
MOBLAB

The reality about Autonomous Drive…

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!noitatropsnarT si suomonotuA

MobLab, recrafting mobility.

The reality about Autonomous Drive…

Transportation is autonomous!

The reality about Autonomous Drive…

Transportation is autonomous!

The reality about Autonomous Drive…

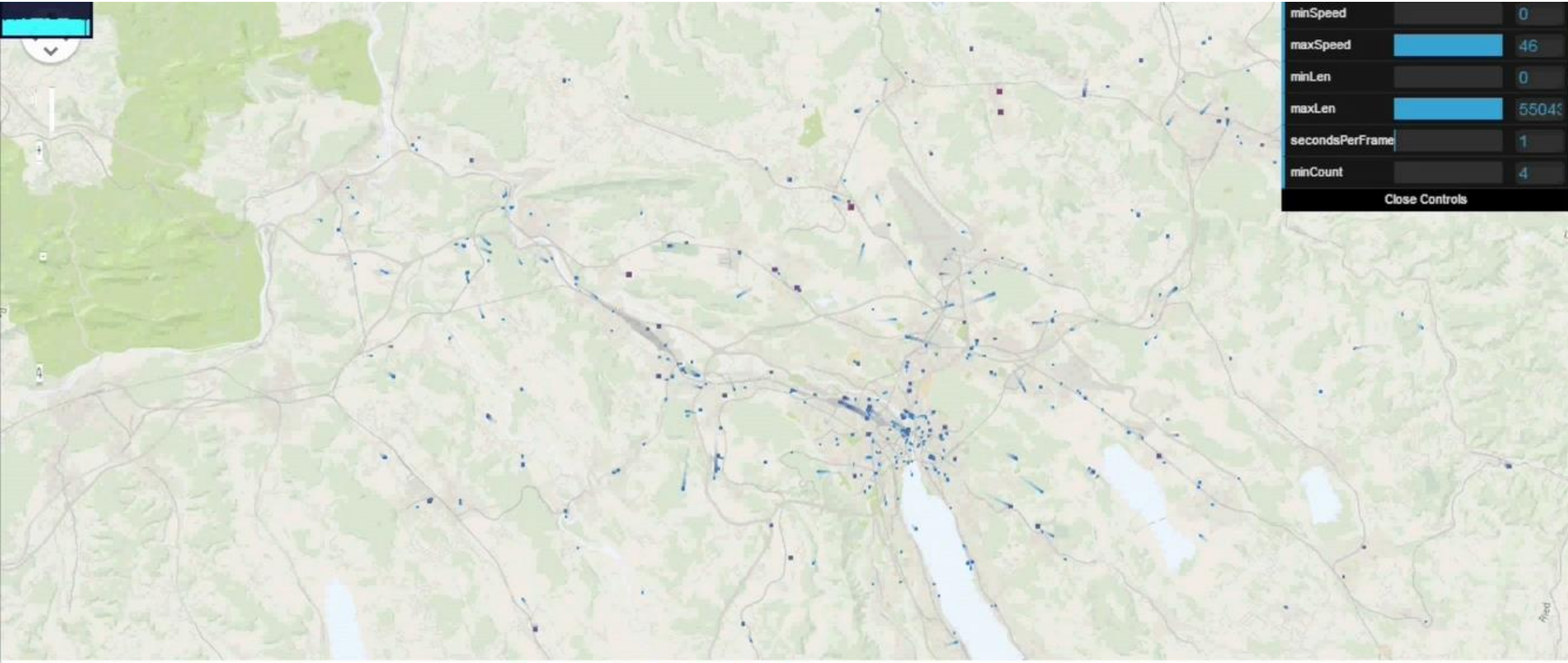
Transportation will be autonomous!

Why Autonomous Drive?

Why Autonomous Drive?

Illustration from Göteborg Public Transport

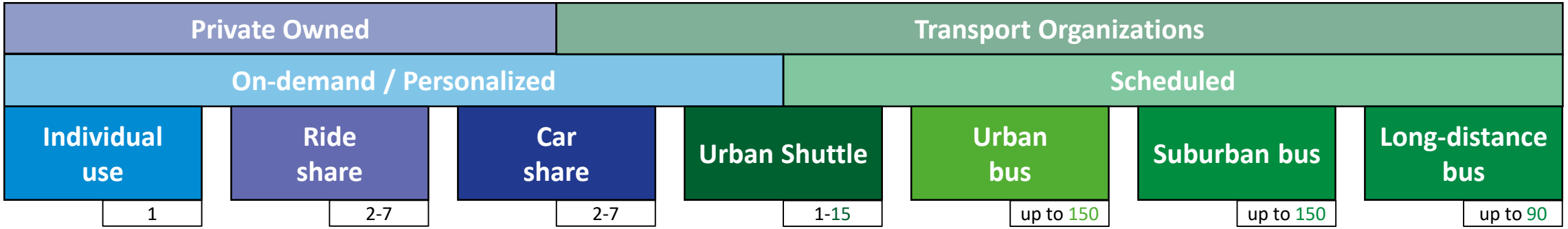
Zurich Urban Area: night and commuting times



swisscom

Courtesy of Swisscom. Data aggregated and anonymized from cellular phones

Transportation Framework (in relation to AD)



