



DEPARTMENT OF GEOMATICS ENGINEERING
GRADUATION - DESIGN PROJECT

DESIGN AND IMPLEMENTATION OF 3D ITU CAMPUS INFORMATION SYSTEM

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PRES

ESENTATION FLOW

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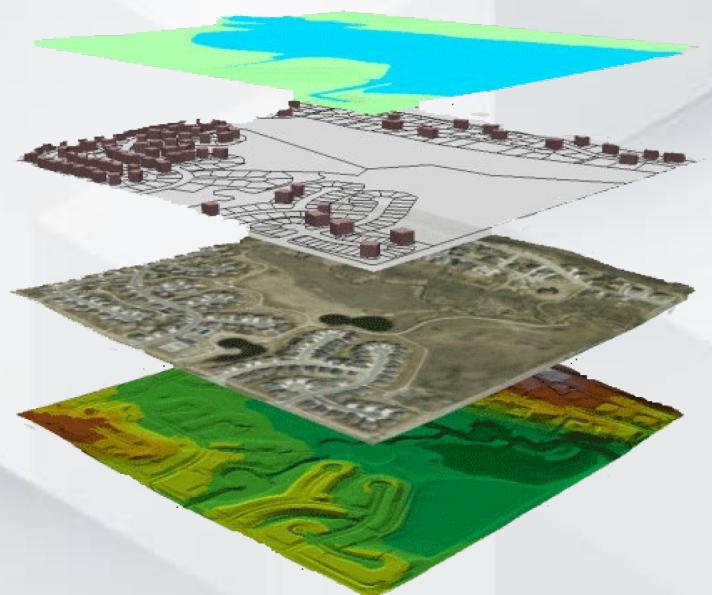
INTRODUCTION

The GIS made for universities is called the Campus Information System (CIS). CIS is a GIS designed for a specific purpose, created with the necessary software and hardware that appeal to a specific user group.

In this project, students, lecturers, visitors, and the administration of the college were selected as a specific group. As this 3D CIS, the service offered to the target group will also increase.

Target User Audience;

- ✓ University administrations,
- ✓ Students,
- ✓ Visitors from outside the university,
- ✓ University Staff need spatial informations.

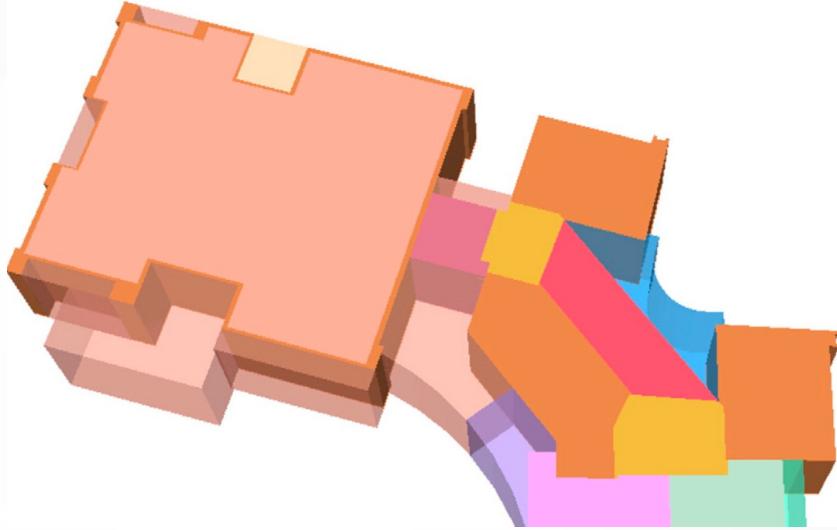


DEFINITION OF PROBLEM

- ❑ GIS which traditionally is limited to two dimensional such as limited 3D is implemented as 2.5D, and height is stored attribute type. The development of 3D GIS has made previously impractical analytical techniques possible.
- ❑ 3D GIS considers to needs of campus life to facilitate the daily life of students such as access to the indoor buildings those classes, lecturer offices and laboratories.

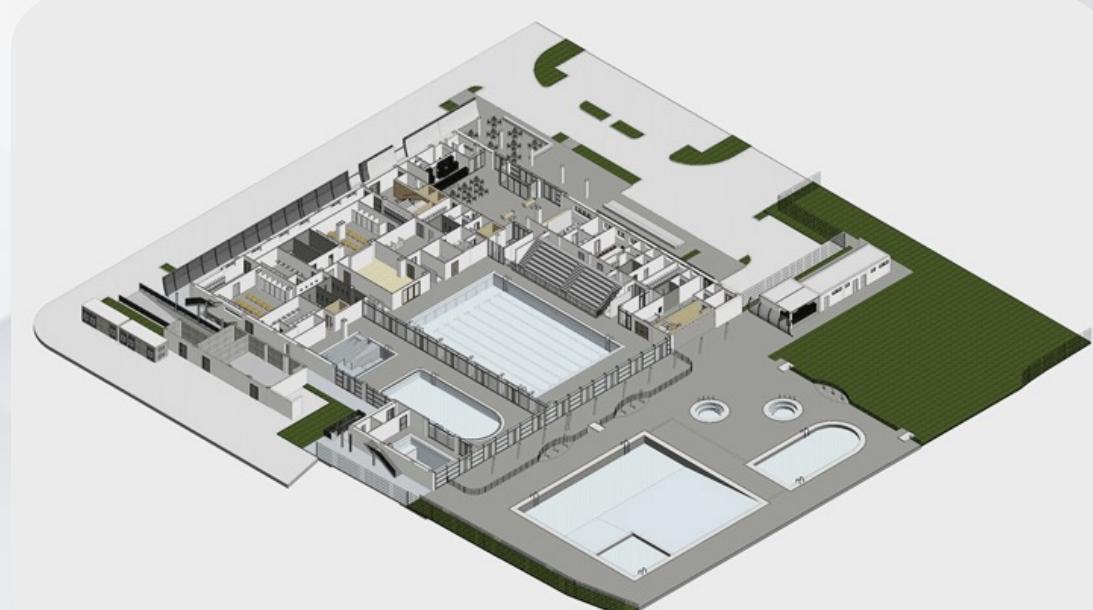


DEFINITION OF PROBLEM



- ❑ 3D GIS can be used for planning, renovation, and reconstruction of parts of structures, with an increase the information on the objects inside of buildings in the CIS.

- ❑ 3D GIS permits creating the building, also display as floor, corridor, and condominiums thus spatial analyzes may be implemented together with the 3D objects is obtained.



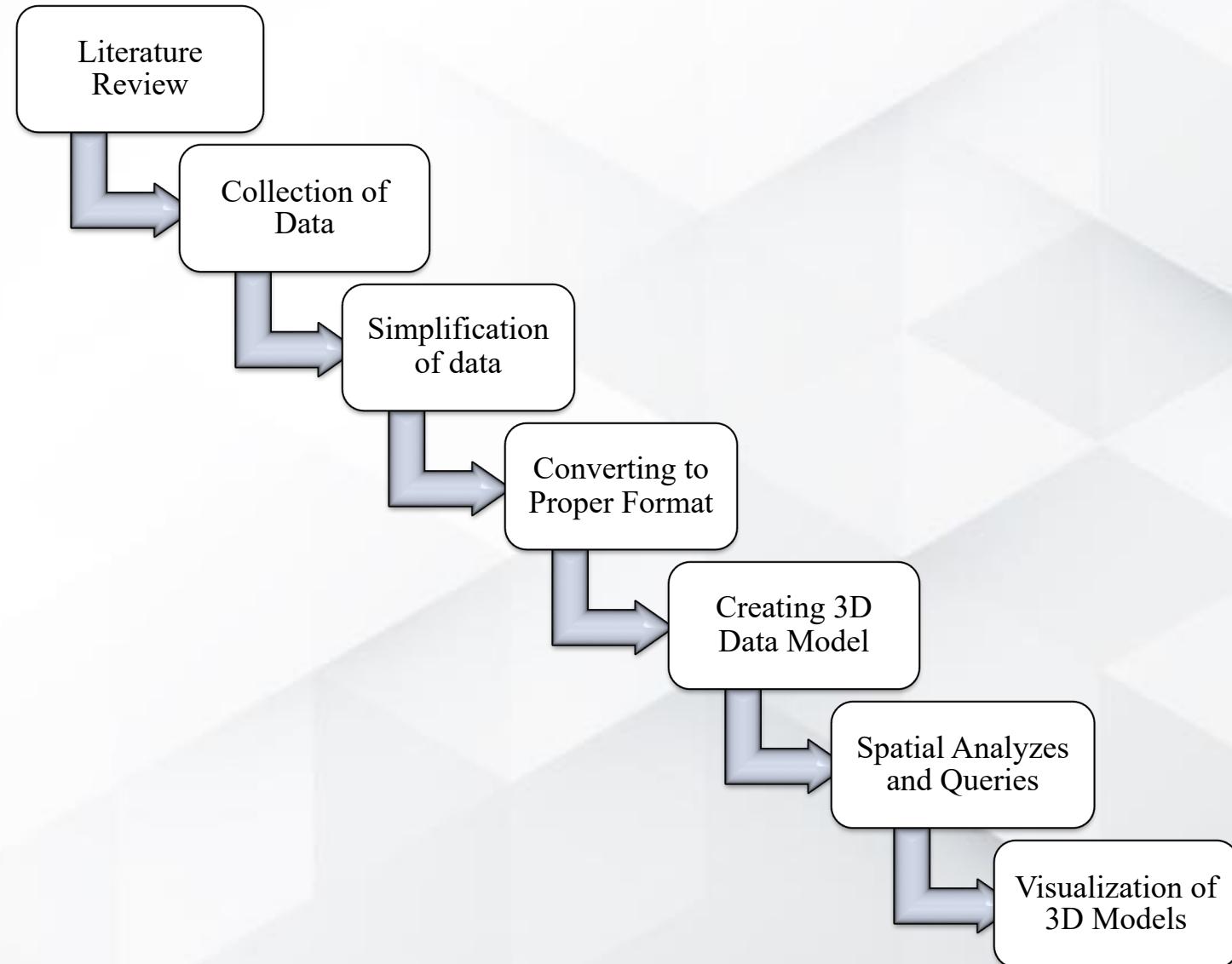
AIM OF THE STUDY



The aim of this study established a 3D CIS belonging to ITU Ayazaga Campus. 3D CIS will be created 3D buildings and their condominiums detailed. The 3D CIS included proper 3D object data sets and their attribute standards.

