

Enabling users to see inside buildings with Spain's new 3D cadastral viewer

Europegraphics Members Case Studies Webinar
September 14, 2023

Fernando Serrano / Javier Luque
Spanish General Directorate of Cadastre



Today's topics:

- Introduction
- Brief history of Spanish Cadastre
- The 3rd dimension in Spanish Cadastre
- 3D Cadastral Viewer





Introduction – Spanish Cadastre

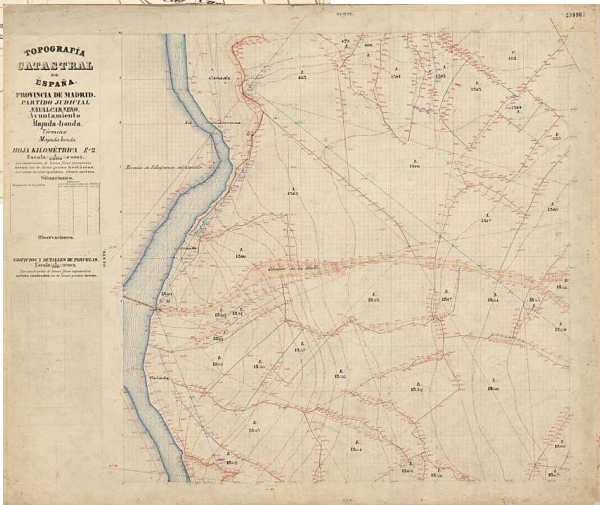
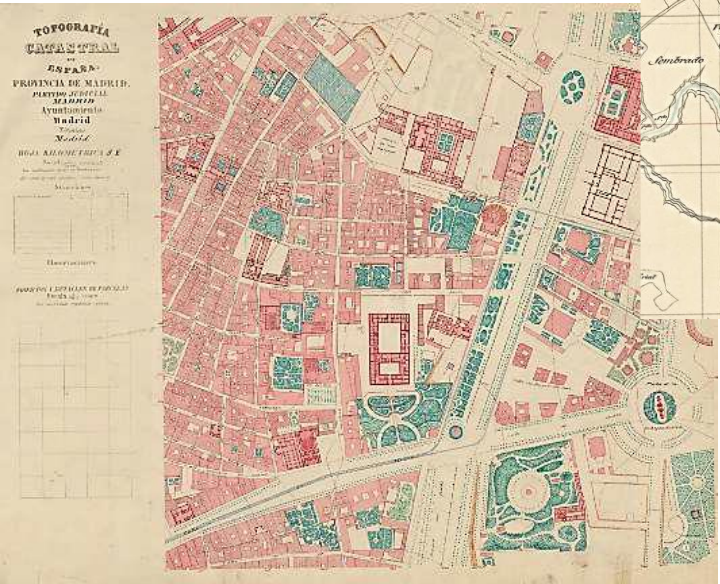
“The Real Estate Cadastre is an **administrative registry** dependent on the Ministry of Finance and Civil Service in which **rural, urban and special characteristics real estate is described.**”

“The cadastral description of real estate will include its **physical, economic and legal characteristics**, among which will be the location and cadastral reference, surface, use or destination, type of crop, quality of the constructions, **graphic representation**, market reference value, cadastral value and cadastral title-owner, with their tax identification number or, where appropriate, foreigner identity number. “



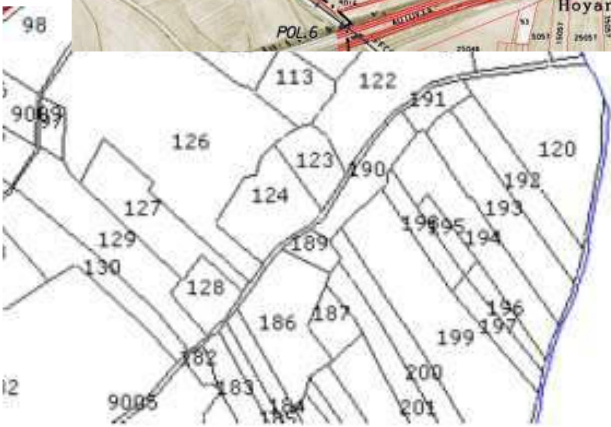
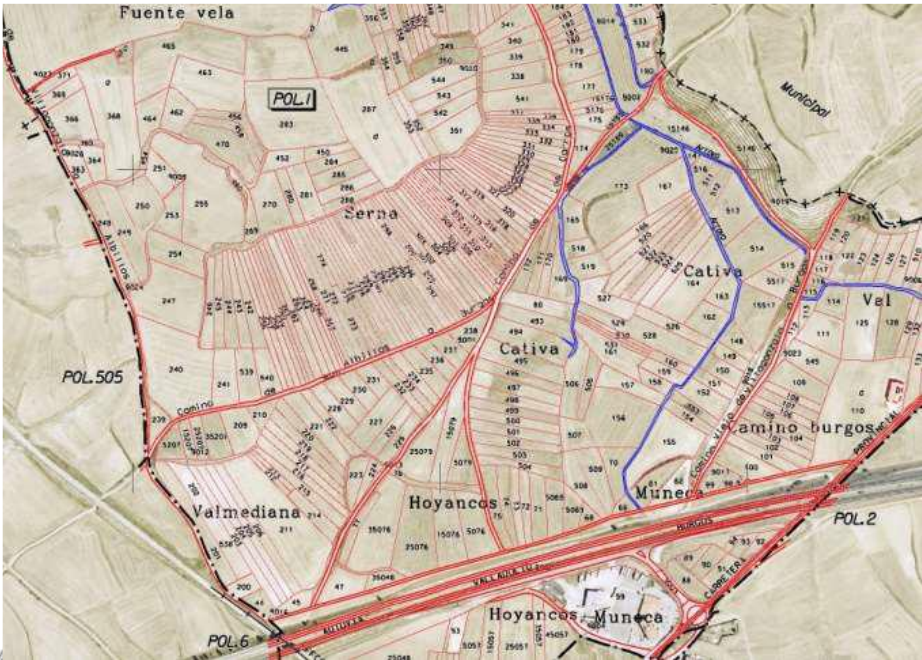
Brief history of Spanish Cadastre

- Cadastral maps works started in second half of 19th century
 - Beginning: based on crops areas
 - Later: detailed map. Two aims: national base map and cadastral map with fiscal purpose
 - Low coverage reached
- During the 20th century, large advance: cartographic works with different technology, accuracy and scale.
- Urban cartography by surveying or photogrammetric stereo compilation from 1970 onwards.

