



# GIS for Facilities & Campus Planning

Pat Wallis, AICP, Assoc. AIA, GISP

Facilities Practice Lead

Technical Workshop

# GIS for Campus & Facilities Planning

ArcGIS for Facilities



# Facilities Industry

*3 Primary Business Lines...*



## Portfolio

*Tracking Demand, Balancing Requirements and Resources*

## Operations

*Meeting Demand and Capturing Requirements*

## Safety & Security

*Protecting the Investment*

# Facilities & Campus Planning

## *Key Challenges*

# Business Challenges

- **Structure & Collaboration**

- Organizing dispersed facilities data, connecting stove-piped processes and stakeholders for the purpose of better managing and using facilities

- **Do more with less**

- Create efficiencies in facilities management processes
- Clearer understanding of actual space needs vs actual space owned/leased

- **Be more effective**

- Enhance stewardship - reduce footprint / costs
- Better management and faster decision making on aging facilities

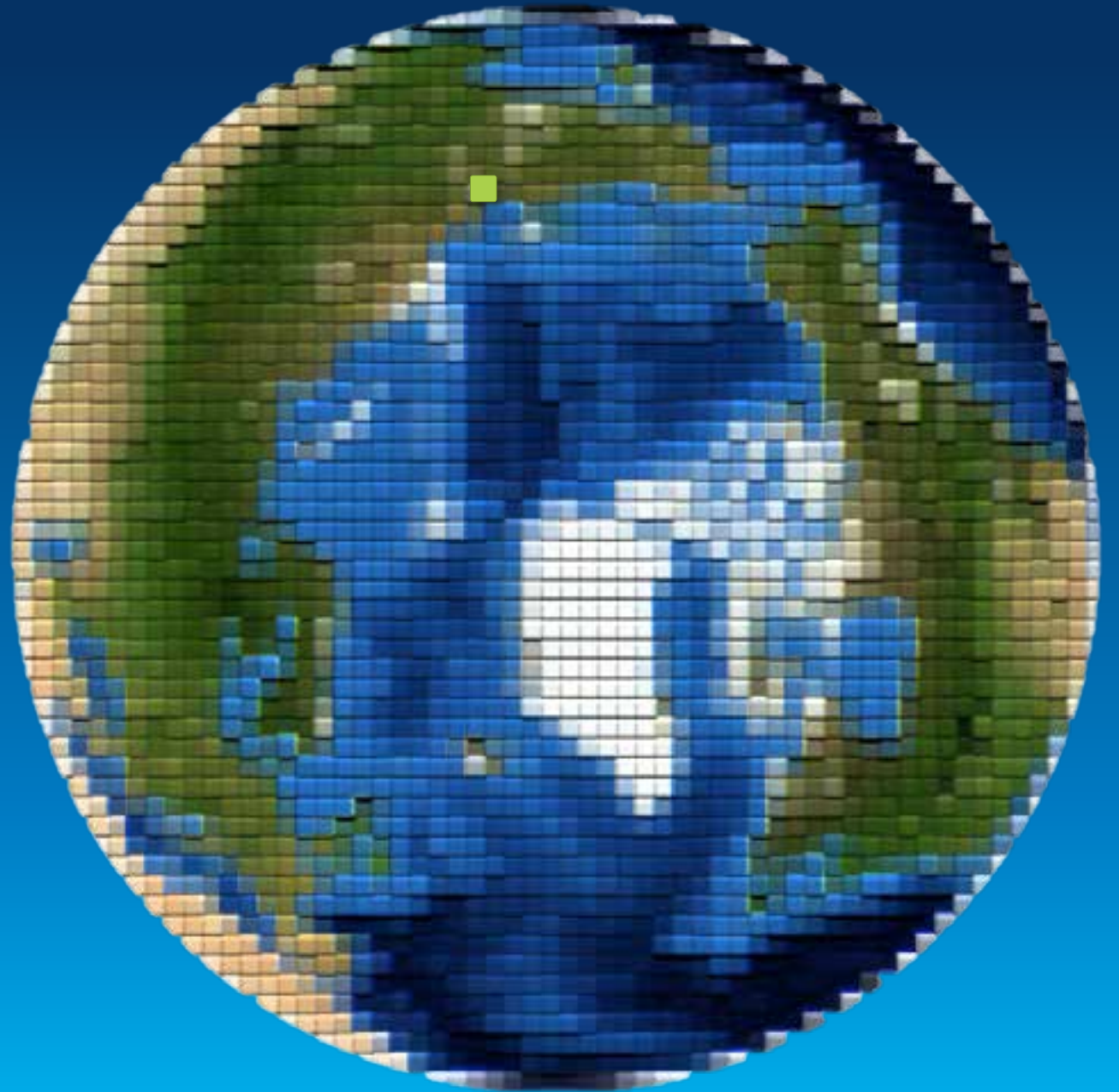
# Fragmentation



# Awareness



# Coordinate(d) Awareness





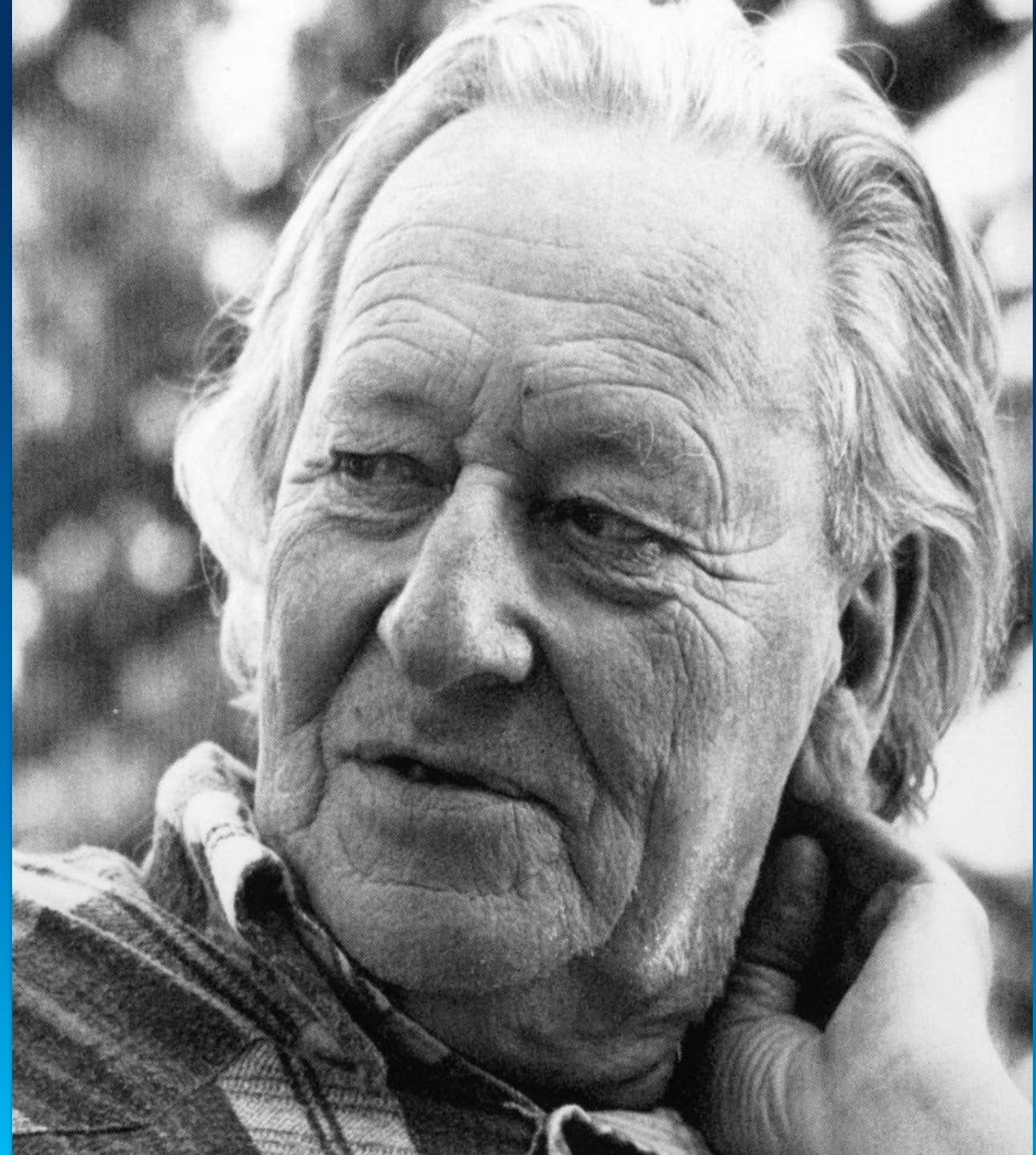
# Spatiality

*System of Relationships*

*“...The lines between (hu)man, computer, and environment are purely artificial... They are not boundaries of the thinking system. What thinks is the total system which engages in trial and error, which is (hu)man plus environment.”*

**Gregory Bateson**

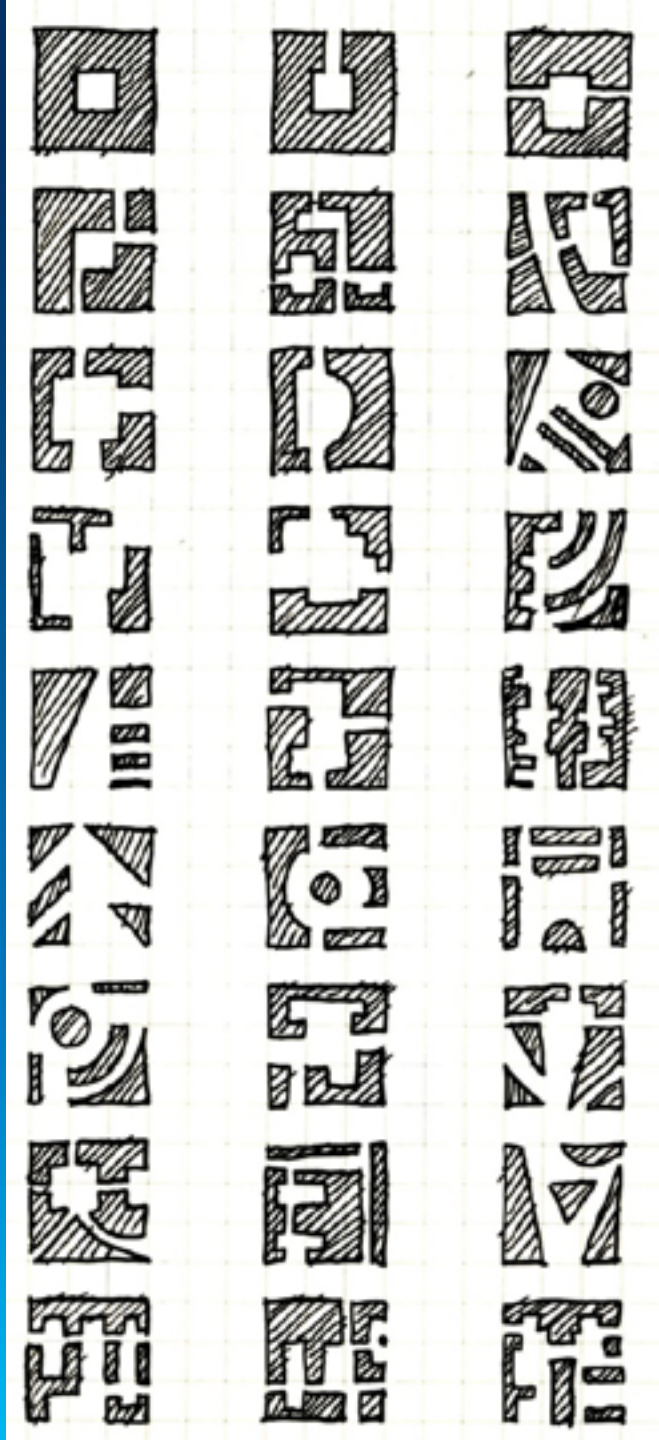
**“An Ecology of the Mind,” 1972**



*“...No pattern is an isolated entity. Each exists in the world only to the extent that it is support by other patterns. This is the fundamental nature of our world.”*