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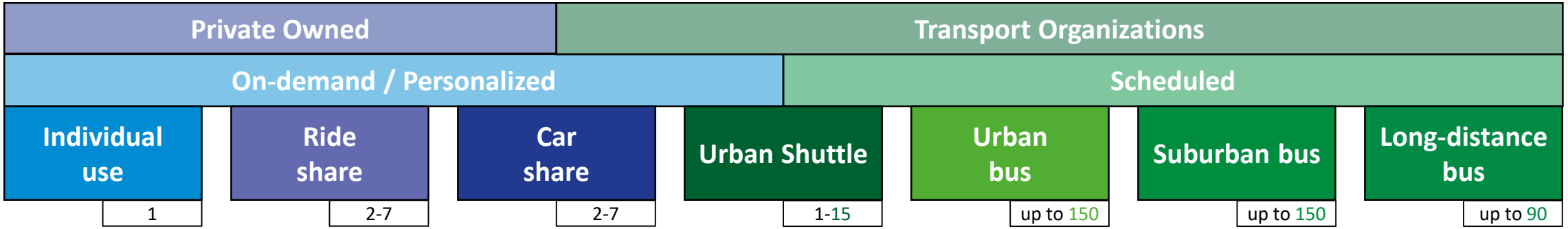
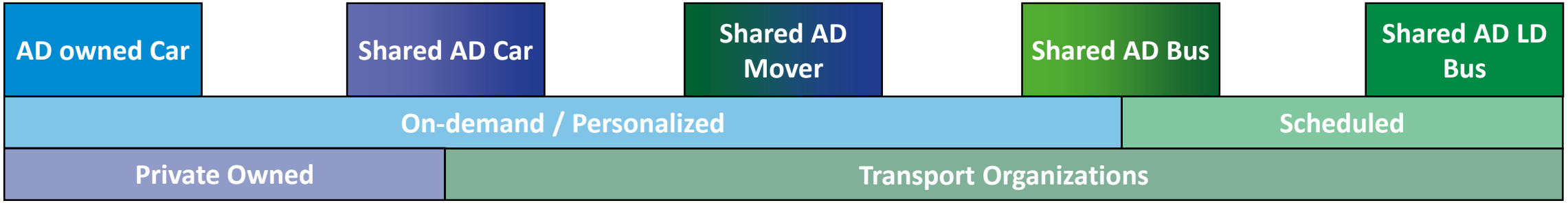
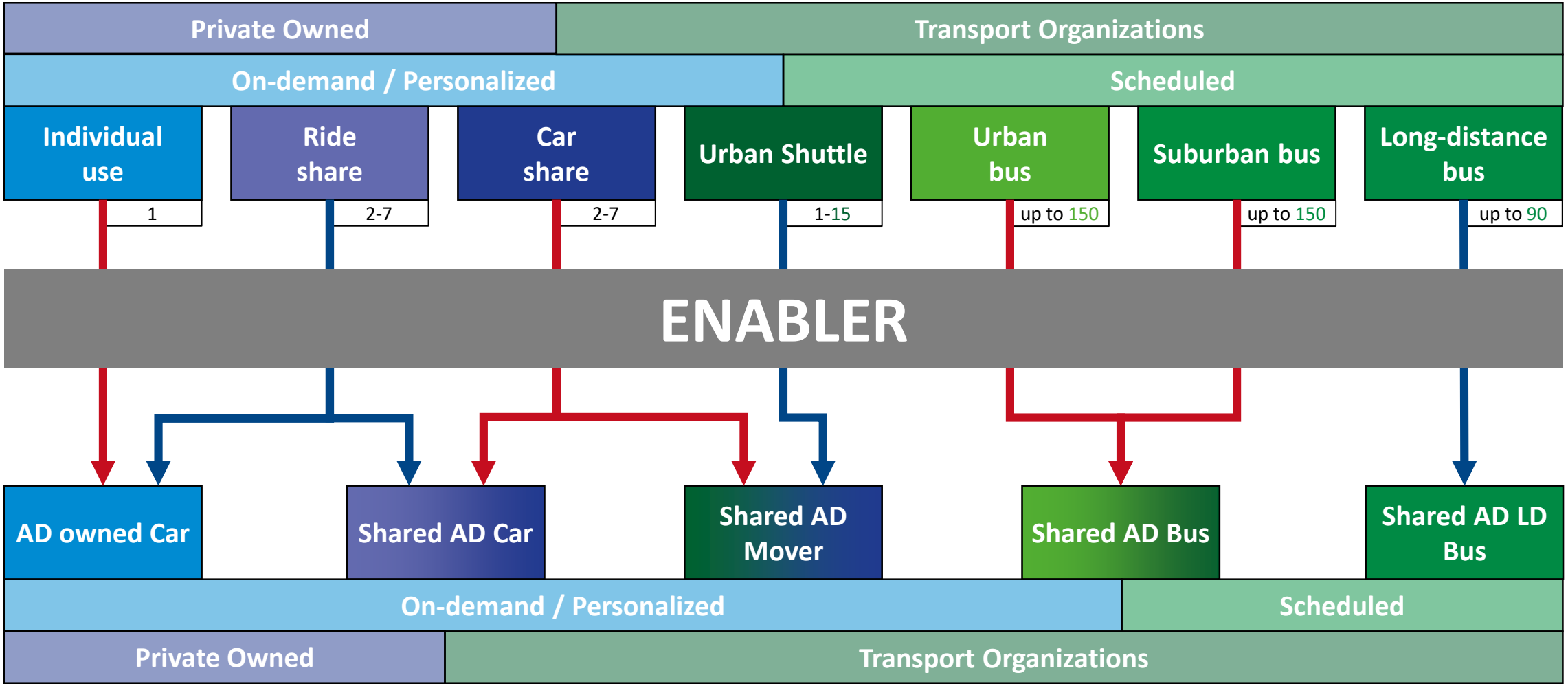




Transportation Framework (in relation to AD)



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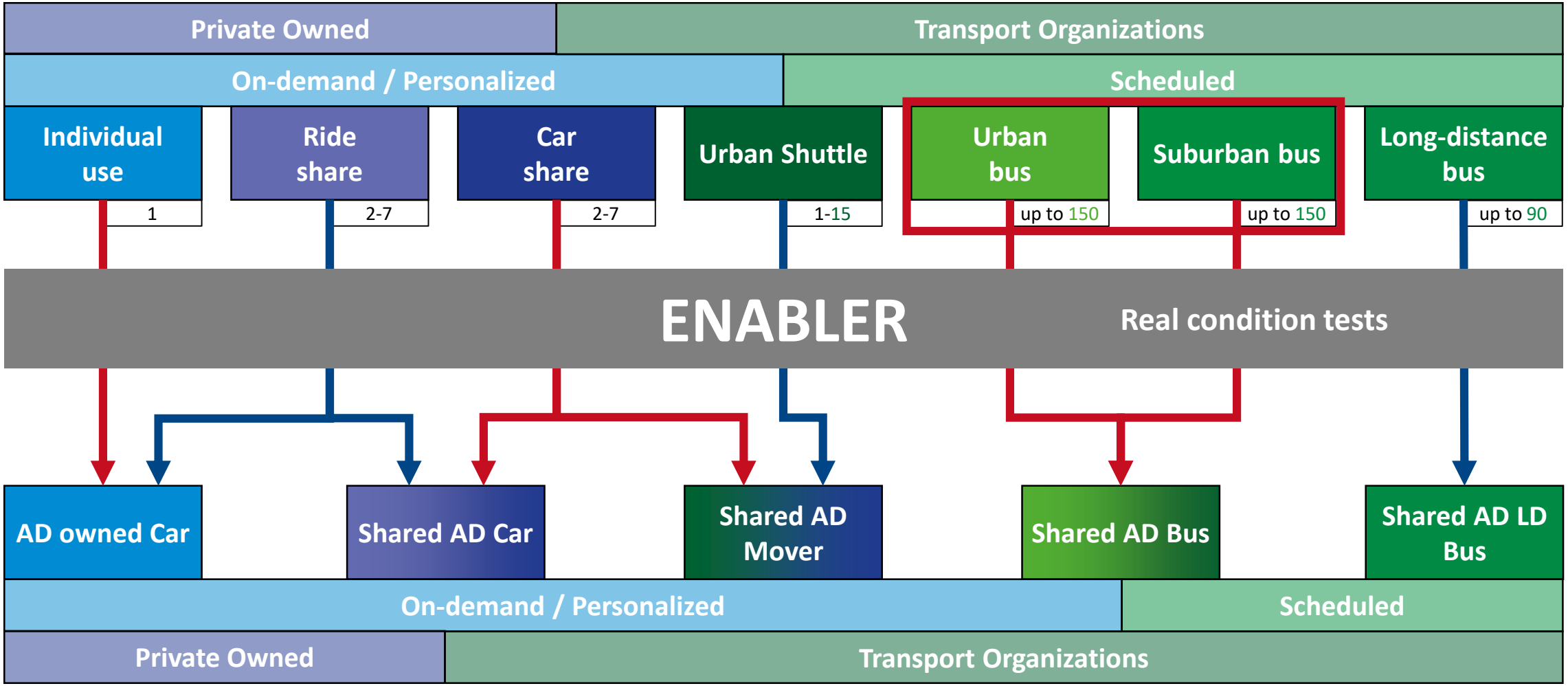

