

3D Cadastre

Clear spatial localisation of property rights

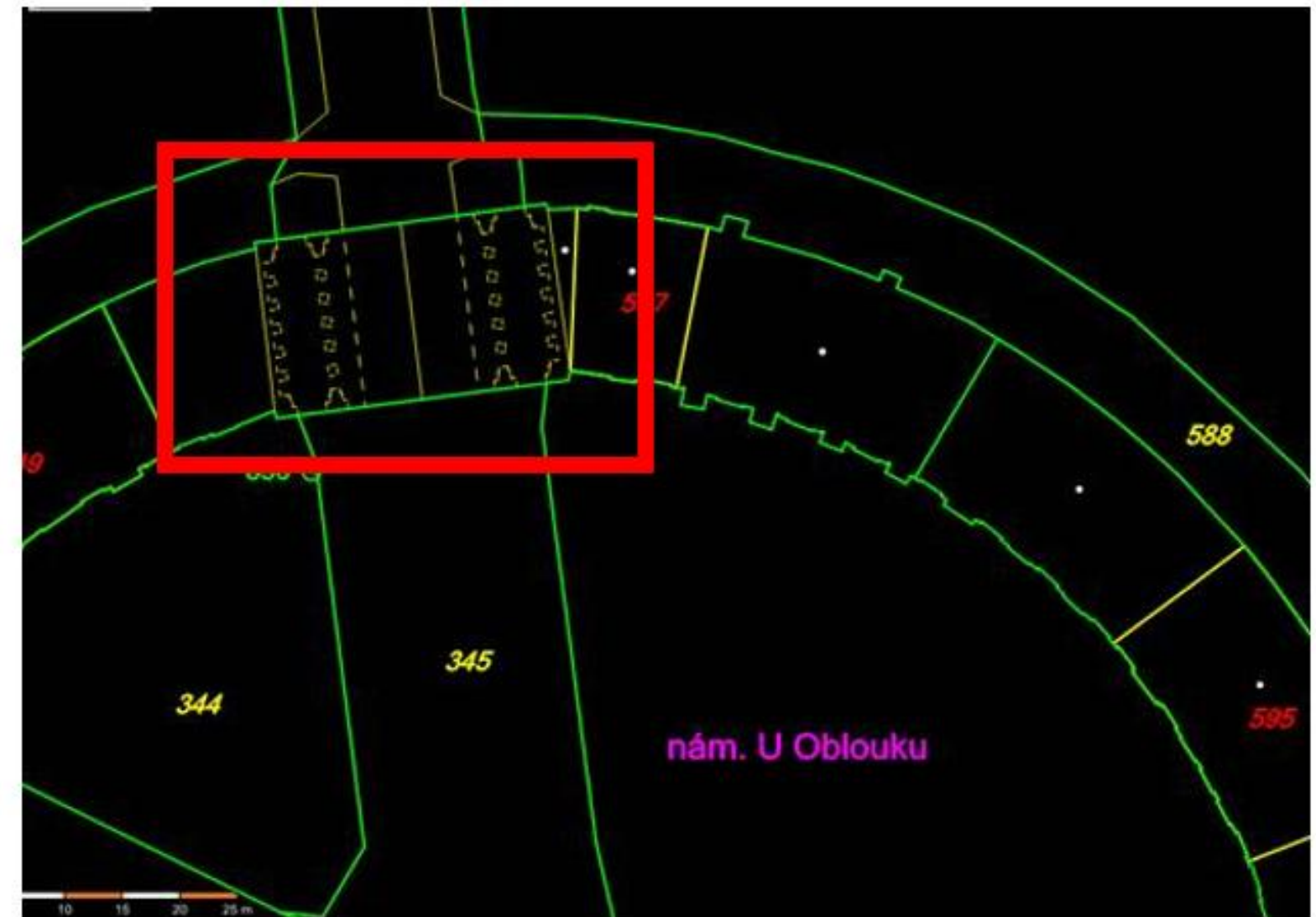


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