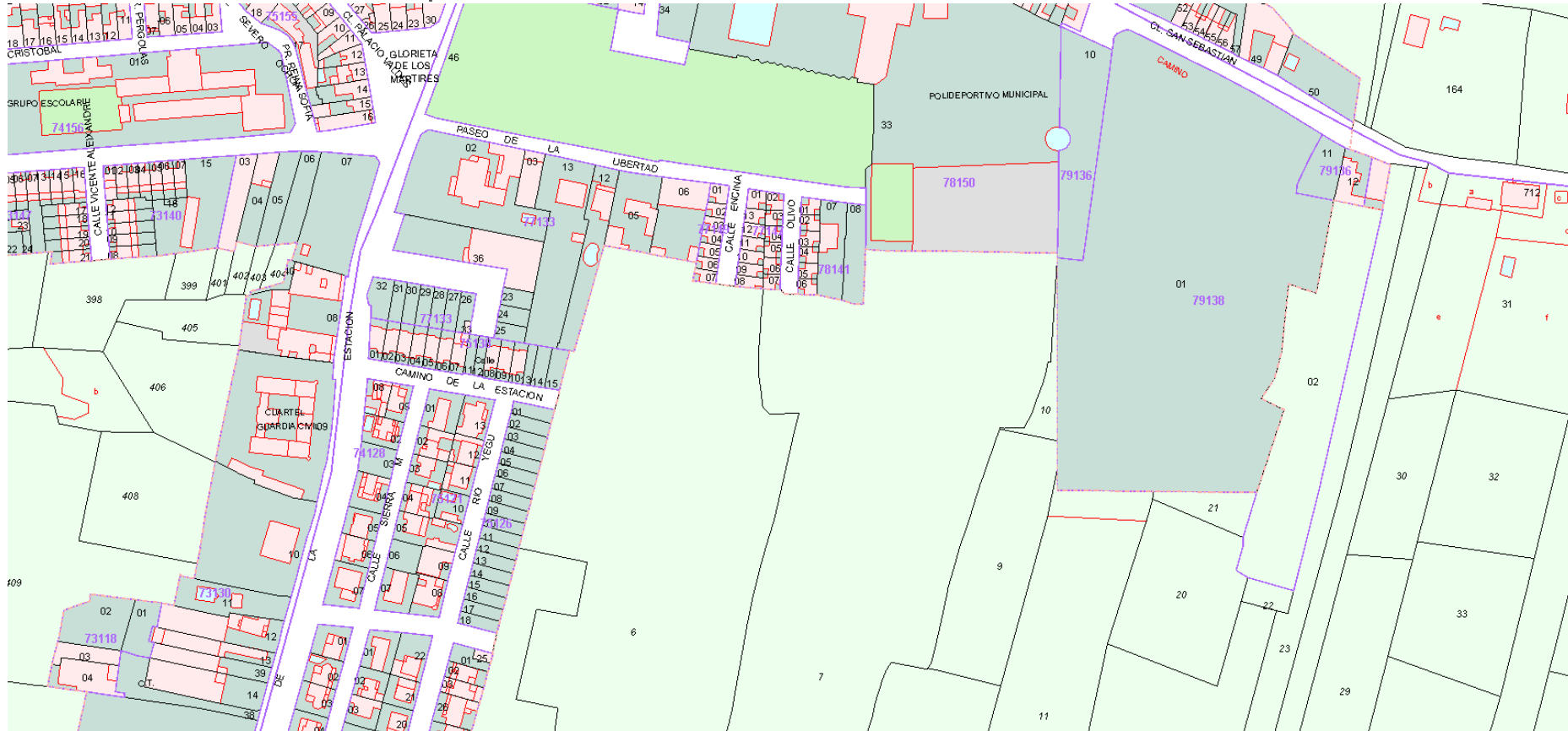


Brief history of Spanish Cadastre

- Definitive impulse of the current Cadastre at the end of the 80's: works of updating, improvement or even creation of Cadastre. Orthophoto, data collection and mapping, where necessary (urban development, real estate boom, CAP).
- All the information in digital format and available on the web site at the beginning of the 2000's.
- Continuous provision of new products and services for use and download: WMS, WFS, INSPIRE, free download data sets.
- And, now ...

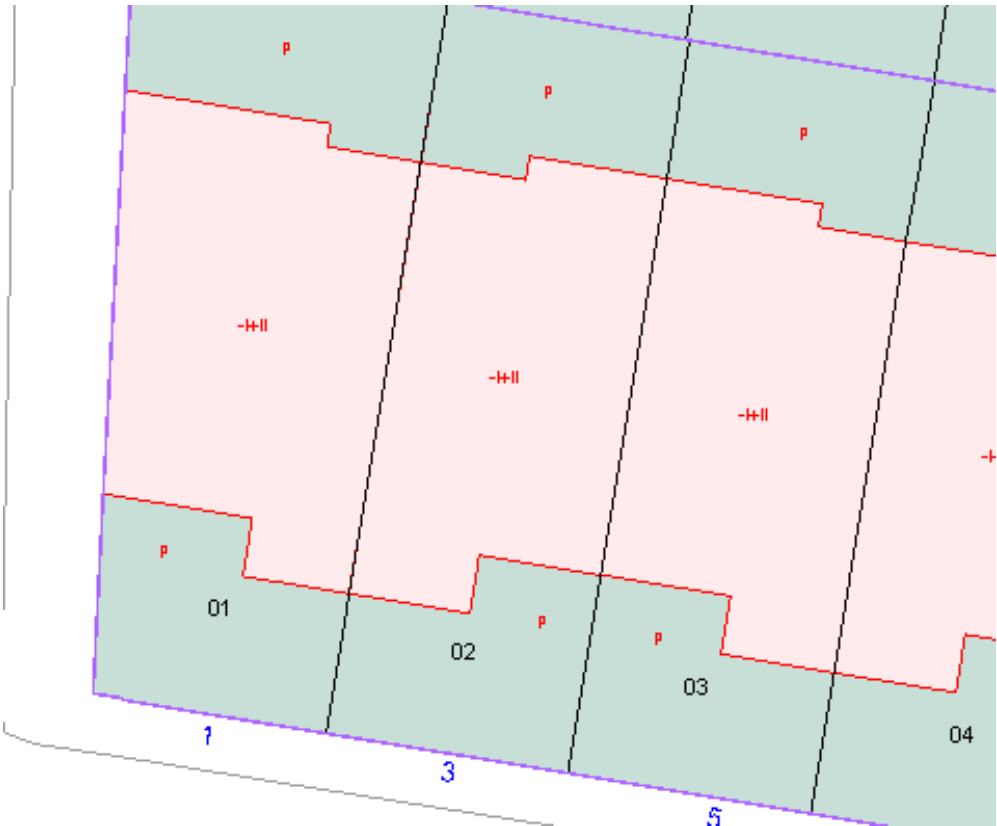


- Spanish cadastral maps are 2D...



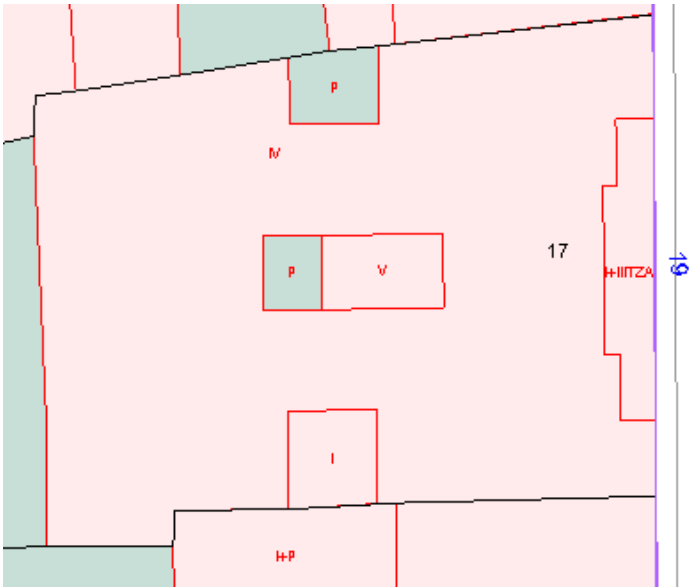
The 3rd dimension in Spanish Cadastre

- ... but zooming in, you start to find some 3d info about buildings



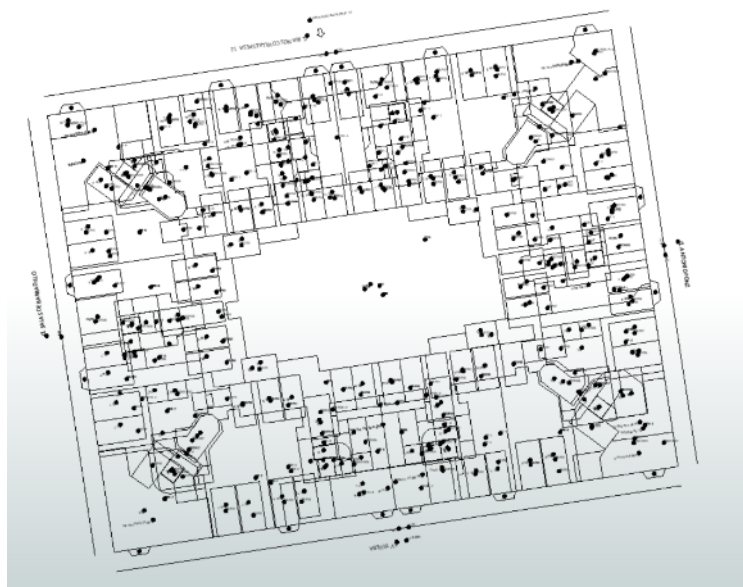
Number of floors of the building indicated with roman numbers:

- I+II: One floor below ground level and 2 floors above ground level
- IV: 4 floors above ground level
- V: 5 floors above ground level
- ...