Autonomous Drive Levels

No Driving Automation	**L0**	The performance by the driver of the entire DDT, even when enhanced by active safety systems.
Driver Assistance	**L1**	The sustained and ODD-specific execution by a driving automation system of either the lateral or the longitudinal vehicle motion control subtask of the DDT (but not both simultaneously) with the expectation that the driver performs the remainder of the DDT.
Partial Driving Automation	**L2**	The sustained and ODD-specific execution by a driving automation system of both the lateral and longitudinal vehicle motion control subtasks of the DDT with the expectation that the driver completes the OEDR subtask and supervises the driving automation system.
Conditional Driving Automation	**L3**	The sustained and ODD-specific performance by an ADS of the entire DDT with the expectation that the DDT fallback-ready user is receptive to ADS-issued requests to intervene, as well as to DDT performance-relevant system failures in another vehicle systems and will respond appropriately.
High Driving Automation	**L4**	The sustained and ODD-specific performance by an ADS of the entire DDT and DDT fallback without any expectation that a user will respond to a request to intervene.
Full Driving Automation	**L5**	The sustained and unconditional (i.e., not ODD-specific) performance by an ADS of the entire DDT and DDT fallback without any expectation that a user will respond to a request to intervene.

Source: Society of Automotive Engineers (SAE)

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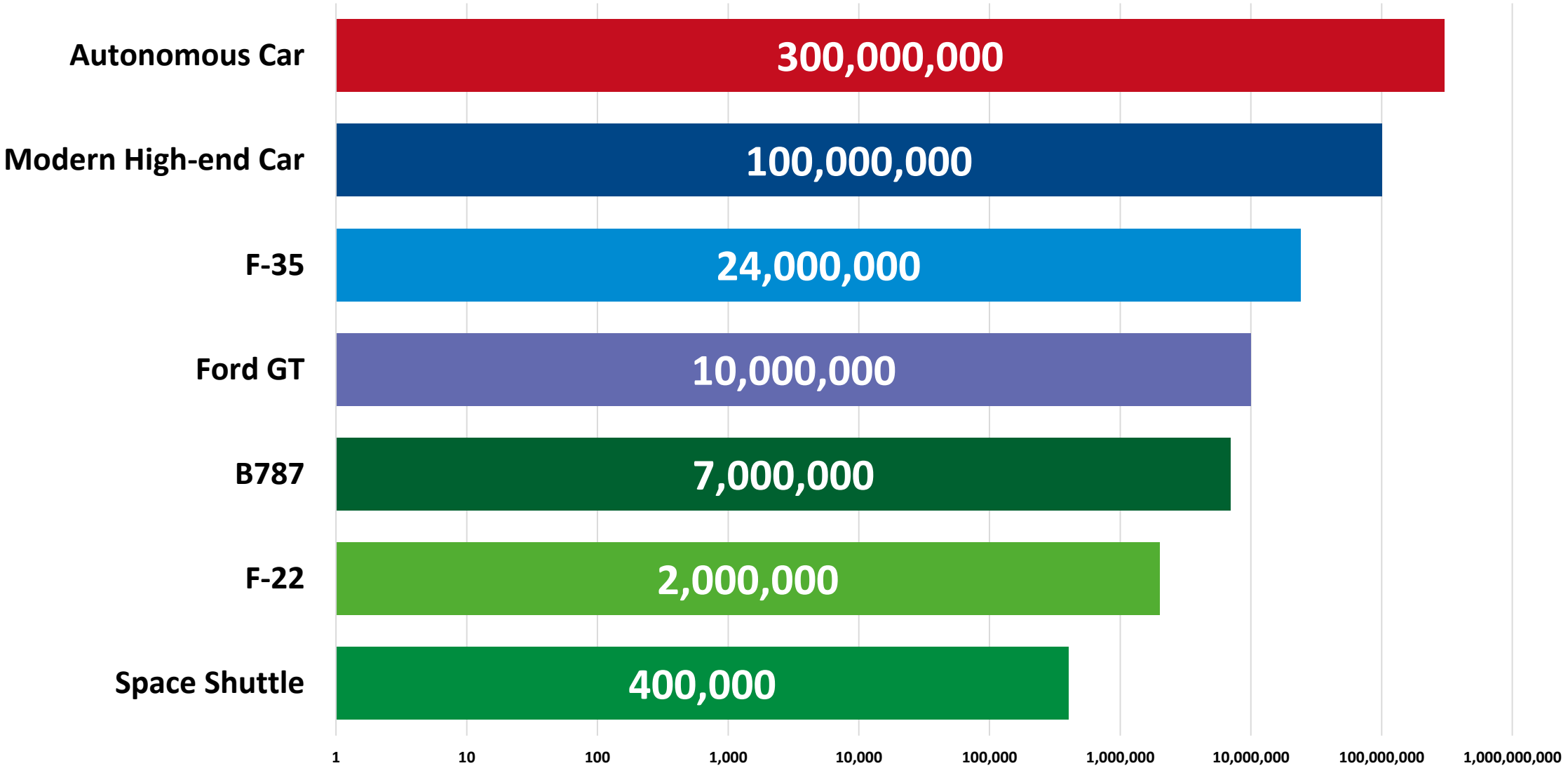
Programming Code Lines



ZER01
Zero Emission
Road Operation

ZER02
Urban Bus
Platooning

ZER03
Urban Bus
AD Retrofit

ZER04
Autonomous
Urban Bus

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Zero Emission
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Project ZER04

Objectives

First Autonomous Vehicle

Emissions

Infrastructure

Efficiency

Skills

Share

Data

New Jobs

Project ZER04

Objectives

To be the first Swiss Fully Autonomous Vehicle on public roads.

- **Emissions**: Increase the use of full electric vehicles (EVs) as a means to reduce dependence on fossil fuel and reduce the emissions toward zero.
- **Infrastructure**: Show that current infrastructure is ready to AD Public Transportation (with minor changes).
- **Efficiency**: Ensure that vehicles are capable of using electric energy to the greatest extent possible.
- **Skills**: Provide appropriate training and new competences for individuals and partner companies in relation to AD.
- **Share**: Inform the the larger community (partners, technology companies, private persons, communities, etc…) about the benefits of autonomous buses and offer strategies to help them implementing similar operations.
- **Data**: Collect the corresponding vehicle, infrastructure, and training information data and analyze social, environment, ethics and business performance.