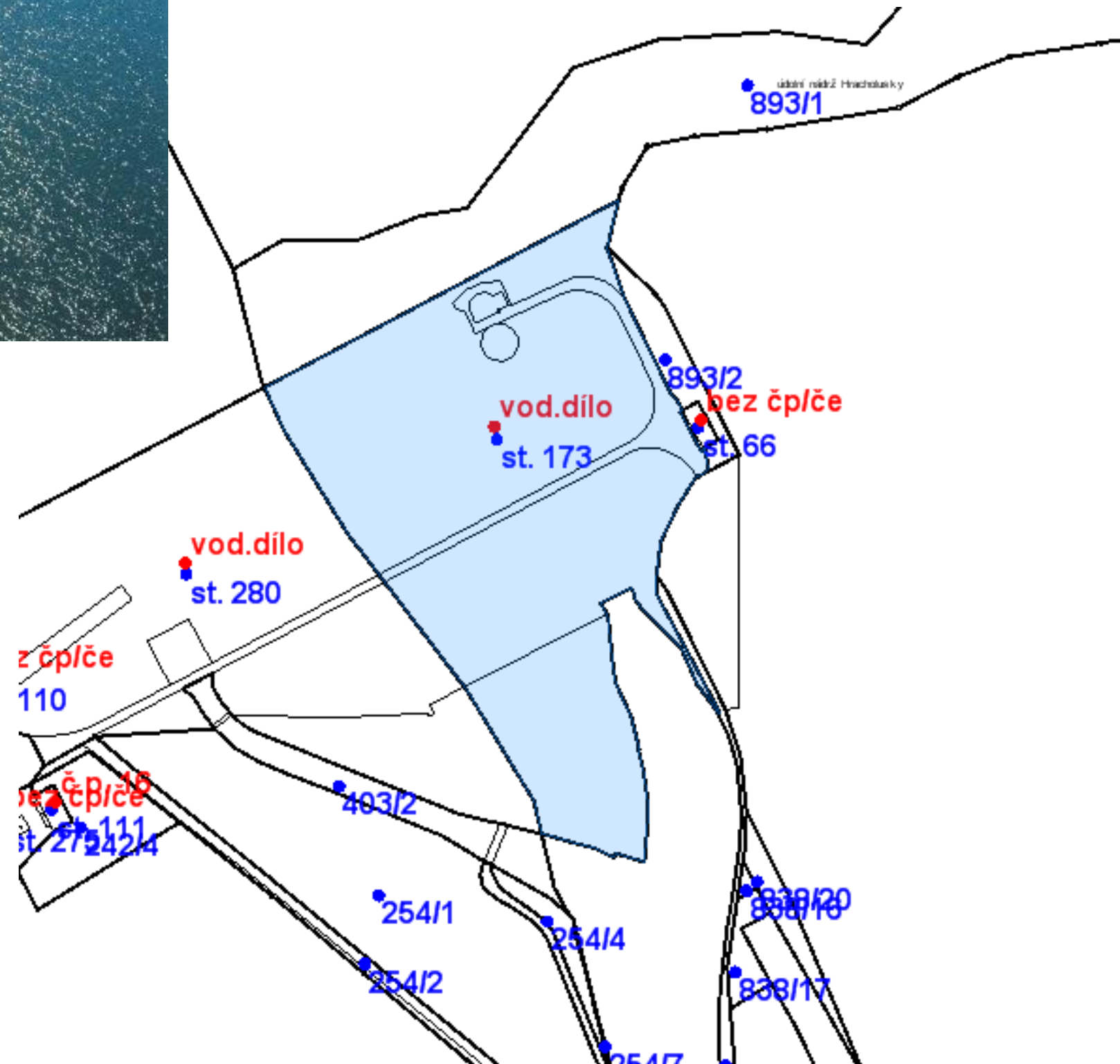
3D Cadastre – main ideas

- Cities **grow vertically** as well as horizontally.
- The cadastre will need to **update to the third dimension**.