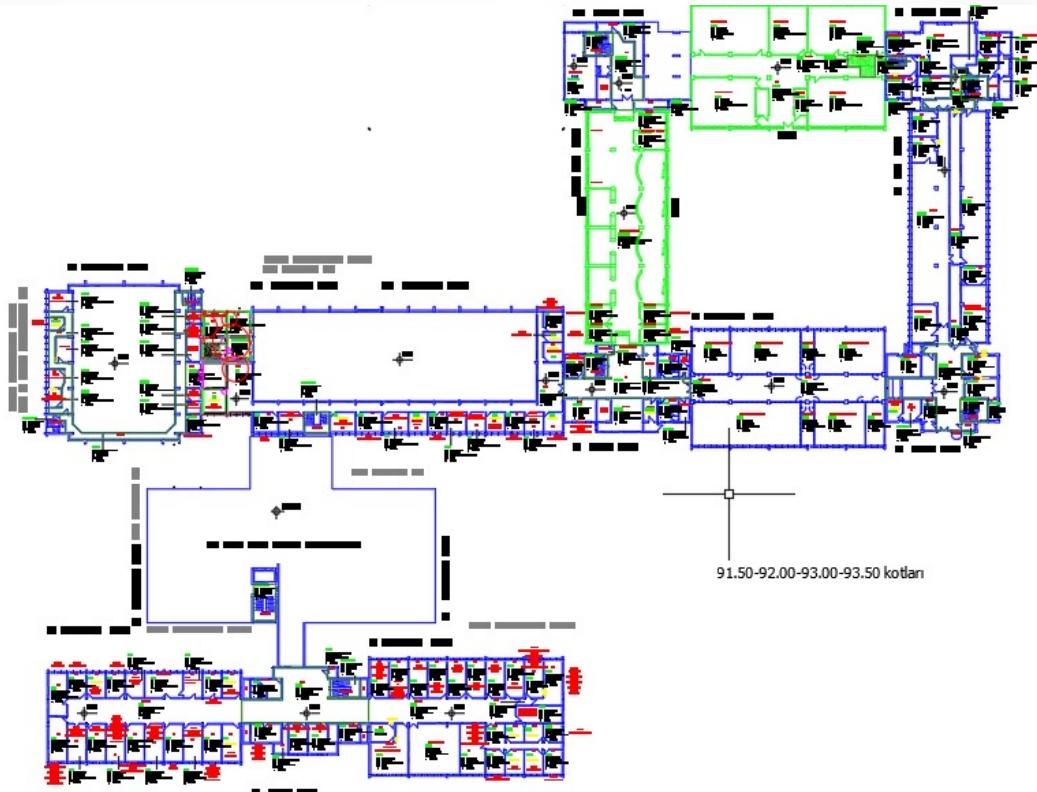
GIS has become many multidisciplinary making decision systems and maintains its efficiency in diverse areas such as urban planning, the energy sector, local government, and the private sector. The campus includes all these sectors and it is the **pilot area** to help breakthrough.

METHODOLOGY



PERFORMED WORKS

Collection of Data



CAD Data of 91.5, 92, 93 and 93.5 Elevations of Istanbul Technical University Faculty of Civil Engineering.



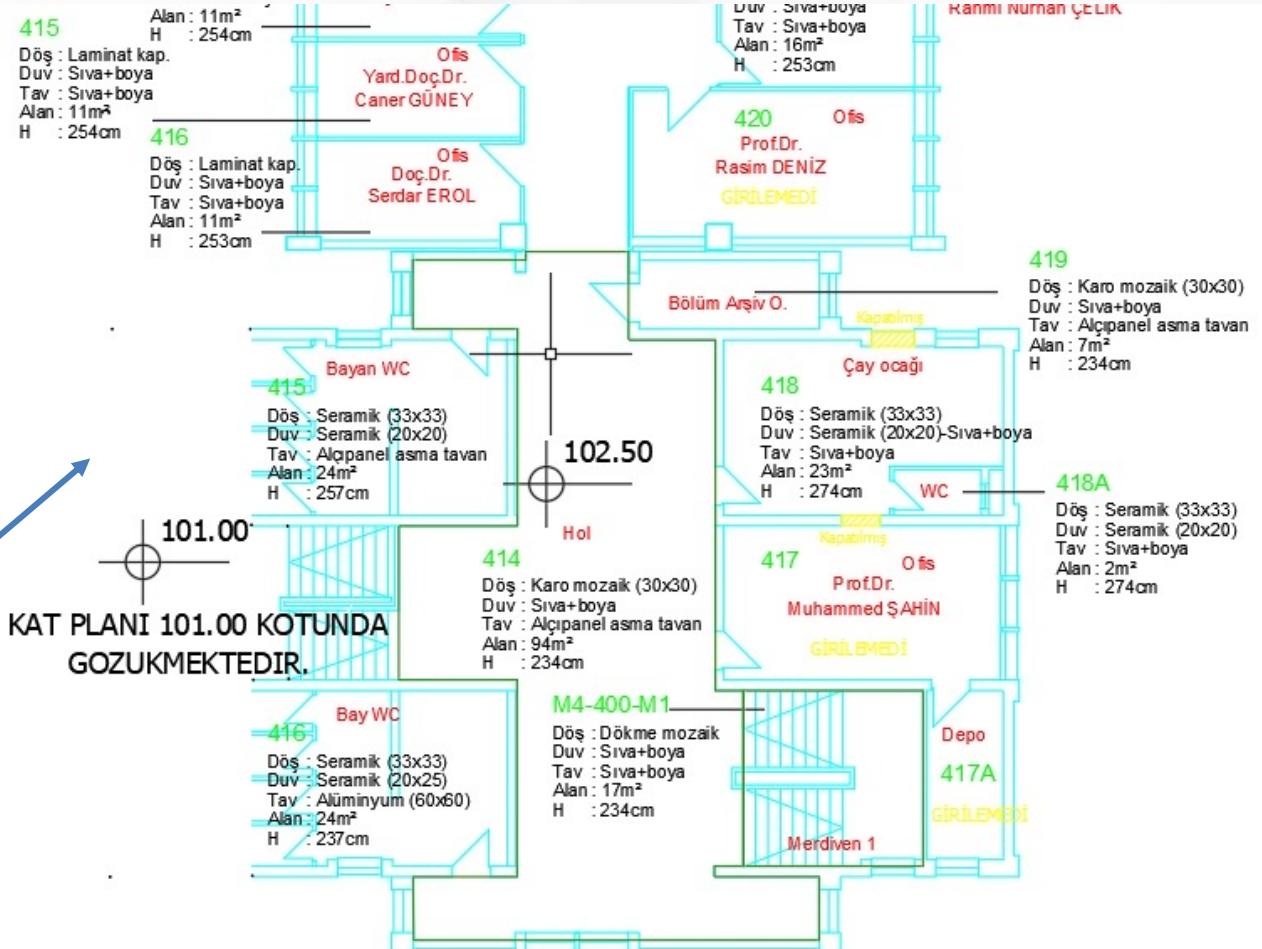
CAD Data of 102.5 and 104 Elevations of Istanbul Technical University Faculty of Civil Engineering.

PERFORMED WORKS

Collection of Data



KAT PLANI 101.00 KOTUNDА
GOZUKMEKTEDIR.



PERFORMED WORKS

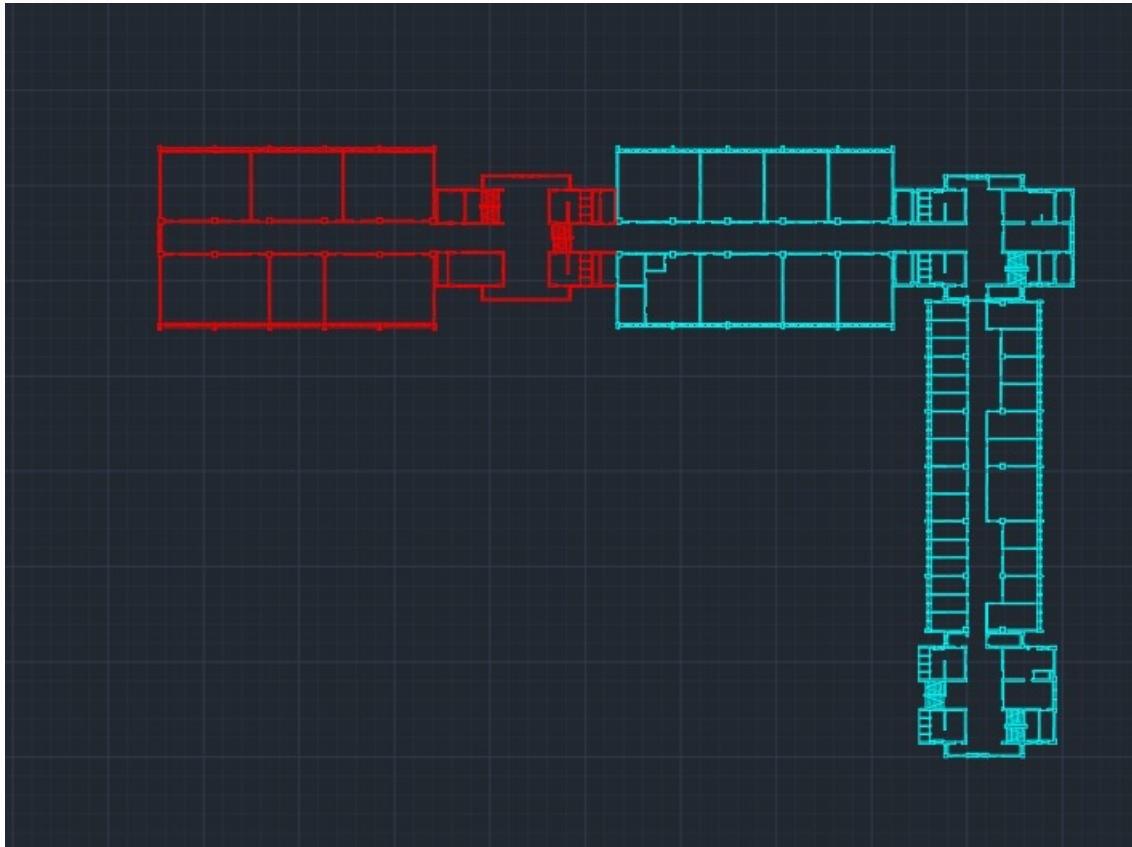
Collection of Data



CAD Data of 3th Floor Lodging Building.