To create new job (profiles) and retain jobs.

impossible

we to make drive

autonomous

buses drive

autonomously

possible

impossible

to drive

buses

autonomously

impossible

we to make drive

autonomous

buses drive

autonomously

possible

Autonomous Drive in a few words…

Elements (7)

- Localization and Mapping
- Perception
- Prediction
- Planning
- Control
- Coordination
- External Human Machine Interaction (e-HMI)

Enabling Technologies (9)

- Artificial Intelligence (AI)
- Computer Vision
- Predictive Algorithms
- Decision Algorithms
- Digital Precision Maps
- Sensors / RADAR / LiDAR
- Actuators
- Simulation
- V2X Communication

Source: https://automatedtoyota.com/elements-of-automated-driving

AD in a few words…

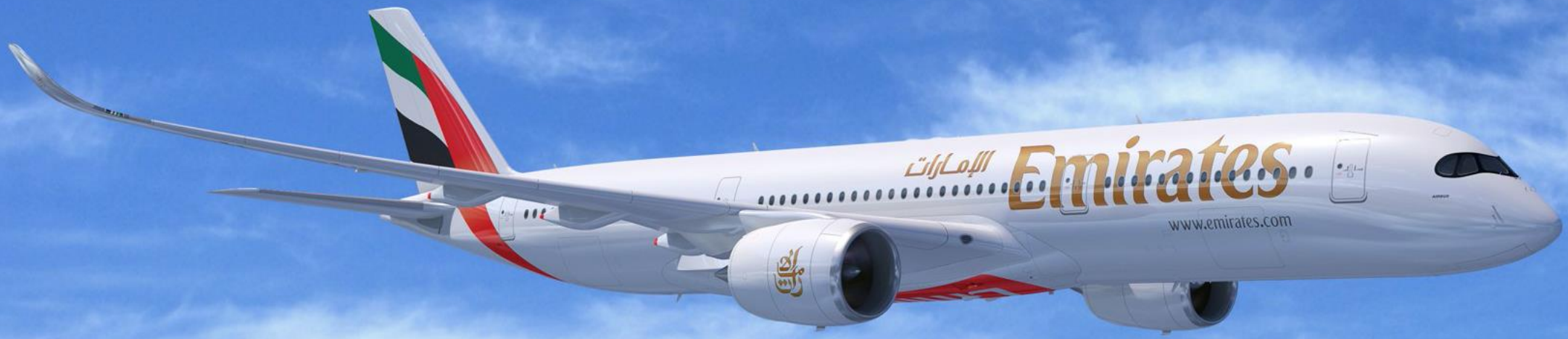
Components

- Cameras
- LIDAR
- RADAR
- Global positioning systems (GPS)
- Inertial navigation units (INU)
- Environmental Data
- Proximity Sensor
- Communication (real-time)
- Data collection system
- Data aggregation system
- …