**Christopher Alexander**

**“A Pattern Language,” 1977**

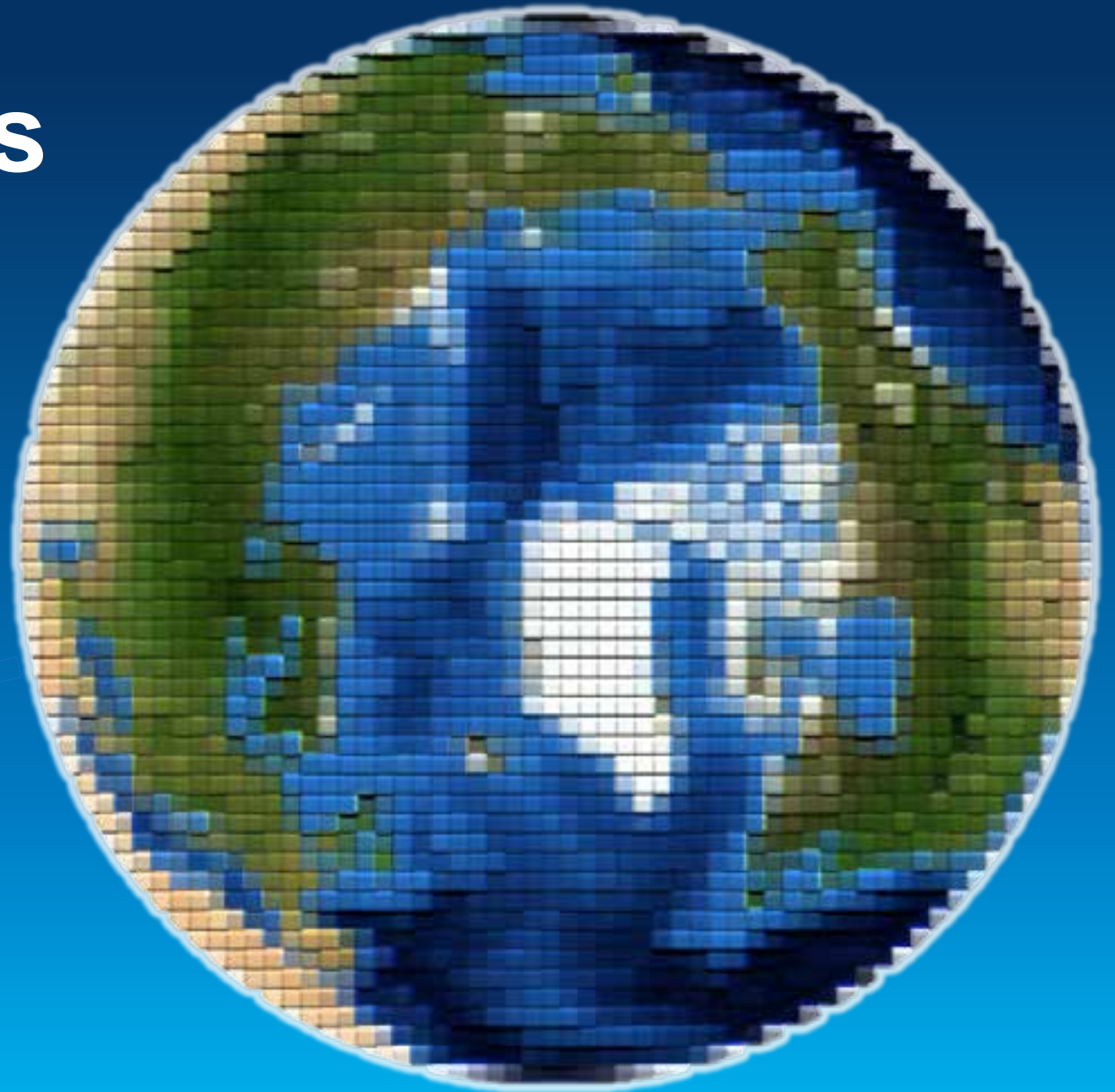
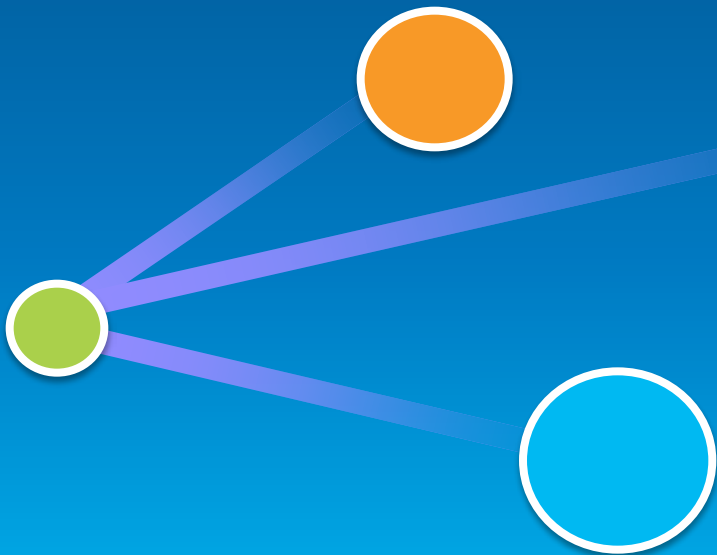


# Spatial Advantage

- **No special training required to understand what you are looking at**
  - You exist and experience the world spatially--spatiality is an innate, shared system of representation allowing you to communicate instantly with others
  - It the common language of understanding
- **Perspective (and Insight)**
  - A defined perspective focuses your gaze on a particular view or series of views—this filtering of your field of view is fundamental to providing insight
  - Spatiality raises the viewers consciousness by providing a better understanding of the surrounding world and how we exist together in it
  - Perspective allows viewers to experience the connectedness between the objects of their observation. Experiencing what you know vs. Seeing it.

# Connecting Dots

- Understanding where
- Measuring size, shape, and distribution
- Determining how places are related
- Finding the best locations and paths
- Detecting and quantifying patterns
- Making predictions

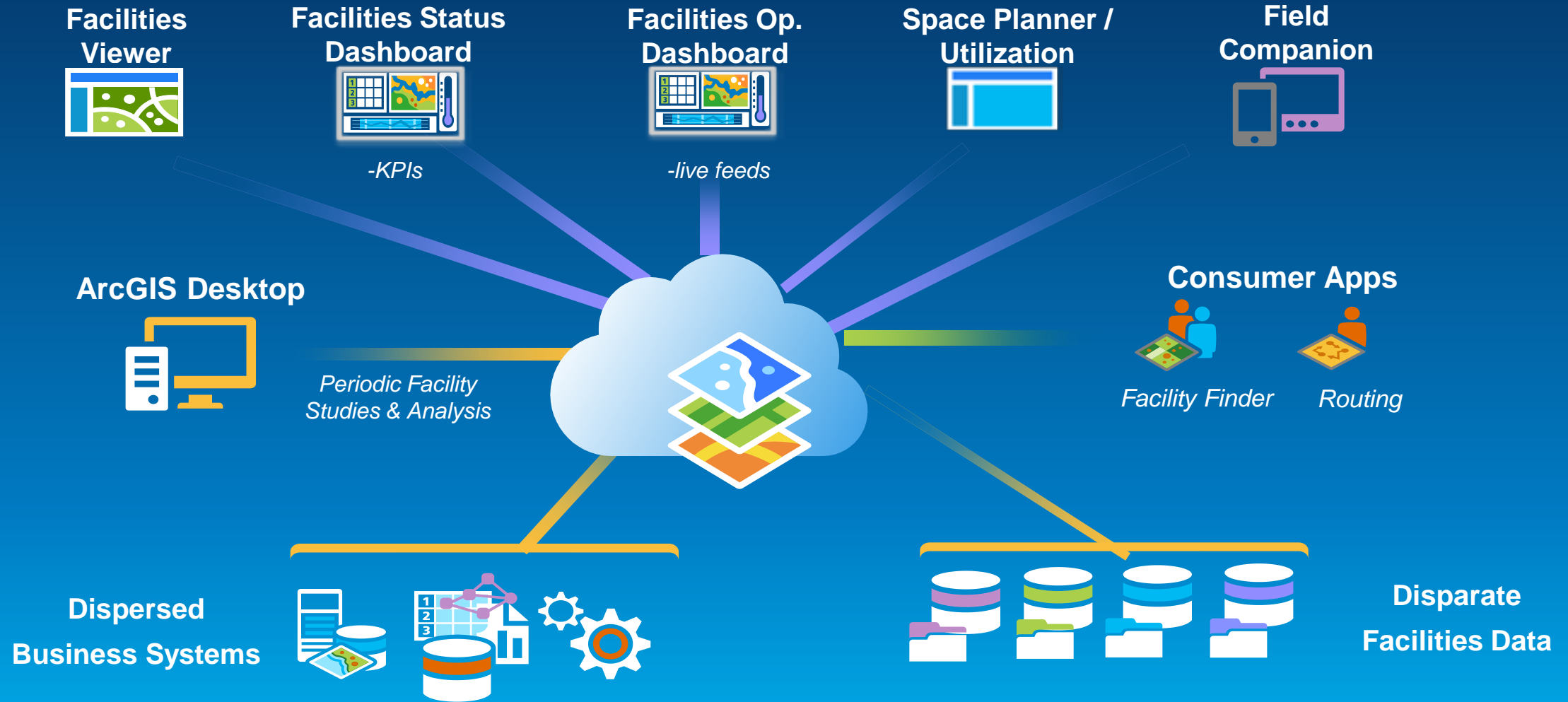


# ArcGIS for Facilities

## *A Spatial Solution*

# ArcGIS for Facilities

## A Complete Mapping System for Managing Facilities

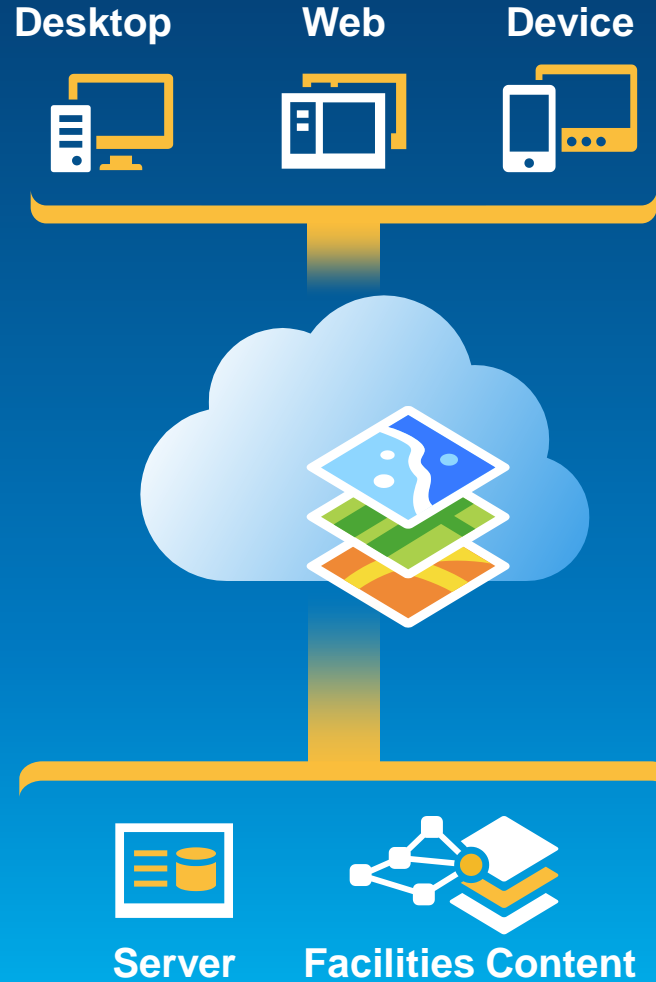


... helps you, your staff & contractors discover, make, use & share facility maps from any device, anywhere, anytime