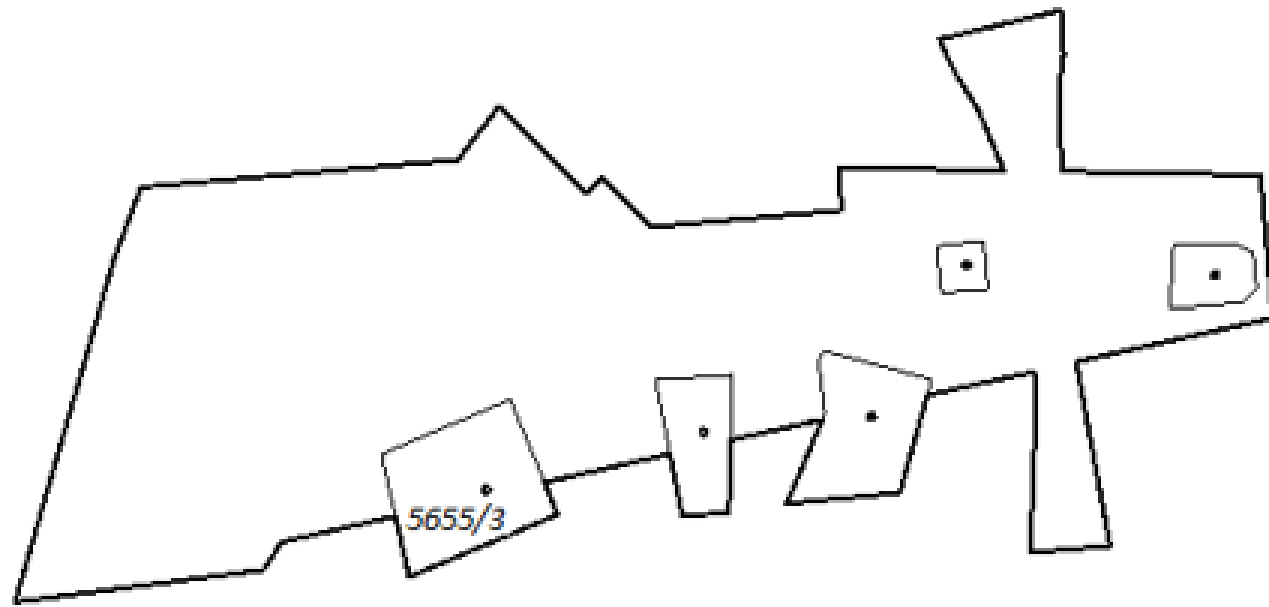






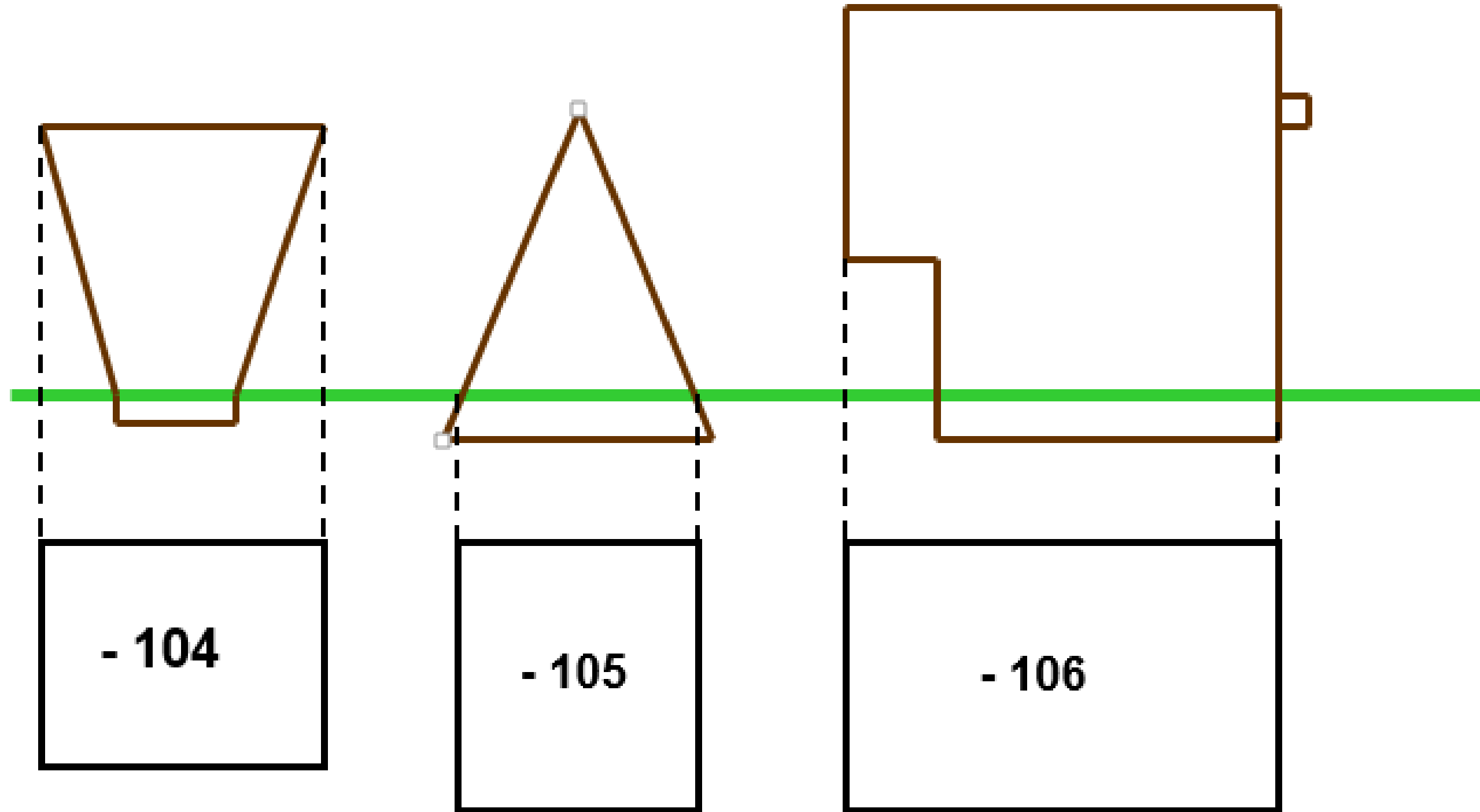