Source: https://automatedtoyota.com/elements-of-automated-driving & own analysis

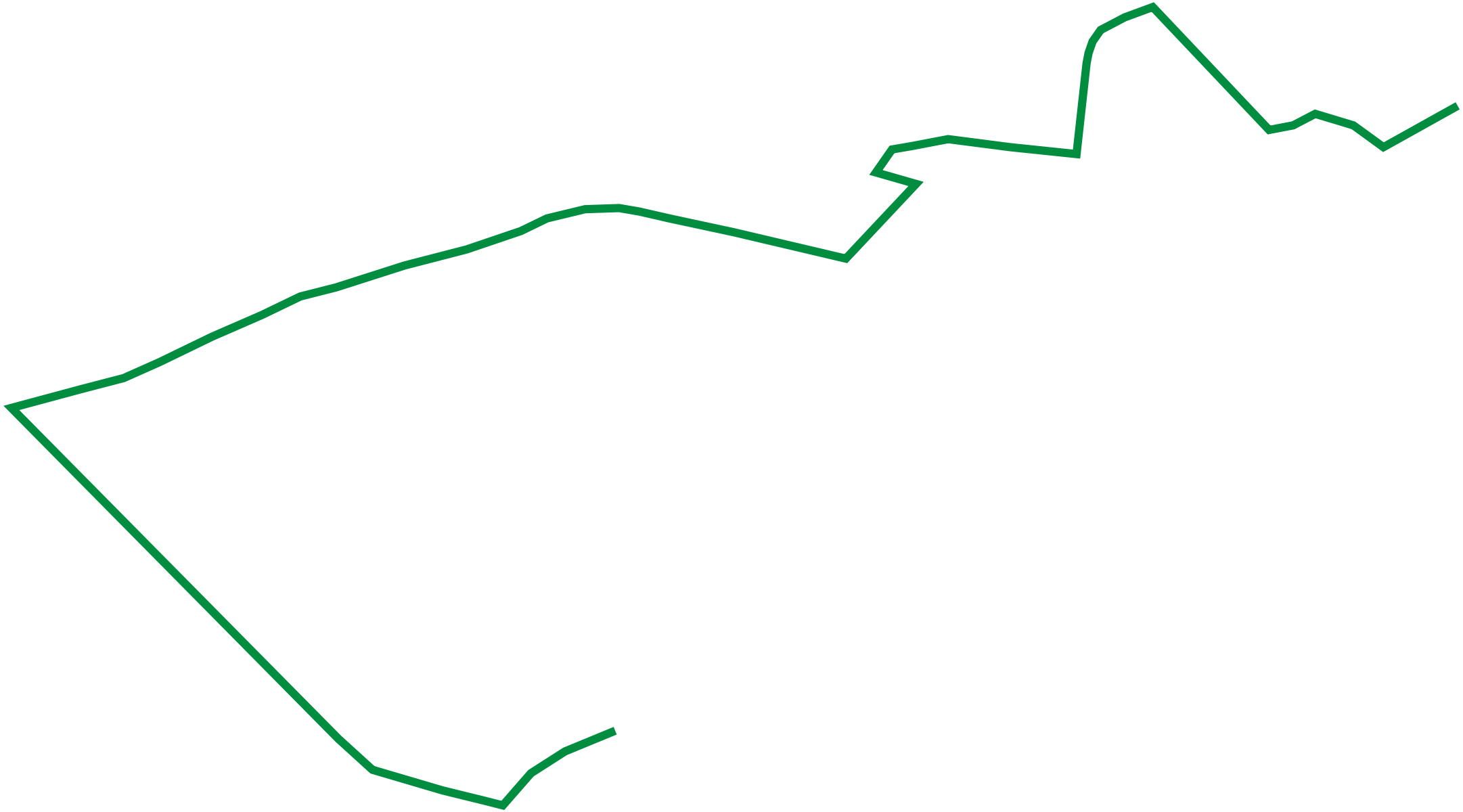

الإمارات
Emirates
www.emirates.com

50,000 sensors

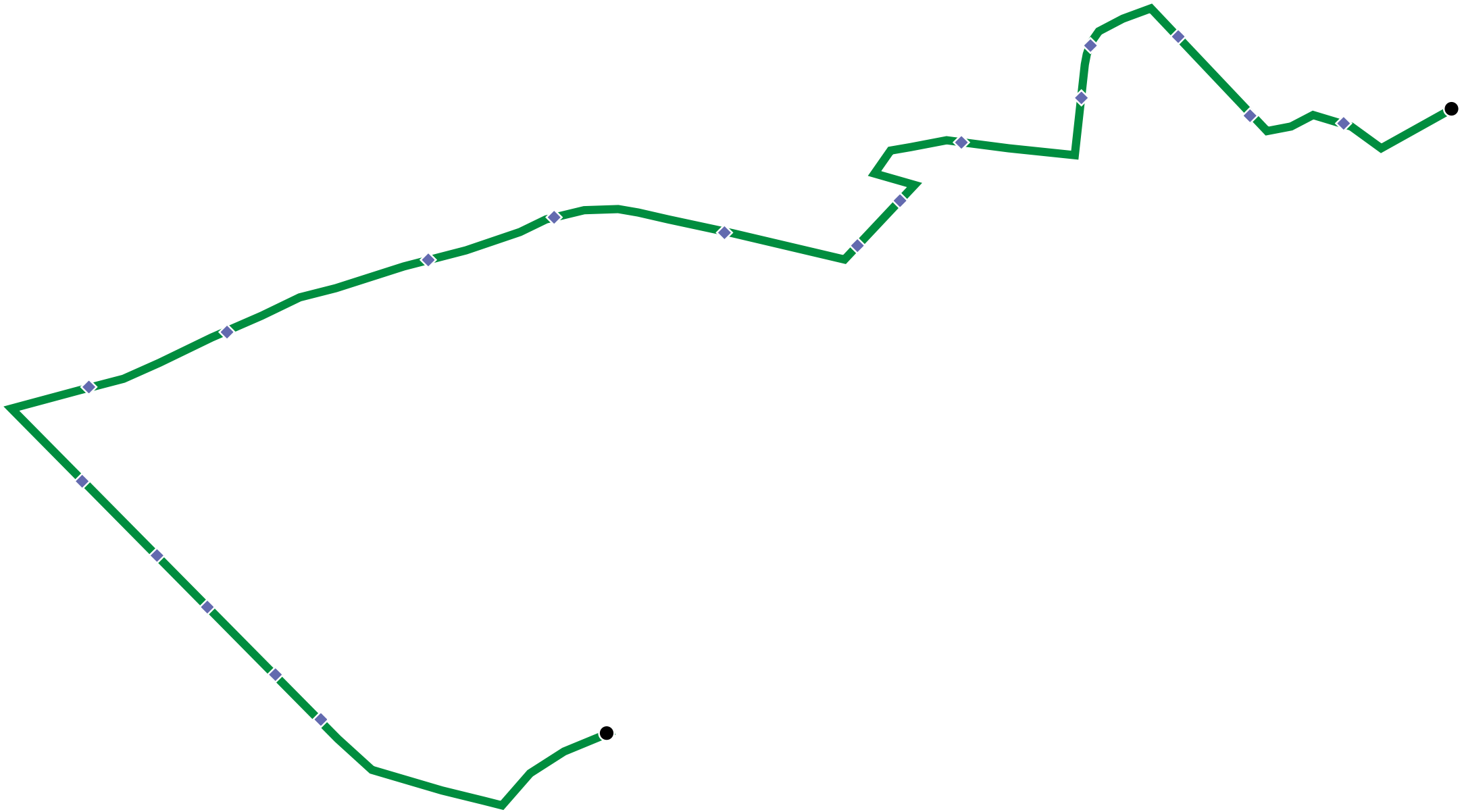



50,000 sensors
Emirates
www.emirates.com
2.5 TB/day

