



Ottawa's Digital Twin Evolution: Powering the City's Data-Driven Future

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Capital of Canada
Fourth-largest
city of Canada



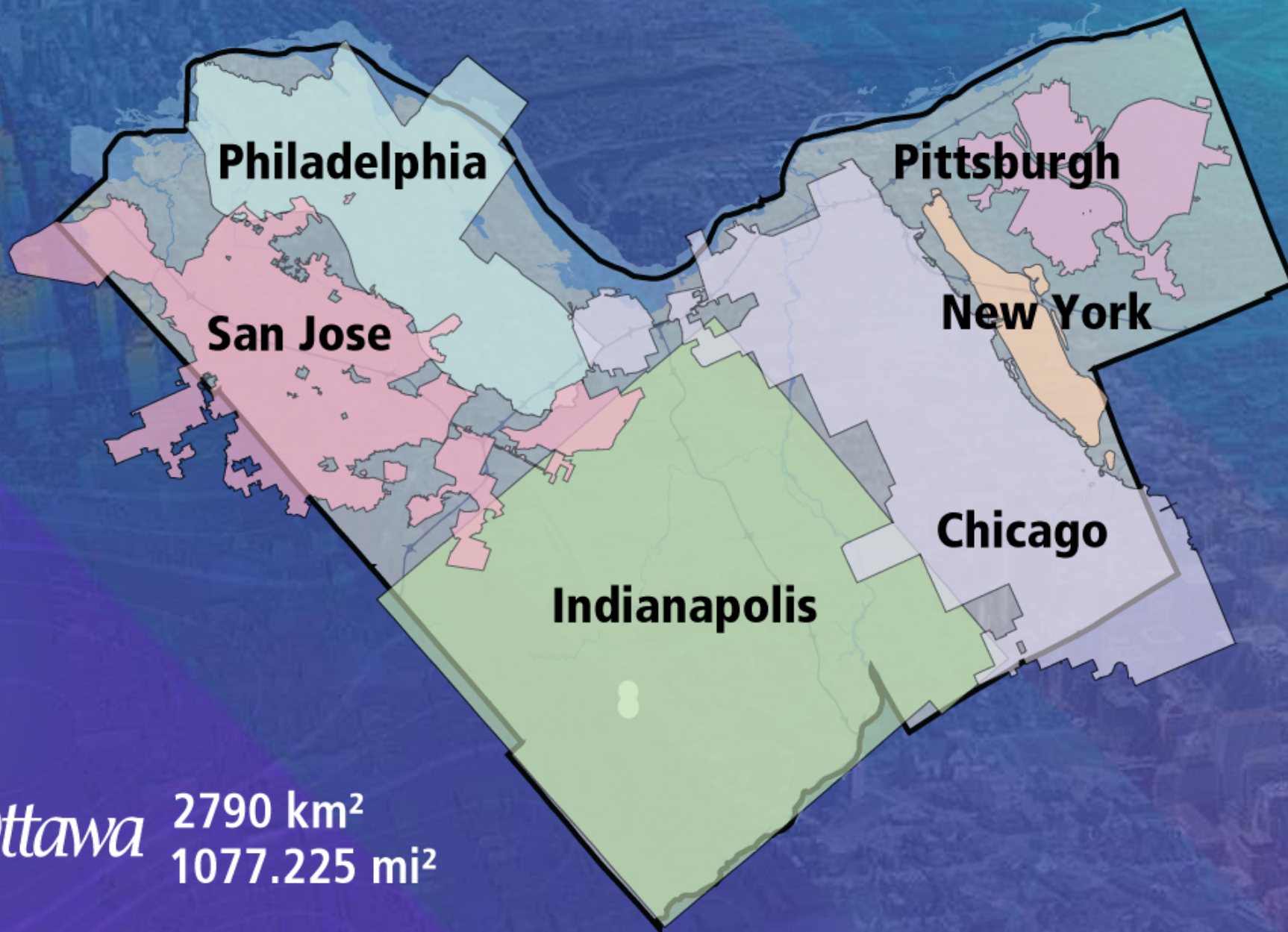
Pop 1,017,449



Large urban area,
rural and
wilderness areas



2790 km²
1077.225 mi²



Ottawa's Digital Twin Vision and Mission Statement

A living, spatially anchored digital ecosystem that unites real-time data, immersive visualization, and predictive analytics — enabling a resilient, efficient, and sustainable city through shared insight and collaboration.