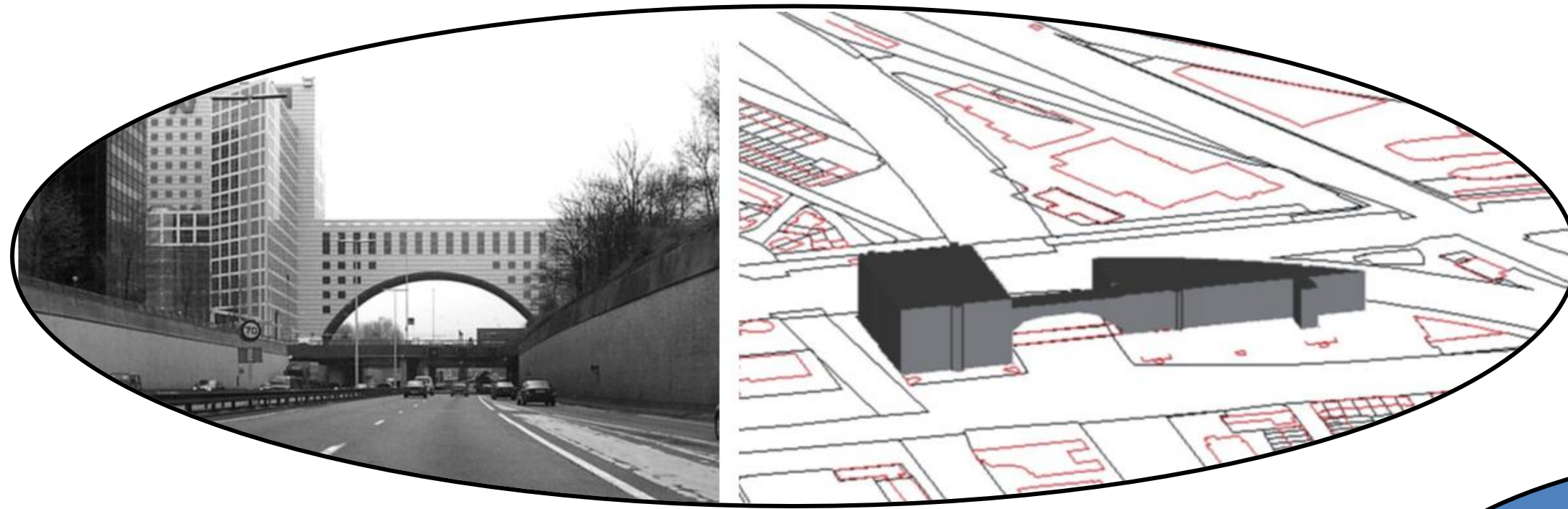
What building is located on parcel no. 5655/3?