# Built on the ArcGIS Platform

Enabling Facilities GIS Everywhere

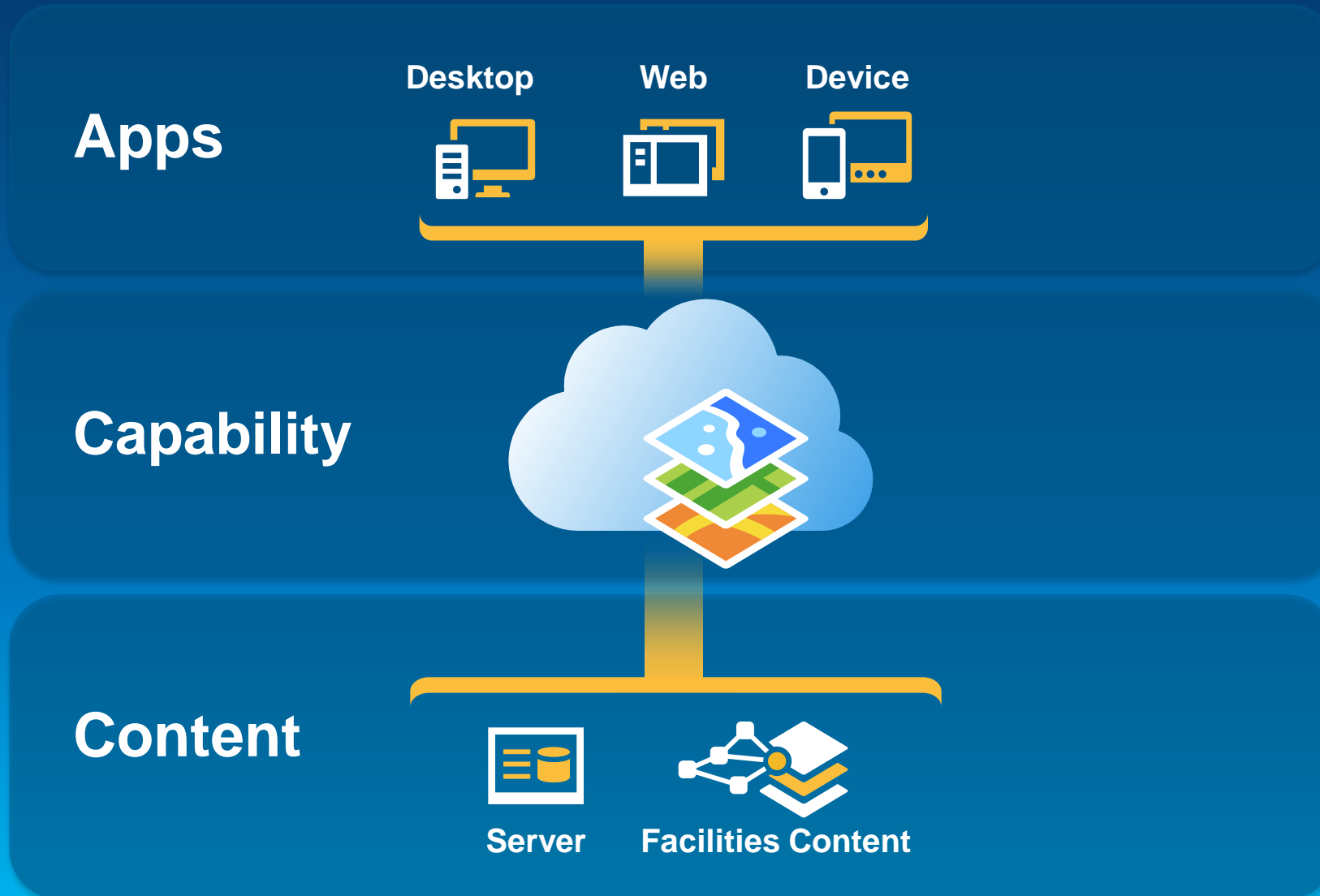
Simple  
Integrated  
Open





# Built on the ArcGIS Platform

## Key Components



# 5 Needed Steps



Prep Data

1



Import Data

2



Generate Features

3



Apply Cartography

4



Share Results

5

# ArcGIS for Facilities

## Components & Implementation Steps

### Facilities Content



### Esri Capability



### Facilities Apps



Location Platform  
for

Operations, Portfolio, and Safety  
& Security Stakeholders



# Desktop

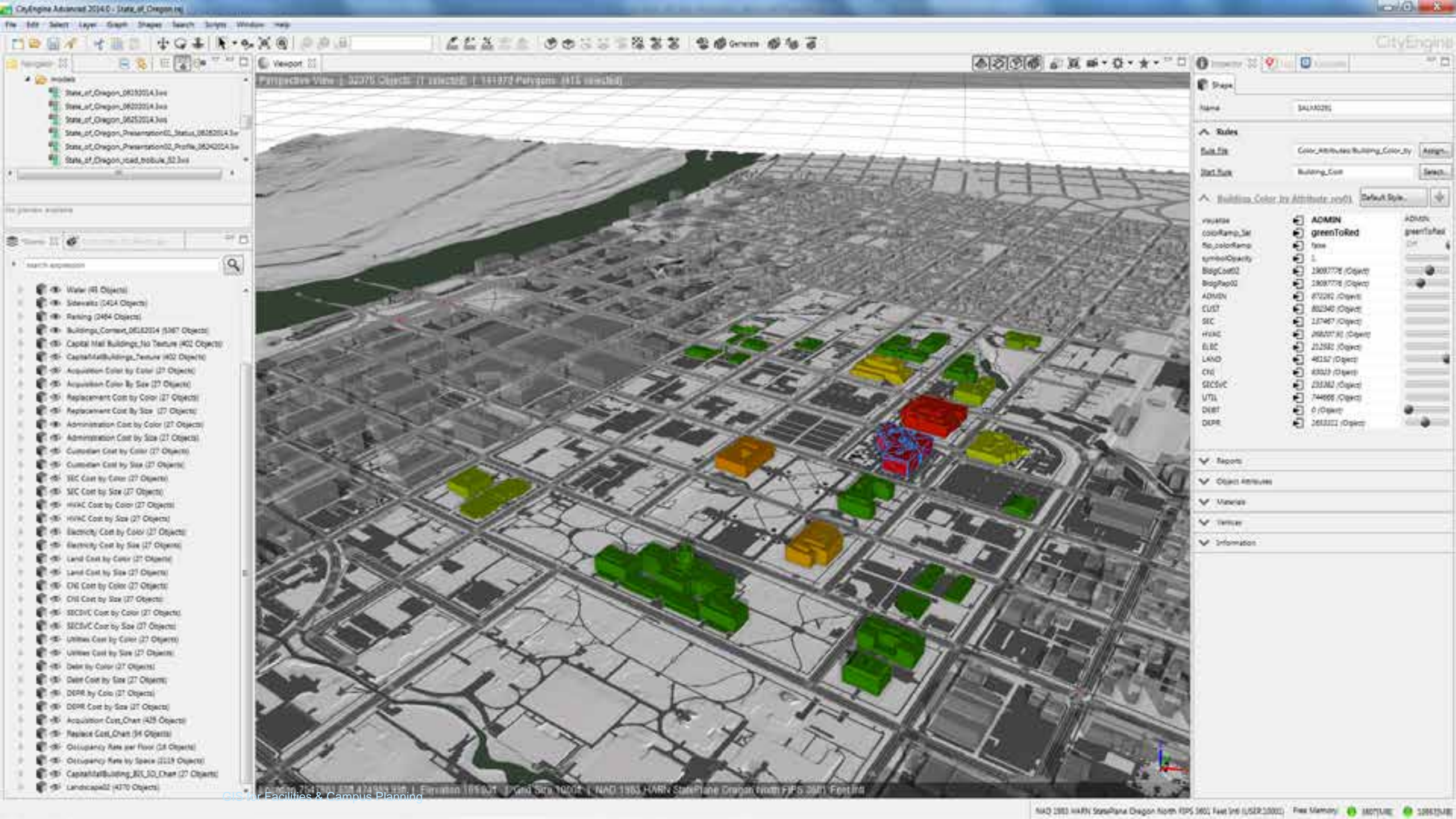
## *ArcGIS for Facilities*

Contents

Drawing Order

- Scene layers
  - 3D Layers
    - Workspaces
    - 3DInfoSurface
      - Map.commission.in
        - #242
        - #243
        - #244
        - #245
        - #250
        - #251
        - #252
        - 1st other values
      - 3DSceneSurface
        - LongName
          - ANNEX
          - BR34L
          - BR34UCOPY
          - CAUCUS
          - CHILLER
          - CL
          - CLRM
          - CLDRM
          - CONFERENCE





Project Explorer

- State\_of\_Oregon\_0618014.3ae
- State\_of\_Oregon\_0620004.3ae
- State\_of\_Oregon\_0625014.3ae
- State\_of\_Oregon\_Presentation02\_Status\_0626014.3ae
- State\_of\_Oregon\_Presentation02\_Profile\_0624014.3ae
- State\_of\_Oregon\_road\_network\_02.3ae