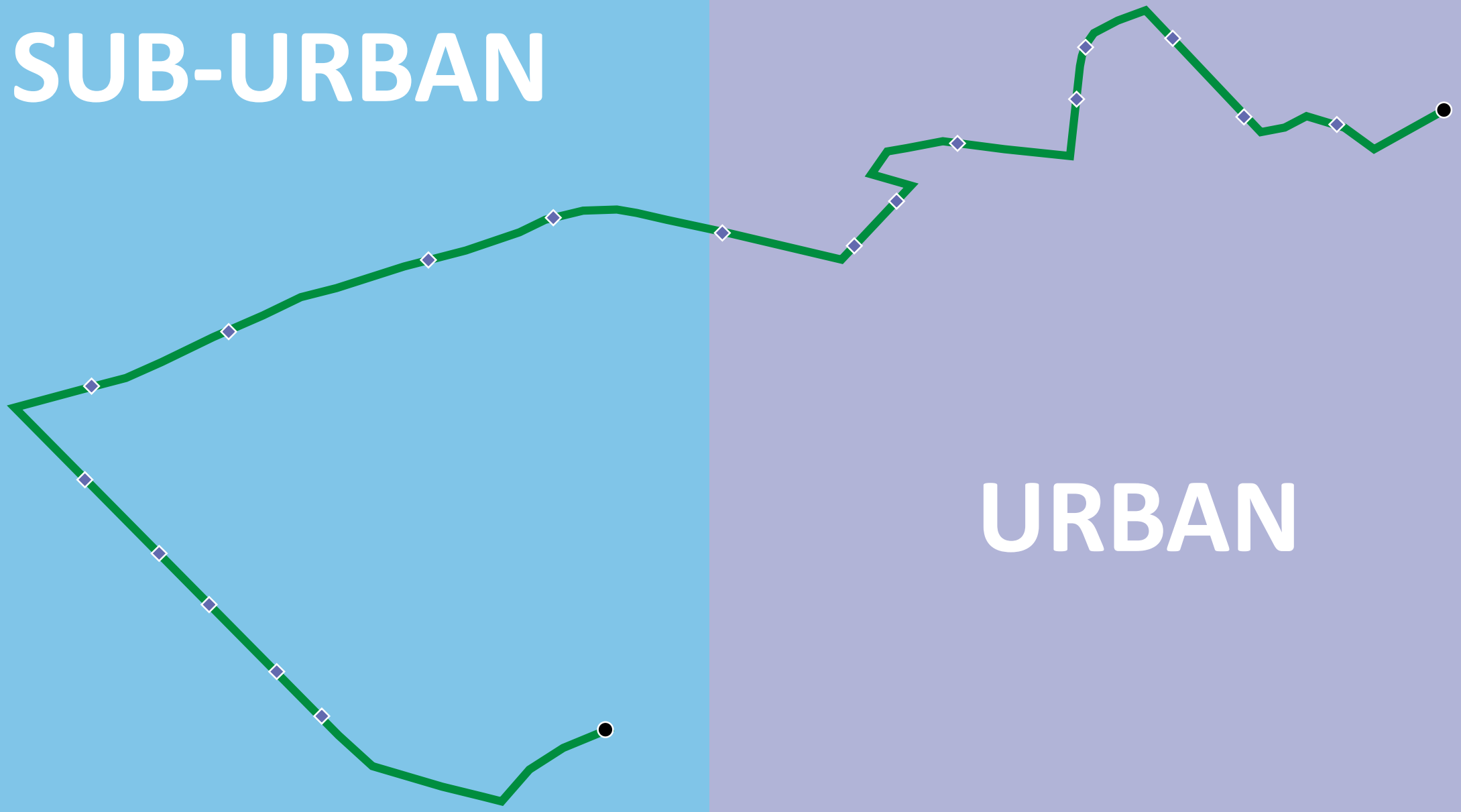
Analyzed Route for Urban Autonomous Bus



Stops

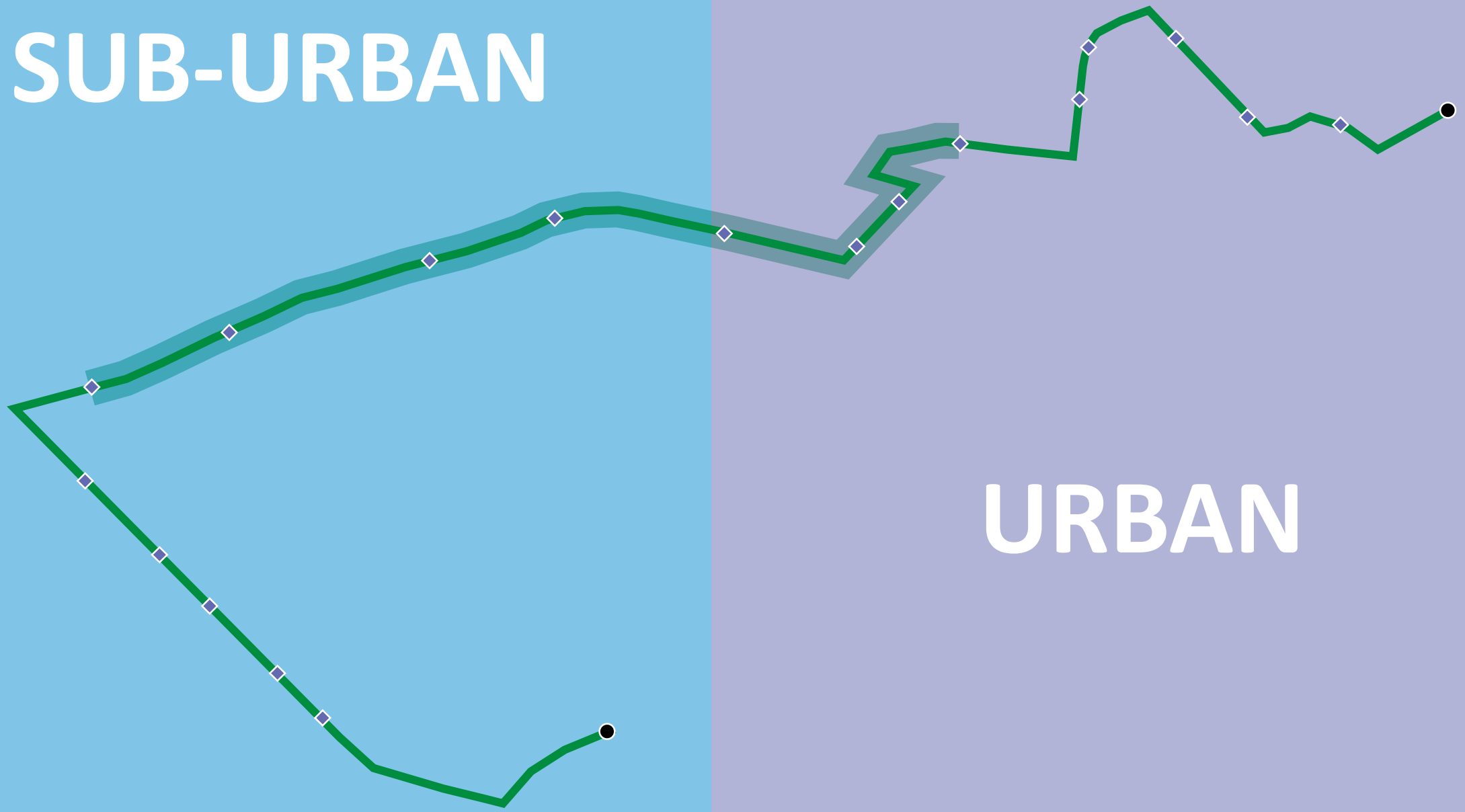


SUB-URBAN



URBAN

SUB-URBAN



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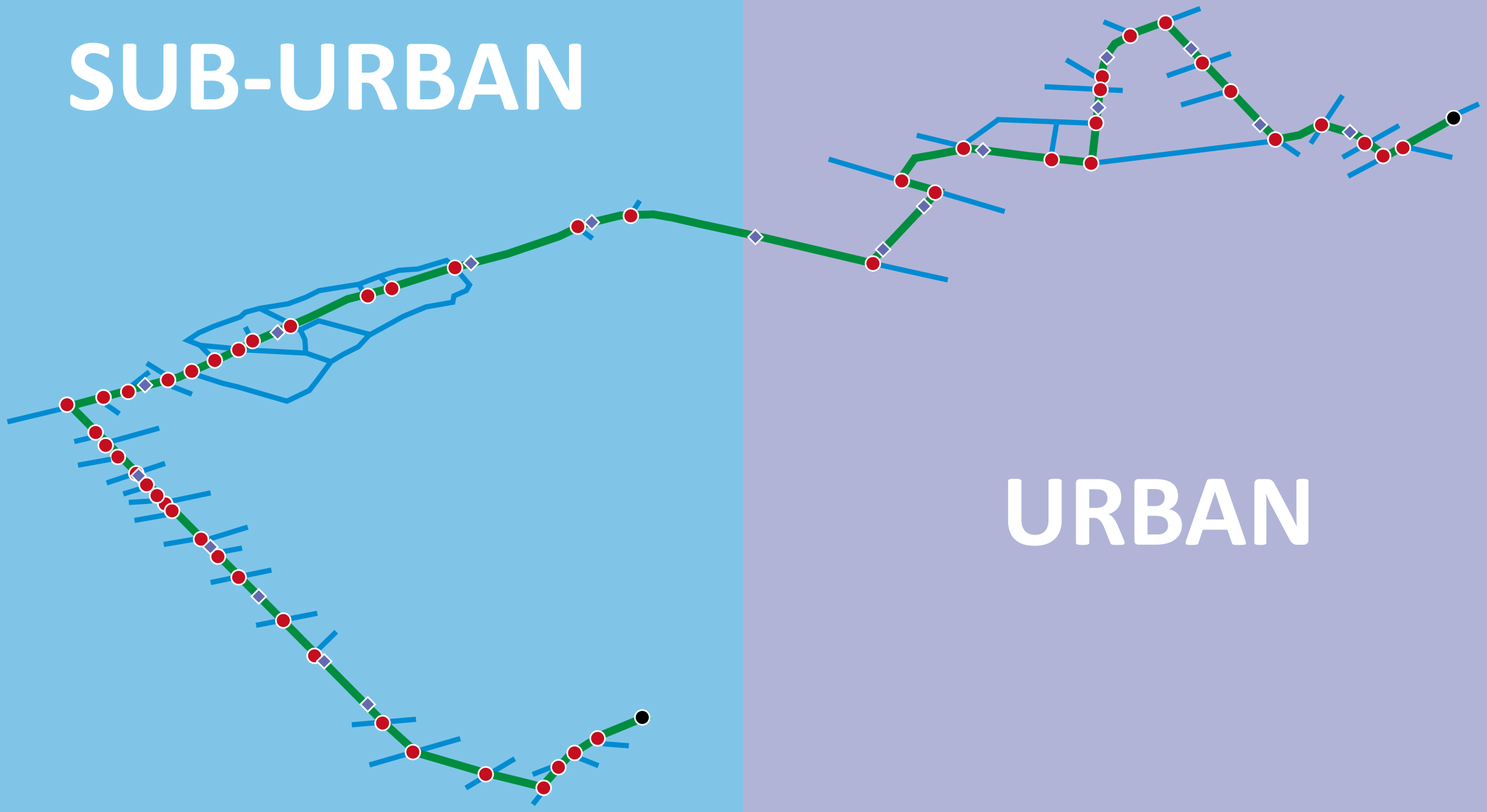

