

GeoBIM

*Experiences with GeoBIM
in the United Arab Emirates*



AVINEON®

Visualize IT. See IT Through.



Project Scope:

- ✓ *Business Needs & Project Objectives*
- ✓ *Avineon Solution Offering*



Implementation:

- ✓ *BIM*
- ✓ *3D City Model*



Key challenges:

- ✓ *5 key challenges overcome during implementation*



Business Value:

- ✓ *8 main end user benefits*

Business Needs

Key challenges & constraints

- ✓ Received building plans only in **2D CAD**
- ✓ Using **non-standardized templates**
- ✓ **Limitations** of 2D CAD files:
 - No visualisation in 3D environment
 - No easy validation against established building standards
 - Complicating data mining & data analytics

Project Objectives

How to solve constraints?

- ✓ Creation of a **BIM platform**
 - Strategy/method for modelling existing buildings
 - Specifications/templates for BIM compatible drawings in future
 - Architecture and IT infrastructure
- ✓ **Conversion** of +15 000 buildings (LOD300)
- ✓ Develop **web viewer application**
- ✓ **Training**



Avineon Solution Offering to meet objectives

Consultancy



- ✓ **LOD 500 BIM data model**
- ✓ **LOD 500 template design** in Autodesk Revit
- ✓ **LOD 300 template design**
- ✓ **Technical specs** for future building drawings

BIM



- ✓ **LOD 300 Architectural Revit models** for + 15 000 buildings
- ✓ **LOD 500 Revit model** for 1 building
- ✓ **BIM viewer application**
- ✓ **Automated conversion tool:** CAD to Revit
- ✓ **Validator tool** for QC/QA