The 3rd dimension in Spanish Cadastre

- Internal division of real estate is stored using a combination of files that is called “FXCC” in Spanish Cadastre.
 - CAD file for geometry: DXF
 - TXT file for characteristics: CAT (Column-aligned text)



Full format specifications are available at:

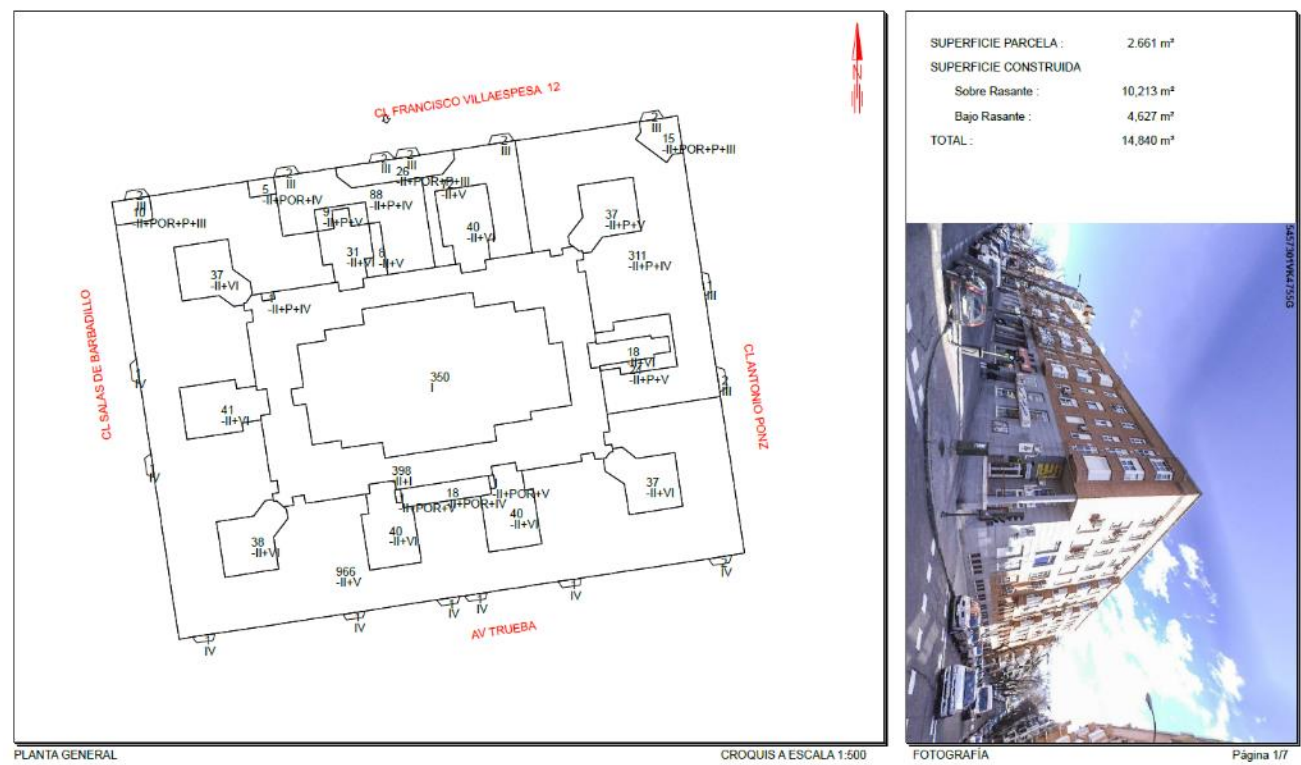
https://www.catastro.minhap.es/documentos/formatos_intercambio/formato_fxcc.pdf

1	280
2	Madrid
3	900
4	MADRID
5	02343
6	CL
7	FRANCISCO VILLAESPESA
8	0012
9	
10	5457301
11	VK4755G
12	DR
13	
14	
15	IZ
16	
17	
18	FD
19	
20	
21	0000
22	18/12/12
23	0002661
24	0010213
25	0004627
26	0014840
27	06
28	01
29	PLANTA -1
30	83
31	AAP01
32	0000012
33	AAP02
34	0000013
35	AAP03
36	0000010
37	AAP04
38	0000013
39	AAP05
40	0000013
41	AAP06
42	0000010



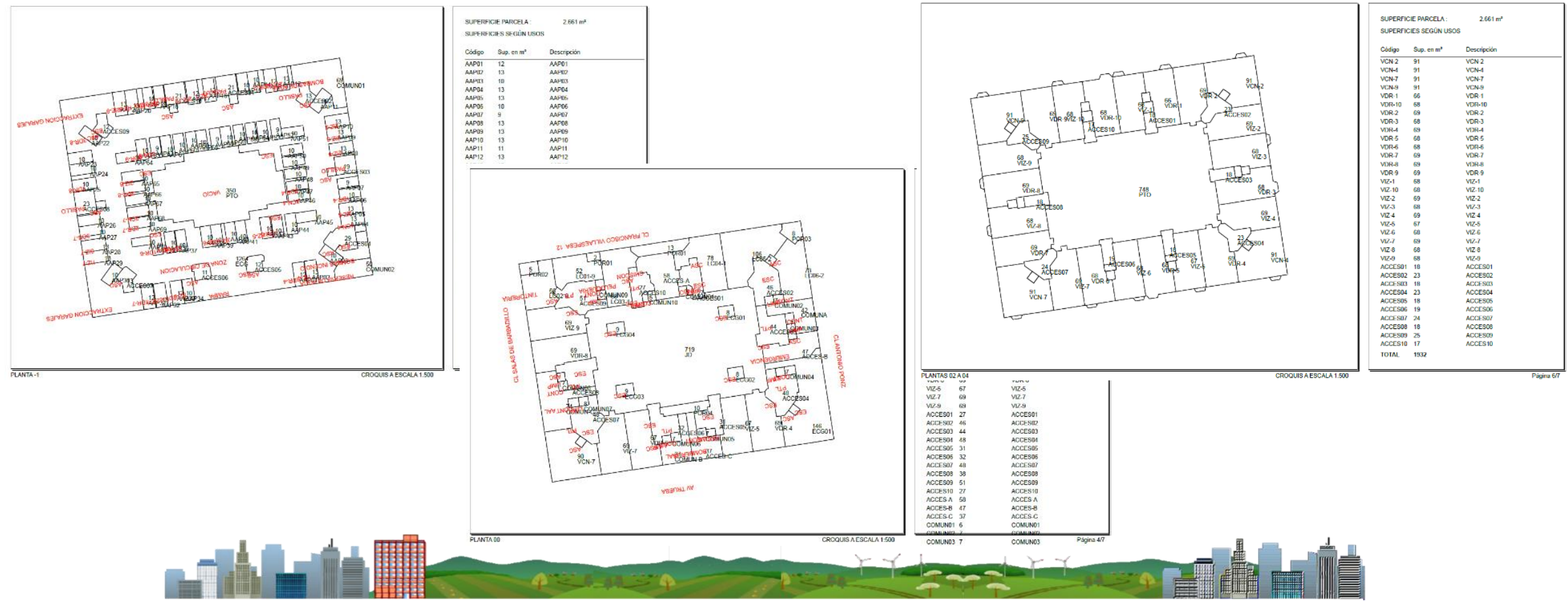
The 3rd dimension in Spanish Cadastre

- Building blueprint stored in FXCC is also provided as PDF, easier to be managed by citizens.