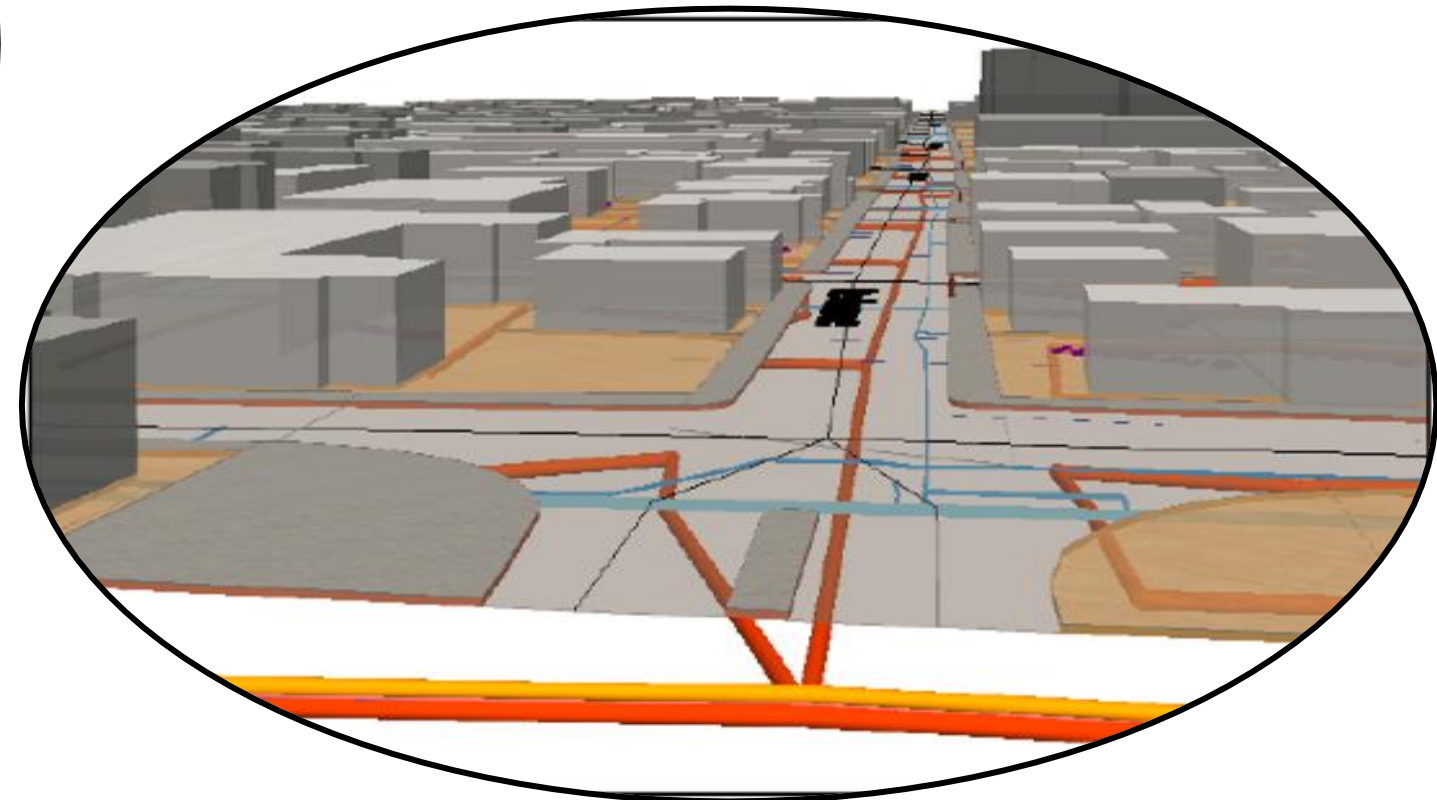
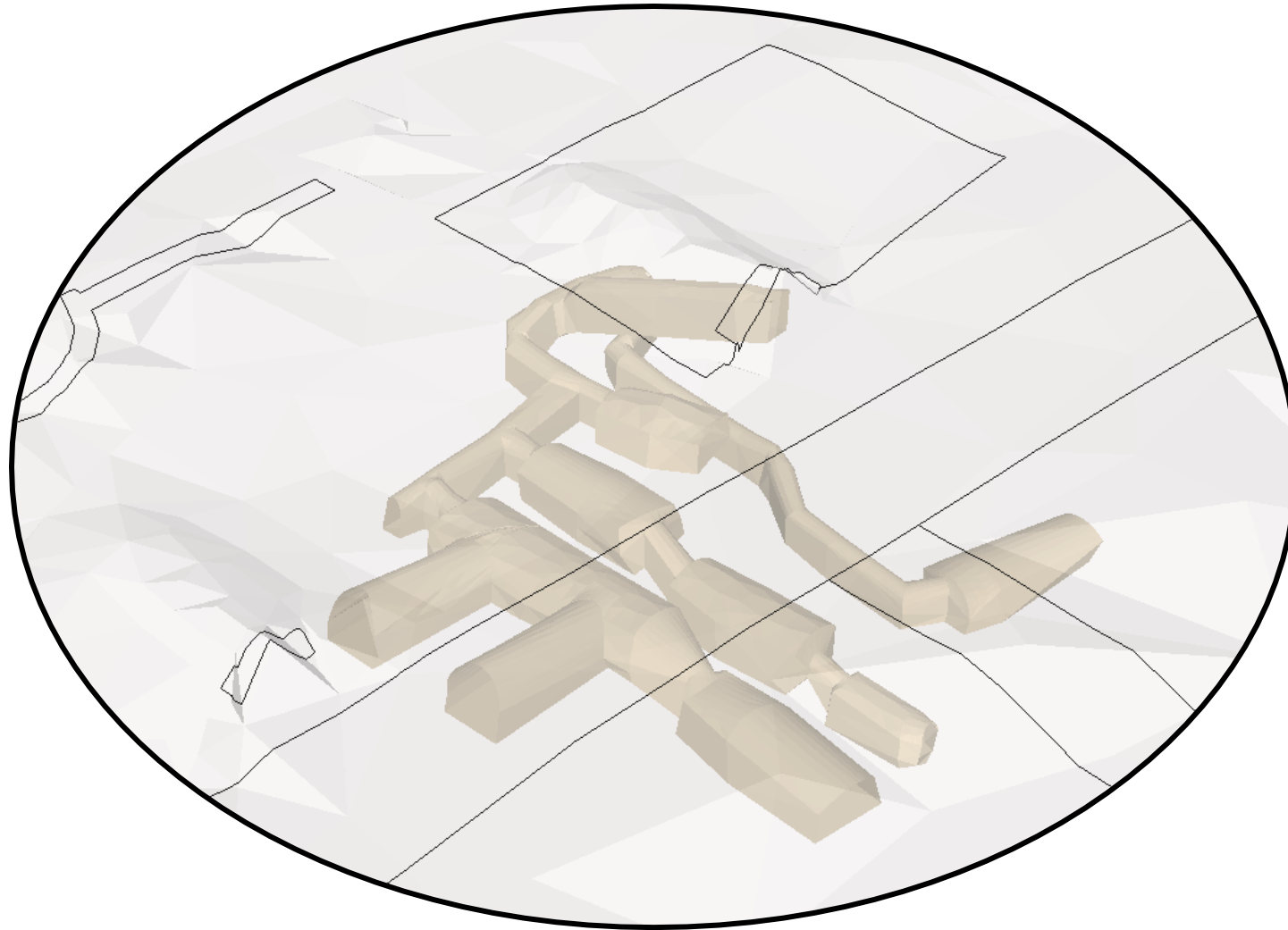