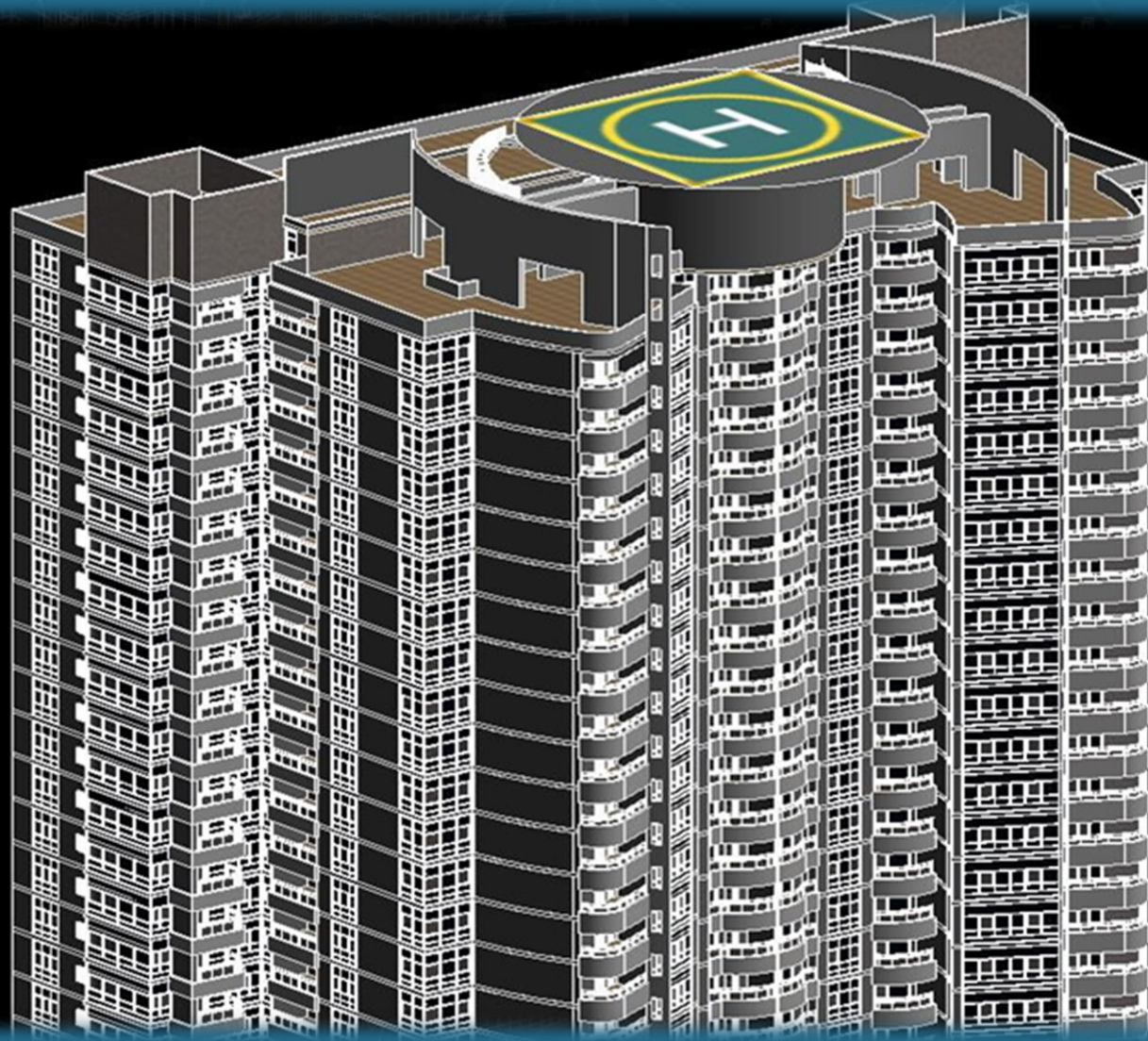
Geospatial



- ✓ **Loading & publishing** of LOD 300 BIM models
- ✓ **Migration tool:** Revit to ESRI GDB
- ✓ **Spatial analytical tools**
- ✓ **3D City modelling** for key areas: LOD 2.2 3D city model
- ✓ **End user training**