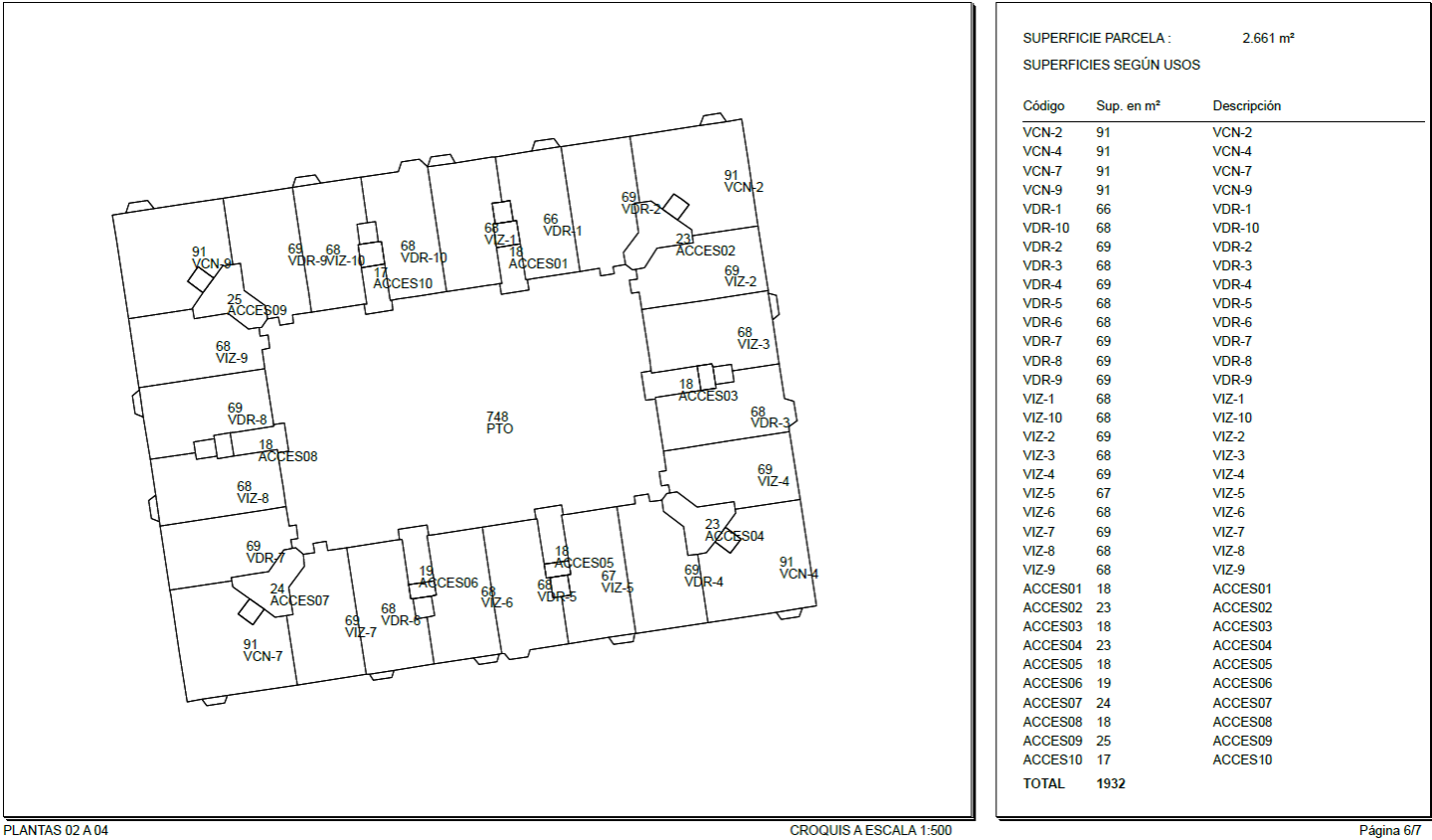
The 3rd dimension in Spanish Cadastre

- General plot + per floor blueprint



The 3rd dimension in Spanish Cadastre

- Blueprint contains contour of apartments, not its interior distribution of rooms.



The 3rd dimension in Spanish Cadastre

- From all this information, a 3D model (KML) can be exported to be viewed in Google Earth.
- 3D model is created using a 3 m height per floor.

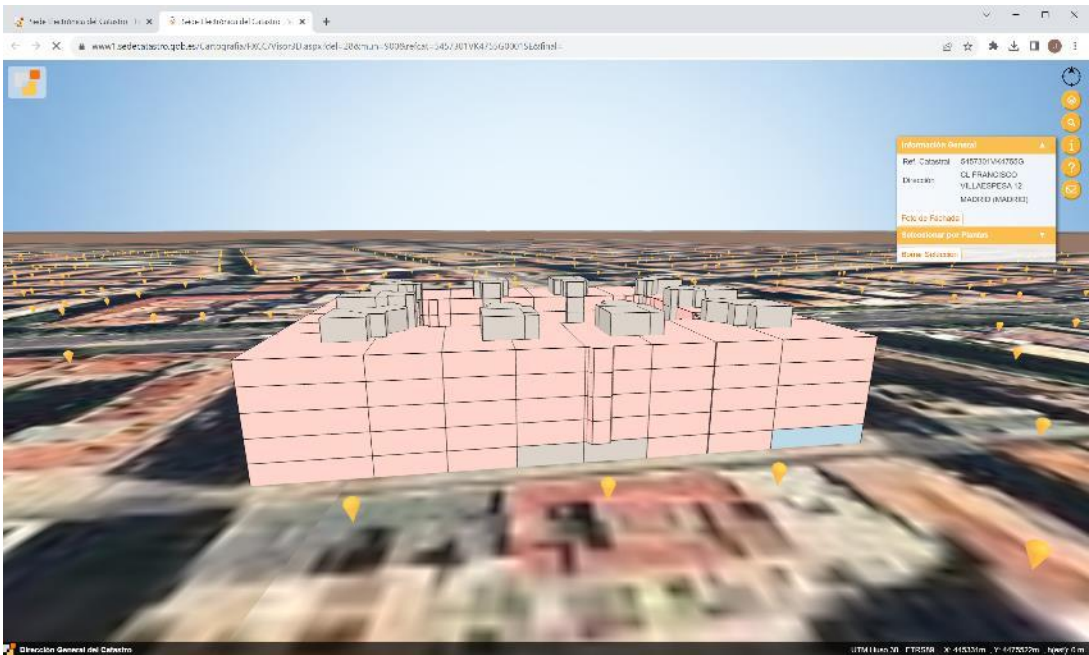


- User installation of proprietary software is required.
- Limitations in the representation of the buildings, few alternatives in the customization of the view.



3D Cadastral Viewer

- New way to access information about buildings, without requiring external applications.
- Fully integrated in Spanish Cadastre’s Electronic Office and Site and cadastral map viewer.