To build and sustain an interoperable digital twin framework that connects planning, design, and operations — fusing data from across city assets, infrastructure, and services to drive informed decisions, optimize performance, and strengthen collaboration across the corporation.

Digital Twin

Real world



Our Digital Twin Journey

An isometric illustration of a city block with several buildings and a road, representing a basic digital model.

Level 1: Passive Digital Twin

Connect the digital blueprint to the real world with live data and assets.

An isometric illustration of a city block with buildings and a road, showing more detail than Level 1.

Level 2: Predictive Digital Twin

Gathering data and test different urban scenarios.

An isometric illustration of a city block with buildings and a road, featuring various icons (globe, Wi-Fi, cloud, etc.) representing data and connectivity.

Level 3: Programmable Digital Twin

Moving from predicting to recommending. Run scenarios to recommend best course of action to improve efficiency.

An isometric illustration of a city block with buildings and a road, showing a more complex and integrated digital model with various icons and a cloud-like background.

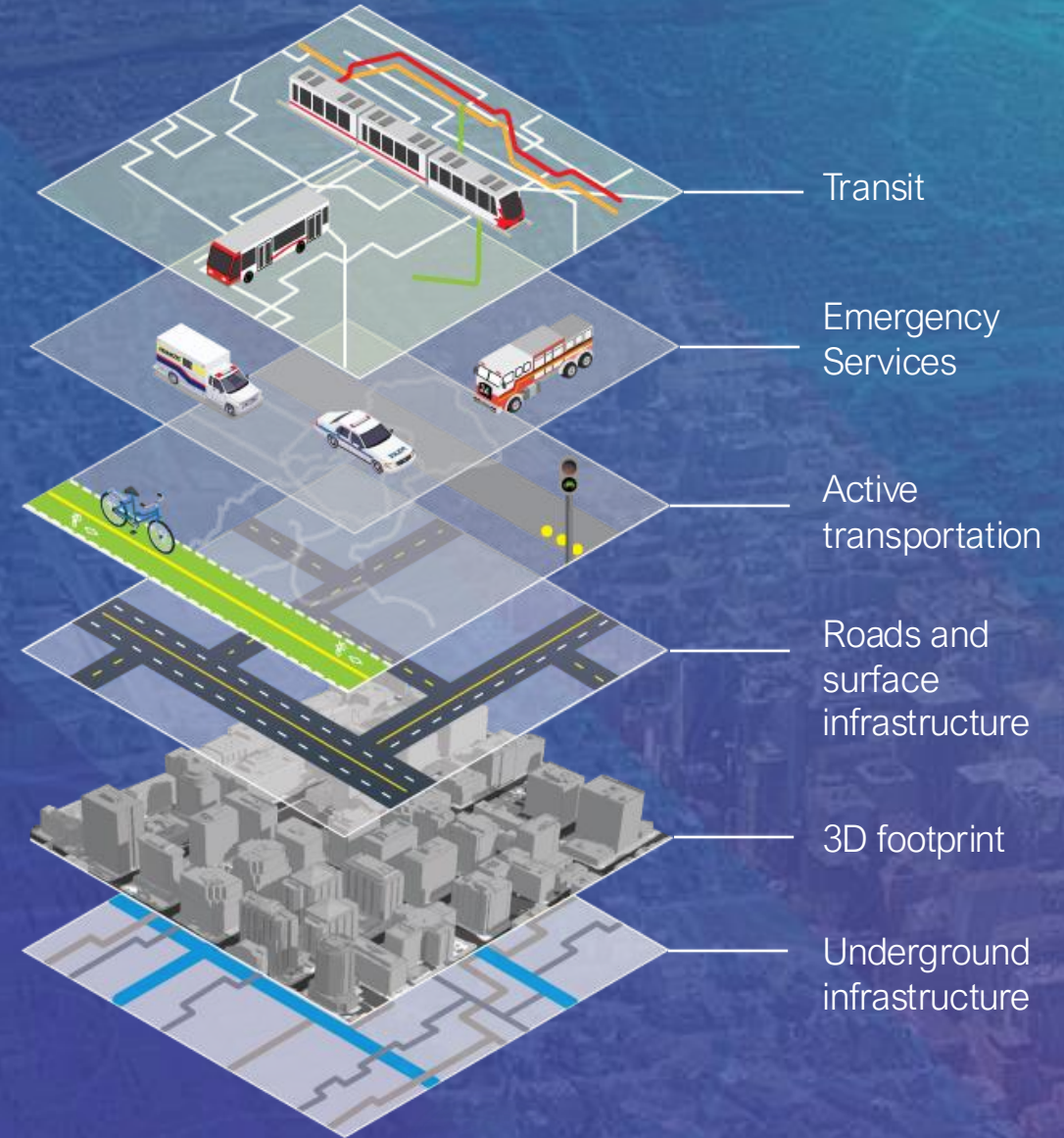
Level 4: Autonomic Digital Twin

Makes autonomous decision based on predictive analytics. Rerouting logistics in real-time to avoid a traffic jam.