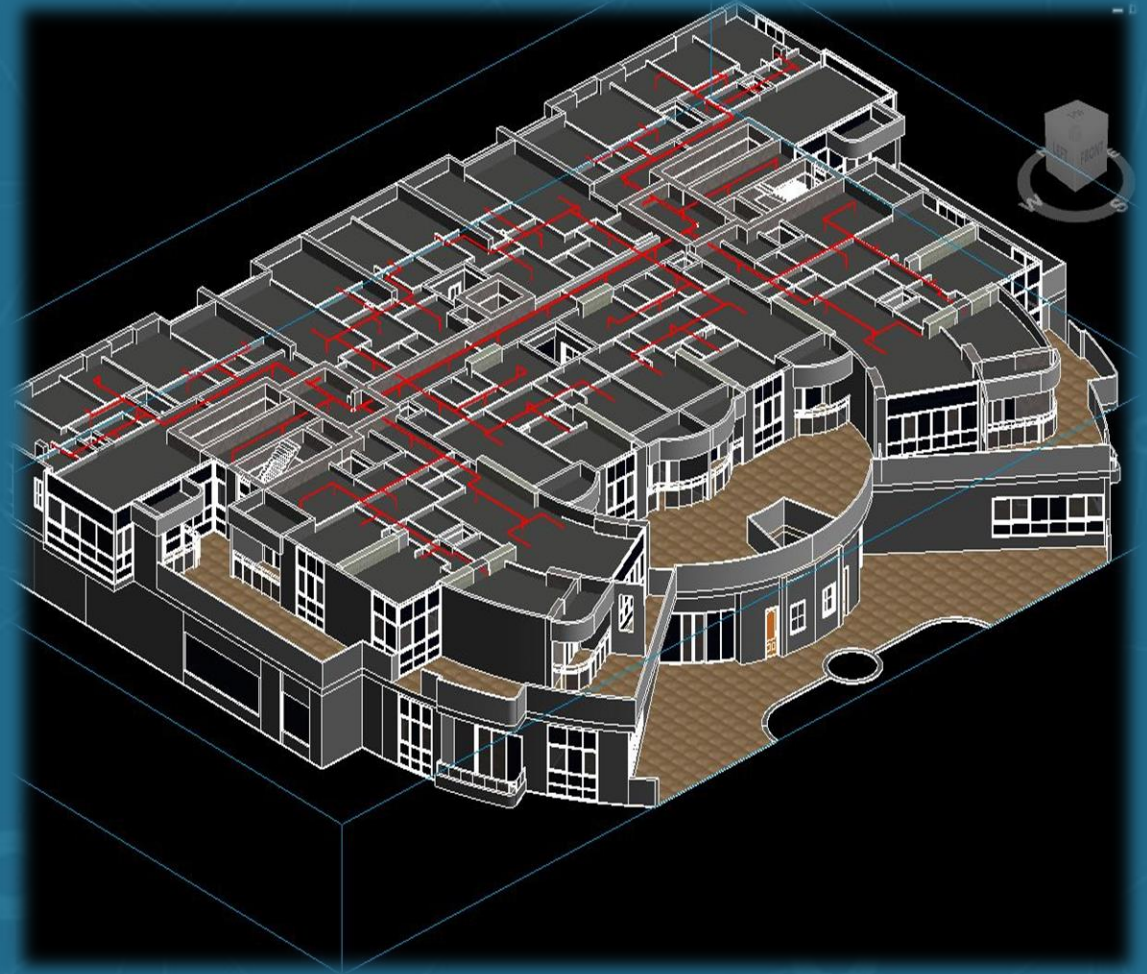


BIM Model - LOD 300





BIM Model - LOD 500





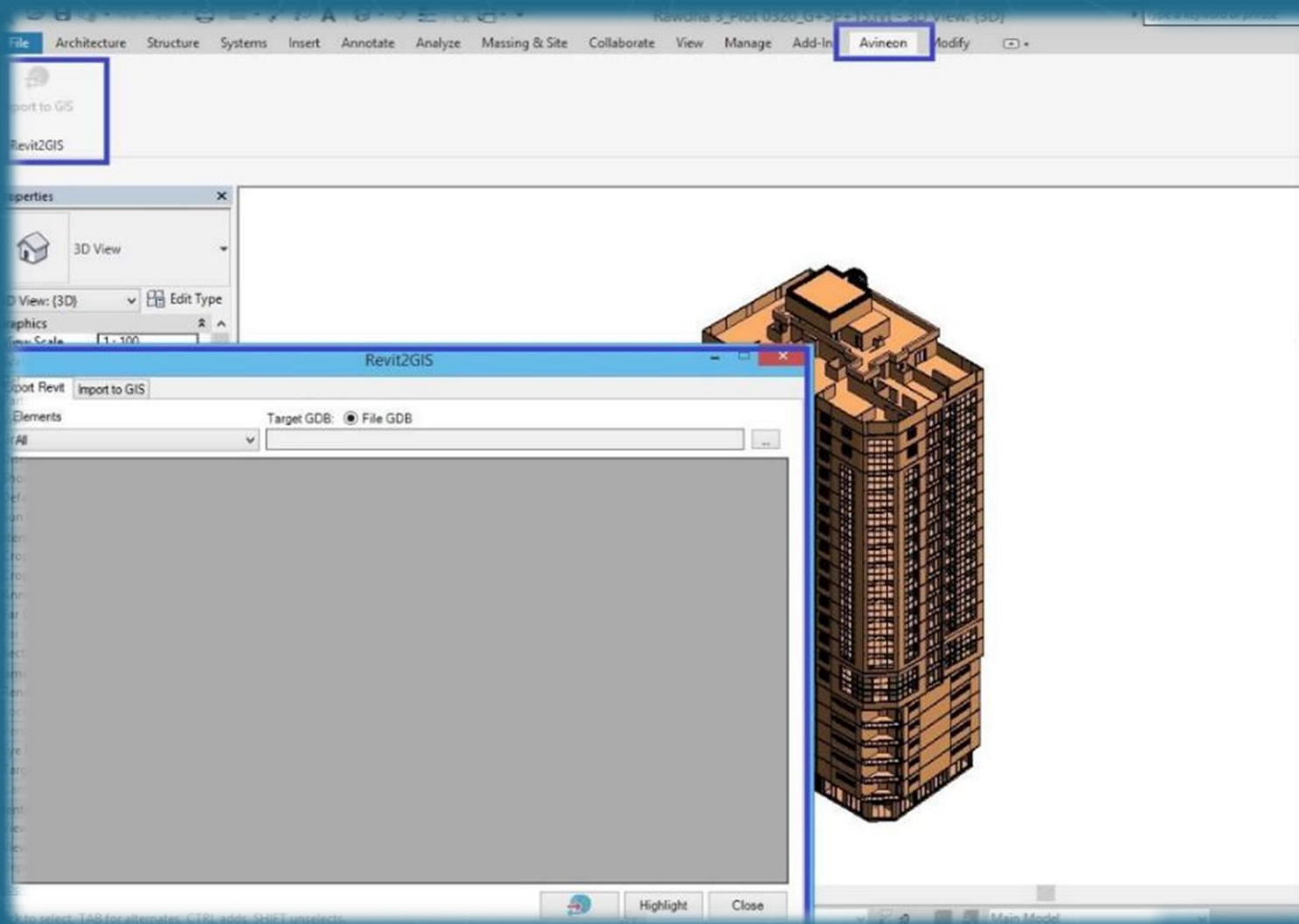
CAD to BIM Migrator

The screenshot displays the AutoCAD interface with several key components:

- AutoCAD To Revit Converter Dialog:** A window for configuring the conversion process. It includes fields for:
 - Select the Folder for the AutoCAD Drawings: D:\BIM\Drawings
 - Select the Folder for Attribute csv: D:\BIM\Configuration
 - Select the Folder for the Configuration csv: D:\BIM\Drawings\Configuration.csvIt also features a 'Drawing File to be converted' field, a 'Process Log' area, and 'Run' and 'Cancel' buttons.
- 3D Model:** A 3D perspective view of a multi-story building with a central tower. A 'FRONT' view cube is visible above the model.
- AutoCAD To Revit Validations Dialog:** A window for validation settings. It shows:
 - Project Dwg Path: D:\CAD To Revit Tool\Final Inputs\Validation Tool\20190919
 - Page indicator: 1/1
 - A 'RUN' button.
