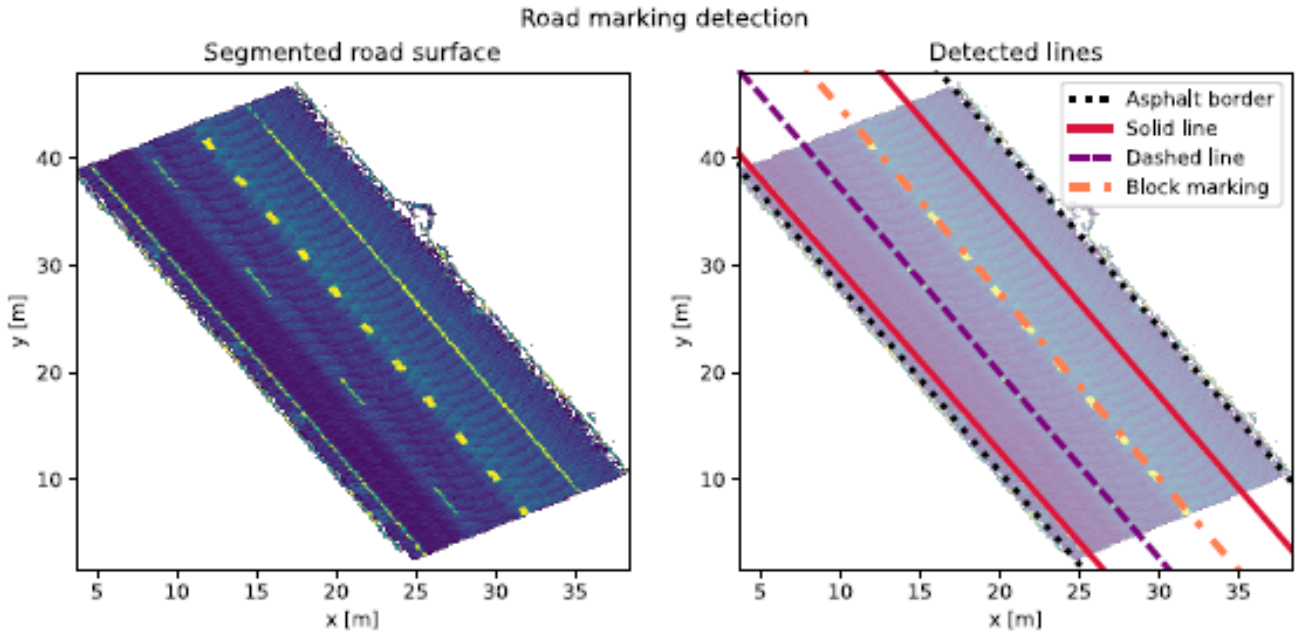
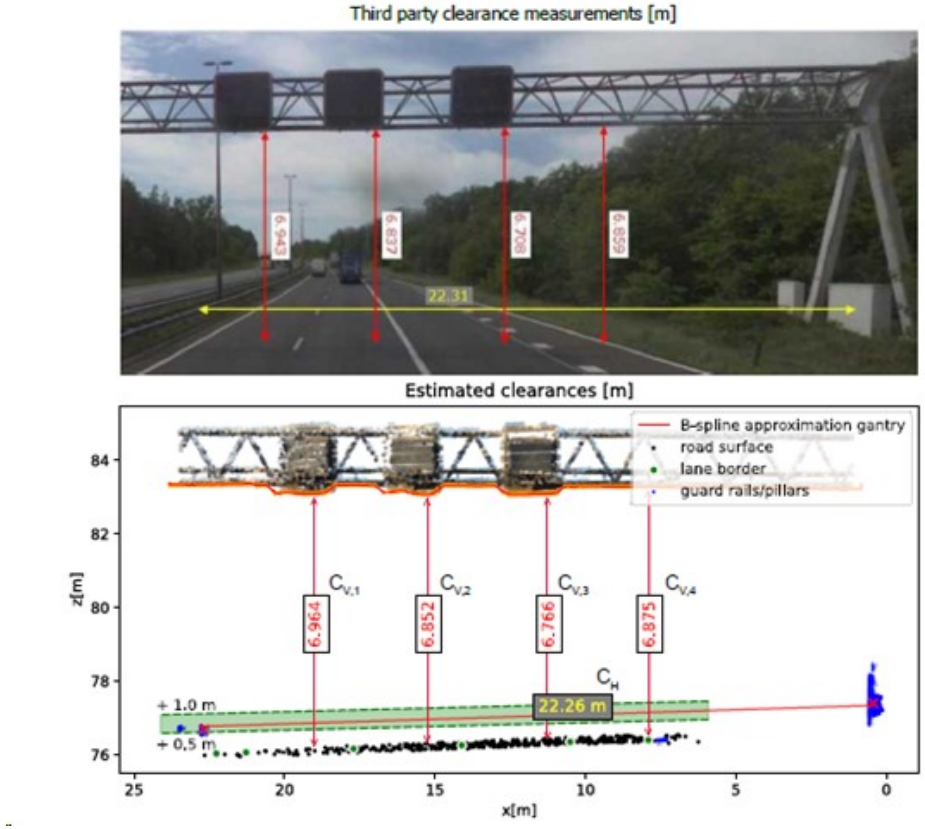
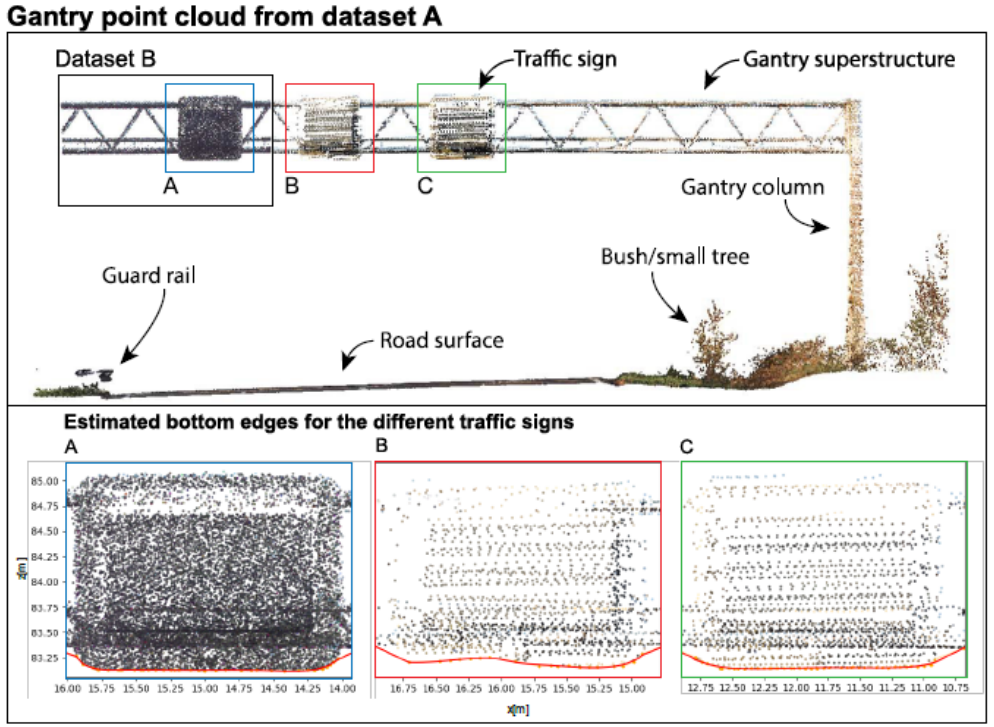


Figure 4.26: Example of a road section with different classes of detected lines.