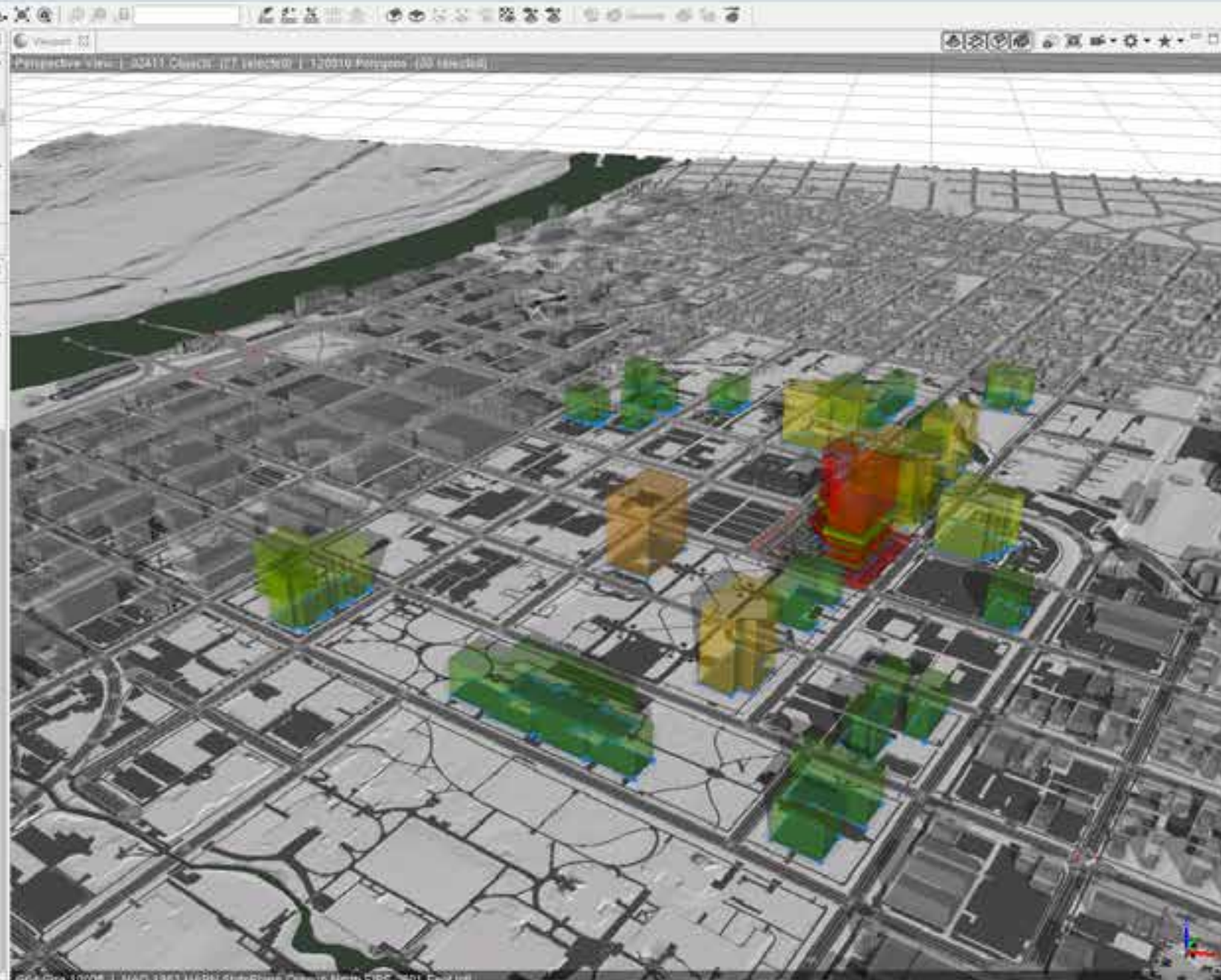
---

No parent objects

---

Search expression

- Water (85 Objects)
- Sidewalks (2424 Objects)
- Parking (2454 Objects)
- Buildings\_Context\_0618014 (3247 Objects)
- Capital Mall Buildings\_No Texture (402 Objects)
- Capital Mall Buildings\_Texture (402 Objects)
- Acquisition Cost by Color (27 Objects)
- Acquisition Cost by Size (27 Objects)
- Replacement Cost by Color (27 Objects)
- Replacement Cost by Size (27 Objects)
- Administration Cost by Color (27 Objects)
- Administration Cost by Size (27 Objects)
- Customization Cost by Color (27 Objects)
- Customization Cost by Size (27 Objects)
- SEC Cost by Color (27 Objects)
- SEC Cost by Size (27 Objects)
- HVAC Cost by Color (27 Objects)
- HVAC Cost by Size (27 Objects)
- Electricity Cost by Color (27 Objects)
- Electricity Cost by Size (27 Objects)
- Land Cost by Color (27 Objects)
- Land Cost by Size (27 Objects)
- CHD Cost by Color (27 Objects)
- CHD Cost by Size (27 Objects)
- SECSTC Cost by Color (27 Objects)
- SECSTC Cost by Size (27 Objects)
- Utilities Cost by Color (27 Objects)
- Utilities Cost by Size (27 Objects)
- Debt by Color (27 Objects)
- Debt Cost by Size (27 Objects)
- DDPR by Color (27 Objects)
- DDPR Cost by Size (27 Objects)
- Acquisition Cost\_Chart (429 Objects)
- Replace Cost\_Chart (24 Objects)
- Occupancy Rate per Floor (18 Objects)
- Occupancy Rate by Space (2218 Objects)
- Capital Mall Building\_Bldg\_3D\_Chart (27 Objects)
- Landscape (4170 Objects)



CityEngine

Shape (27)

Name

---

Rules

Build File: Color\_Attributes/Color\_Chart\_3D\_Re Assign

Start File: Building\_Cost Select

---

Cost\_Chart\_3D\_Build

Default Style

visuals	SEC	SEC
colorRamp_01	greenToRed	SEC
Rg_colorRamp	blue	HVAC
SymbolOpacity	0.5	ELC
BlpCost01	1 (Object)	LAND
BlpCost02	1 (Object)	CHD
ADVEN	1	SECSTC
CUST	1	UTIL
SEC	1	DEBT
HVAC	1	DDPR
ELC	1	
LAND	1	
CHD	1	
SECSTC	1	
UTIL	1	
DEBT	1	
DDPR	1	