We are here

Purpose of Ottawa's Municipal Digital Twin:

- ✓ Support urban planning and zoning analysis
- ✓ Improve infrastructure asset management
- ✓ Enhance emergency response and situational awareness
- ✓ Enable environmental modeling and climate adaptation
- ✓ Increase transparency and public engagement
- ✓ Provide a unified 3D view of the city for cross-departmental collaboration
- ✓ Facilitate data-driven decision-making across municipal services
- ✓ Serve as an incubator for future smart city technologies



Strong data practices create technology value

Ottawa's digital twin is a tangible example of what strong foundational data practices can enable.

CERTIFICATION

A framework for stronger data practices and continuous improvement

Governance

Confidence in ownership, quality, access and sharing

Integration

A foundation for connecting information across departments

Decisions

Technology supports better planning and operations

Improvement

Benchmark, strengthen and build capacity over time

Foundation: Reality Capture Program



3D Reconstruction/Mesh/3DGS



LiDAR Scanning



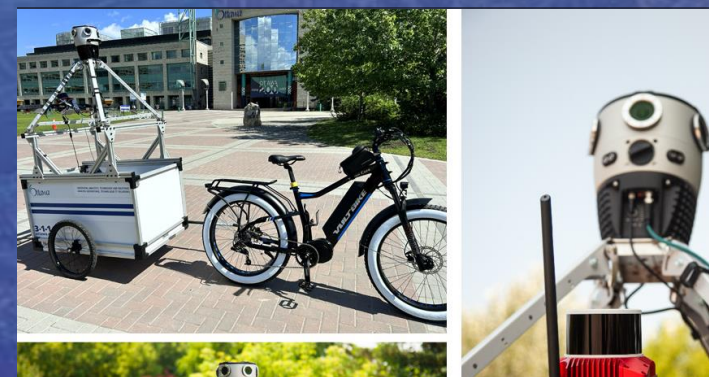
GNSS Correction Network



Network Array Storage



Mosaic 51 Meridian (360/LiDAR)



Bike Mapping

Integrating Partners data

Physical and Built Environment

- Digital Elevation Model (DEM/DTM)
- 3D buildings
- BIM models
- LiDAR data

Underground and Surface Infrastructure/Services

- Wastewater, stormwater, watermain Geoscience (boreholes, hydrogeology)
- Traffic Operations
- Solid waste collection, disposal and processing
- Traffic and streetlighting, poles, ducts and all associated ironworks
- Roads and sidewalks
- Streetscaping, bus shelters, planters