- It can be viewed in any web browser with internet access, without the need for any installation.
- Completely customized viewer design to adapt to the needs of cadastral information consumers:
 - Expand and order the relevant information of the building.
 - Possibility of representation and visualization of floors below ground.
 - Different base maps, with the possibility of applying transparency on them.
 - Connection to other Cadastre services:
 - Addresses
 - Buildings



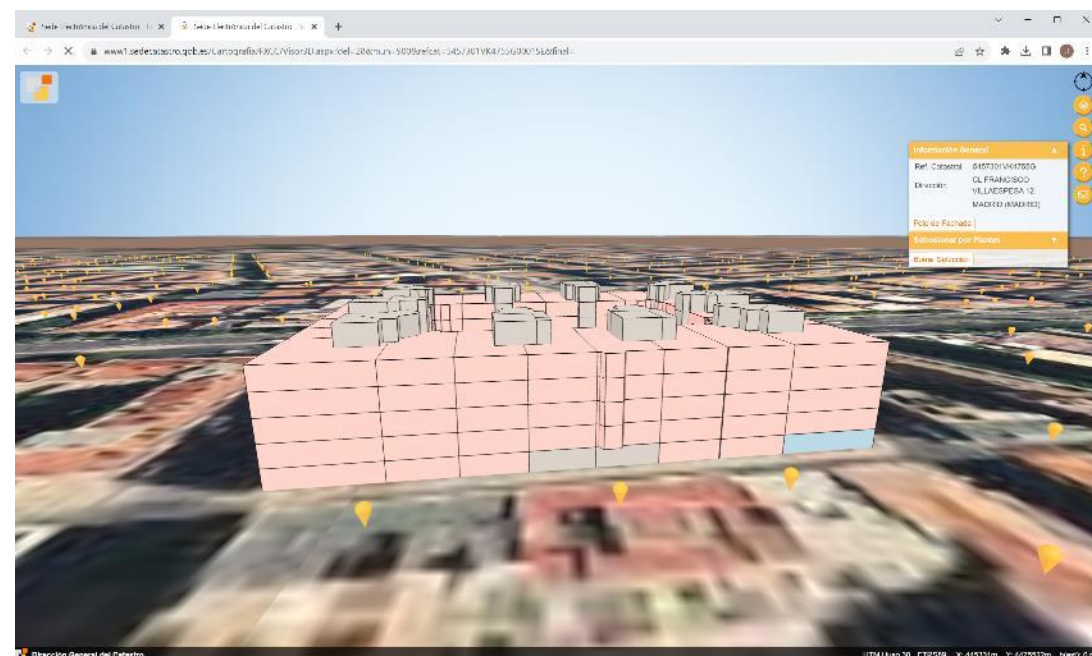
3D Cadastral Viewer

• TECHNOLOGIES:

- WebGL: 2D and 3D rendering API in web pages.
 - Use the HTML <Canvas>
 - OpenGL standard
 - Low level API → high effort
- THREE.js: WebGL-based abstraction
- JavaScript, HTML, CSS

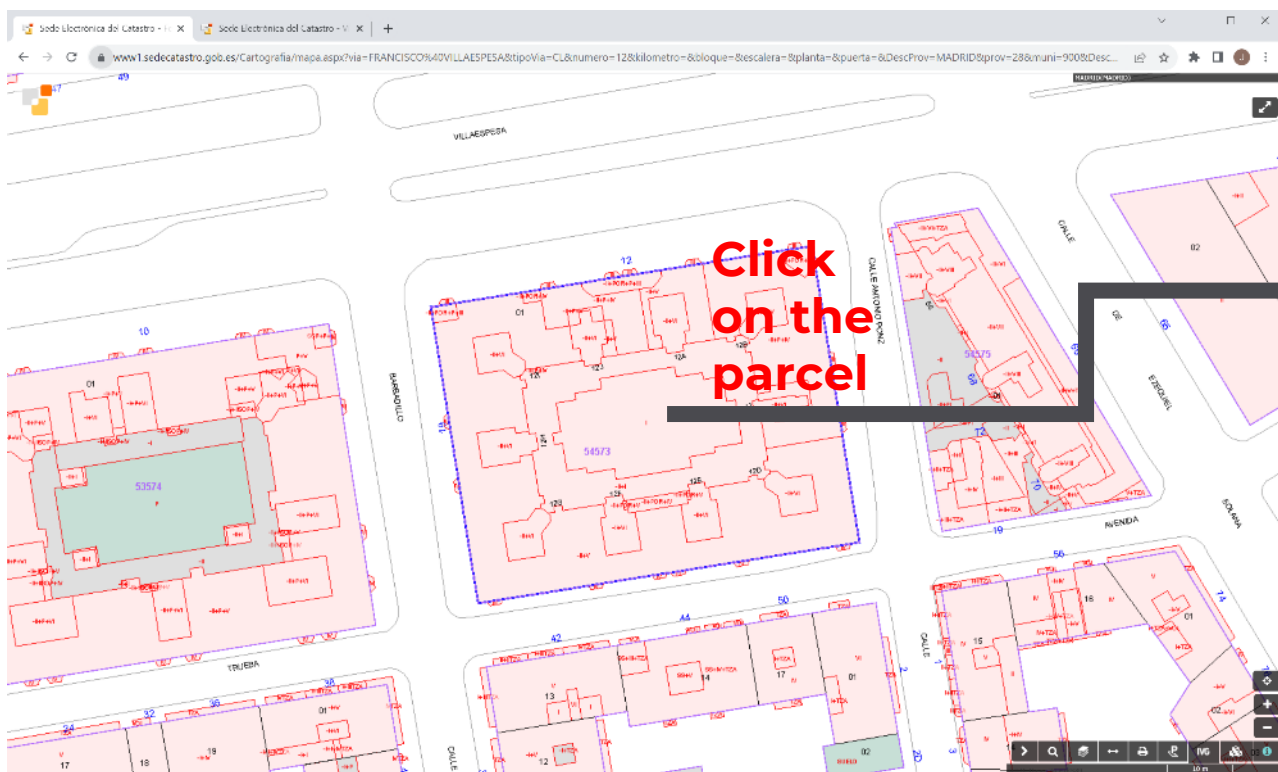
• INSPIRE SERVICES:

- Based on OGC standards
- Map services (WMS and WMTS)
- Download Services (WFS)
- Coverage Services (WCS)



3D Cadastral Viewer

- How to get the 3D view?
- Directly from the map viewer in the Cadastre's Electronic Office.



Click on the parcel

Información de parcelas e inmuebles

Click on "3D"

PARCELA CATASTRAL 5457301VK4755G

Croquis

Fotografía fachada

Parcela con varios inmuebles (division horizontal)
CL FRANCISCO VILLAESPESA 12
MADRID (MADRID)
2.661 m²