Untypical (3D) buildings in 2D cadastre (Czechia)



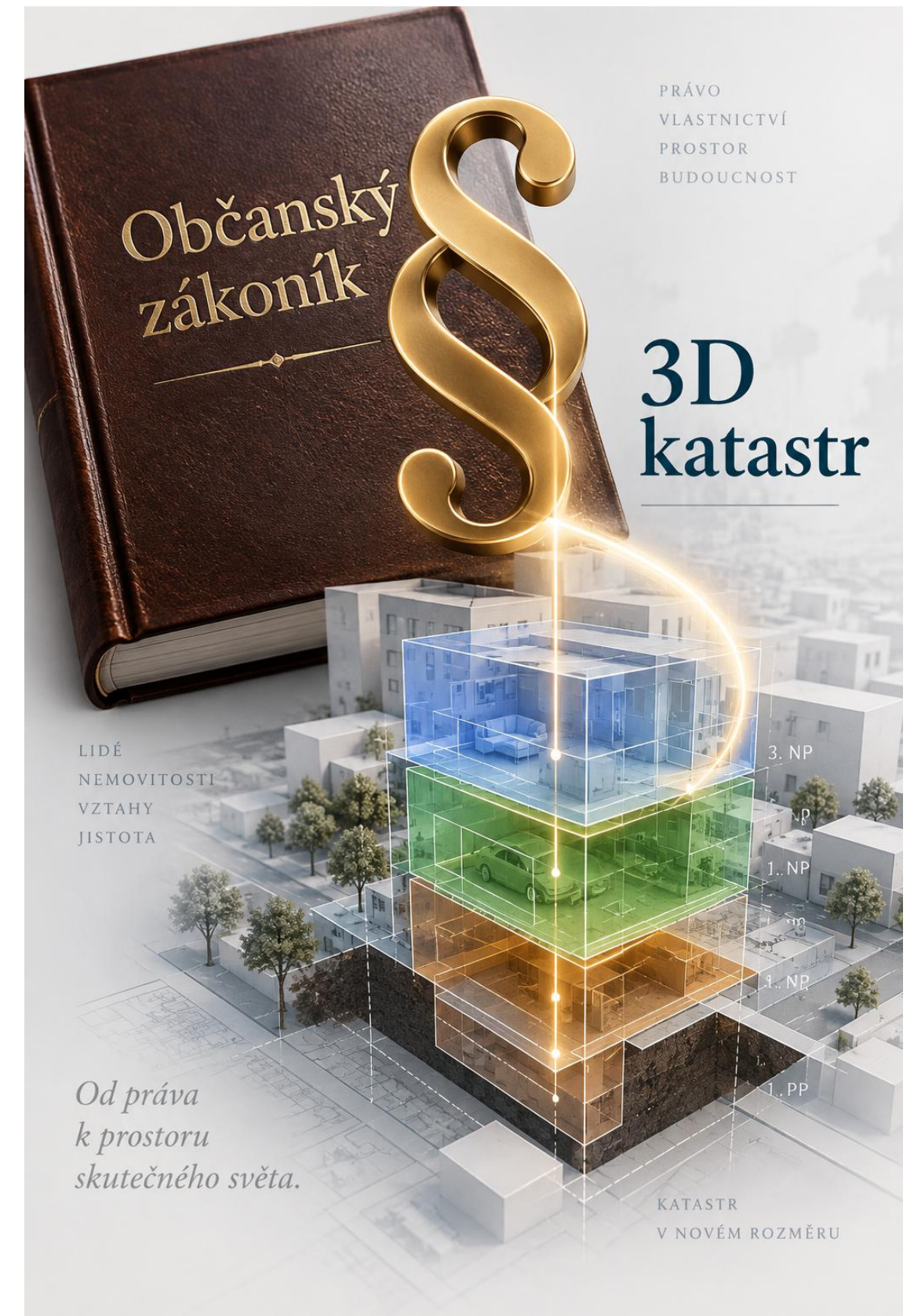


3D Cadastre



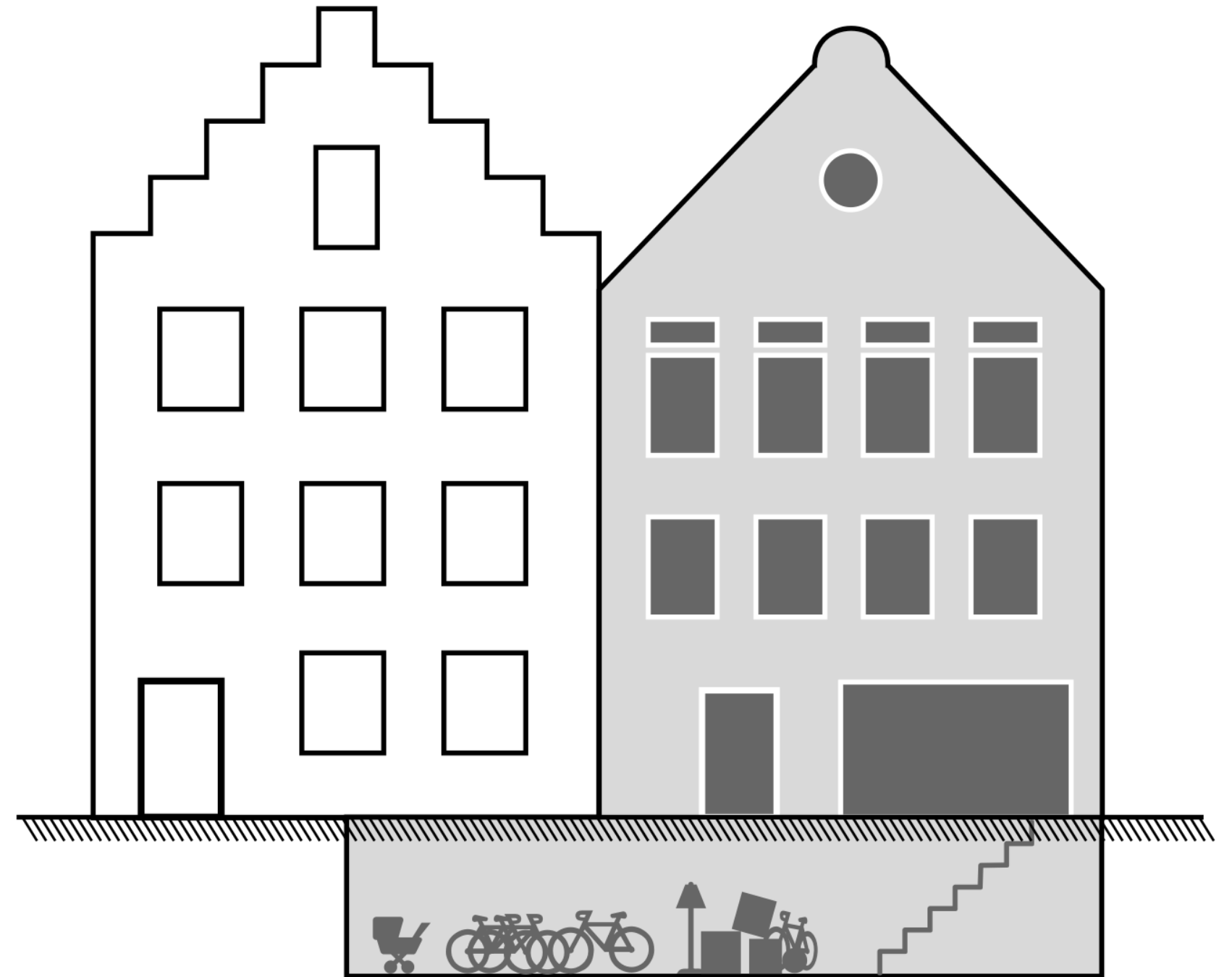
Civil Code (2012)