---

Reports

---

Object Attributes

---

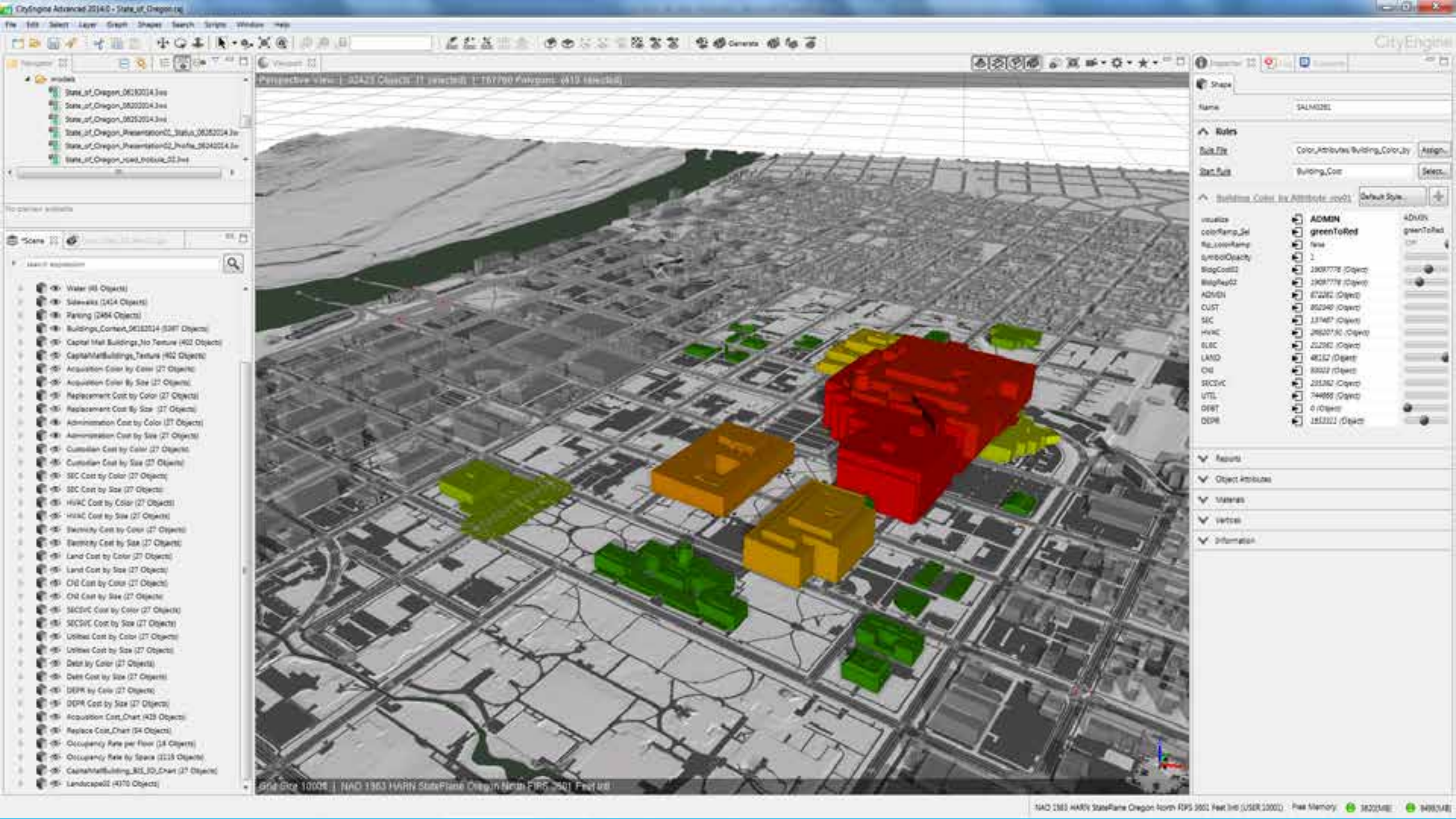
Materials

---

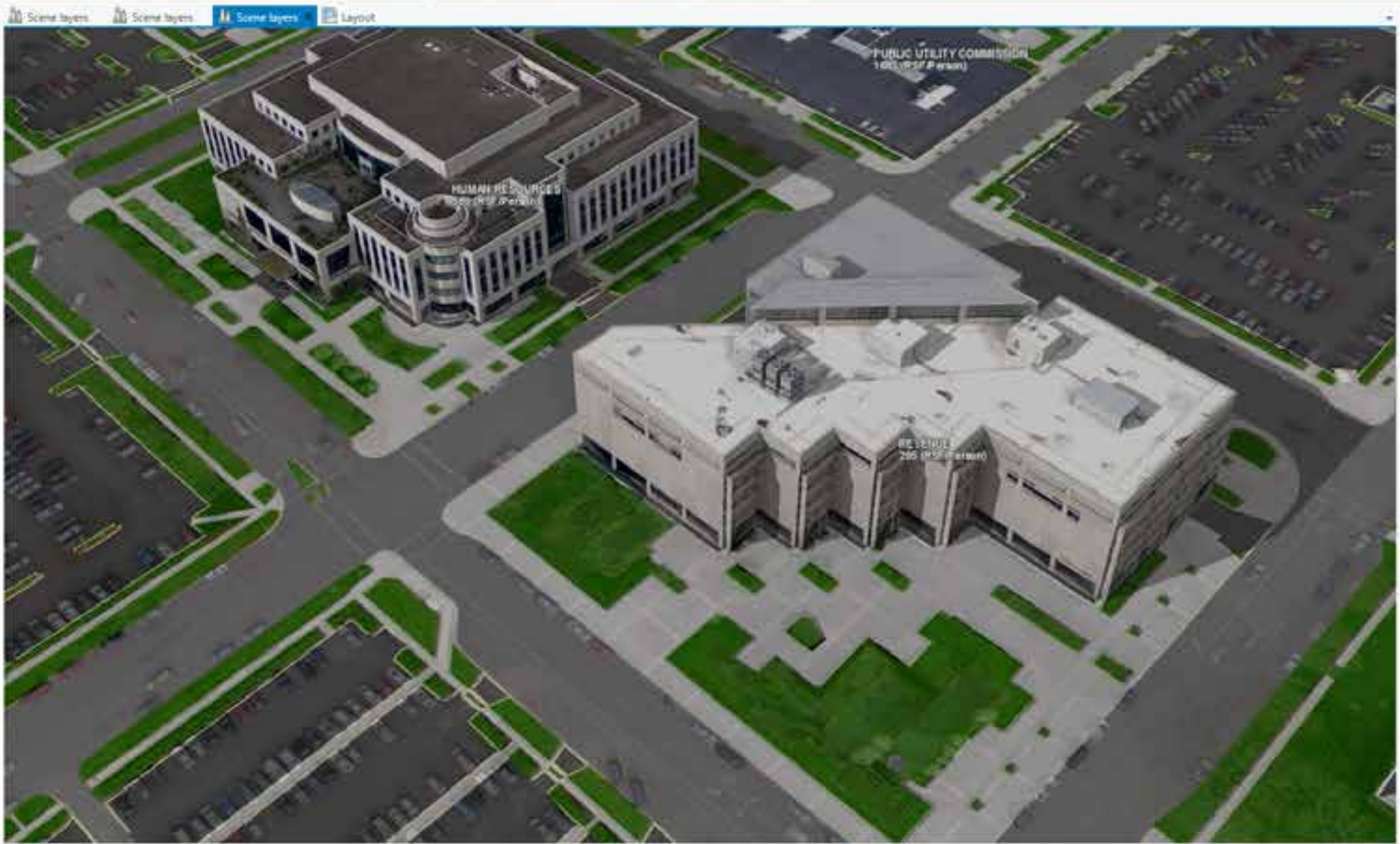
Vertex

---

Information







### Symbology

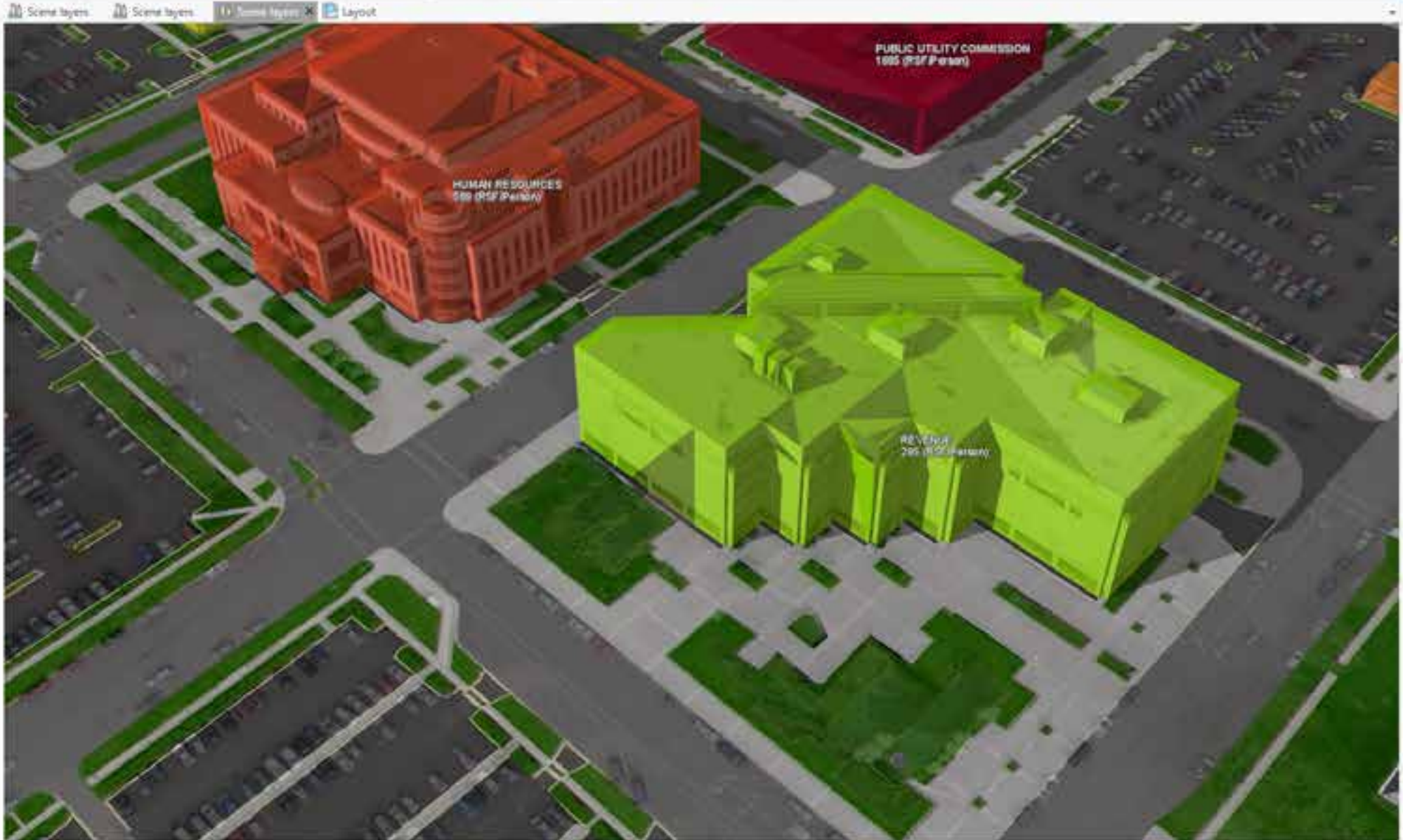
Single Symbol : Study Buildings

Current symbol

Descriptions

Label in table of contents

Description in legend



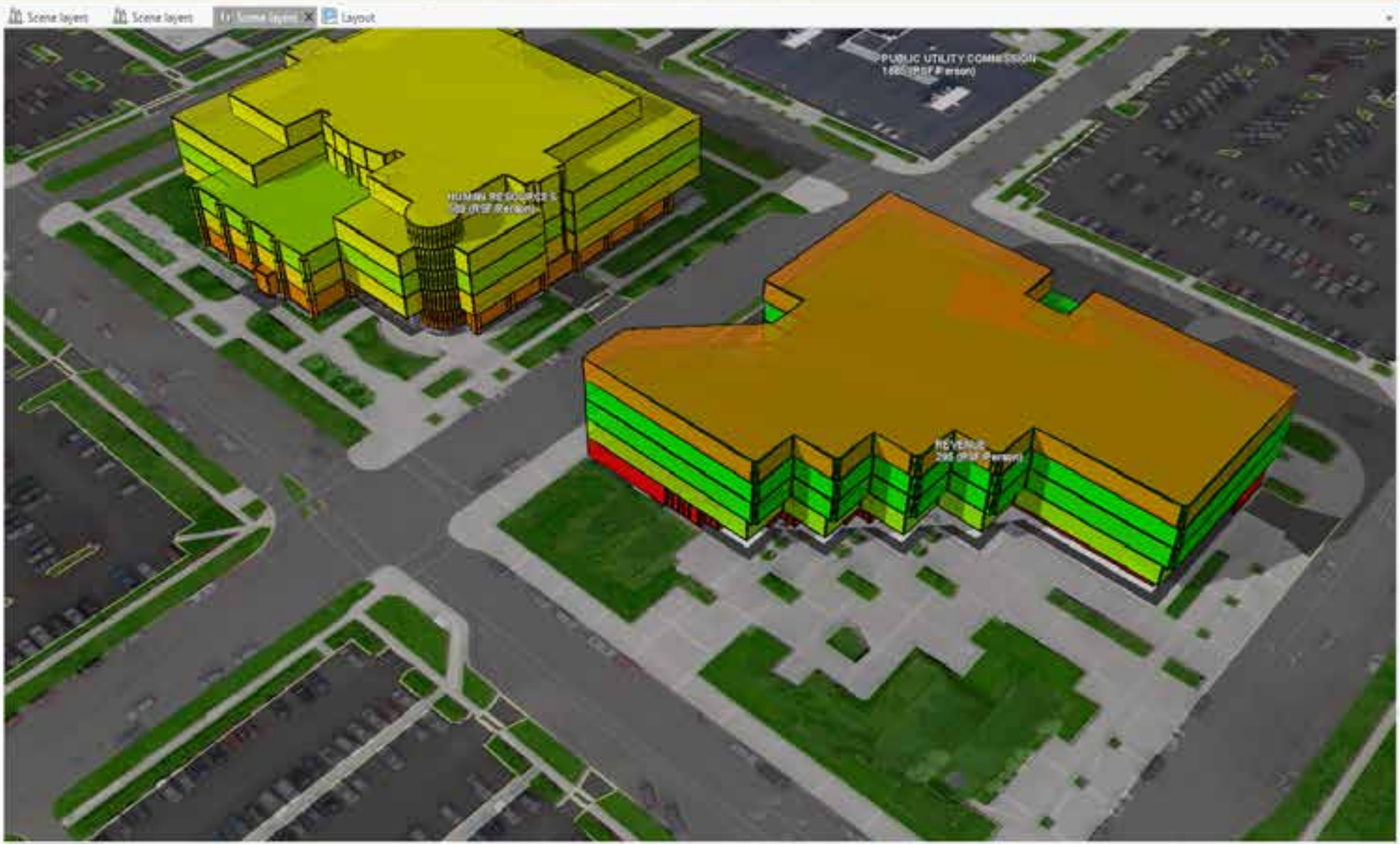
### Symbology

Graduated Colors - Study Buildings by

Field: OC\_RSIF  
 Normalization: None  
 Method: Natural Breaks (Jenks)  
 Classes: 8  
 Color scheme: [Color gradient bar]

Class breaks

Symbol	Upper value	Label
[Blue square]	≤ 224	≤224.000000
[Green square]	≤ 267	≤267.000000
[Light Green square]	≤ 302	≤302.000000
[Yellow square]	≤ 326	≤326.000000
[Orange square]	≤ 474	≤474.000000
[Red square]	≤ 585	≤585.000000
[Dark Red square]	≤ 1170	≤1170.000000
[Dark Red square]	≤ 1885	≤1885.000000