PERFORMED WORKS

Simplification of Data



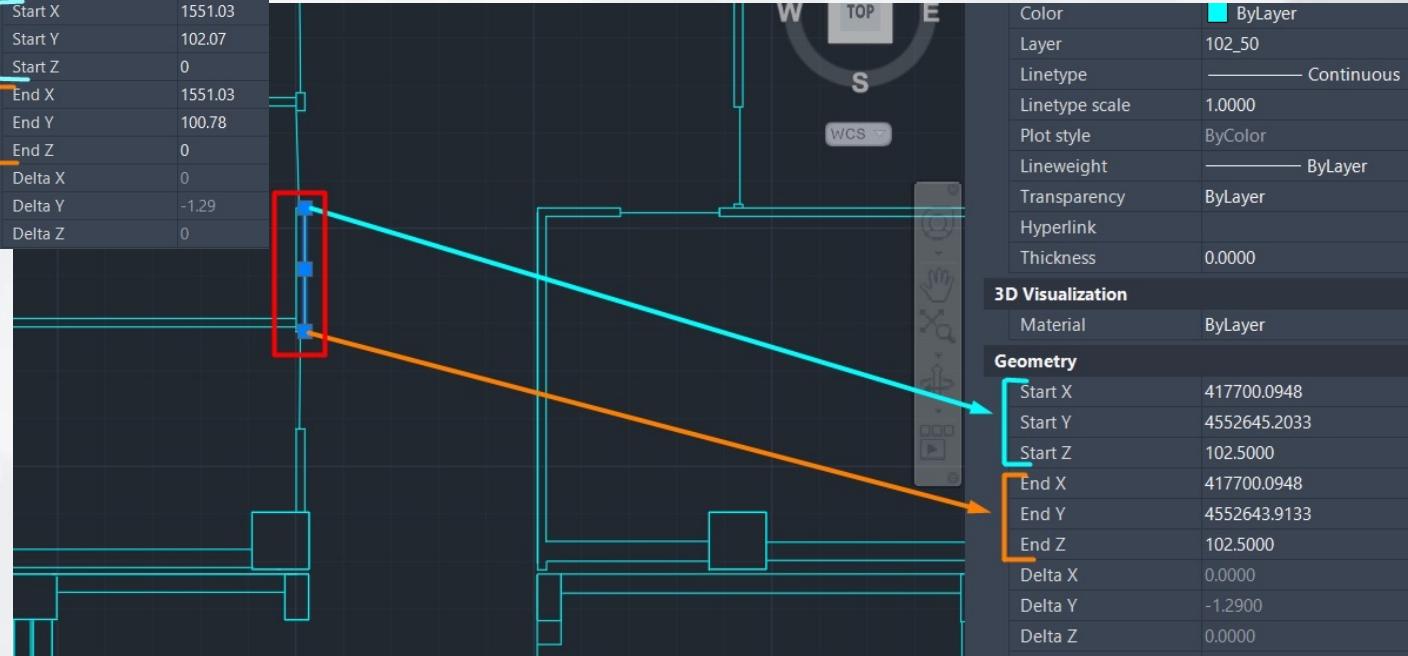
Simplified version of Istanbul Technical University
Faculty of Civil Engineering.



Simplified version of Lodging Building.

PERFORMED WORKS

Coordinates Transformation



Files were converted to the TUREF/TM30
EPSG:5254 coordinate system.

PERFORMED WORKS

Data Transformation



AUTOCAD



ArcGIS Pro

CAD files were converted to shapefile data format via ArcGIS Pro software.

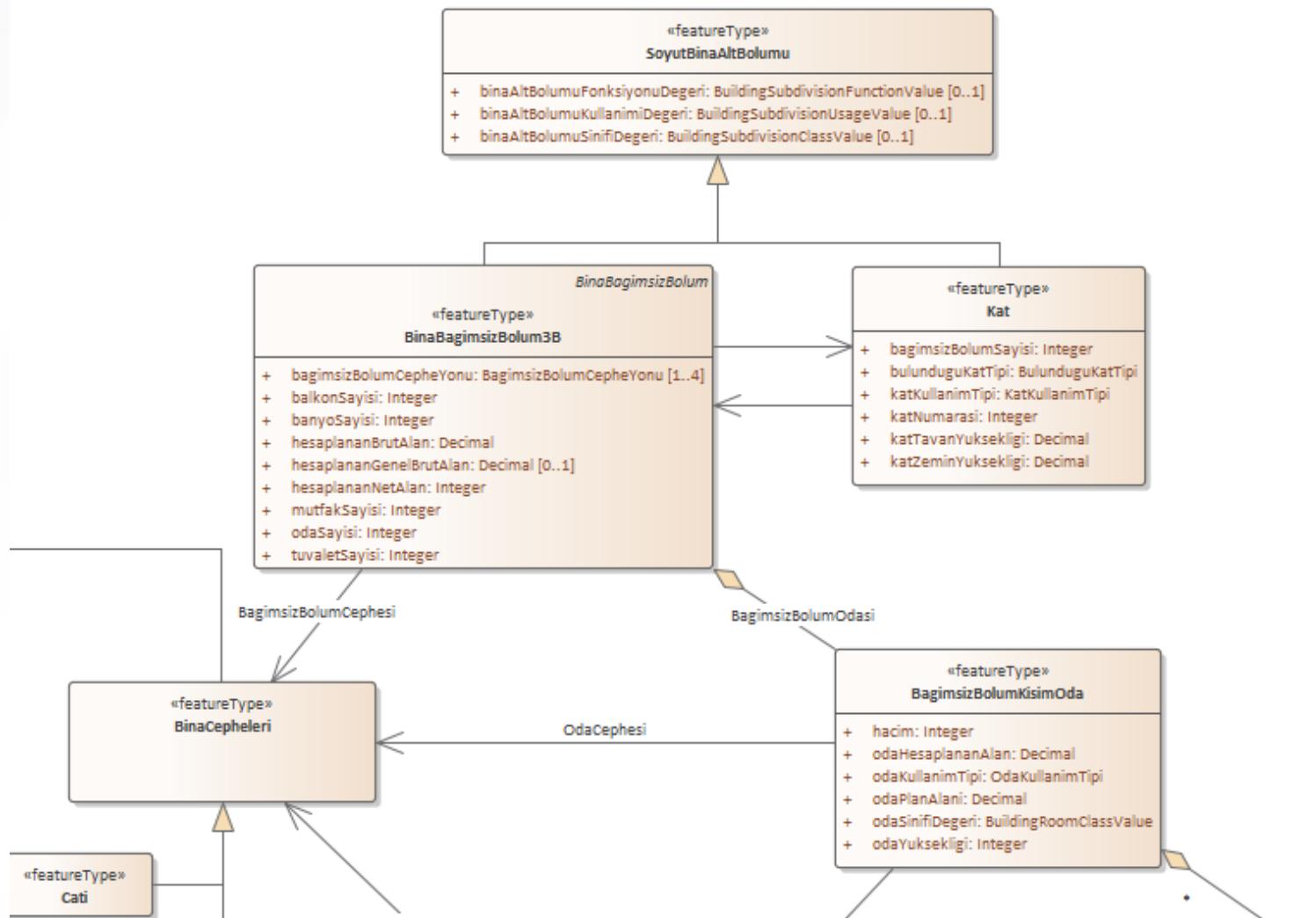
CAD To Geodatabase (Conversion Tools)

Reads a CAD dataset and creates feature classes of the drawing. The feature classes are written to a geodatabase feature dataset.