- § 506: The land includes the **SPACE above and below the surface**, structures erected on the land, and other installations (hereinafter referred to as the "structure")—with the exception of temporary structures—including items embedded in the land or fixed to the walls.
- § 1023/1: The owner of the land must tolerate the use of the **SPACE above and below** the land if there is a significant reason for doing so and if it occurs in such a manner that the owner has no reasonable grounds to object.



Civil Code (2012)

- § 498: Real estates are land and **UNDERGROUND STRUCTURES** with a distinct purpose, as well as rights in rem relating to them.
- § 506: If an **UNDERGROUND STRUCTURES** is not real estate, it forms part of the land, even if it extends beneath another parcel of land.



3D katastr nemovitostí

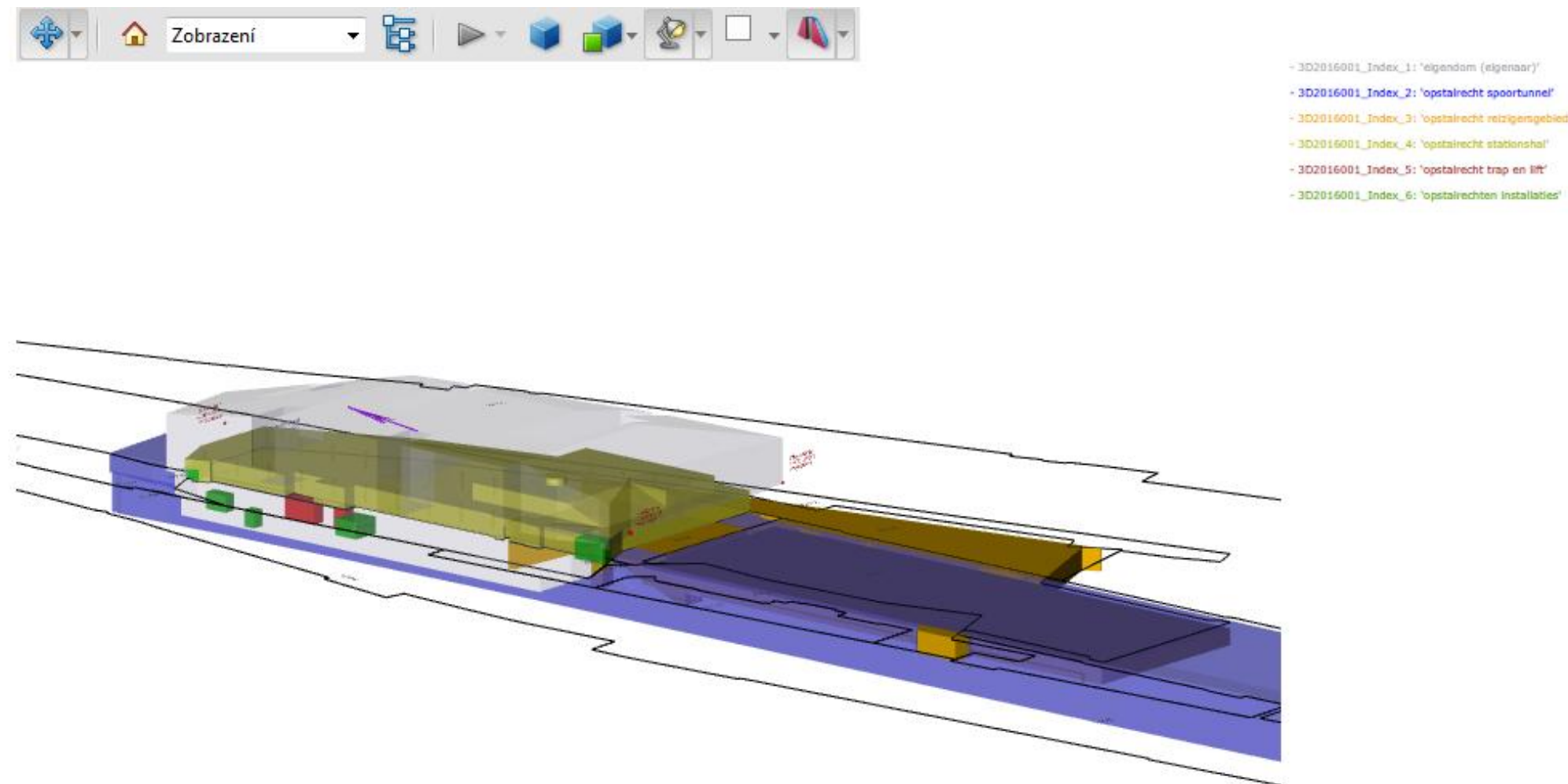
3D cadastre:

- It records **space as a separate entity** within the real estate cadastre system in the form of **explicitly expressed 3D spatial units**.
- Registration of rights to 3D spatial units offers **unambiguous spatial localisation**.