### Symbology

Graduated Colors - Penthouse

Field: OC\_RSF\_Ratio

Normalization: None

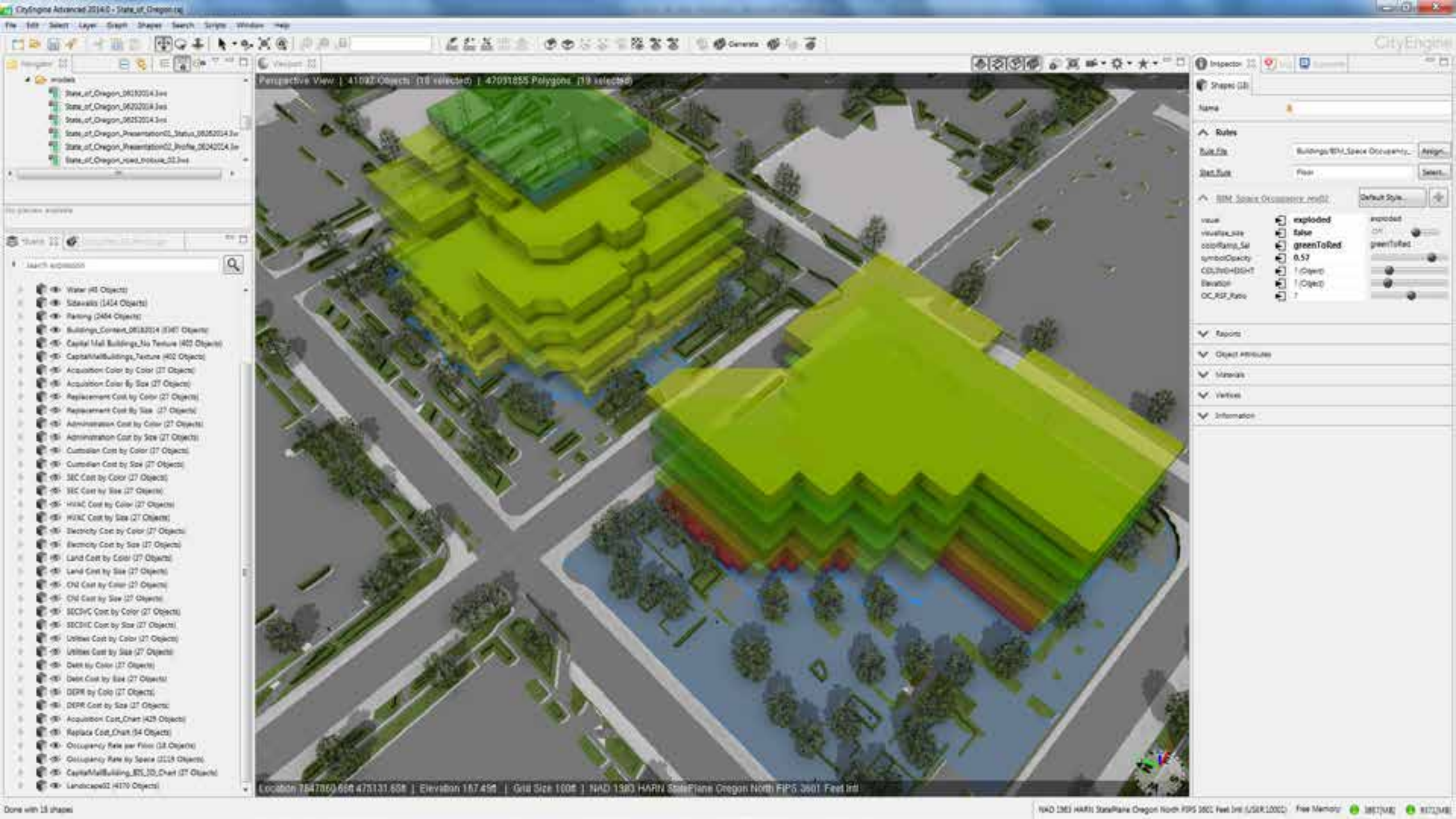
Method: Natural Breaks (Jenks)

Classes: 5

Color scheme: [Color gradient bar]

Class breaks Options

Symbol	Upper value	Label
[Green square]	< 216	175 - 216
[Light Green square]	< 214	217 - 314
[Yellow square]	< 385	315 - 385
[Orange square]	< 441	386 - 441
[Red square]	> 750	442 - 750



Inspector

Models

- State\_of\_Oregon\_06182014.3.rvt
- State\_of\_Oregon\_06202014.3.rvt
- State\_of\_Oregon\_06252014.3.rvt
- State\_of\_Oregon\_Presentation02\_Status\_06252014.3.rvt
- State\_of\_Oregon\_Presentation02\_Profile\_06242014.3.rvt
- State\_of\_Oregon\_road\_network\_02.3.rvt

---

Search expression

- Water (40 Objects)
- Sidewalk (1454 Objects)
- Railing (2454 Objects)
- Building\_Context\_06182014 (346) Objects
- Capital Mall Buildings\_No Texture (402 Objects)
- CapitalMallBuildings\_Texture (402 Objects)
- Acquisition Cost by Color (27 Objects)
- Acquisition Cost by Size (27 Objects)
- Replacement Cost by Color (27 Objects)
- Replacement Cost by Size (27 Objects)
- Administration Cost by Color (27 Objects)
- Administration Cost by Size (27 Objects)
- Custom Cost by Color (27 Objects)
- Custom Cost by Size (27 Objects)
- SEC Cost by Color (27 Objects)
- SEC Cost by Size (27 Objects)
- HWK Cost by Color (27 Objects)
- HWK Cost by Size (27 Objects)
- Electricity Cost by Color (27 Objects)
- Electricity Cost by Size (27 Objects)
- Land Cost by Color (27 Objects)
- Land Cost by Size (27 Objects)
- Oil Cost by Color (27 Objects)
- Oil Cost by Size (27 Objects)
- SEC/CFC Cost by Color (27 Objects)
- SEC/CFC Cost by Size (27 Objects)
- Utilities Cost by Color (27 Objects)
- Utilities Cost by Size (27 Objects)
- Debt by Color (27 Objects)
- Debt Cost by Size (27 Objects)
- DEPR by Color (27 Objects)
- DEPR Cost by Size (27 Objects)
- Acquisition Cost\_Chart (429 Objects)
- Replace Cost\_Chart (54 Objects)
- Occupancy Rate per Floor (18 Objects)
- Occupancy Rate by Space (2219 Objects)
- CapitalMallBuilding\_BTS\_3D\_Chart (27 Objects)
- Landscape02 (4170 Objects)

Perspective View | 41092 Objects | 116 selected | 47091855 Polygons | 19 selected

Location 7547850.658 475131.658 | Elevation 167.490 | Grid Size 100ft | NAD 1983 HARN StatePlane Oregon North FIPS 3201 Feet Int

CityEngine

Inspector

Shapes (8)

Name

Rules

Buildings/WH\_SpaceOccupancy...

Assign

WH\_SpaceOccupancy.mxd

Default Style...

value	exploded	exploded
visualize_size	false	ON
colorRange_Sat	greenToRed	greenToRed
symbolOpacity	0.57	
COL_DEPTH	1 Object	
Elevation	1 Object	
OC_RST_Ratio	1	

Reports

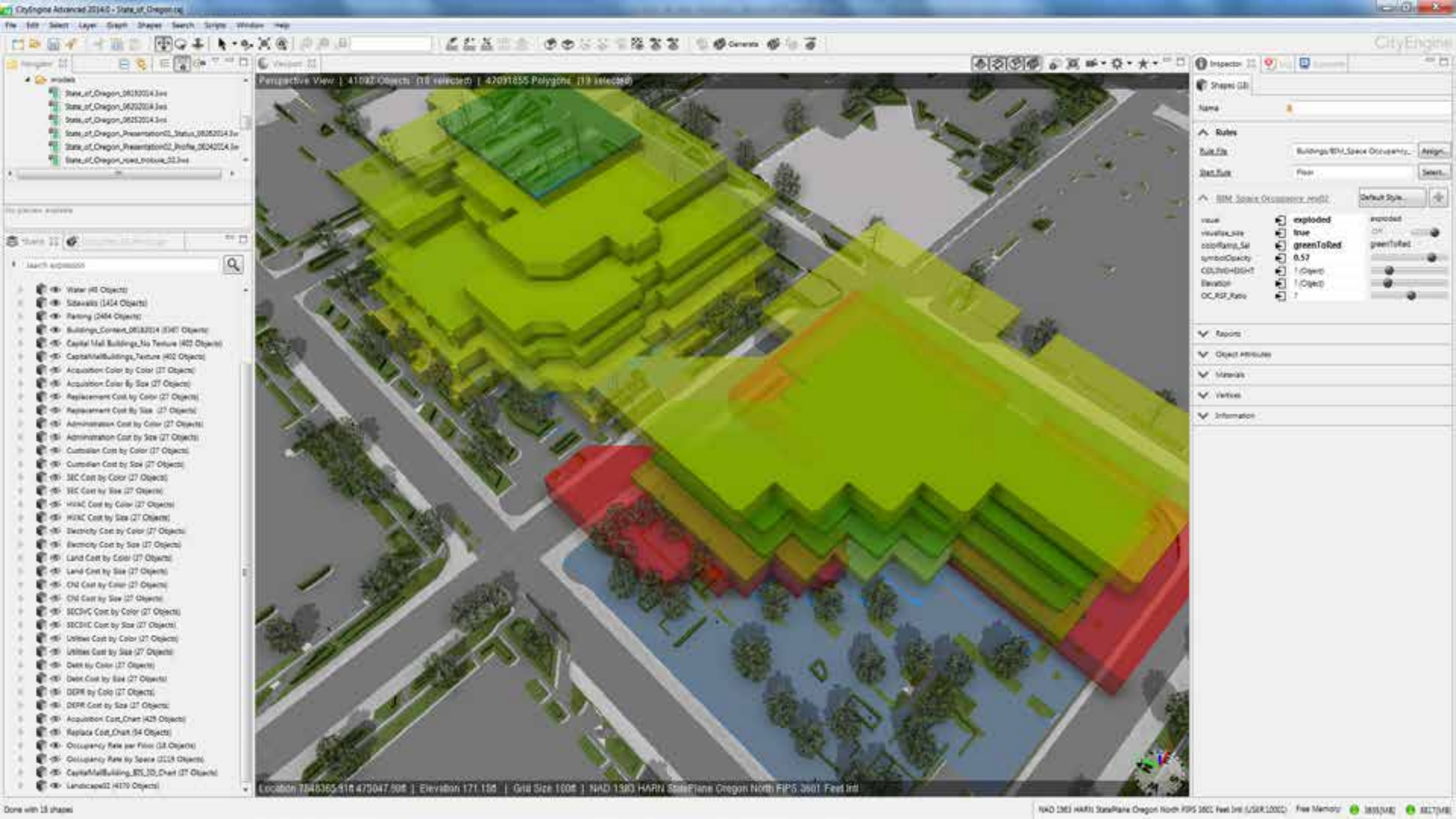
Object Attributes

Materials

Vertices

Information

NAD 1983 HARN StatePlane Oregon North FIPS 3201 Feet Int (USER:10002) Free Memory 18671MB 83723MB