PERFORMED WORKS

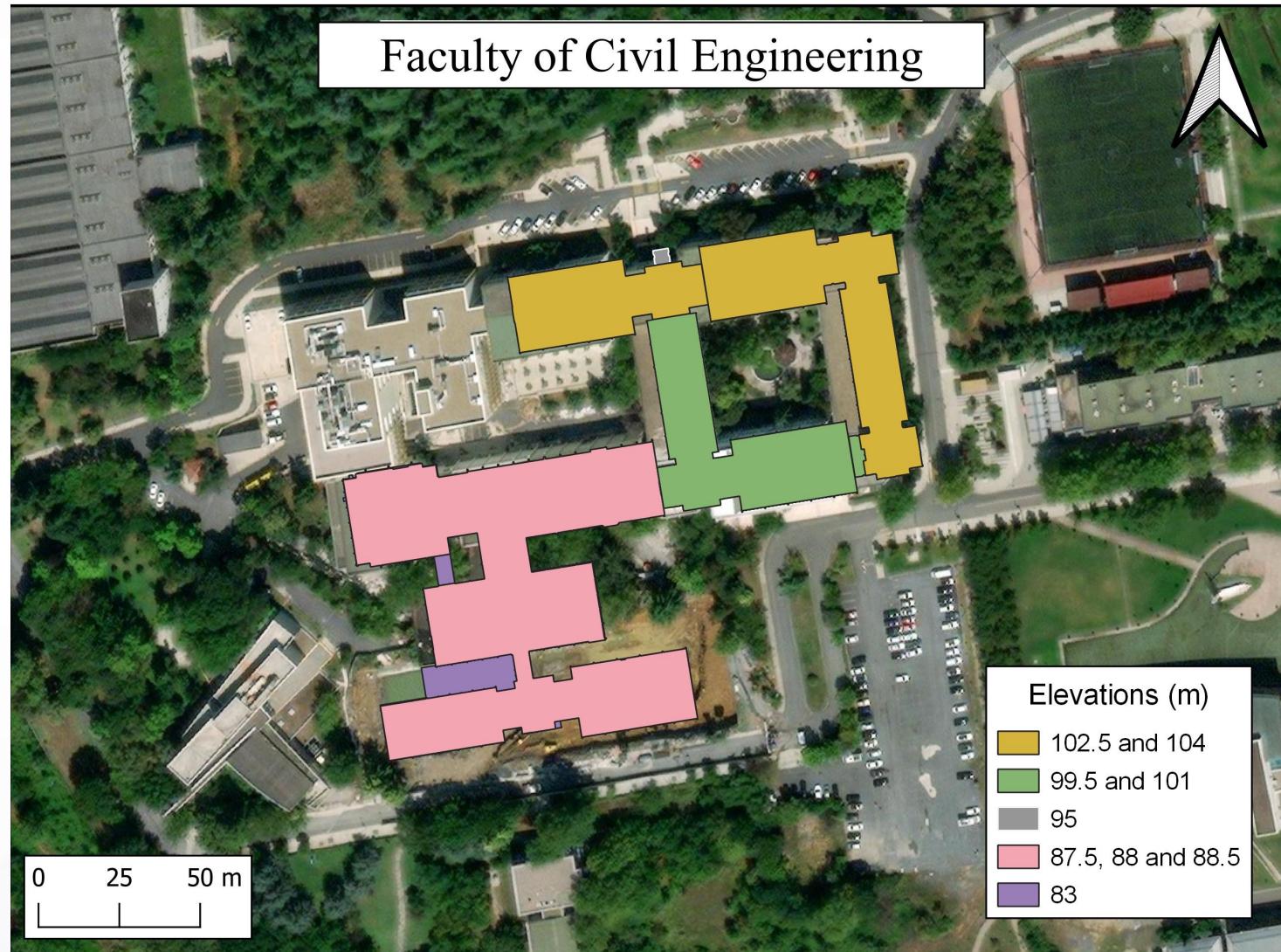
TUCBS Standards



The obtained data were divided into layers and their attributes were determined according to the Turkish National Geographic Information System (TUCBS) standards.

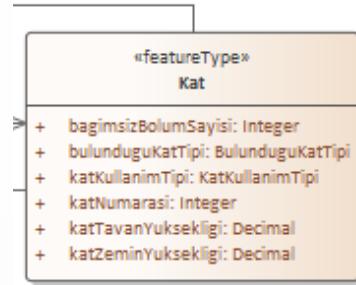
PERFORMED WORKS

Building Floors



PERFORMED WORKS

Building Floors

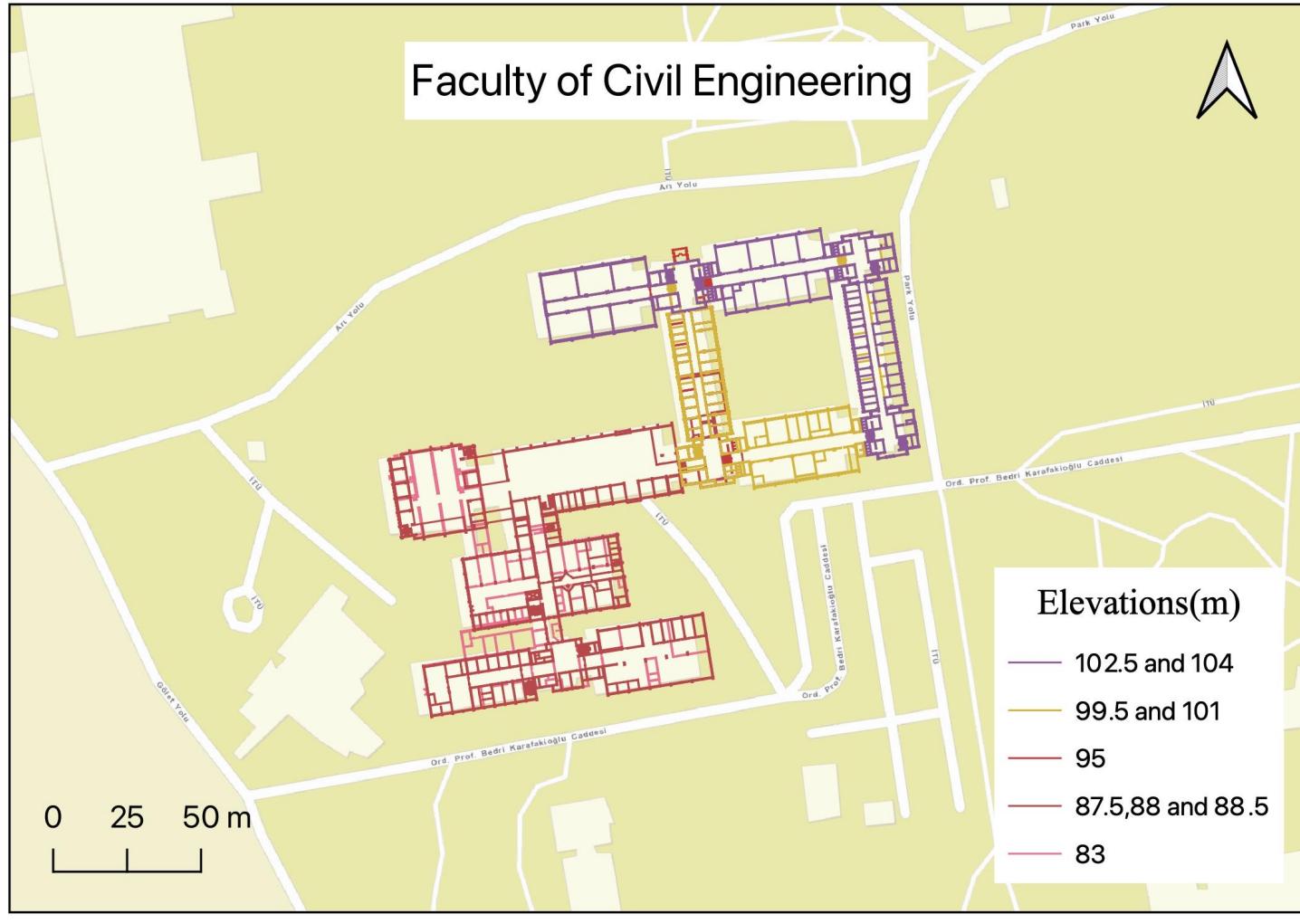


fid	bagimsizBolumSayisi	bulunduguKat Tipi	katKullanimTipi	katNumarası	kat TavanYuksekligi	katZeminYuksekligi
1	1	6	normalKat	kamu	3	11.5
2	2	102	normalKat	kamu	3	13.5
3	3	2	normalKat	kamu	3	12
4	4	23	normalKat	kamu	3	13.5
5	5	6	normalKat	kamu	3	15

Istanbul Technical University Faculty of Civil Engineering Buildings 3rd Floors Layers Attributes