Resulting data

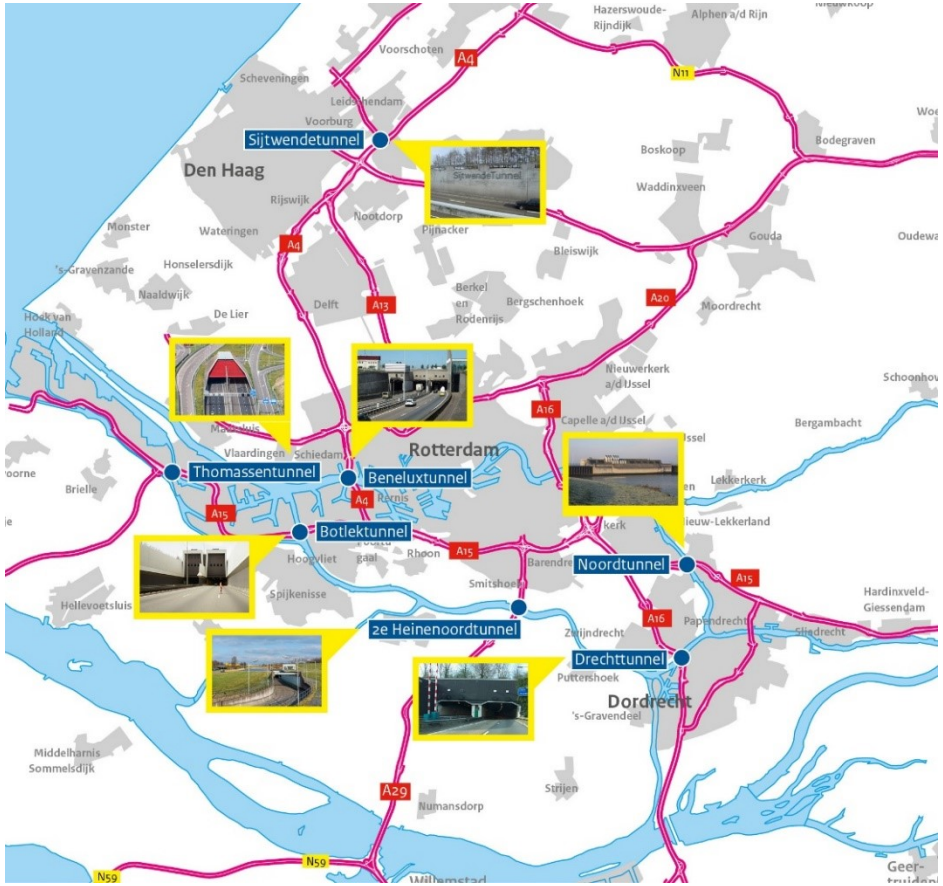




Meinderts (2023) - Link: [Master Thesis rapport]