- Task Pane:** A vertical panel on the right side of the interface containing various tool icons such as 'Data', 'Style', 'Table', 'Tools', 'Maps', 'Groups', and 'Draw Order'.



Geo BIM Migrator





Avineon BIM Viewer (1/3)

Tools Search Dashboard Reports Welcome gpulikallu

- No. of Buildings by Footprint Area
- Builtup Area Vs Parcel Area
- No. of Buildings By Floors
- Buildings Count by Land Use
- Footprint Area Vs Parcel Area
- Buildings By Material

Builtup Area Vs Parcel Area

Sectors Districts AOI

City Center Sector

0 % 15 % +
 15 % 30 % -
 30 % 50 % -
 50 % 70 % -

Above Last Input Range

PieChart BarChart

Submit Reset

* Enter range in increment order

Builtup Vs Parcel Area Range	Building Count
0 To 15%	277
15 To 30%	306
30 To 50%	73
50 To 70%	47
70 And Above%	262

0 To 15
 15 To 30
 30 To 50
 50 To 70
 70 And Above



Avineon BIM Viewer (2/3)



BOQ_ResultData (1).xls - Excel Gini Venkata Ramana Reddy Pulikallu / 015

File Home Insert Draw Page Layout Formulas Data Review View Help Tell me what you want to do