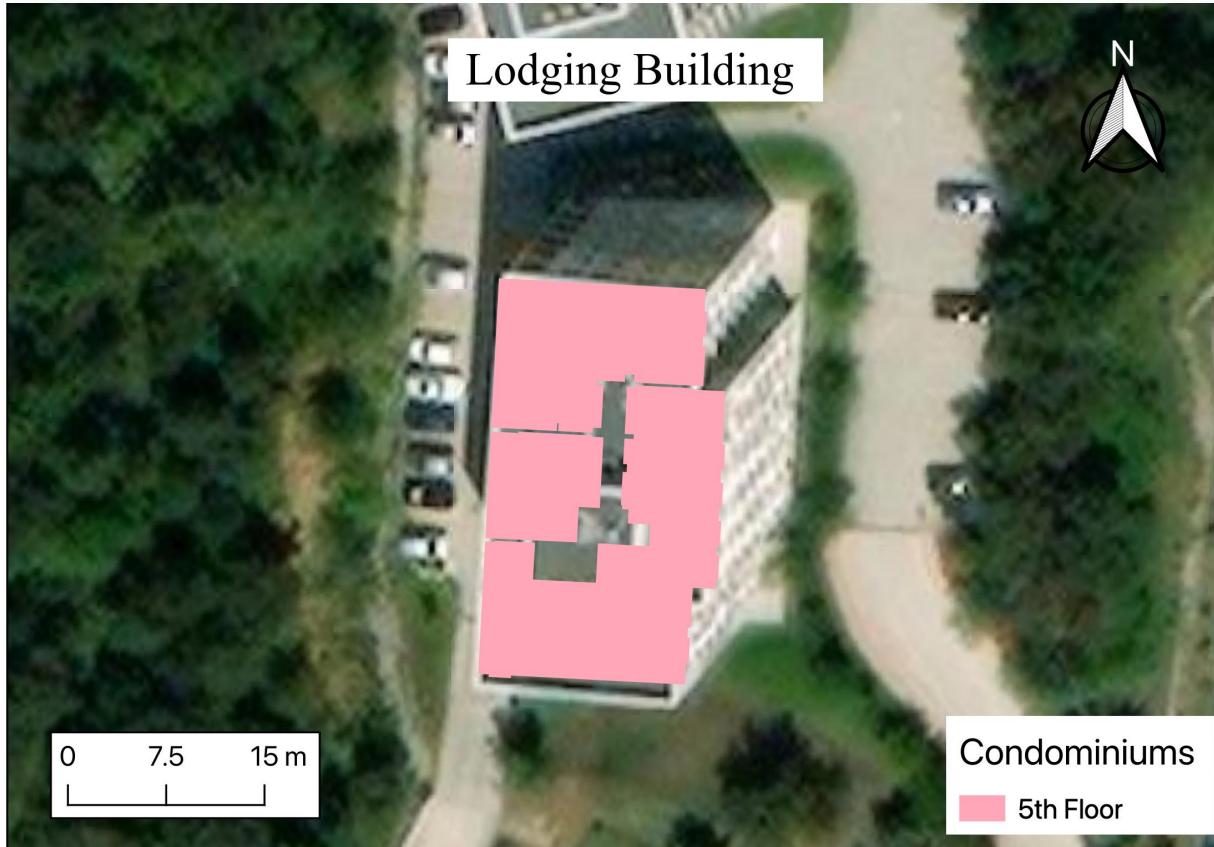
PERFORMED WORKS

Building Wall



PERFORMED WORKS

Condominiums Layers

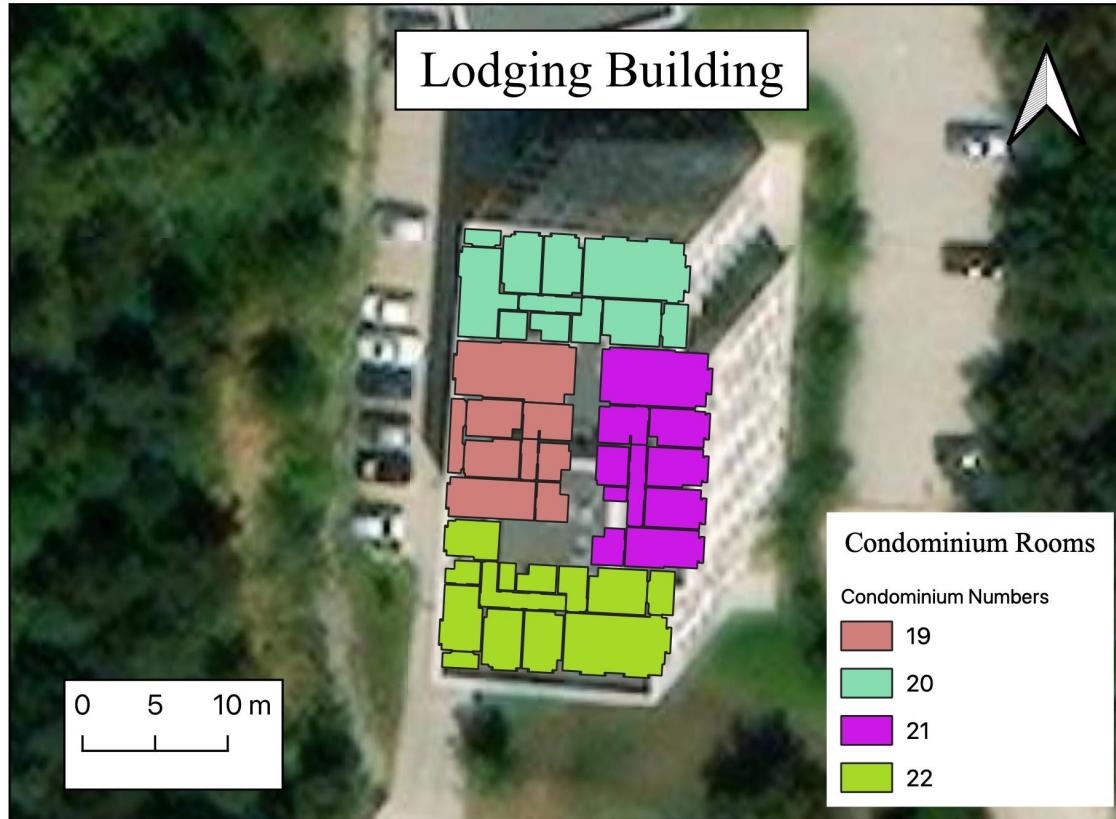


Field	Type
fid	integer
bağımsızBolumCepheYonu	text
bagimsizBolumNo	integer
balkonSayisi	integer
banyoSayisi	integer
hesaplananBrutAlan	decimal
hesaplananGenelBrutAlan	decimal
hesaplananNetAlan	integer
mutfakSayisi	integer
banyoSayisi	integer
tuvaletSayisi	integer

Attributes of the Condominium Layer of the Lodging Building.

PERFORMED WORKS

Condominium Room Layers

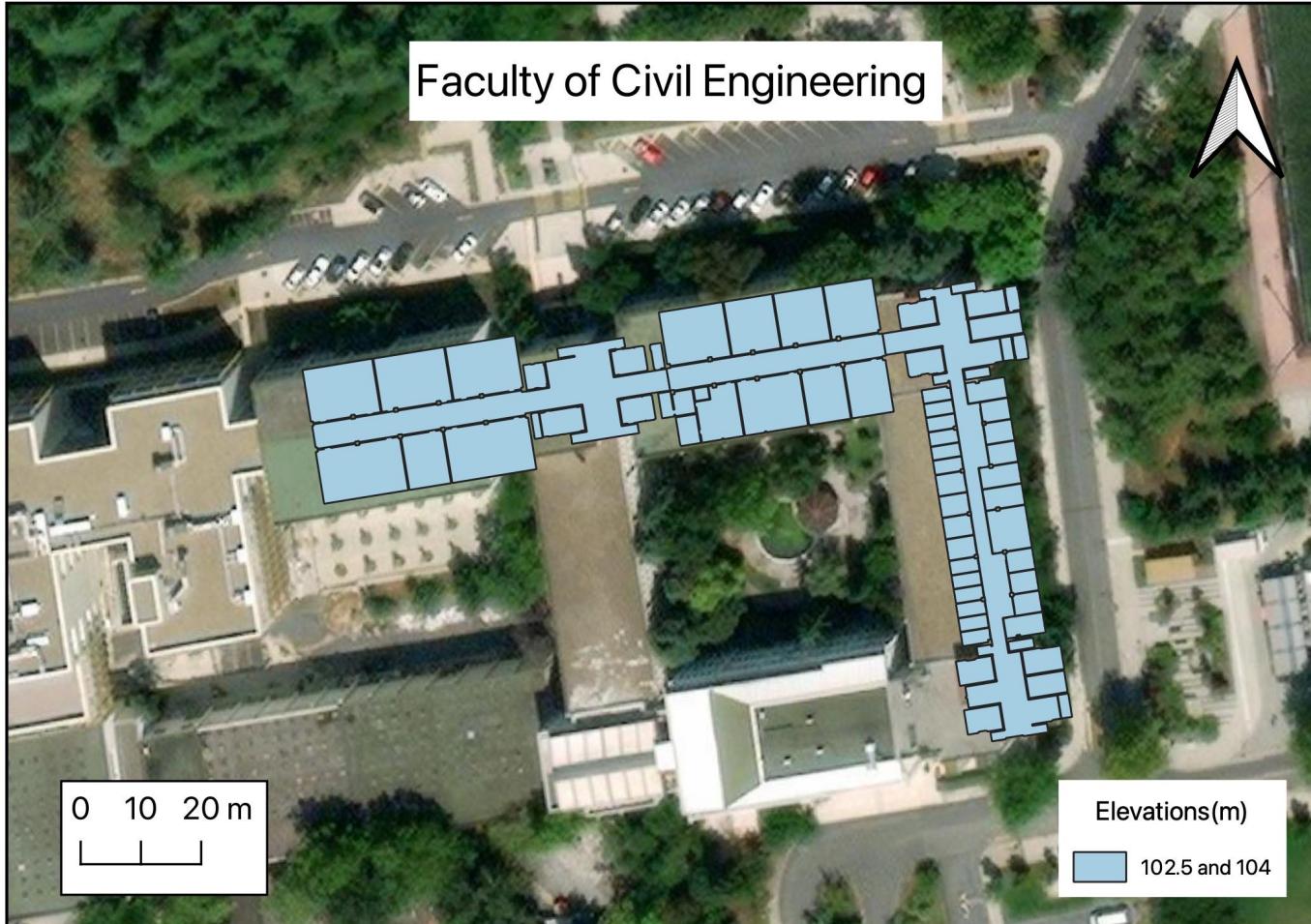


Field	Type
fid	integer
hacim	integer
bagimsizBolumNo	integer
odaHesaplananAlan	decimal
odaKullanimTipi	text
odaPlanAlani	decimal
odaSinifiDegeri	text
odaYukseligi	integer

Attributes of the Condominium Room Layers of the Lodging Building.

PERFORMED WORKS

Condominium Room Layers



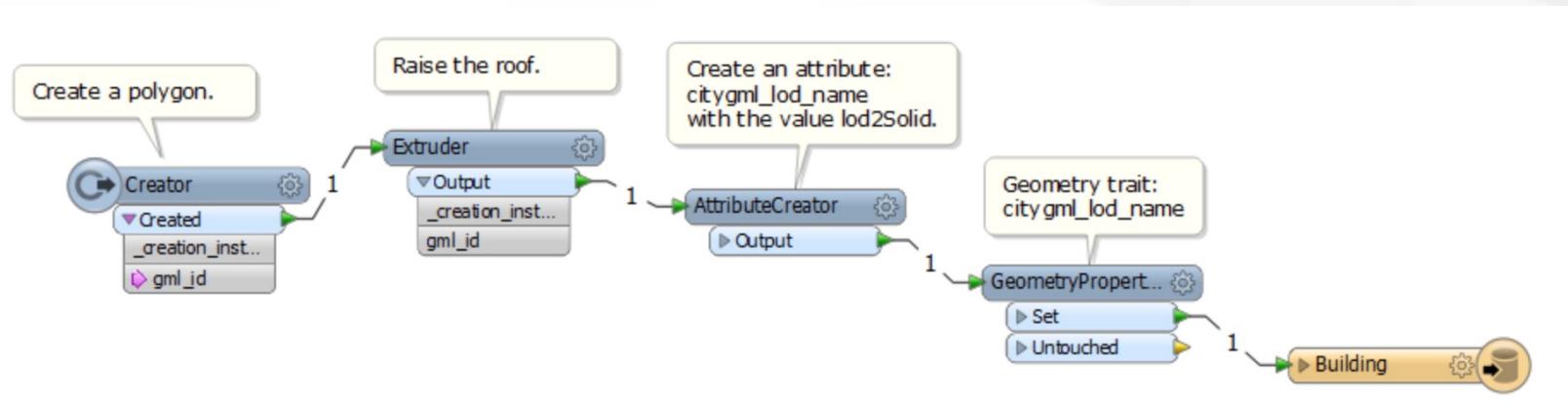
Field	Type
fid	integer
odaHesaplananAlan	integer
odaNo	text
kapasite	integer
odaKullanımTipi	text
malik	text
odaYuksekligi	integer
bagimsizAlanCepheYonu	text
hacim	integer

Attributes of the Condominium Room Layers of the Faculty Building.

PERFORMED WORKS

Three-Dimensional Modeling and Implementation

CityGML data standards are the most suitable format for producing a 3D campus information system. Proper program for conversion to the CityGML format should choose FME Workbench. FME Program is used to easily convert the data to the desired format and view the converted data.



FME Conversion Tools.