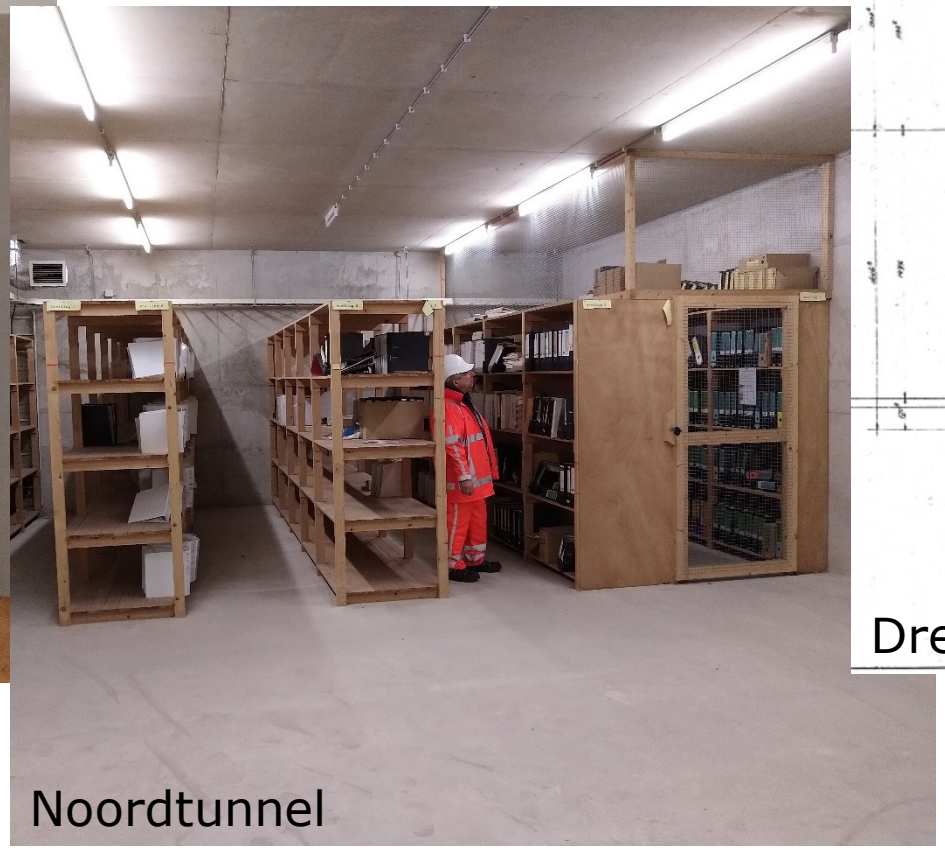
Use Case 3 :
Tunnels of South Holland

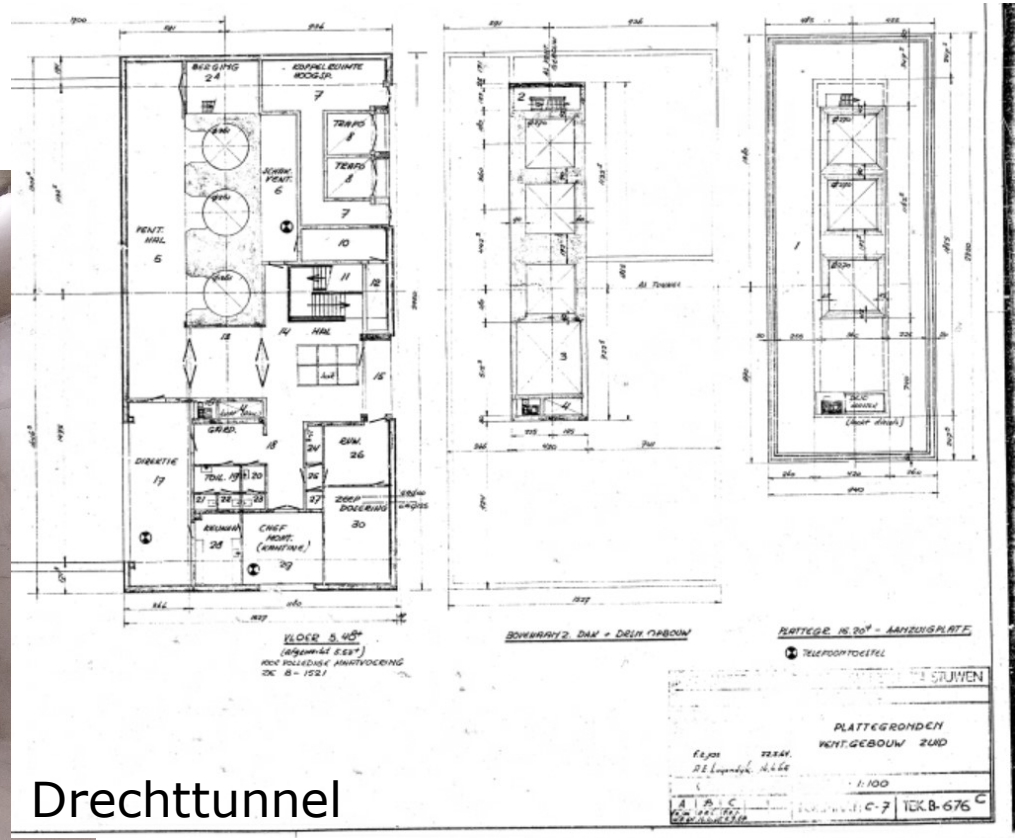
Locations of the current projects



Initial status of the tunnel data

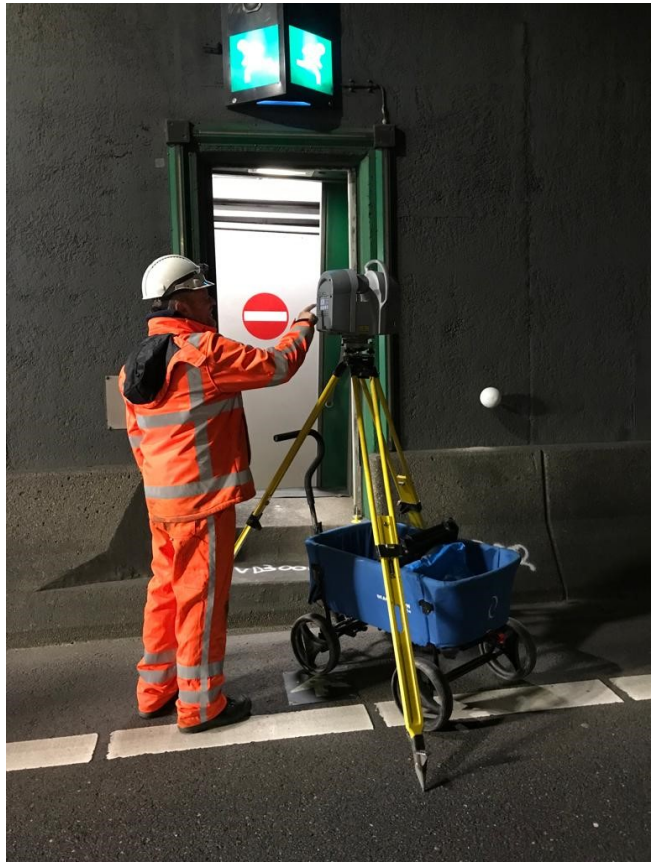

Drechttunnel

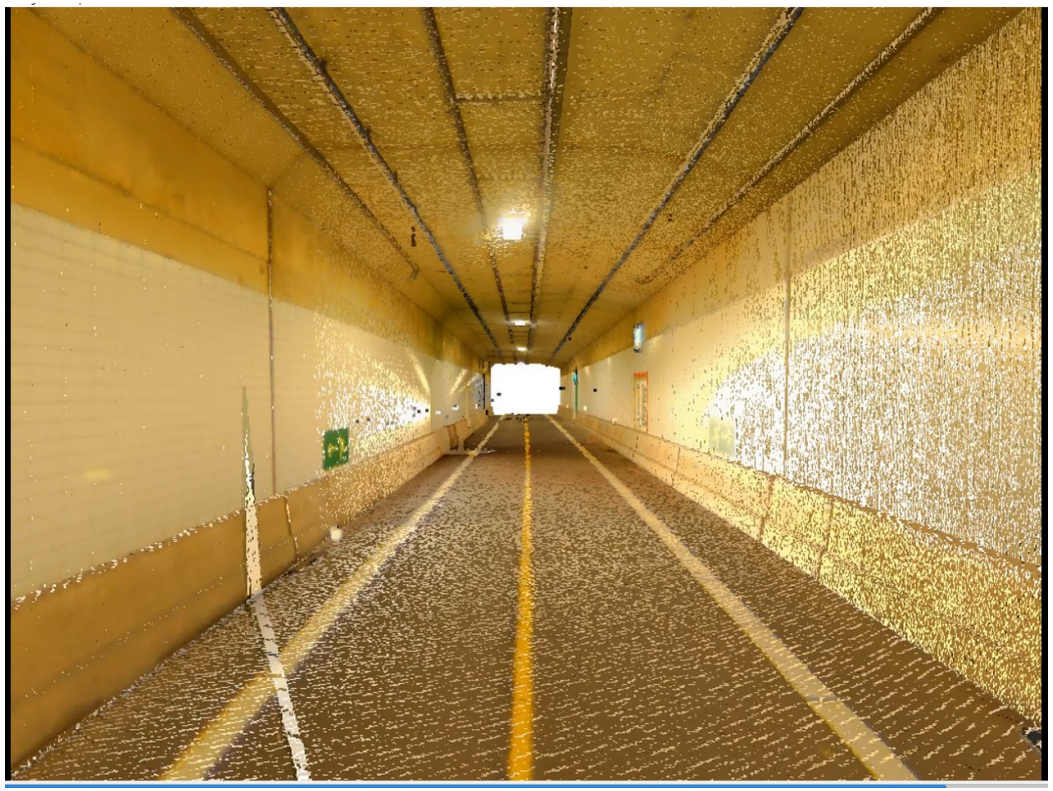

Noordtunnel

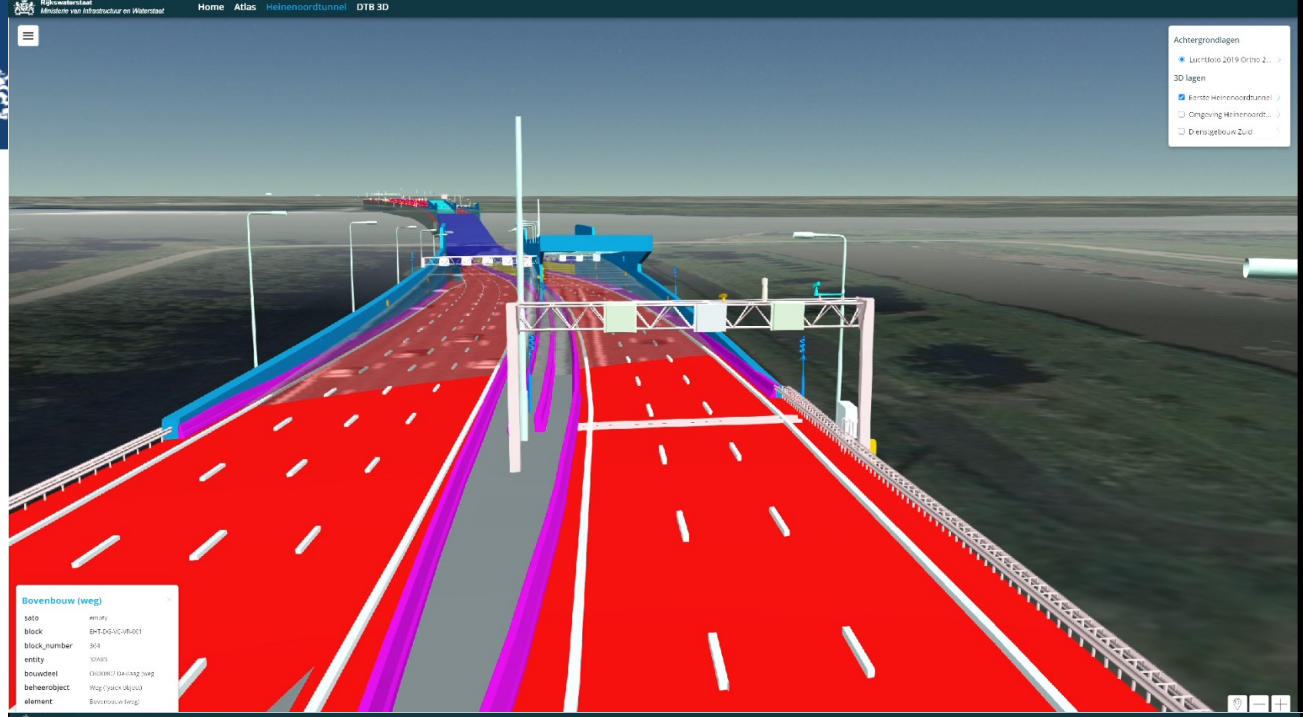


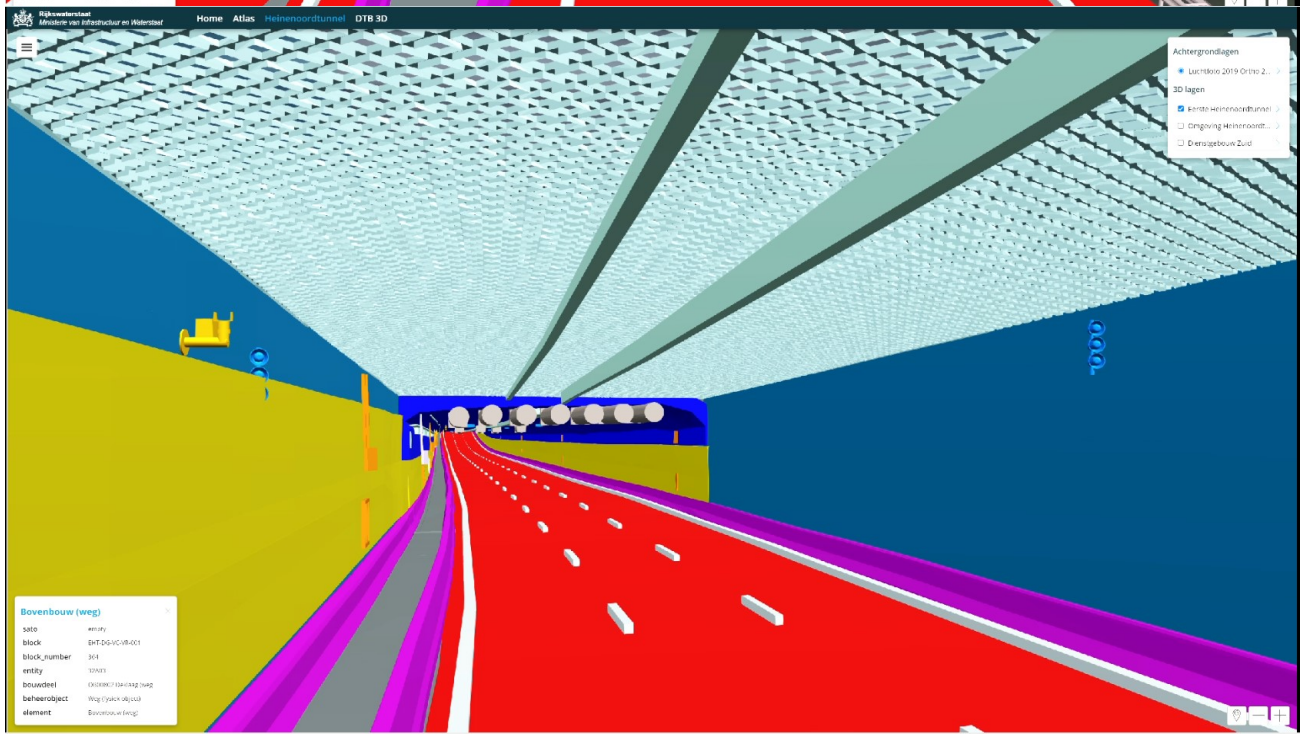
Drechttunnel

Measurements of the tunnels

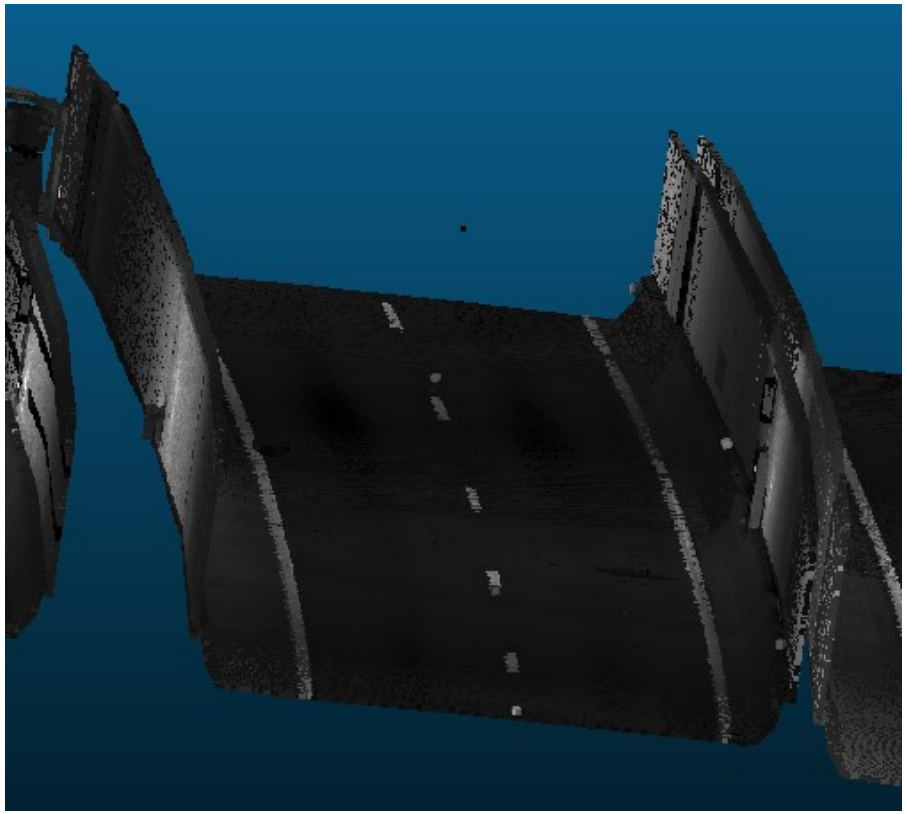





Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat
Home
Atlas
Heinenoordtunnel
DTB 3D
Achtergrondlagen
3D lagen
Bovenbouw (weg)

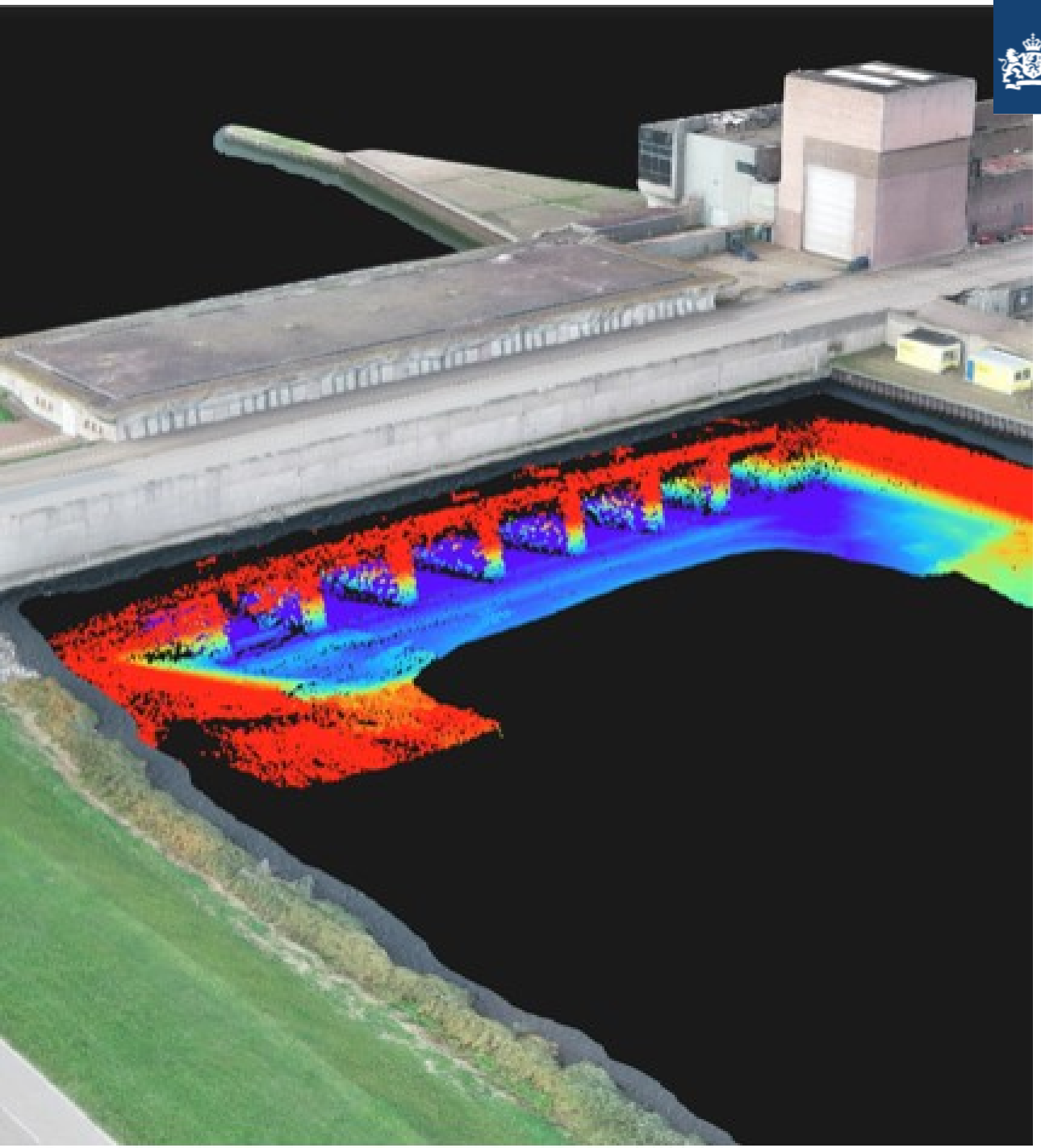

Rijkswaterstaat
Ministerie van Infrastructuur en Waterstaat
Home
Atlas
Heinenoordtunnel
DTB 3D
Achtergrondlagen
3D lagen
Bovenbouw (weg)

Receiving data at Rijkswaterstaat



Location of open Rijkswaterstaat data

- Large database of open datasets
- 20 themes available
- Free to download
- Available in different platforms
- Published with quality specifications