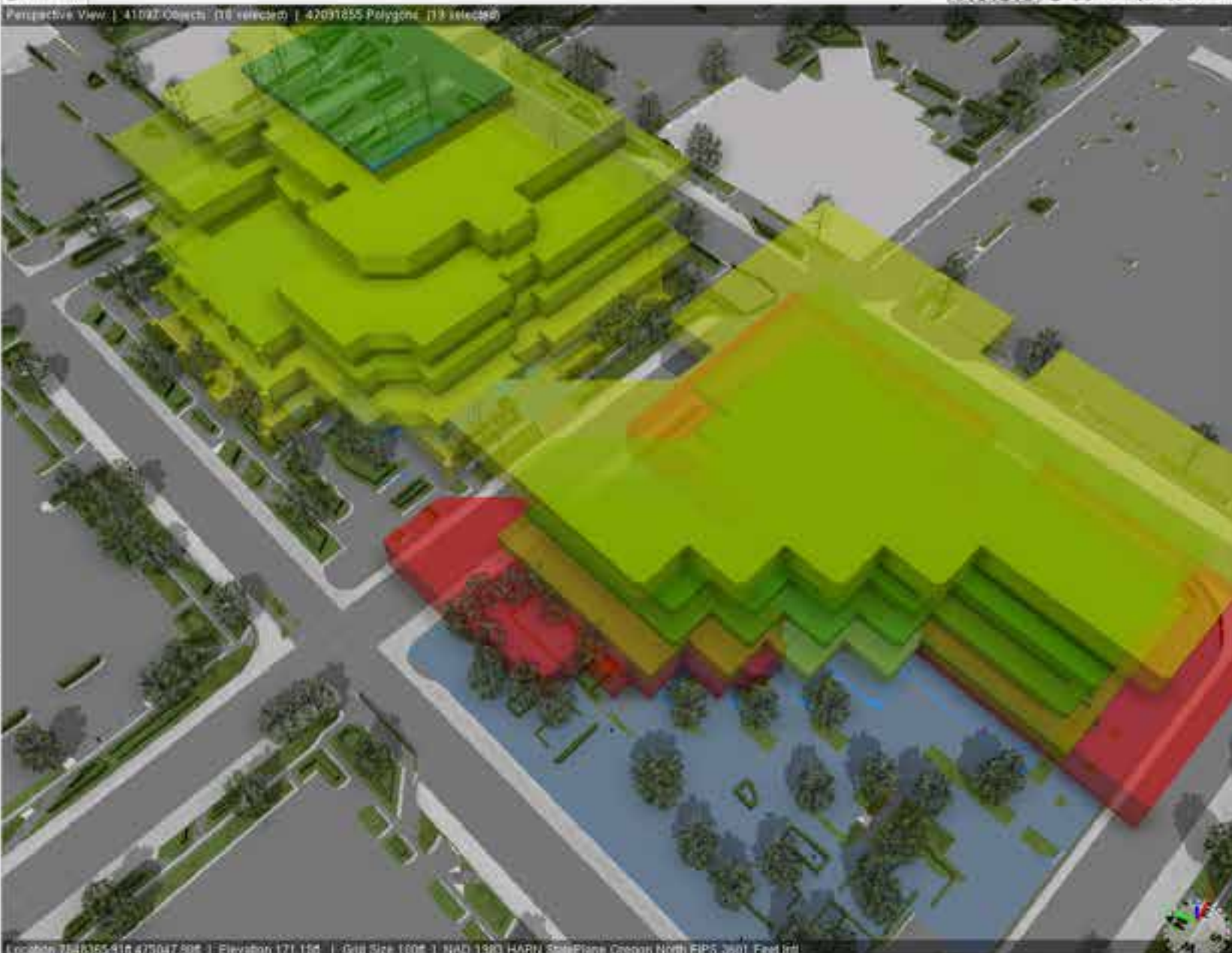
Inspector

- models
- State\_of\_Oregon\_0612014.rvt
- State\_of\_Oregon\_0202014.rvt
- State\_of\_Oregon\_06252014.rvt
- State\_of\_Oregon\_Presentation02\_Status\_06252014.rvt
- State\_of\_Oregon\_Presentation02\_Profile\_06242014.rvt
- State\_of\_Oregon\_road\_network\_02.rvt

No global aliases

Search expression

- Water (40 Objects)
- Site walls (1454 Objects)
- Railing (2454 Objects)
- Buildings\_Context\_06182014 (346) Objects
- Capital Mall Buildings\_No Texture (402 Objects)
- CapitalMallBuildings\_Texture (402 Objects)
- Acquisition Cost by Color (27 Objects)
- Acquisition Cost by Size (27 Objects)
- Replacement Cost by Color (27 Objects)
- Replacement Cost by Size (27 Objects)
- Administration Cost by Color (27 Objects)
- Administration Cost by Size (27 Objects)
- Custom Cost by Color (27 Objects)
- Custom Cost by Size (27 Objects)
- SEC Cost by Color (27 Objects)
- SEC Cost by Size (27 Objects)
- HWK Cost by Color (27 Objects)
- HWK Cost by Size (27 Objects)
- Electricity Cost by Color (27 Objects)
- Electricity Cost by Size (27 Objects)
- Land Cost by Color (27 Objects)
- Land Cost by Size (27 Objects)
- Oil Cost by Color (27 Objects)
- Oil Cost by Size (27 Objects)
- SECHC Cost by Color (27 Objects)
- SECHC Cost by Size (27 Objects)
- Utilities Cost by Color (27 Objects)
- Utilities Cost by Size (27 Objects)
- Debt by Color (27 Objects)
- Debt Cost by Size (27 Objects)
- DEPR by Color (27 Objects)
- DEPR Cost by Size (27 Objects)
- Acquisition Cost\_Chart (429 Objects)
- Replace Cost\_Chart (54 Objects)
- Occupancy Rate per Floor (18 Objects)
- Occupancy Rate by Space (2219 Objects)
- CapitalMallBuilding\_BTS\_3D\_Chart (27 Objects)
- Landscape02 (4170 Objects)



Inspector

Shapes (0)

Name

Rules

Rule File: Buildings/ETH\_Space Occurrence... Assign

Start Rule: Floor Select

Rule: BIM\_Space Occurrence.rvt02 Default Style

value	exploded	exploded
visualize_size	line	greenToRed
colorRange_Sat	greenToRed	greenToRed
symbolOpacity	0.57	
COL_TRANSPARENT	1 Object	
Elevation	1 Object	
OC_RST_Ratio	1	

Reports

Object Attributes

Materials

Vertices

Information



### Symbology

Unique Values: Useable Spaces - 5th

Value field  
Field 1: ROOM\_STATUS

Add field

Color scheme

Values + - Options

Symbol	Value	Label
+	OC	OC
+	VA	VA

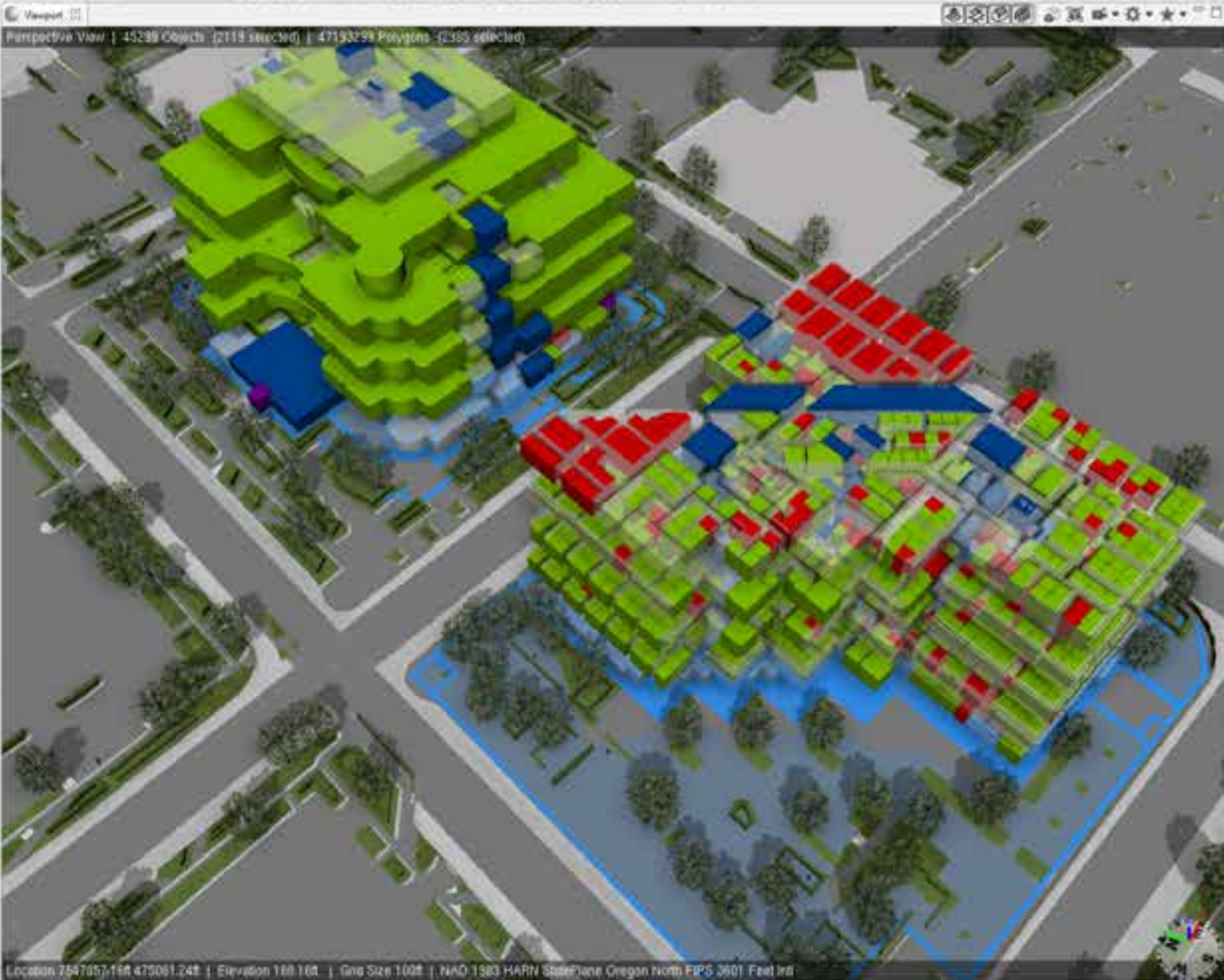
Navigator

- models
  - State\_of\_Oregon\_0612014.rvt
  - State\_of\_Oregon\_06202014.rvt
  - State\_of\_Oregon\_06212014.rvt
  - State\_of\_Oregon\_Presentation02\_Status\_06262014.rvt
  - State\_of\_Oregon\_Presentation02\_Profile\_06242014.rvt
  - State\_of\_Oregon\_road\_model.rvt