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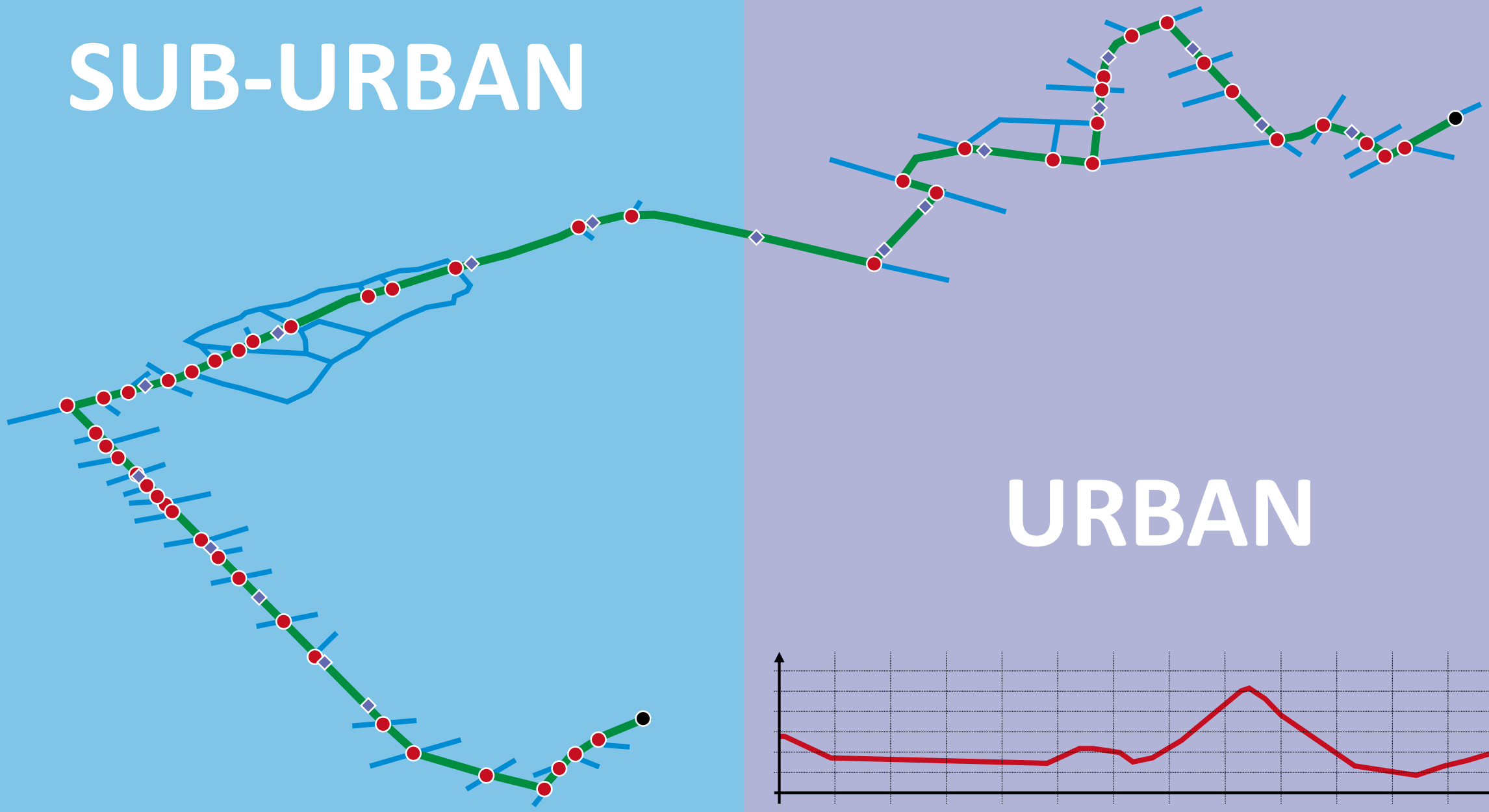