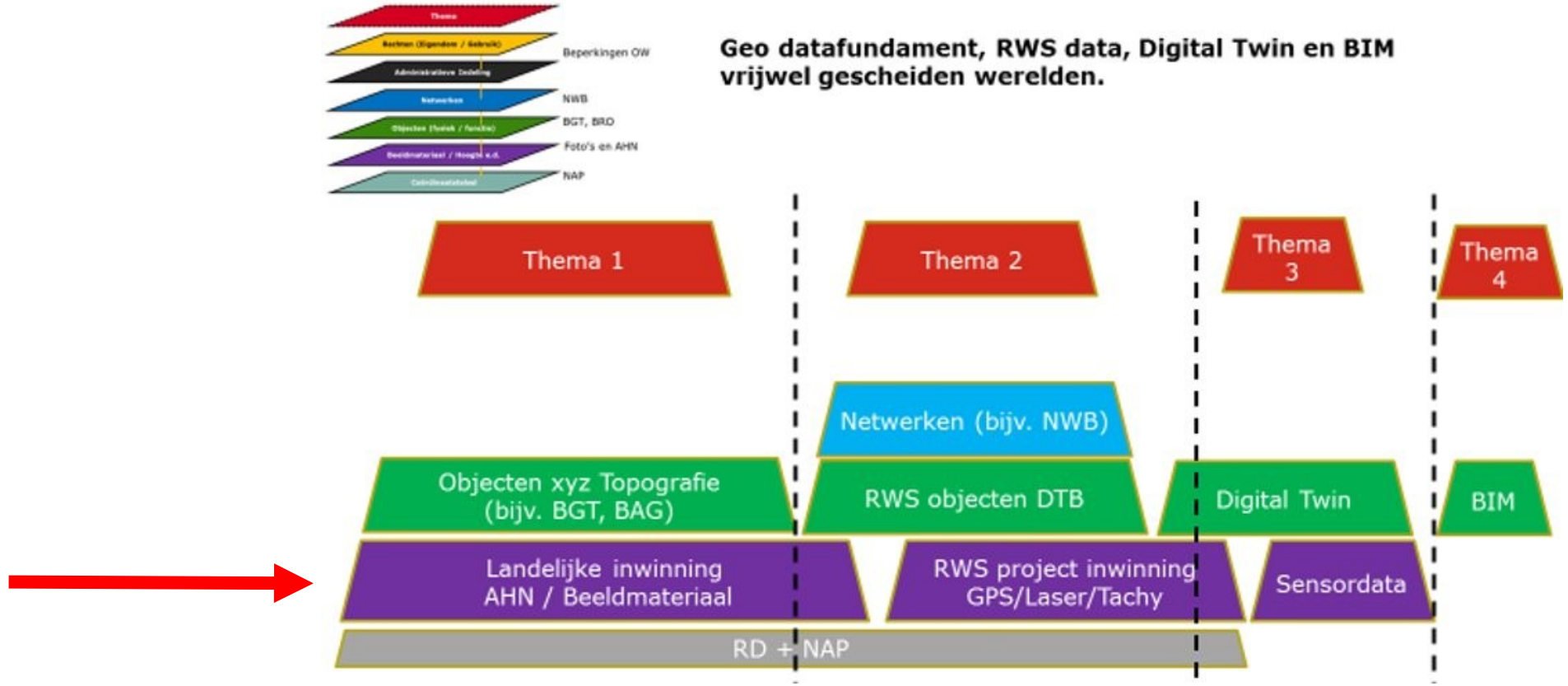
Digital Twin at RWS

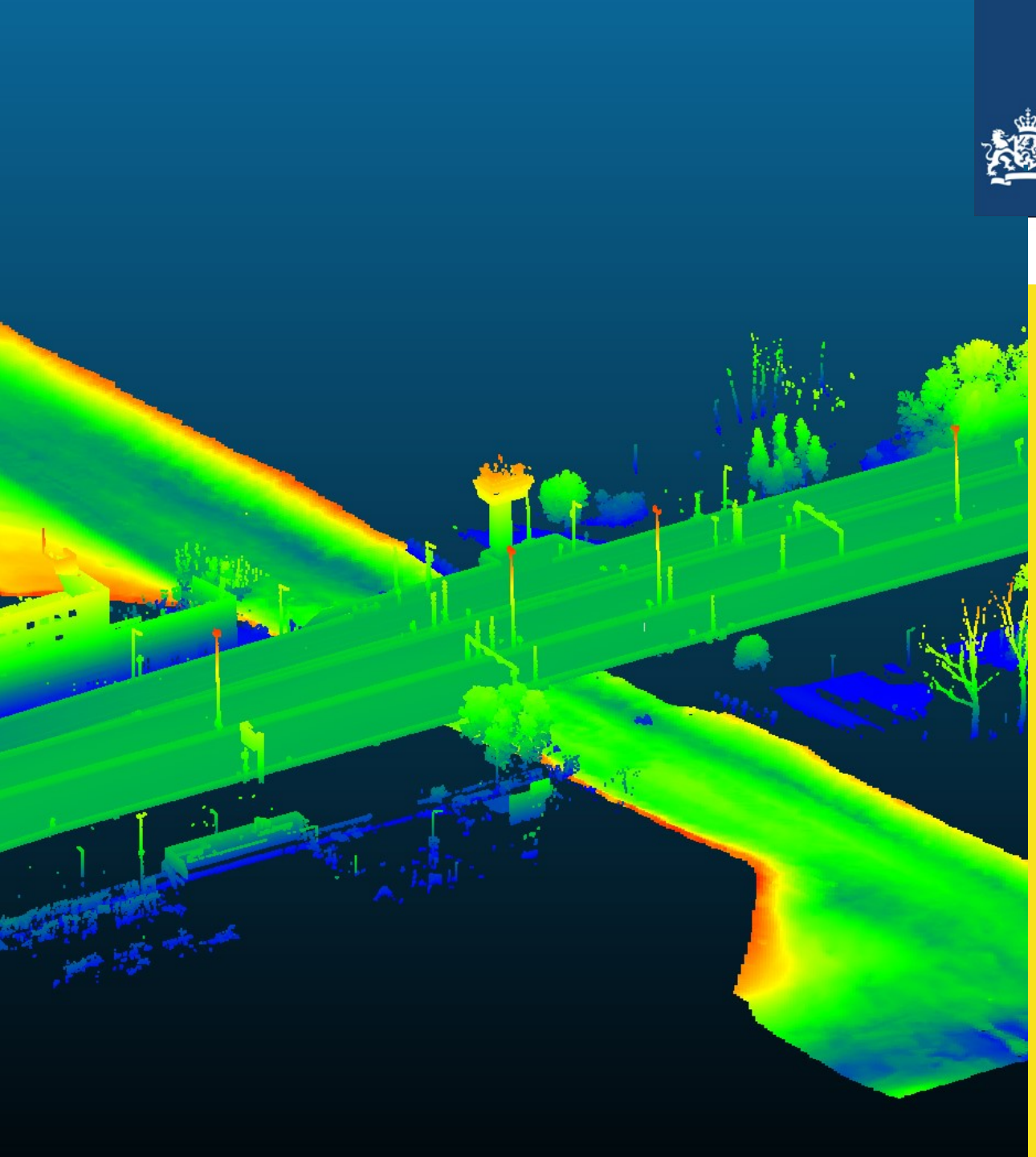
Objective: a complete and up-to-date view of the entire object