PERFORMED WORKS

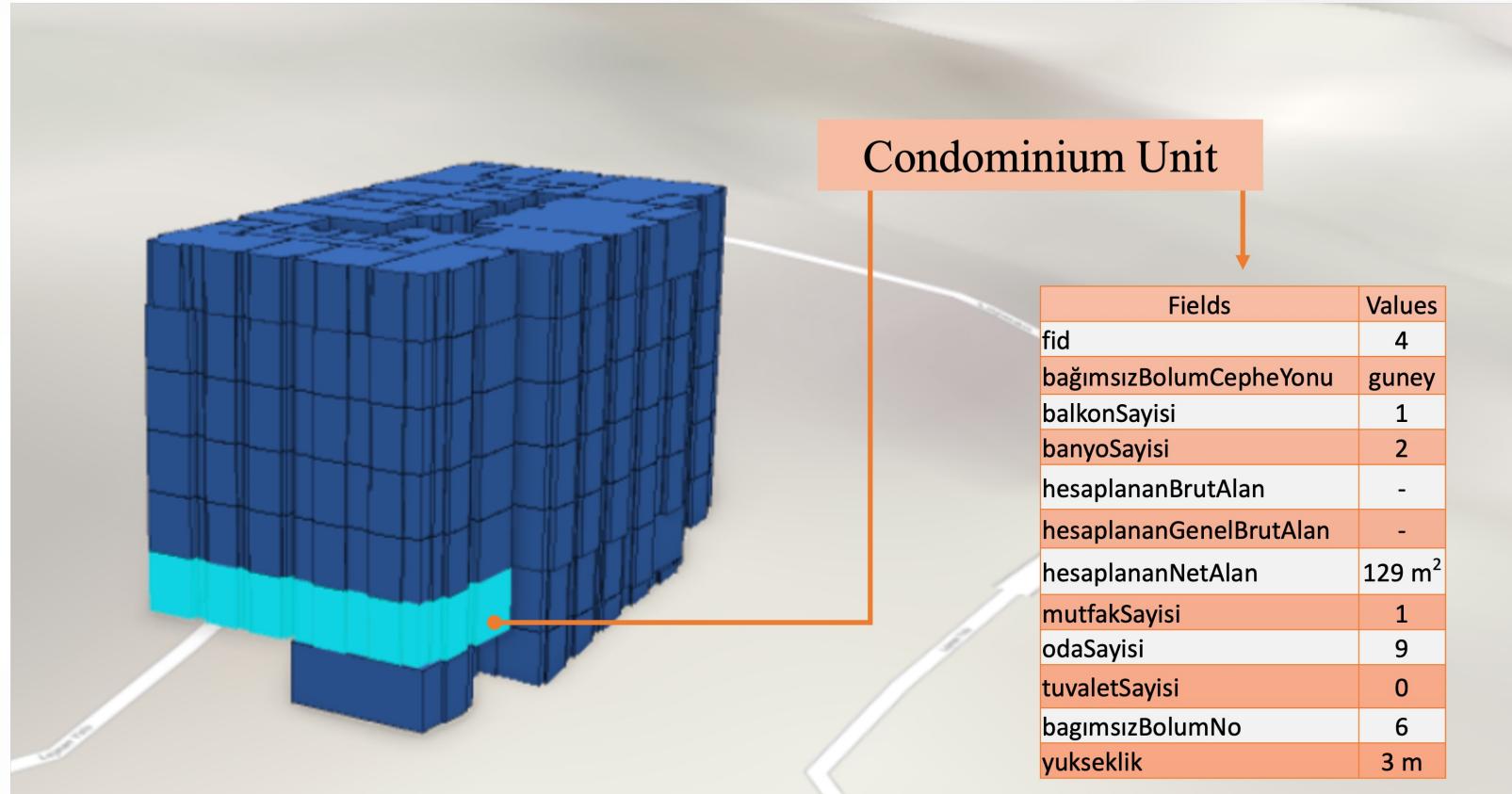
Three-Dimensional Modeling and Implementation



3D Modelling of ITU Maslak Campus.

PERFORMED WORKS

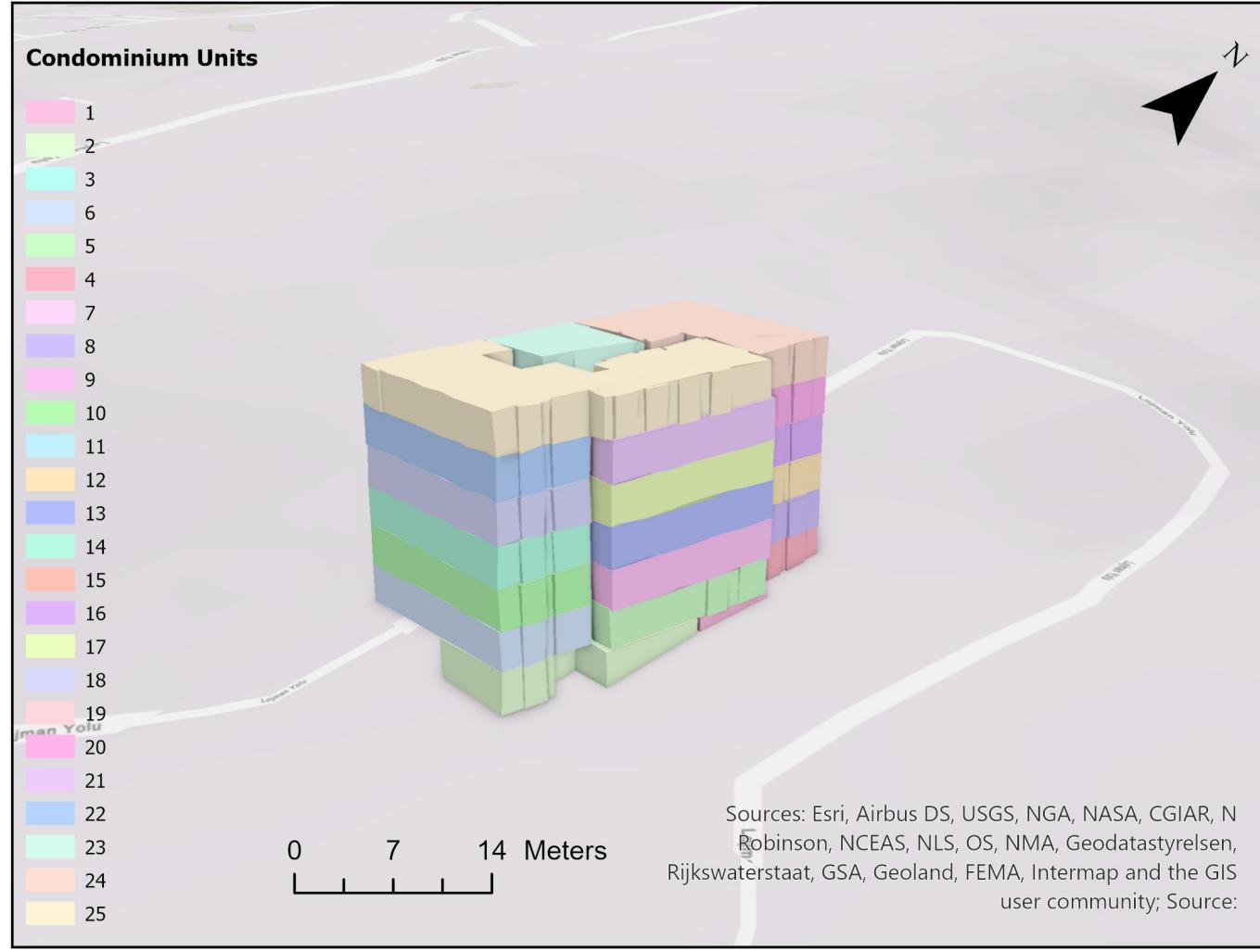
Three-Dimensional Modeling and Implementation



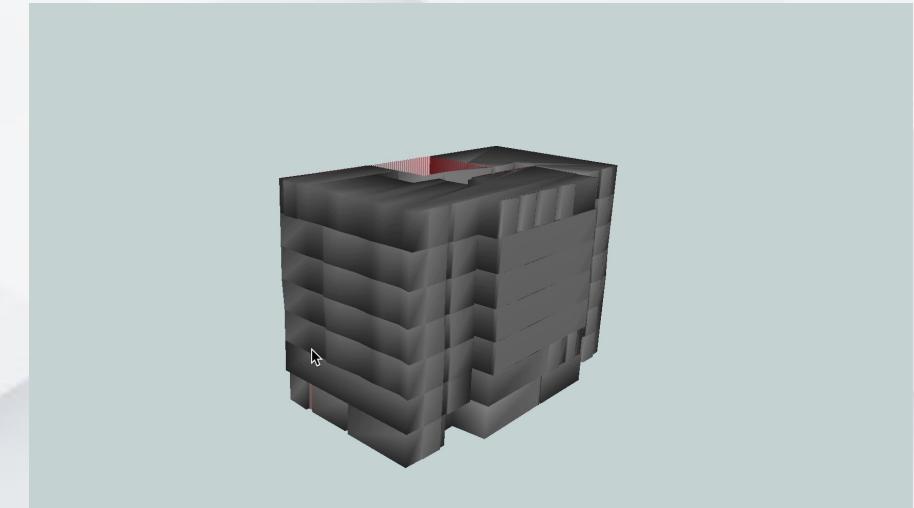
Condominium in ITU Lodging Building.