Mobility Services

- LRT (OTrain)
- OC Transpo
- ParaTranspo
- Uber / Lift

External Partners

- HydroOttawa/HydroOne
- Enbridge
- Bell / Rogers
- Google / Apple
- ESRI

Systems Integration

- Maximo, Envista, MAP, SARS
- BIM
- MPAC/Teranet
- LMS
- Environics

OTwin: Enabling and integrating transformational change



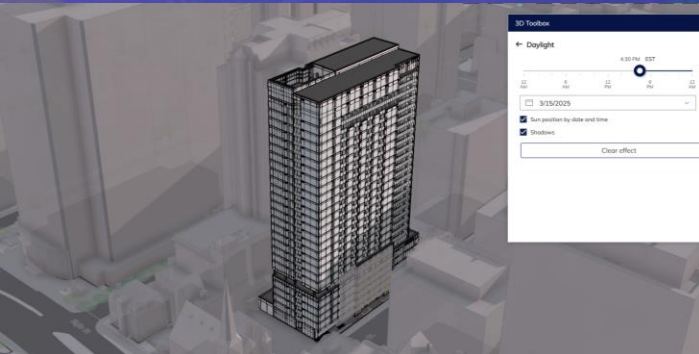
Zoning Analysis



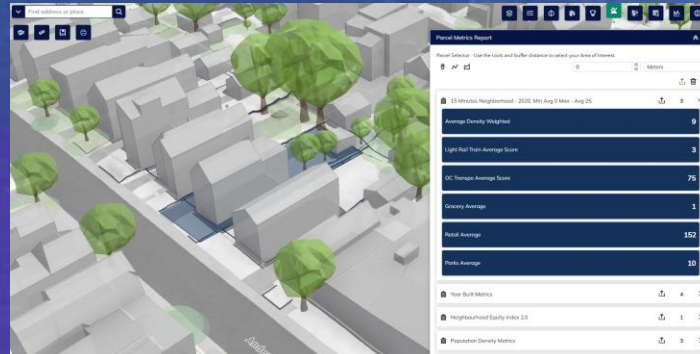
Scenario Modeling



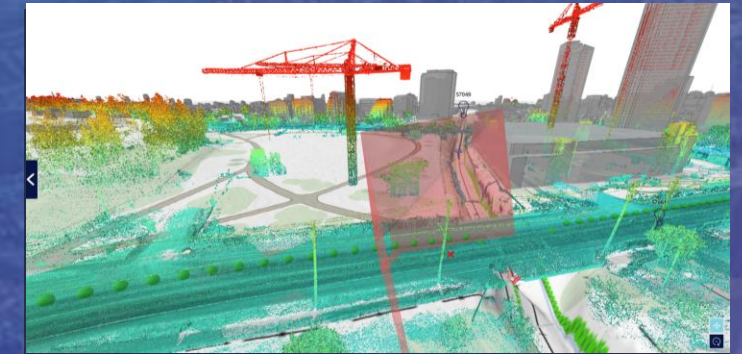
Shadow and Solar analysis



Building Information Models (BIM)



Parcel Suitability



Point Cloud Rendering

Collaborating with Partners



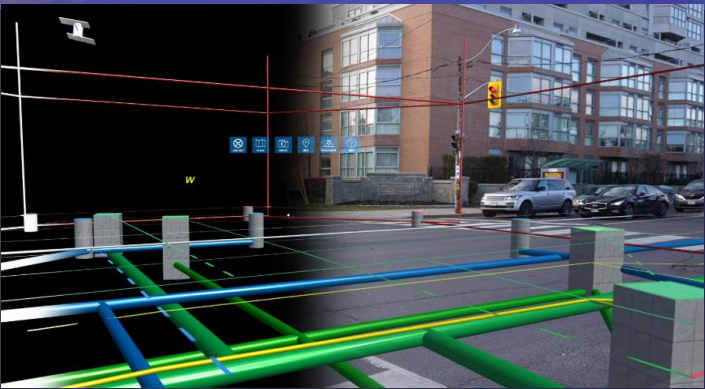
Solar capacity on rooftops MWh per year analysis for the Climate Change unit



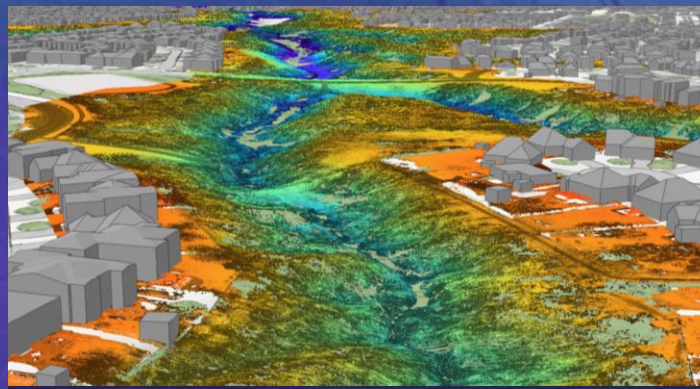
Risk assessments modelling for EOC



Water Rate Review Implementation Project - Impervious surface analysis



AR underground As-Built utilities with VGIS, Inspections, IWSD, ROW



Slope stability and erosion LiDAR scan for Bilberry Creek with Asset Mgt



Indoor Facility Scanning (RCFS)

Lessons Learned

- 01 Start with a decision Lead with a business problem and accountable owner.
- 02 Invest in reusable data Acquisition and quality work are not side activities.
- 03 Avoid single-use solutions Build interoperable components that can support many services.
- 04 Match detail to purpose More detail is not automatically more value.
- 05 Show value through small wins Operational proof builds confidence and adoption.

An aerial photograph of a city, likely New York City, showing a dense grid of buildings and streets. The image is overlaid with a semi-transparent blue and purple gradient, which is darker on the left and fades towards the right. The word "Questions?" is centered in the middle of the image in a white, sans-serif font.

Questions?