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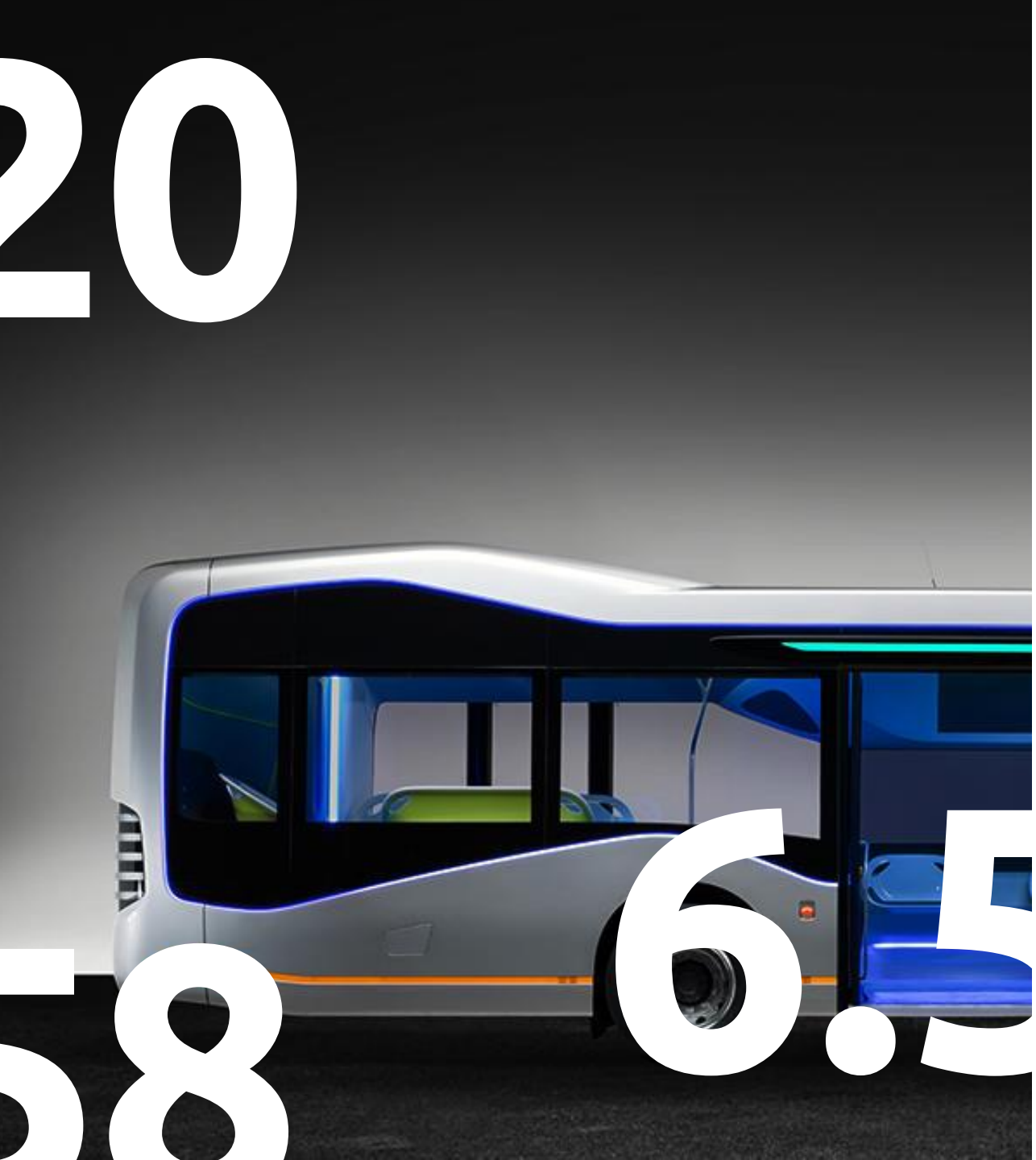


ZER04 Project

58 intersections

20 stops

6.5 km

Operational implications

Concept ZERO4

- Remote surveillance
- Scheduled vs. continuous operation
- Sequence of action
- Environmental conditions
- Complex Intersections
- Recovery
- …

Maintenance implications

Concept ZERO4

- Engineering Skills
- Big Data (Smart Data)
- Predictive Maintenance
- Maintenance Infrastructure
- Performance monitoring
- …

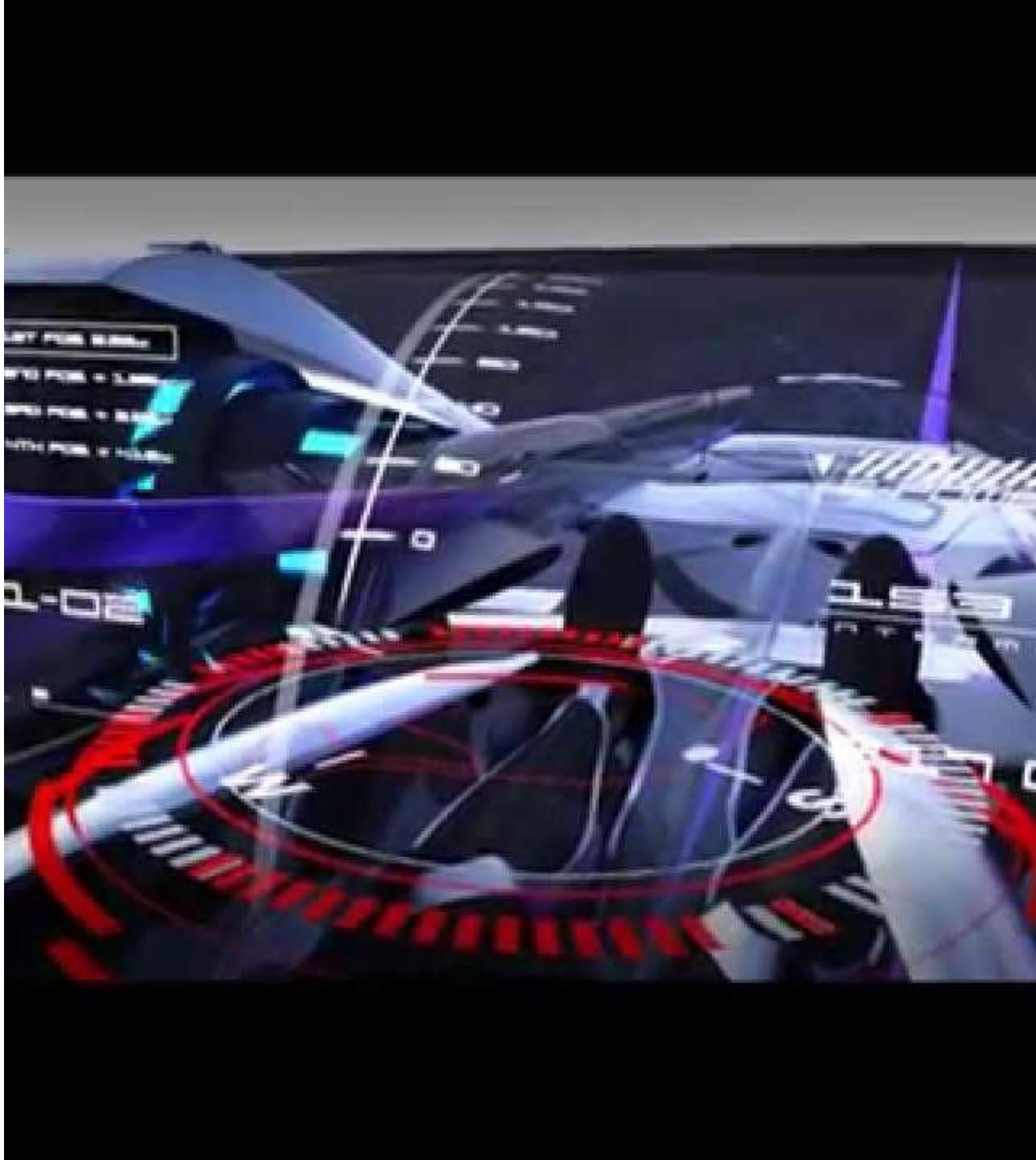
M&O implications

Concept ZERO4

> Ethics

> Human Machine Interface

> Decision making



Reduce Emission

Mobility Trends

New Jobs and New Profiles

Technology Transfer

Acceptance of Autonomous Drive

Autonomous Drive on Public Roads


MOBLAB