3D scans of the underwater combined with a laser scan of what is above water

- Support for Asset Management

New **Geodatafundament** of Rijkswaterstaat





Rijkswaterstaat
Ministry of Infrastructure and Water Management

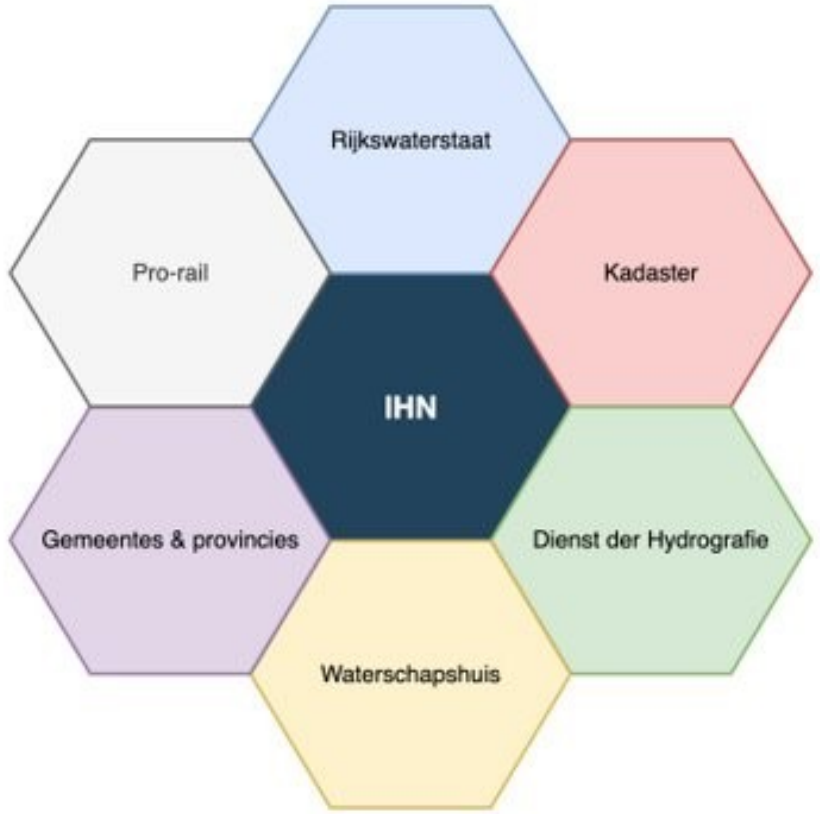
TU Delft 3Dgeoinfo

Integrale Hoogtebestand Nederland

TU Delft & Rijkswaterstaat

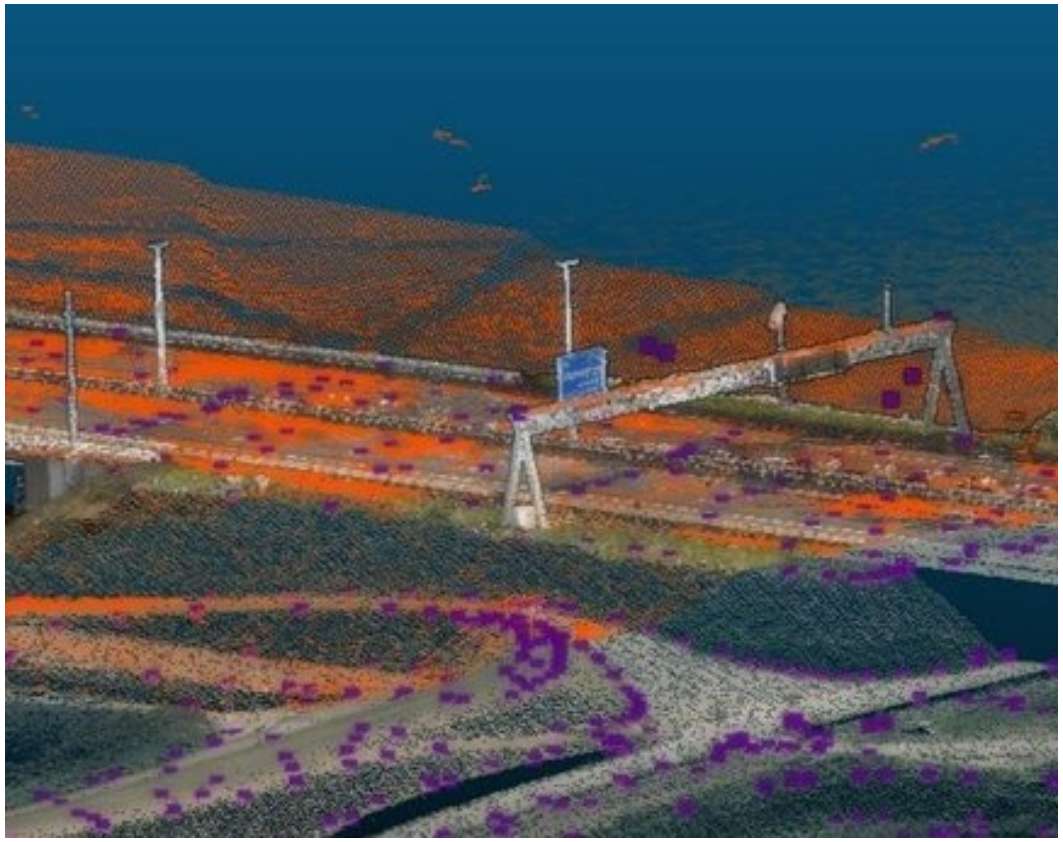
Potential stakeholders of the data governance

- Different government agencies
- Varying specifications regarding the point clouds
- Varying locations of the open data
  - *Land*
  - *Urban*
  - *Rivers*
  - *Sea*

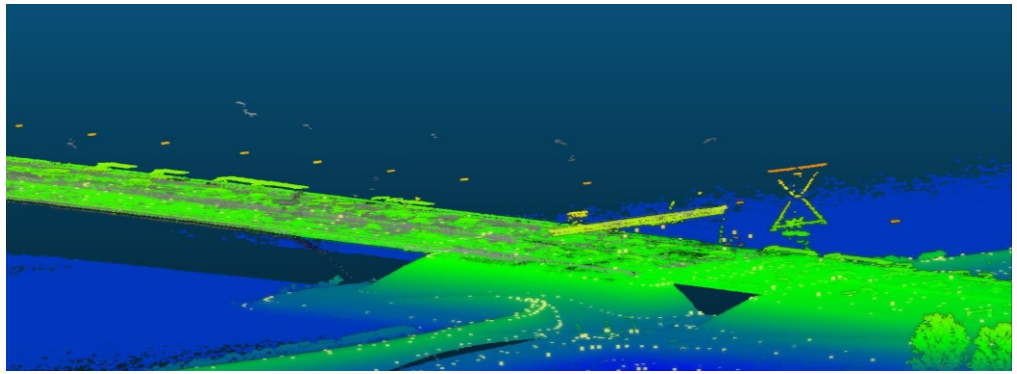


The integration of heterogeneous pointclouds

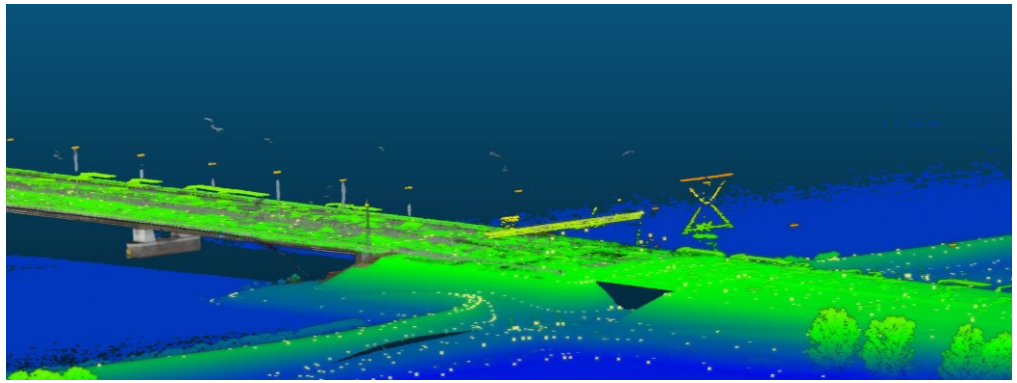
- PhD research: *integrating point clouds in the Netherlands*
- Collaboration between Rijkswaterstaat and TU Delft
- The merging of point clouds on a national scale
  - 4 research fields



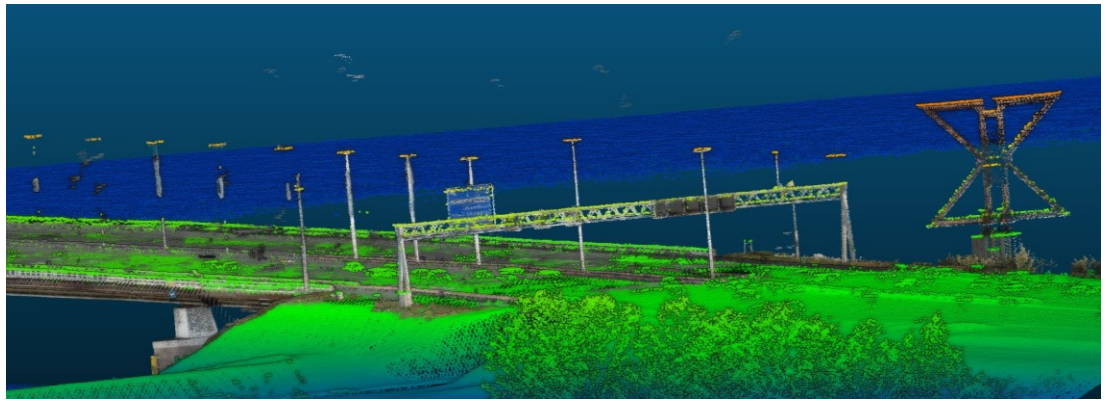
Potential of the Integrated Height dataset of the Netherlands



AHN4 (hWH)+Dense Matching (KD)+DTB (RWS)



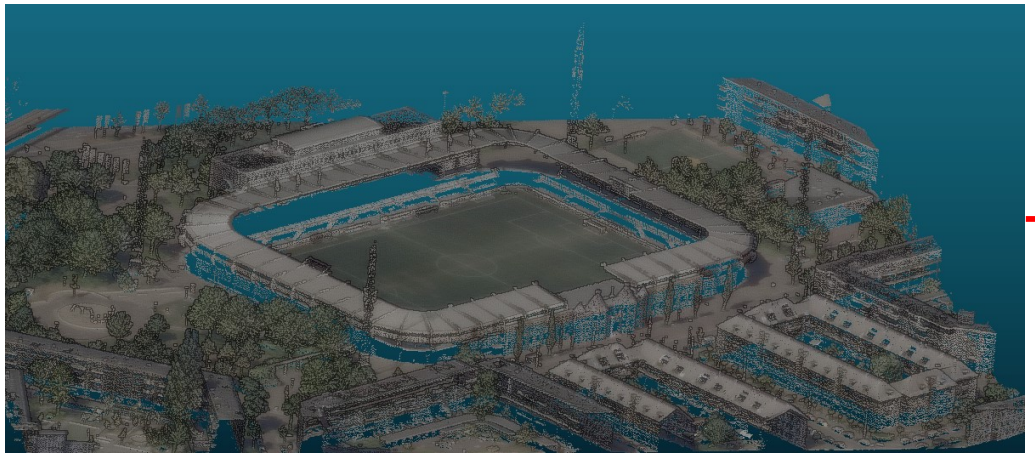
AHN4 (hWH)+Dense Matching (KD)+DTB (RWS) + drone (RWS)