PERFORMED WORKS

Three-Dimensional Modeling and Implementation



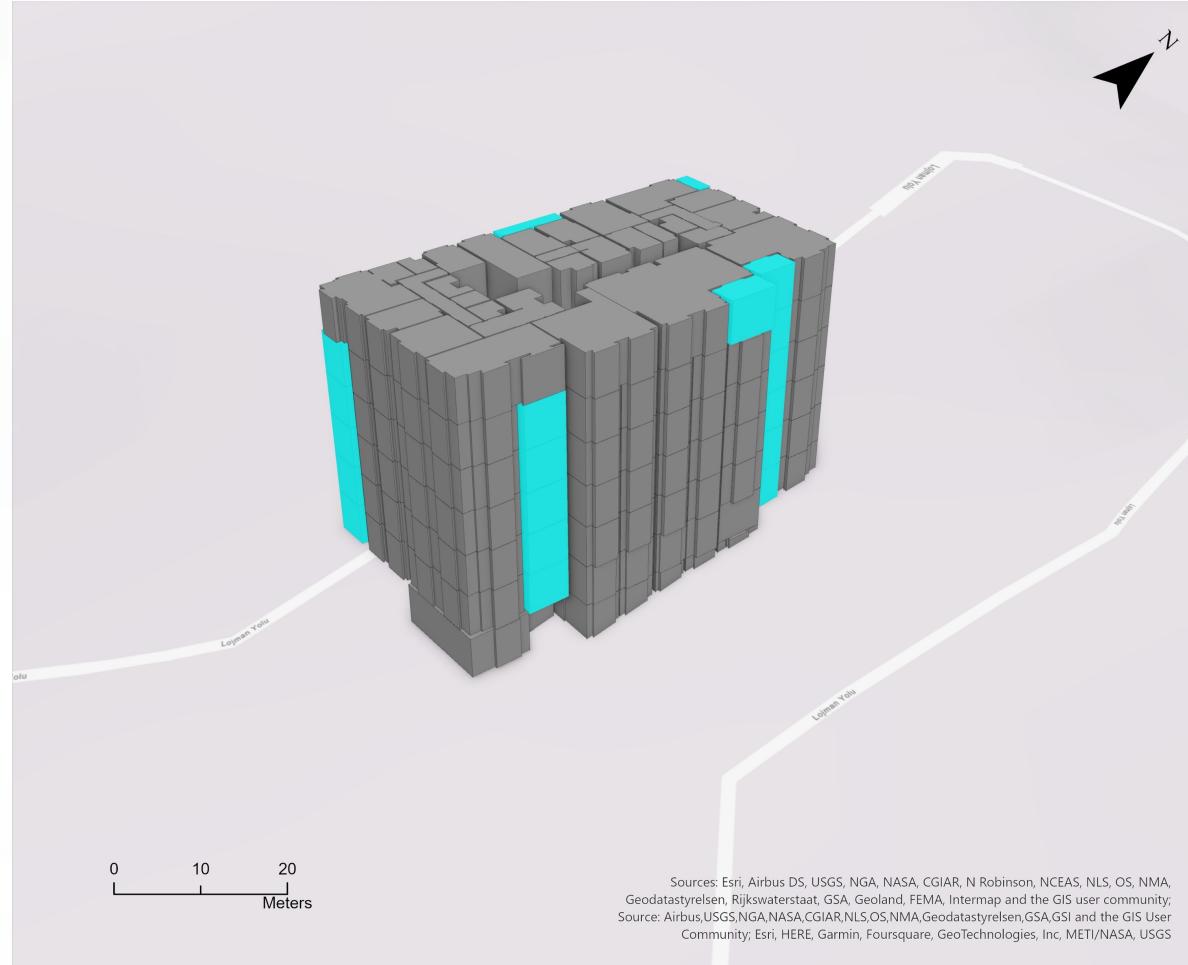
Lodging Building in ITU Maslak Campus.



Displayed in FME Data Inspector.

PERFORMED WORKS

Three-Dimensional Modeling and Implementation

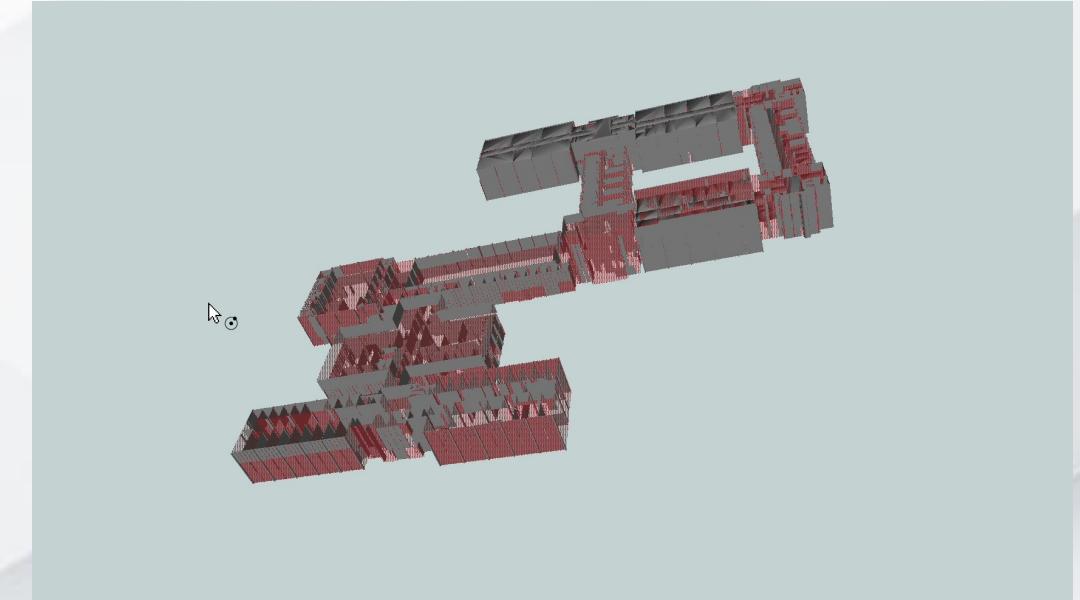


Balconies in Lodging Building.

In this sample, the balconies on the lodging building were found by query. With such queries may be pioneer to analyzes such as 3D feasibility analyzes, and each condominium rooms in the building can be implement.

PERFORMED WORKS

Three-Dimensional Modeling and Implementation



Displayed in FME Data Inspector.

3D Visualization ITU Faculty of Civil Engineering Walls.

PERFORMED WORKS

Three-Dimensional Modeling and Implementation

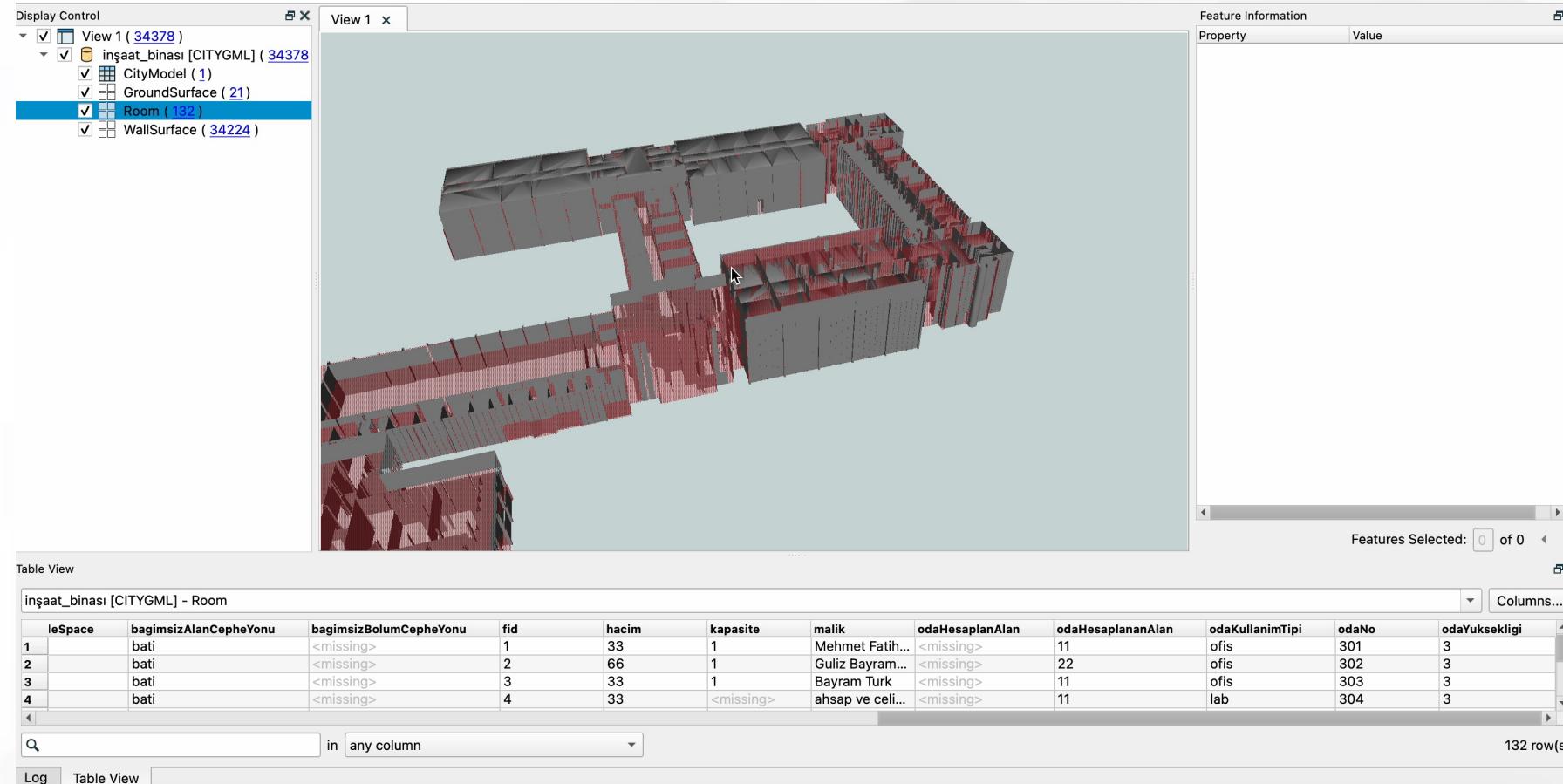


3D Visualization ITU Faculty of Civil Engineering Condominium Rooms.

PERFORMED WORKS

Three-Dimensional Modeling and Implementation

Query Sample in FME Data Inspector Program.