Más información de la parcela

INFORMACIÓN DE LOS INMUEBLES

Excel

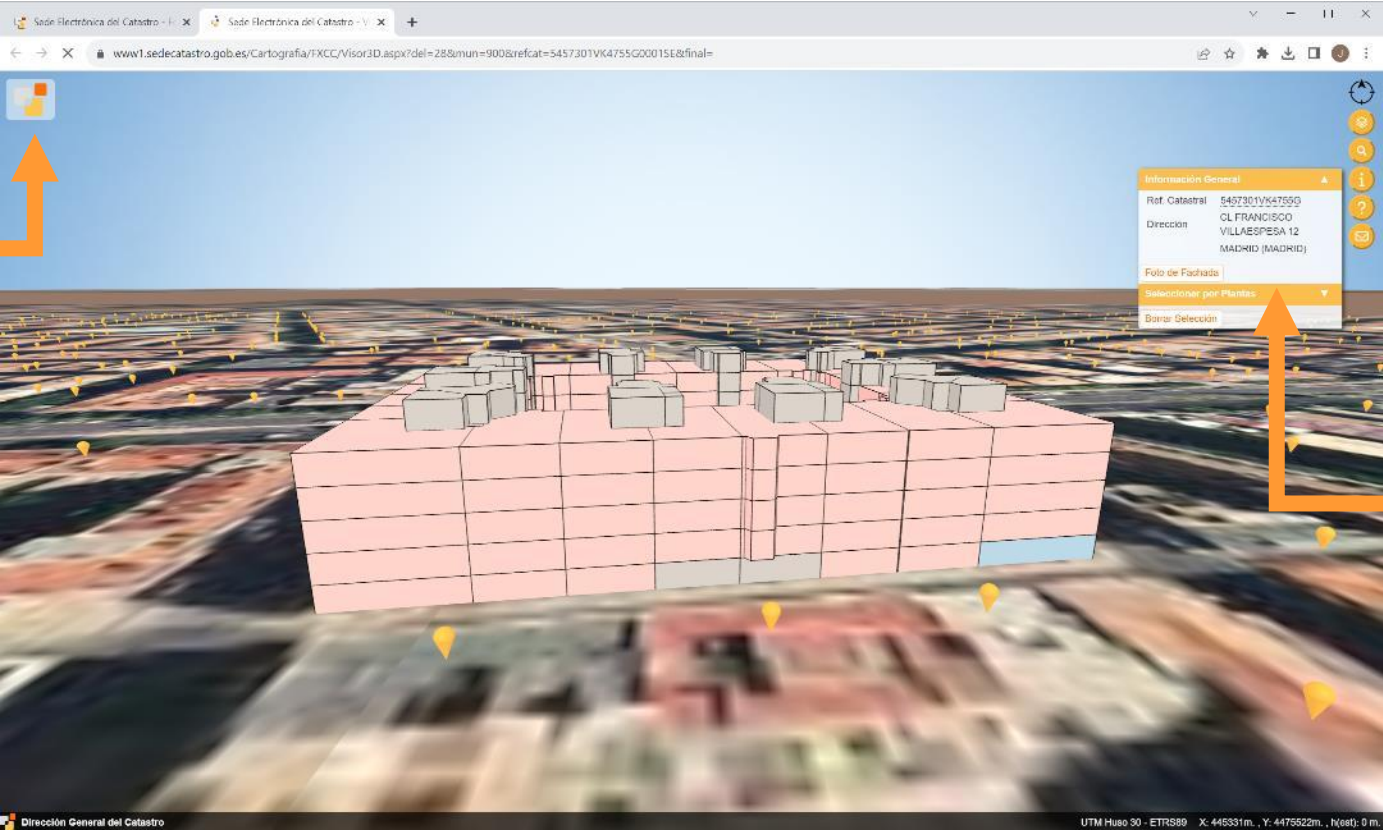
5457301VK4755G0001SE CL SALAS DE BARBADILLO 19 Es:9 Pl:00
Pt:01
Almacén-Estacionamiento | 130 m² | 0,76% | 1996



3D Cadastral Viewer

- 3D Viewer options

LINK TO MAIN PAGE



BUILDING DETAILS

REFERENCE SYSTEM AND CURSOR COORDINATES

3D Cadastral Viewer

- General view options
 - Base map
 - Transparency of base map
 - Addresses
 - Surrounding buildings
 - Shadows



- Building details:
 - General information
 - Selection by floor
 - Information per unit
 - Floor sketch



Información General

Ref. Cadastre: 04073015617050
 CL. FRANGOSCO
 VELLA ESPERA 17
 MONTEJO (A020100)

Punto de Rotación: Todos

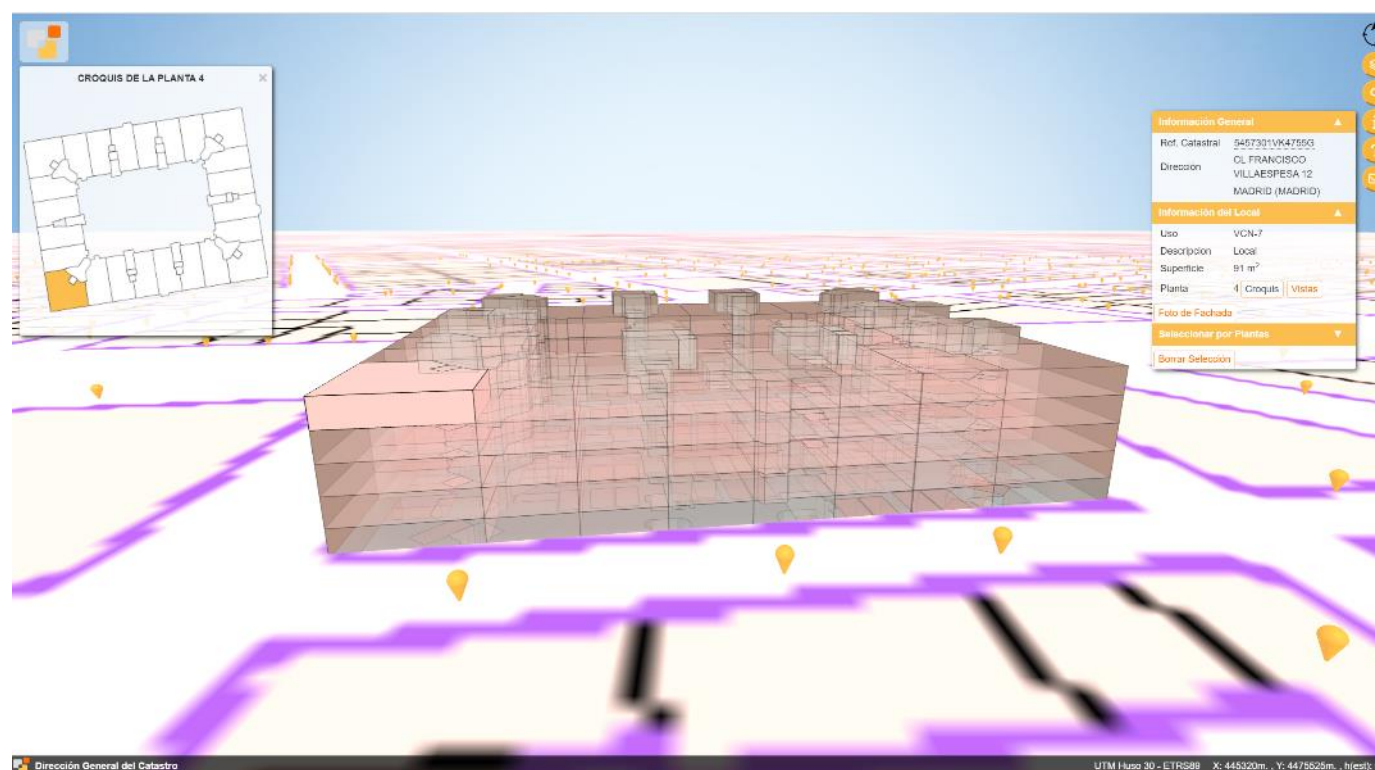
Selecciones por Puntos

Selección	Punto	Estado
Todos		<input checked="" type="checkbox"/>
-1		<input type="checkbox"/>
0M		<input type="checkbox"/>
1		<input type="checkbox"/>
2		<input type="checkbox"/>
3		<input checked="" type="checkbox"/>
4		<input type="checkbox"/>
5		<input type="checkbox"/>

Forma Selección:

3D Cadastral Viewer

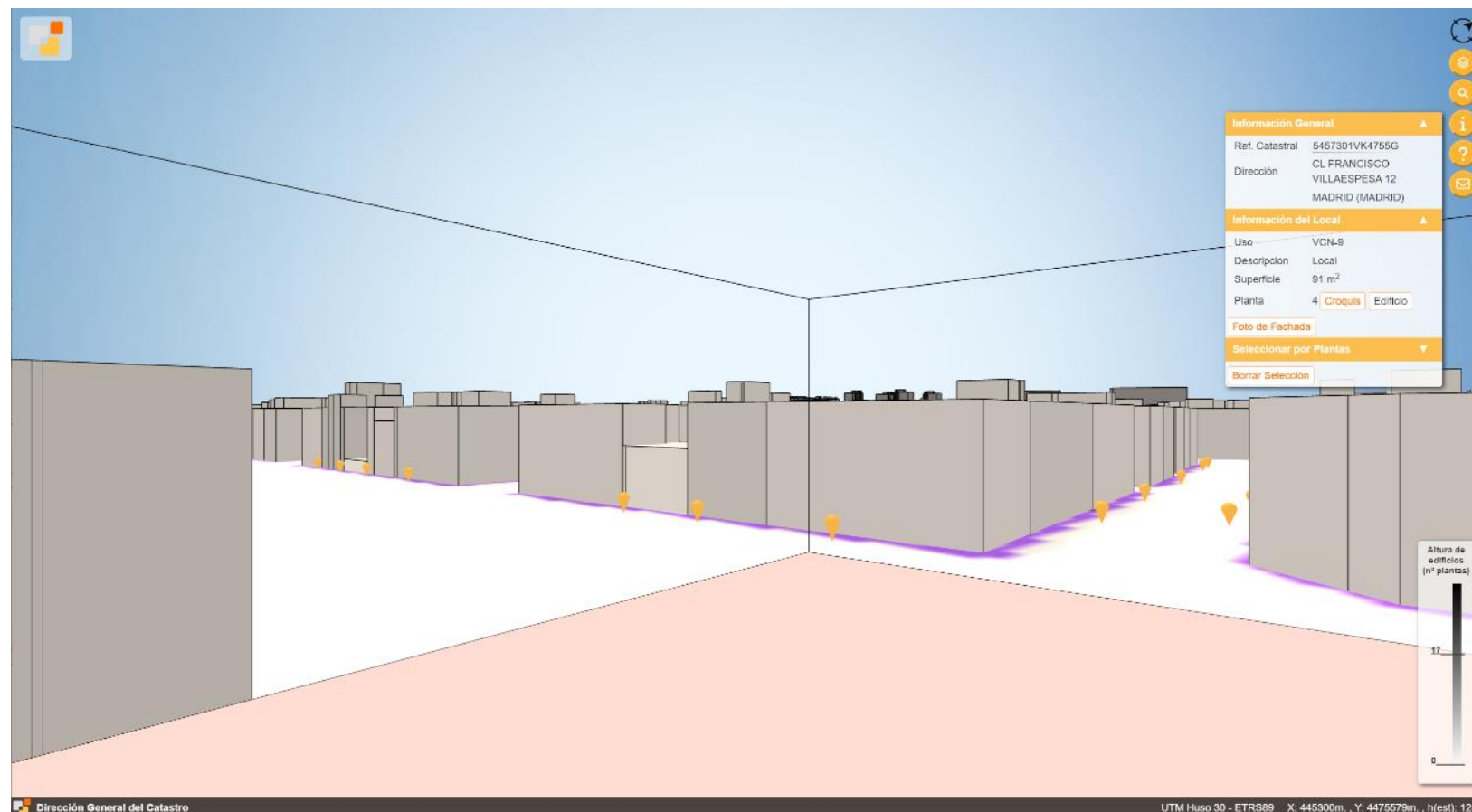
- Building details:
 - Selection of unit: allow access to unit information and floor sketch with location



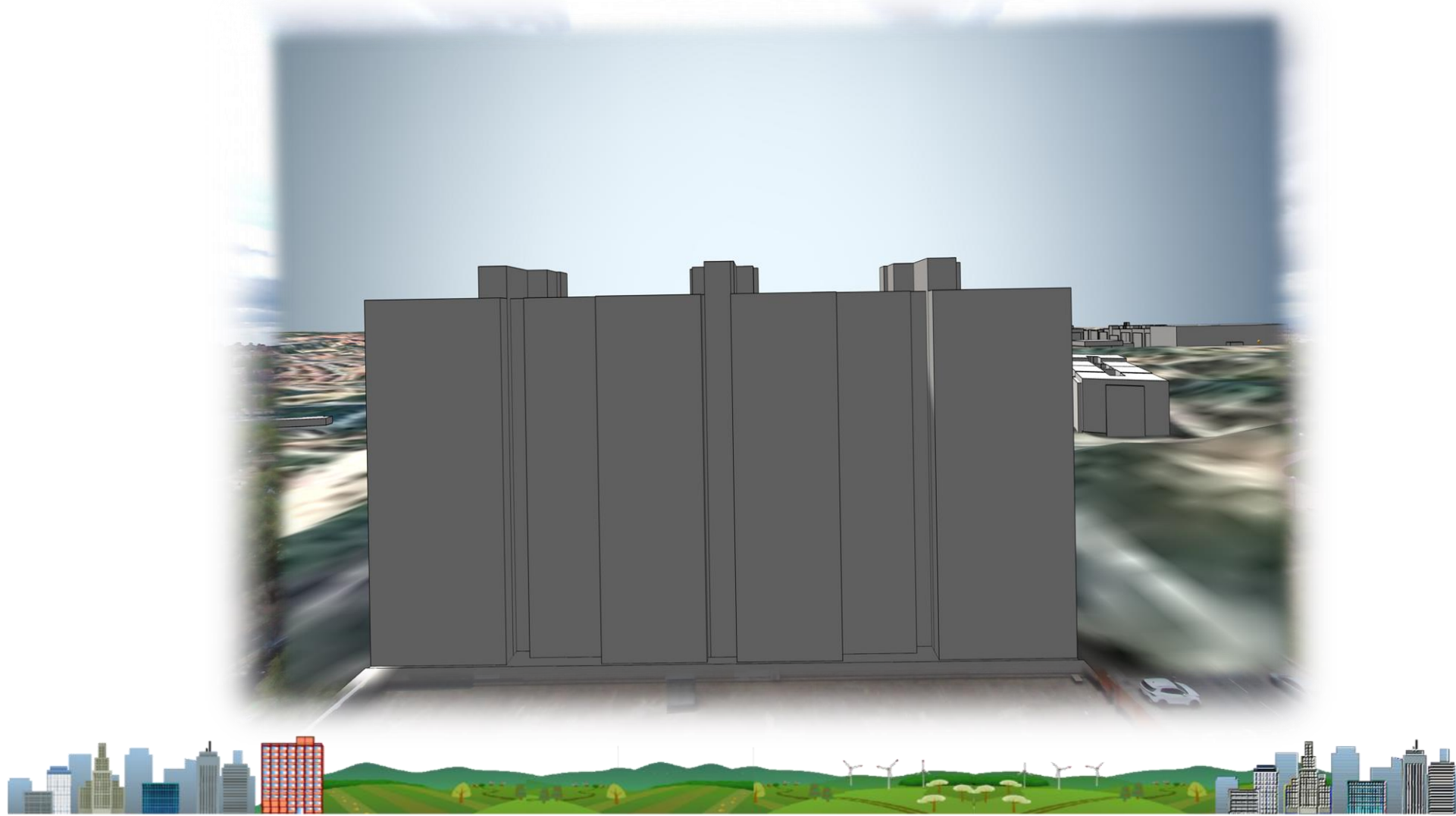
3D Cadastral Viewer

- ... and a new feature:

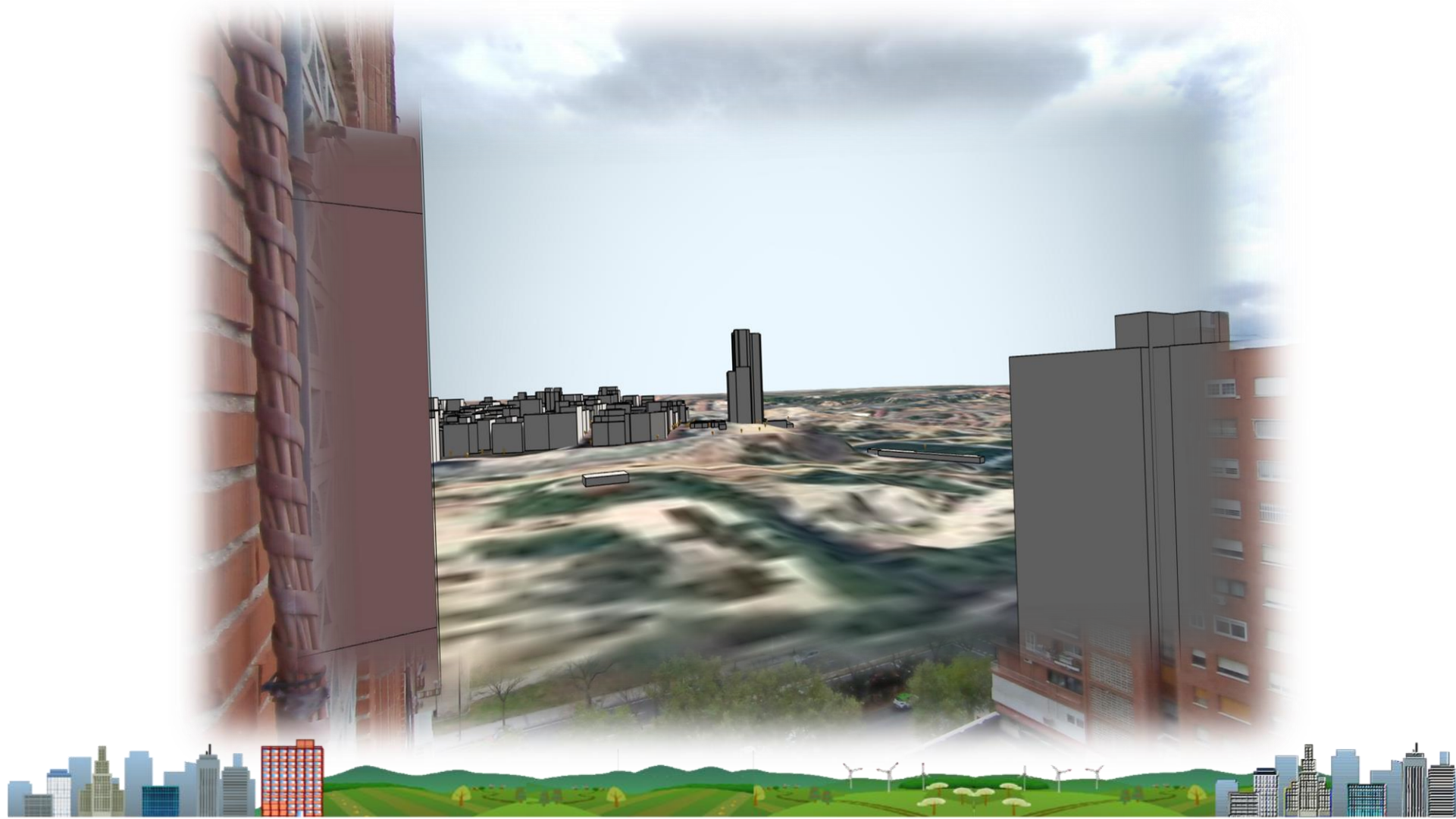
View point
from
the unit.



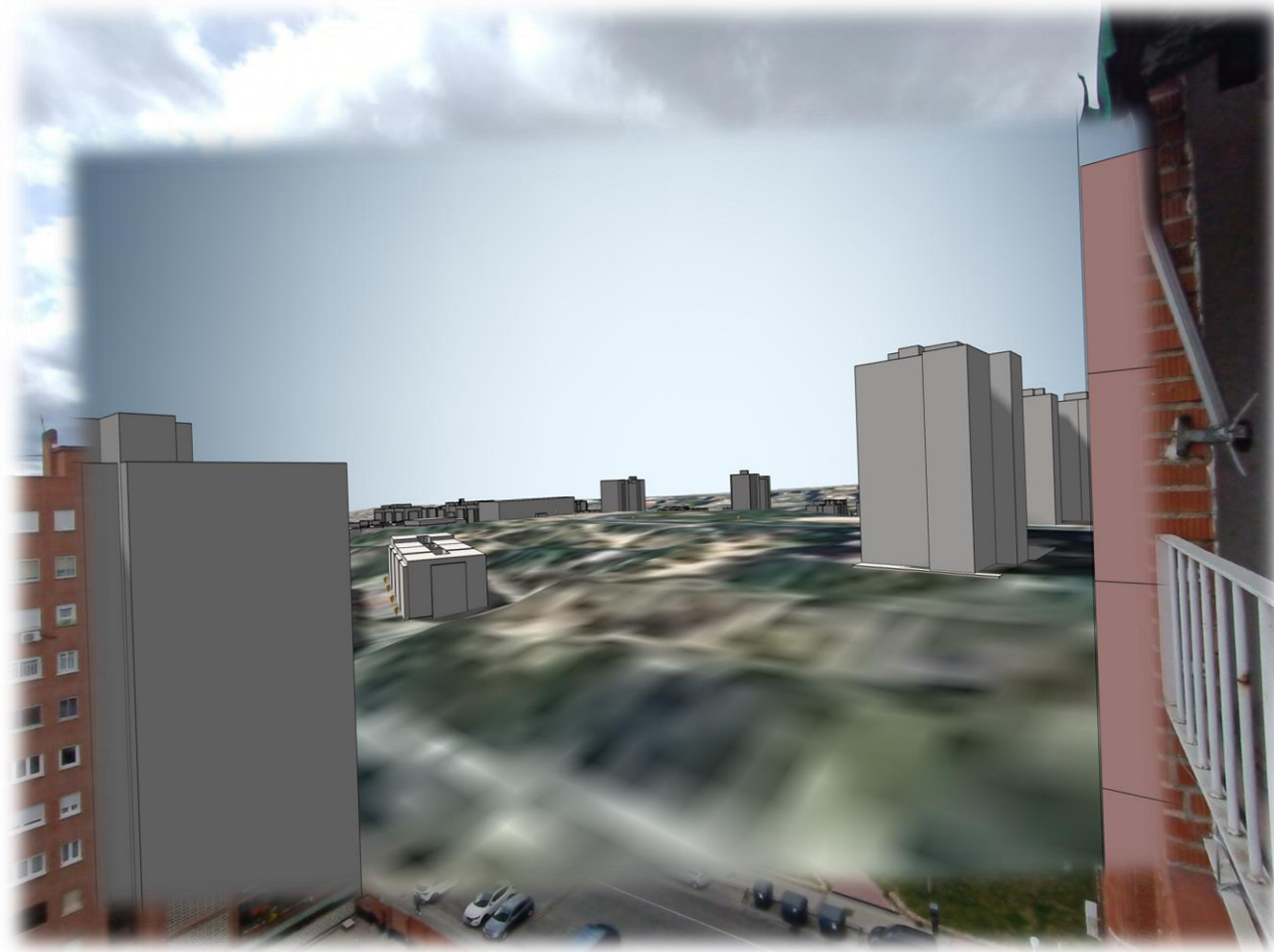
3D Cadastral Viewer



3D Cadastral Viewer



3D Cadastral Viewer





Many thanks for your attention!

Fernando Serrano

Fernando.serrano@catastro.hacienda.gob.es

Javier Luque

javier.luque@catastro.hacienda.gob.es

Spanish General Directorate of Cadastre



ENABLING USERS TO SEE INSIDE BUILDINGS WITH SPAIN'S NEW 3D CADASTRAL VIEWER
EUROGEOGRAPHICS - MEMBERS CASE STUDIES WEBINAR