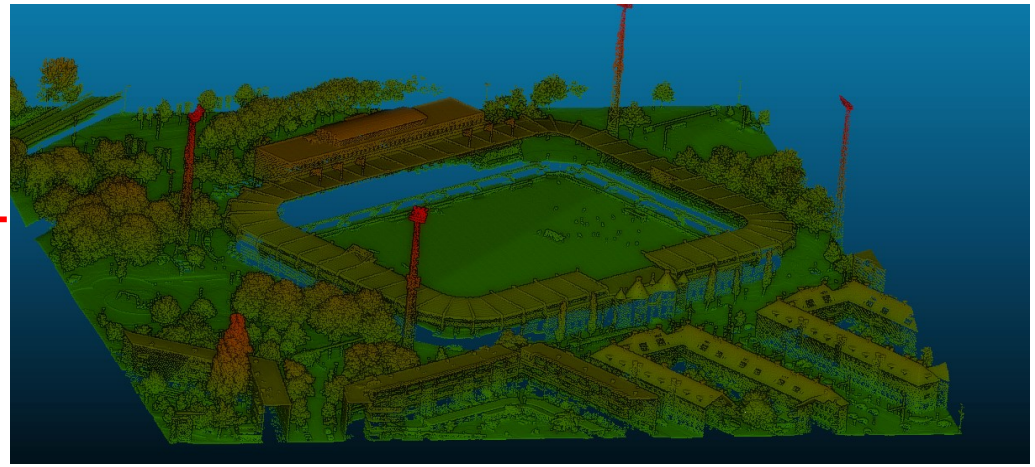


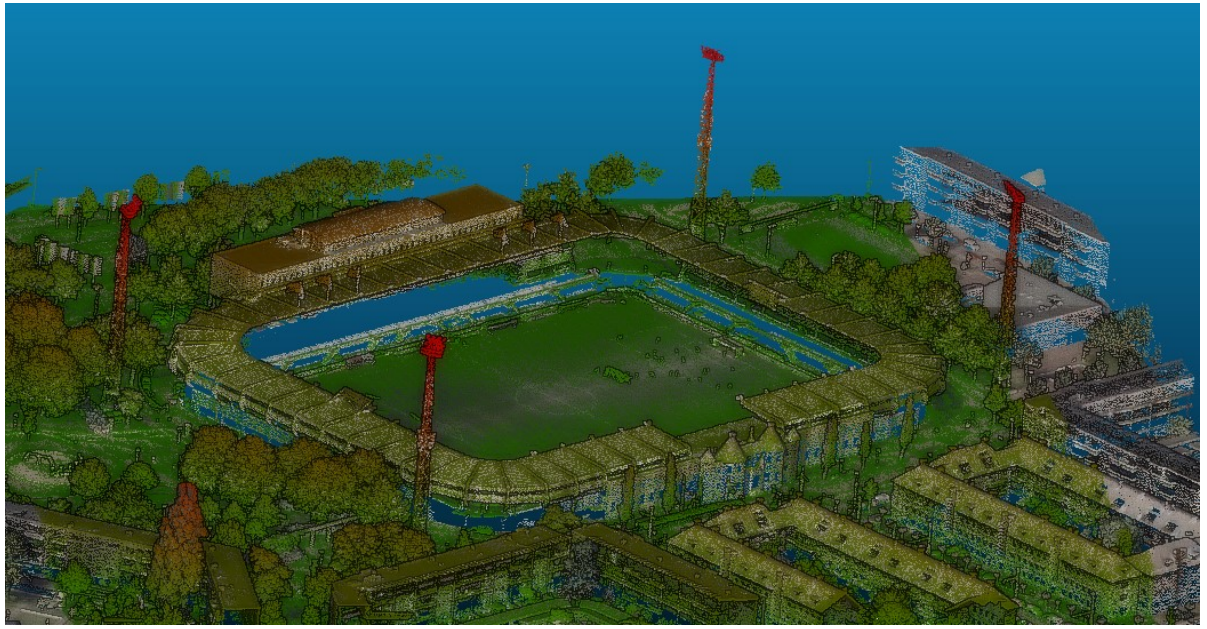
AHN4+DM+DTB+drone+car = IHN

AHN4 + Beeldmateriaal

Gemeente Rotterdam (2022)







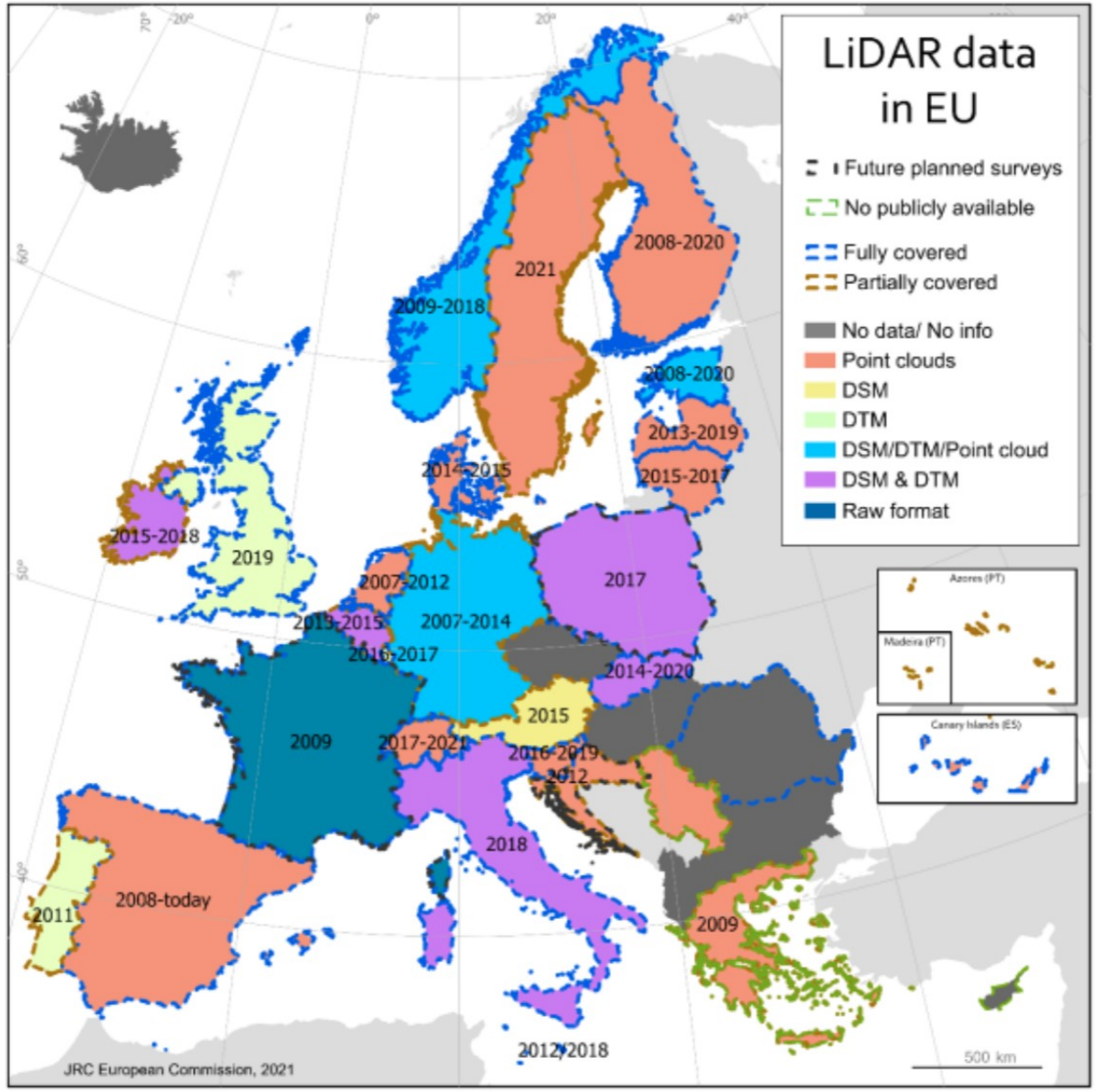
Een IHN visualisatie van het Kasteel, Rotterdam

Complexity of data governance

Rijkswaterstaat
Ministry of Infrastructure and Water Management

Research subject 1

Uniform specifications of pointcloud datasets



Specifications of point clouds in the EU

- Research from 2020 of the Joint Research Centre
- Significant difference between open and closed datasets
- Subjective consensus for the quality
  - Questionnaire at the EuroSDR