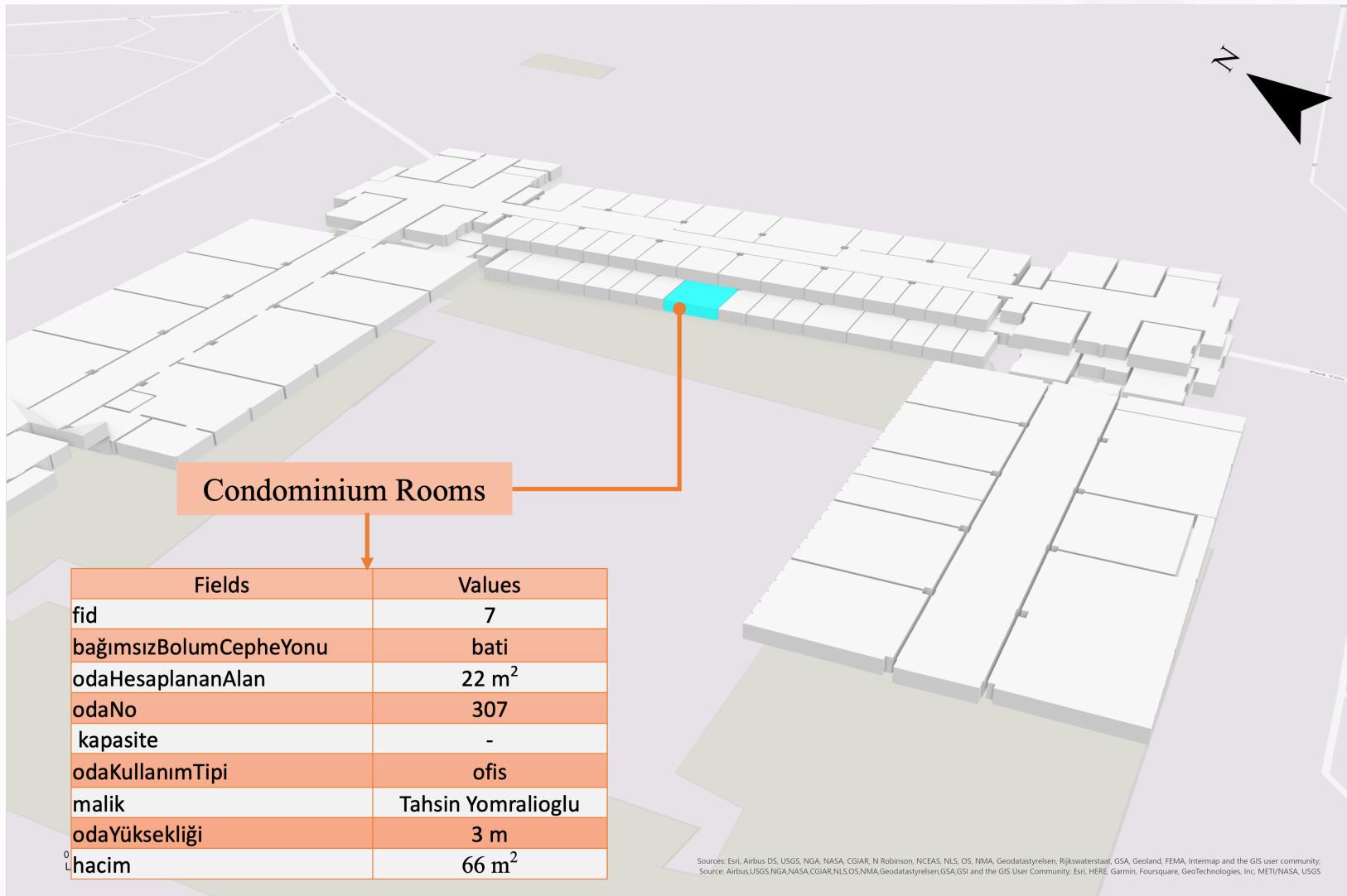


The screenshot shows the FME Data Inspector interface. On the left, the "Display Control" panel lists "View 1 (34378)" containing "inşaat_binası [CITYGML] (34378)". Under this, "Room (132)" is selected, highlighted with a blue border. The main window displays a complex 3D CityGML model of a building structure, primarily in red and grey. To the right, the "Feature Information" panel shows a table with columns "Property" and "Value". At the bottom, the "Table View" panel shows a detailed table for "inşaat_binası [CITYGML] - Room". The table has 132 rows and includes columns such as "leSpace", "bagimsizAlanCepheYonu", "bagimsizBolumCepheYonu", "fid", "hacim", "kapasite", "malik", "odaHesaplananAlan", "odaHesaplananAlan", "odaKullanimTipi", "odaNo", and "odaYuksekligi". A search bar at the bottom allows filtering by "any column".

leSpace	bagimsizAlanCepheYonu	bagimsizBolumCepheYonu	fid	hacim	kapasite	malik	odaHesaplananAlan	odaHesaplananAlan	odaKullanimTipi	odaNo	odaYuksekligi
1	bati	<missing>	1	33	1	Mehmet Fatih...	<missing>	11	ofis	301	3
2	bati	<missing>	2	66	1	Guliz Bayram...	<missing>	22	ofis	302	3
3	bati	<missing>	3	33	1	Bayram Turk	<missing>	11	ofis	303	3
4	bati	<missing>	4	33	<missing>	ahsap ve celi...	<missing>	11	lab	304	3

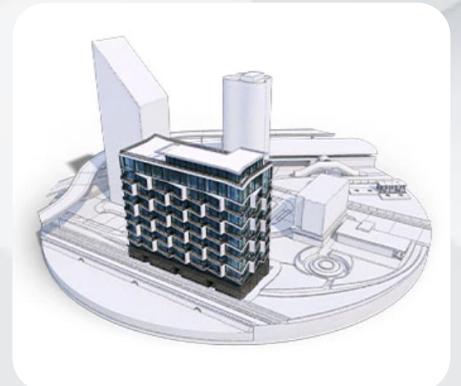
PERFORMED WORKS

Three-Dimensional Modeling and Implementation



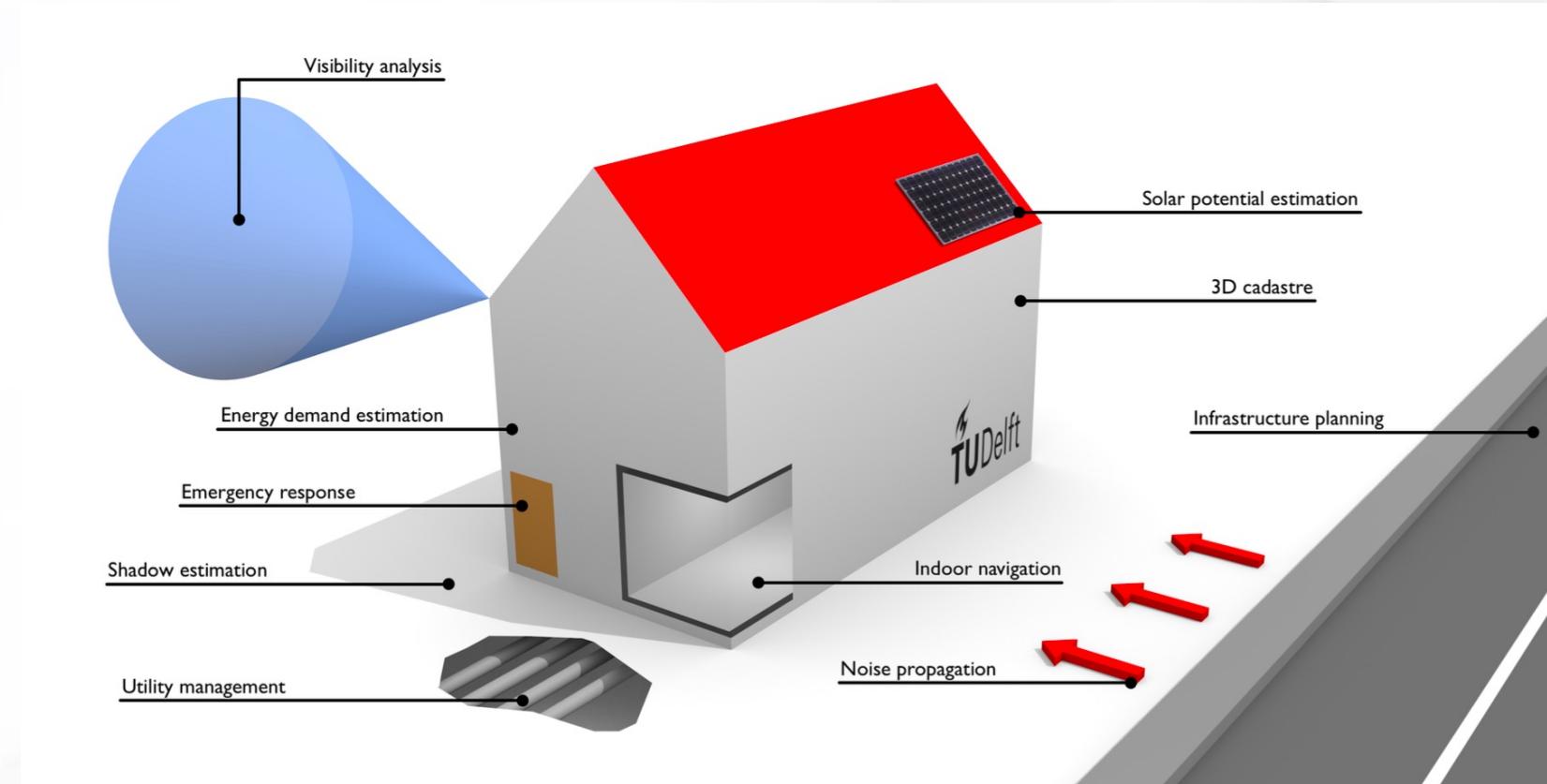
RESULTS AND DISCUSSIONS

- ❑ CAD files have a local coordinate system. The conversion of this coordinate system to the geographic coordinate system is required for GIS.
- ❑ It has been determined that the concept of condominium in public buildings is insufficient to analyzes and queries.
- ❑ It has been comprehended that the use of CityGML data format on QGIS provides relevance usage of analyzes and queries.



RESULTS AND DISCUSSIONS

- Thanks to the 3D coordinated building model, it has been revealed that new researches can emerge in areas such as indoor navigation, real estate valuation and 3D indoor mapping.



CONCLUSIONS AND RECOMMENDATIONS

- ❑ This study presents a methodology for creating 3D models of buildings in LOD for a virtual 3D campus.
- ❑ CityGML file format was found suitable to provide 3D representation of these data.
- ❑ FME Workbench was chosen as the appropriate software to obtain the CityGML format.
- ❑ This study was conducted to be a pioneer of future studies.



İTÜ



THANKS FOR LISTENING!

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