(autor of the definition: K. Janečka, University of West Bohemia in Pilsen)

Trends in the field of 3D cadastre

- **The Netherlands: First 3D spatial units in digital form entered into the cadastre**
- New legislation towards 3D cadastre (Australia, Sweden, ...)
- National research projects on 3D cadastre (New Zealand, Switzerland, ...)
- Using BIM as a source of 3D geodata for 3D cadastre (Singapore, Shenzhen,...)



BIM & 3D cadastre in the Czech Republic

- In 2017, the Czech government approved the **Strategy of BIM implementation in the Czech Republic**
- **Measurement: Usage of BIM models for 3D cadastre**
- Czech Office for Surveying, Mapping and Cadastre (ČÚZK) is obliged to ensure the **reusing of the BIM data for 3D cadastre purposes**
- In 2024: The Strategy updated



**Aktualizace Koncepce
zavádění metody BIM
v České republice**

červen 2024

Připravilo Ministerstvo průmyslu a obchodu České republiky

Schváleno vládou České republiky dne 24. července 2024

ISO 19152:2012 Land Administration Domain Model (LADM)

- Developed under ISO/TC 211
- **Defines a conceptual data model for 3D cadastre**
- Exists also in Czech version (**ČSN EN ISO 19152 Model Domény Správa Pozemků**)
- Enables **3D spatial units (3D parcels)**
 - Janečka, K., Rak, P. (2014). *3D spatial units – considering the ISO 19152 (LADM) as a base for 3D Cadastre.*
- Enables creation of **national profiles**
 - Janečka, K., Souček, P. (2017) *A Country Profile of the Czech Republic Based on an LADM for the Development of a 3D Cadastre.*



Article

A Country Profile of the Czech Republic Based on an LADM for the Development of a 3D Cadastre

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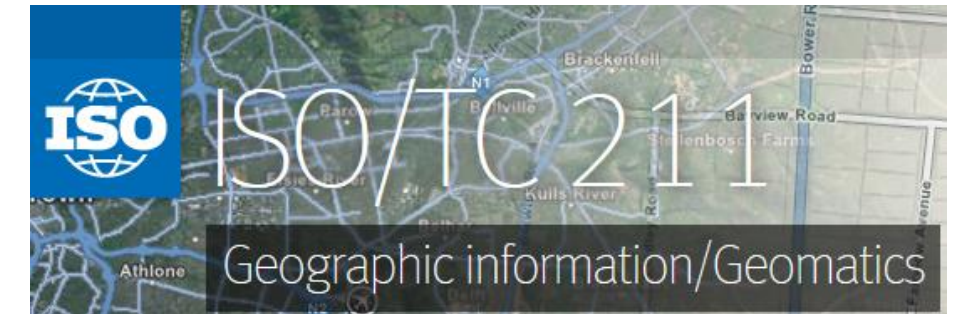
Academic Editors: Peter van Oosterom and Wolfgang Kainz

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Abstract: The paper presents a country profile for the cadastre of the Czech Republic based on the ISO 19152:2012 Land Administration Domain Model (LADM). The proposed profile consists of both legal and spatial components and represents an important driving force with which to develop a 3D cadastre for the Czech Republic, which can guide the Strategy for the Development of the

Revision of ISO 19152:2012 → ISO 19152:2025

- Under ISO/TC 211
- Now multipart standard (6 parts)
- Technical annexes: **BIM/IFC <-> ISO 19152 mapping**
- **Emphasis on geometric modelling of 3D spatial units (*3D parcels*)**
- Best Practices for creating national profiles
 - based on Kalogianni, Janečka et al. (2021) **Methodology for the development of LADM country profiles.**



Methodology for the development of LADM country profiles

Eftychia Kalogianni^{a,*}, Karel Janečka^b, Mohsen Kalantari^c, Efi Dimopoulou^d,
Jarosław Bydłosz^e, Aleksandra Radulović^f, Nikola Vučić^g, Dubravka Sladić^f, Miro Govedarica^f,
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FIG publication – Best practises 3D Cadastres

Chapter 1: Legal Foundations

Chapter 2: Initial Registration of 3D Parcels

Chapter 3: 3D Cadastral Information Modelling

Chapter 4: 3D Spatial DBMS for 3D Cadastre

Chapter 5: 3D Cadastre Visualization



Summary

- Existing 2D representation is no longer sufficient in many cases
- There is an international standard ISO 19152:2025
- ISO 19152:2025 supports 3D spatial units
- BIM can/must serve as a source of data for 3D cadastre
- **Janečka, K. (2020) Selected Technical Aspects of the 3D Cadastre in the Context of the International Standard ISO 19152:2012 (*Habilitation thesis*).**

3D Cadastre

Clear spatial localisation of property rights



LEGAL CERTAINTY
OF PROPERTY RIGHTS



EFFICIENT
USE OF SPACE



SUSTAINABLE
URBAN DEVELOPMENT



BETTER DECISIONS
FOR FUTURE GENERATIONS



3D cadastre opens new opportunities

THANK YOU FOR YOUR ATTENTION

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