Effects of different specifications and goals

VS

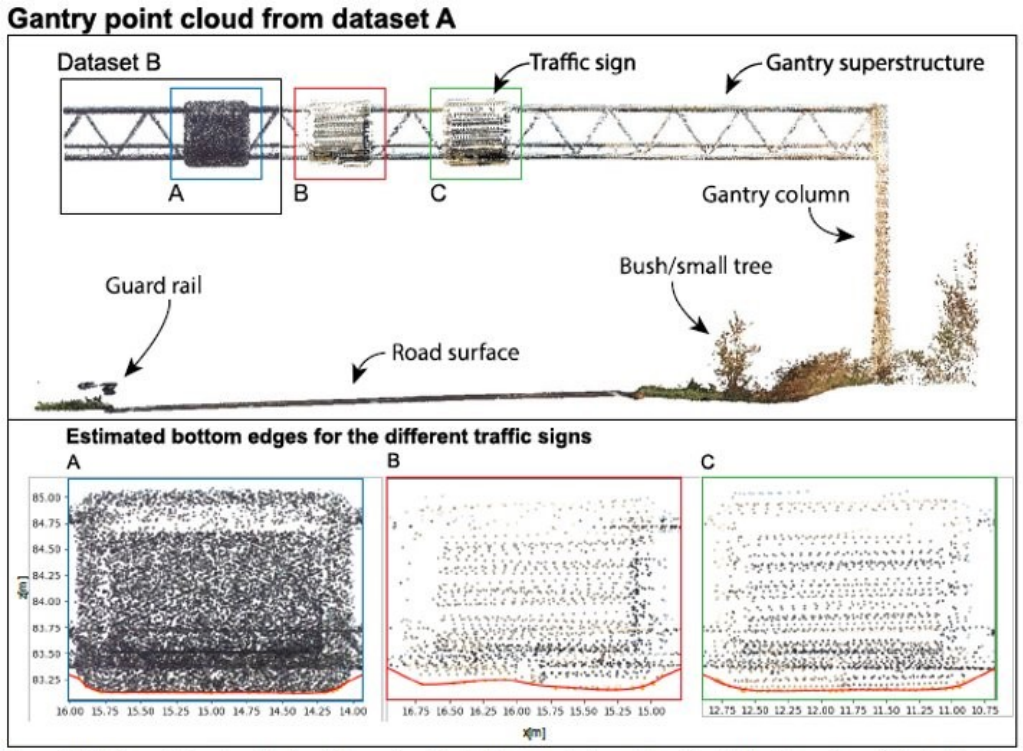
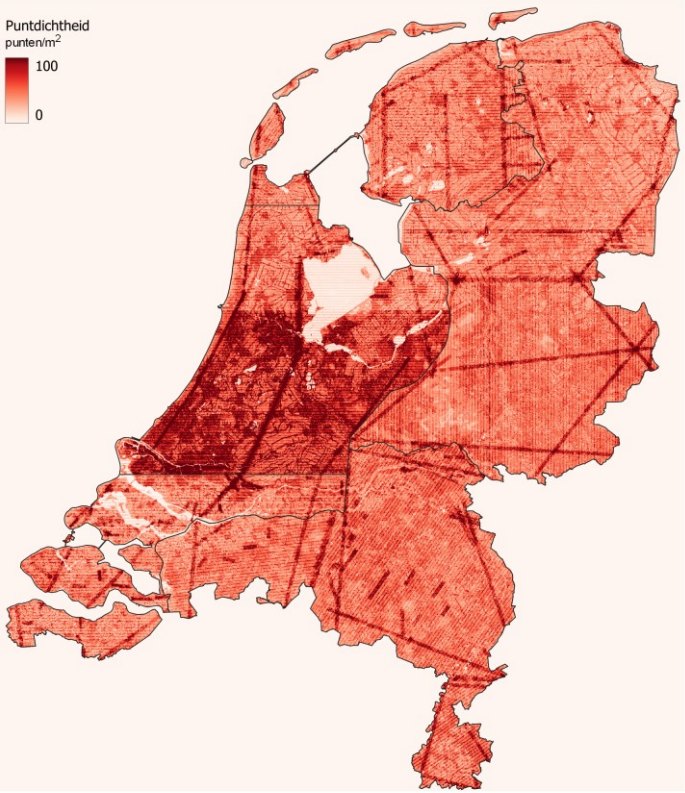
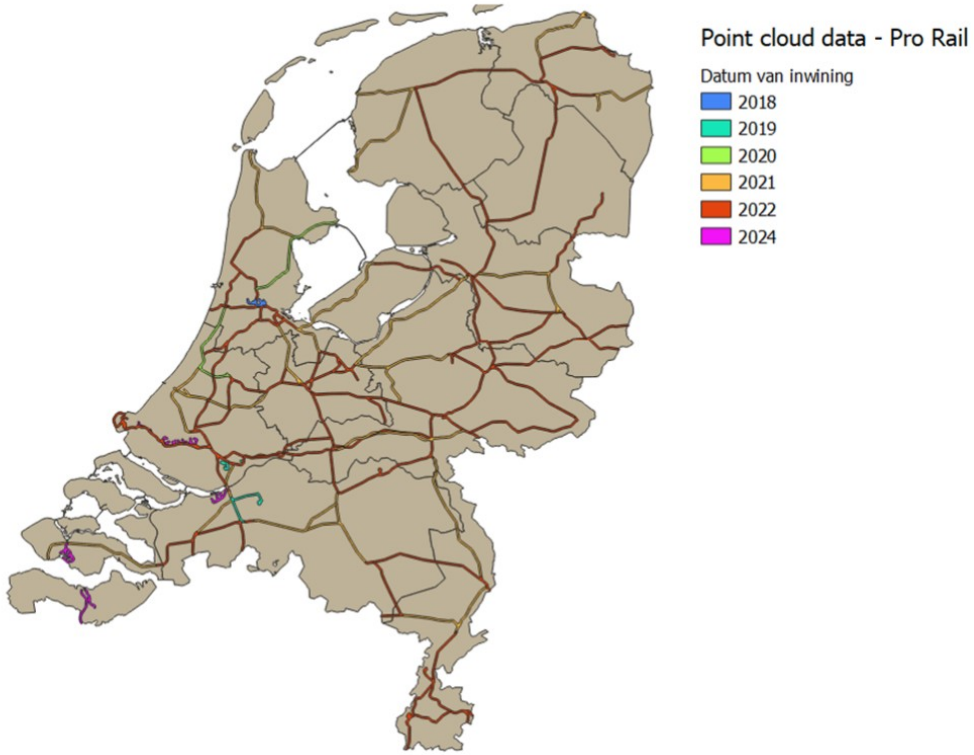


Figure 5.48: Example input point cloud of a gantry. The bottom panel shows the estimated bottom edges of the traffic signs attached to the gantry superstructure.

Effects of different specifications and goals





Rijkswaterstaat
Ministry of Infrastructure and Water Management

TU Delft 3Dgeoinfo

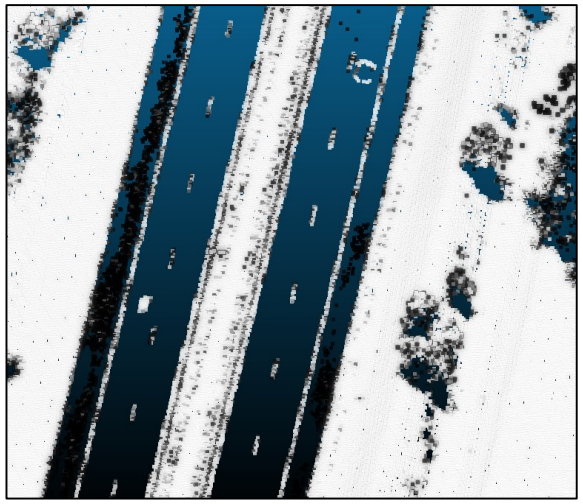
Looking forward: Co-registration of pointclouds

Research subject 2

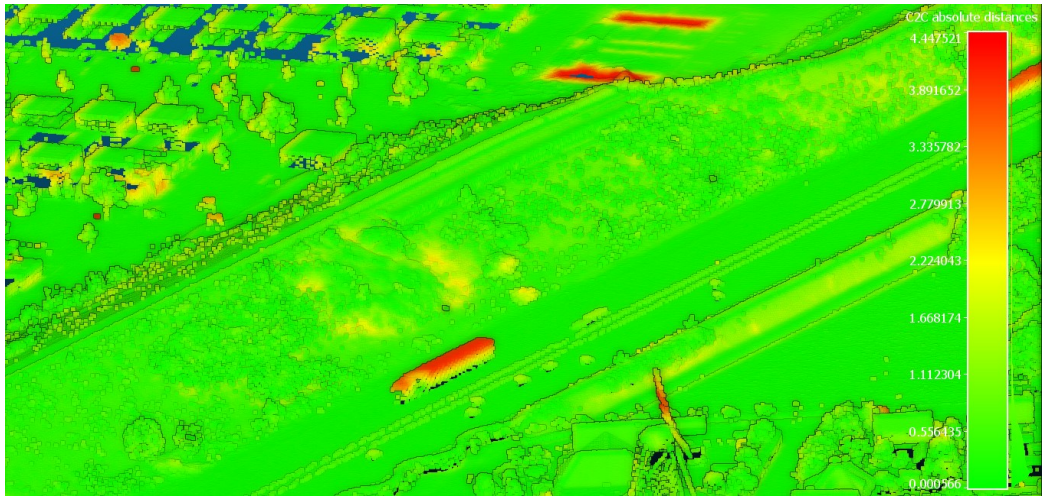
Research Subject 2

AHN4

Road marking



Difference between AHN4 and AHN3



Co-registration for comparison analysis

Contact

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Dr. Tessa Eikelboom
Mail: tessa.eikelboom@rws.nl