Clipboard Font Alignment Number Styles Cells Editing

Building ID

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	Building ID	Element Name	Type	Total Area (m ²)	Volume (m ³)	Length (m)	Count							
2	AV2030	Columns	M_Rectangular Column	870	319	0	37							
3	AV2030	CurtainWalls	System Panel	4914	0	1729	457							
4	AV2030	Doors	Double Door_Wood	5	0	0	1							
5	AV2030	Doors	Louver_Door_Aluminium	105	1	0	31							
6	AV2030	Doors	Louvered_Double_Door_Aluminium	72	1	0	6							
7	AV2030	Doors	M_Door-Curtain-Wall-Double-Glass	63	1	0	14							
8	AV2030	Doors	M_Door-Curtain-Wall-Single-Glass	12	0	0	6							
9	AV2030	Doors	Single Door_Wood	6140	233	0	1891							
10	AV2030	Doors	Sliding Double Door_Aluminium	1470	17	0	348							
11	AV2030	Doors	Sliding Double Door_Steel	69	1	0	24							
12	AV2030	ExteriorWalls	Basic Wall	14770	3192	6367	2075							
13	AV2030	Floors	Floor	42208	0	0	28							
14	AV2030	InteriorWalls	Basic Wall	43291	7885	15266	4215							
15	AV2030	Railings	Railing	0	0	1818	463							
16	AV2030	Ramps	Ramp	0	0	0	4							
17	AV2030	Roofs	Null	0	0	0	0							
18	AV2030	Rooms	Null	23310	0	0	833							
19	AV2030	Stairs	Monolithic Run	0	0	0	9							
20	AV2030	Windows	Sliding_Window_Aluminium	2609	49	0	633							
21	AV2030	Windows	Rectangle Ventilater_Aluminium	1205	12	0	489							
22	AV2030	Windows	Rectangle Window_Aluminium	46	1	0	1055							
23														
24														



Avineon BIM Viewer (3/3)



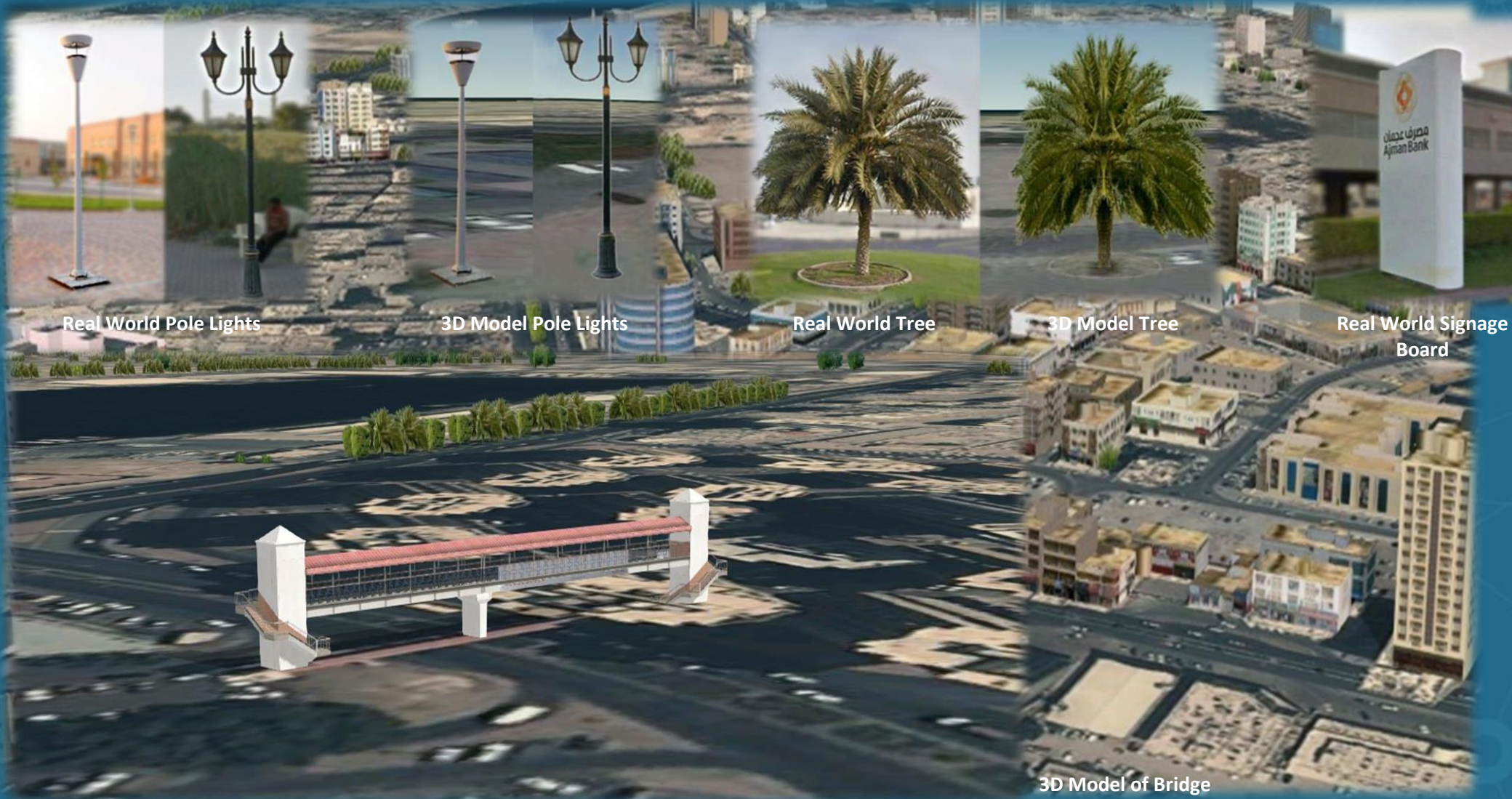
The screenshot displays the Avineon BIM Viewer interface. At the top, there is a navigation bar with icons for Tools, Search, Dashboard, and Reports. The main view is a 3D perspective rendering of a city block with several tall buildings and a network of blue lines representing infrastructure. A data popup window is open on the right side, displaying the following information:

- OBJECTID : 51789
- TYPE : House Connection
- created_user :
- created_date :
- last_edited_user :
- last_edited_date :
- Zv : -2

On the left side, there is a vertical toolbar with icons for zooming in (+), zooming out (-), panning, and other navigation functions. At the bottom left, the scale is set to 1:700 and the coordinates are Y:25°23'34.203" N X:55°26'04.717" E. At the bottom right, there is a circular clock showing 3:59 PM and a compass.



3D City Modelling: Textured 3D model



Real World Pole Lights

3D Model Pole Lights

Real World Tree

3D Model Tree

Real World Signage Board

3D Model Signage Board

3D Model of Bridge



3D City Viewer

Tools Search Analysis Welcome gpulikallu

- Building Information
- Spot Elevation
- BIM BOQ
- Query
- Search By

BOQ					
Building Id	Name	Area (sq m)	Volume (cu m)	Length (m)	Count
50054488	Columns	3972	0	0	70
50054488	CurtainWalls	123688	0	40136	11729
50054488	ExteriorWalls	16731	3503	8443	2710
50054488	Floors	116704	0	0	55
50054488	11th Floor	97	0	0	1
50054488	19th Floor	1804	0	0	1
50054488	21st Floor	3	0	0	1
50054488	22nd Floor	5	0	0	1
50054488	26th Floor	3	0	0	1
50054488	27th Floor	2	0	0	1



Key Challenges overcome

1

Project of such a massive scale probably is the **1st of its kind** to be **successfully implemented** in ME

2

Current technology framework and platform does **not** provide a **seamless interoperability** between **ESRI & Autodesk Revit** for such huge numbers of heavy BIM data (*+15 000 buildings*)

3

FME as a **3rd party plug-in** for Revit to GIS conversion using **IFC format** – causing loss in attributes & fields, as well as creation of additional “redundant” fields

4

Avineon developed **customized methods/tools** for **overcoming** IFC format/FME shortcomings in migrating from Revit models to GIS

5

ESRI has **limitation** with creating **data store** for publishing massive multi-patch geometry scene services. **Avineon** devised **turnaround methods** to overcome the publishing challenges

Business Value & End user benefits

1

Published standards, templates & specifications enable contractors to **submit building design in BIM up to LOD 500**

2

Building permit process **visualizes buildings in BIM** before approving designs

3

Building standards/codes validation tools help **automated validation** of building rules (*e.g. No. of exits required / doors less than certain height / access ramp specifications / etc.*)

4

Automated process for **converting 2D CAD plans to 3D Revit BIM drawings**

5

Automated tools enable **quick conversion** of **BIM drawings into GIS**

6

Web application enables multiple govt. authorized users to **see building information in web browsers** in a secured environment

7

Web application enables users to run and derive **data mining / business analytics** across multiple buildings / regions (*e.g. material quantities / floor space available / open space vs. built up space / etc.*)

8

BIM output is being utilized in developing a **textured 3D building and VR views** of key installations

Thank you

*3DGI – Internationale Fachtagung zu 3D-Geoinformation,
29. August 2019, FHNW Muttensz*