No pending elements

Layers

- Search expression
- Water (85 Objects)
  - Sidewalks (2424 Objects)
  - Paving (2464 Objects)
  - Buildings\_Concrete\_0612014 (3367 Objects)
  - Capital Mall Buildings\_No Texture (402 Objects)
  - Capital Mall Buildings\_Texture (402 Objects)
  - Acquisition Cost by Color (27 Objects)
  - Acquisition Cost by Size (27 Objects)
  - Replacement Cost by Color (27 Objects)
  - Replacement Cost by Size (27 Objects)
  - Administration Cost by Color (27 Objects)
  - Administration Cost by Size (27 Objects)
  - Custodian Cost by Color (27 Objects)
  - Custodian Cost by Size (27 Objects)
  - SEC Cost by Color (27 Objects)
  - SEC Cost by Size (27 Objects)
  - HARC Cost by Color (27 Objects)
  - HARC Cost by Size (27 Objects)
  - Electricity Cost by Color (27 Objects)
  - Electricity Cost by Size (27 Objects)
  - Land Cost by Color (27 Objects)
  - Land Cost by Size (27 Objects)
  - CHC Cost by Color (27 Objects)
  - CHC Cost by Size (27 Objects)
  - SEC/CVC Cost by Color (27 Objects)
  - SEC/CVC Cost by Size (27 Objects)
  - Utilities Cost by Color (27 Objects)
  - Utilities Cost by Size (27 Objects)
  - Debt by Color (27 Objects)
  - Debt Cost by Size (27 Objects)
  - DEPR by Color (27 Objects)
  - DEPR Cost by Size (27 Objects)
  - Acquisition Cost\_Chart (429 Objects)
  - Replace Cost\_Chart (34 Objects)
  - Occupancy Rate per Floor (28 Objects)
  - Occupancy Rate by Space (2219 Objects)
  - Capital Mall Building\_BIL\_ID\_Chart (27 Objects)
  - Landscape02 (4179 Objects)



Inspector

Show (128)

Name

Rules

Rule File: Buildings/BN\_Space Occupancy | Assign

Start File: Score | Select

BN\_Space Occupancy | Default Style

view	exploded	exploded
colorRamp_Set	yellowToRed	whiteToBlack
symbolOpacity	1	
CELINEHEIGHT	7 Object	
Elevation	7 Object	
OC_RSF_Rate	100	
ROOM_STATUS	7 Object	OC
SPACETYPE	7	COMMON

Reports

Object Attributes

Materials

Vertical

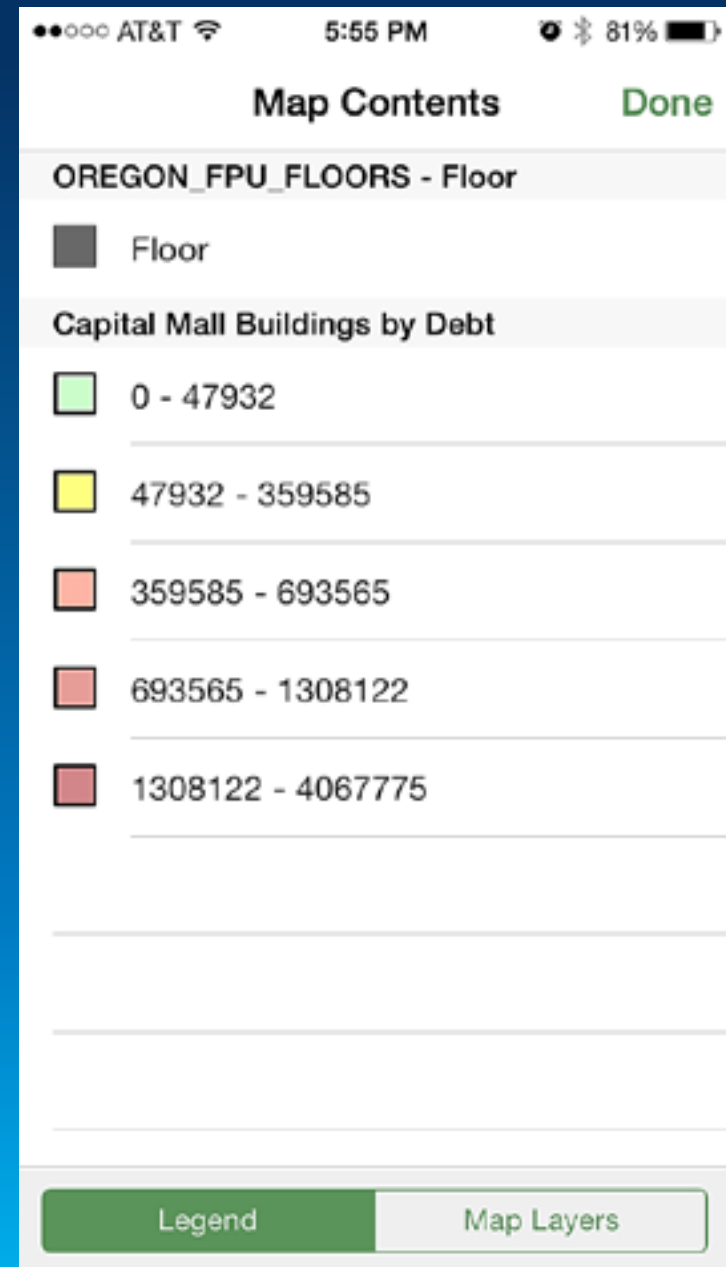
Information

Location: 7547057.168 475081.248 | Elevation: 160.16d | Grid Size: 1.00ft | NAD 1983 HARN StatePlane Oregon north FIPS 3601 Feet Int

# Facilities Viewer

*ArcGIS for Facilities*





Base Alameda



(1 of 7)

**Circulation: PRIVATE OFFICE**

Interior Space: 22064.00,8000.00211

Identifier

Floor Identifier: 24312.01

Building Floor: 0

Section

Building Name: BLDG 50 011

Floor Number: 01

Full Name of Space: PRIVATE OFFICE

Description: Director - Aux. R. Region

Access Type

Ceiling Height: 14.20

Base Elevation: 0.00

Legend

**Object - Circulation**

- Corridor
- Stairway

**Analysis - BuildingsKPI**

- <=50%
- 50-75%
- 75-90%
- 90-110%
- 110-150%
- 150-200%

**Object - Buildings**

- Building
- Structure

# Facility Status Dashboards

## *ArcGIS for Facilities*

New Legend

- OREGON\_FPU\_Spaces
  - NA
  - Building Support, NA
  - COMMON, NA
  - Corridor, NA
  - Open Space Circulation, NA
  - Room, NA
  - Room, CC
  - Room, VA
  - Vertically Penetrated, NA
  - Workspace, NA
  - Workspace, CC
  - Workspace, VA

OREGON\_FPU\_FLOORS - Floor

- Capital Mall Buildings by Debt
  - 0 - 47932
  - 47932 - 109545
  - 109545 - 209585
  - 209585 - 3308122
  - 3308122 - 4067775

Total Usable SF:

1,306,149.93



Oregon State

## REVENUE BUILDING

Department of Administrative Services



\$19,097,776

14%

Acquisition Cost

Acquisition Cost

Acquisition Cost

\$19,097,776

7%

Replacement Co...

Replacement Co...

Replacement Co...

\$744,666

20%

Utility Cost

Utility Cost

Utility Cost

UNIVERSITY OF OREGON



# Space Planner

## *ArcGIS for Facilities*



Symbology

Unique Values - Useable Spaces - 5th

Value field

Field 1: ROOM\_STATUS

Add field

Color scheme

Values

Symbol	Value	Label
+	OC	OC
+	VA	VA

Building Replacement Costs

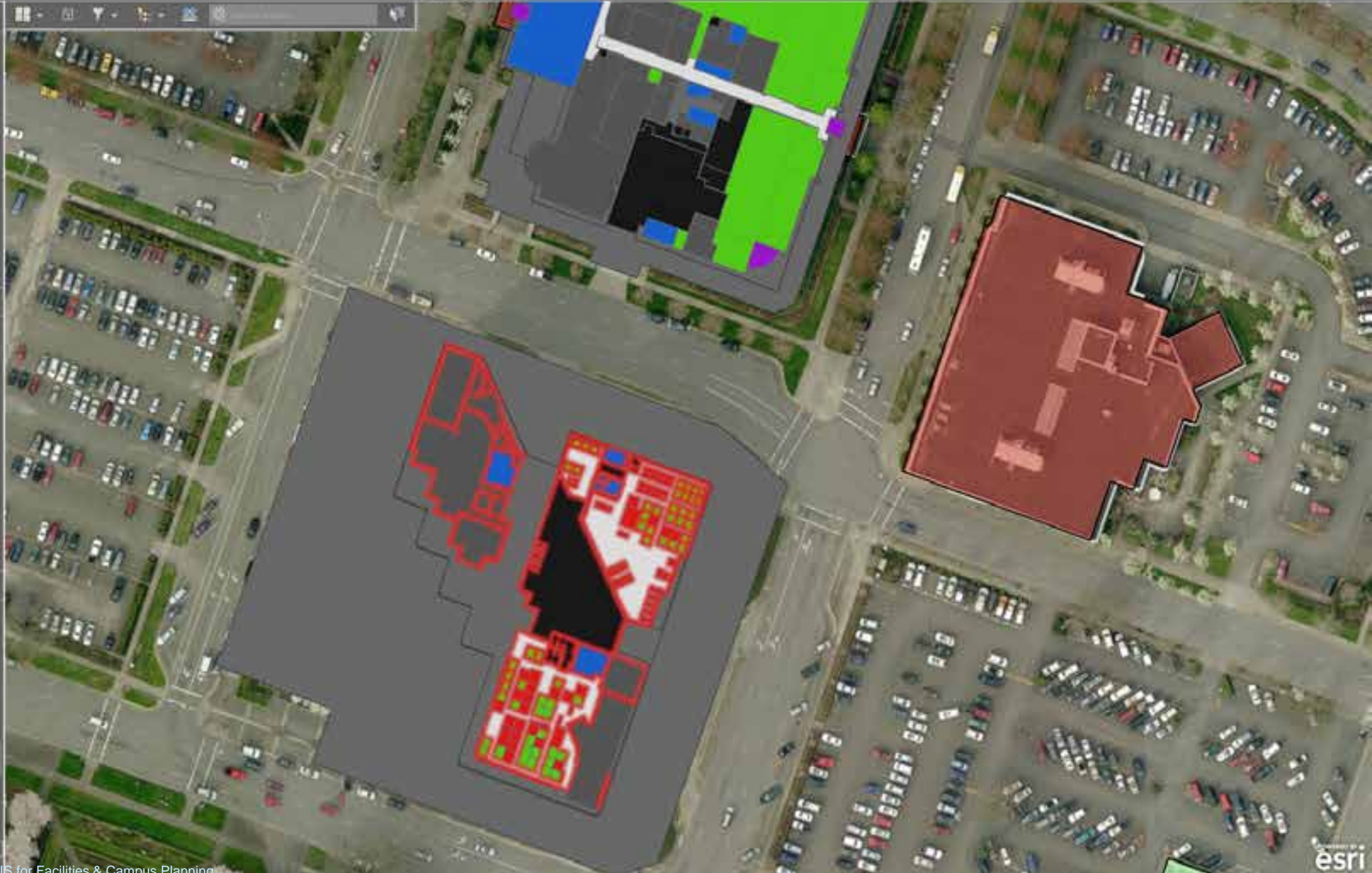
\$48,067,745.00

RSF Per Occupant

295.00

New Pie Chart

INITIAL BUILDING





**Condition & Utilization**  
 Drag the sliders to select matching buildings

200 100 100 100 100 100 200

0 0 10 0 -97 -1509 -1412

0.9 >= 100 >= 100 >= 100 >= 100 >= 200 >=

300 > ME > UR > ME > IC > PI > IC >

0 0 10 0 97 1509 1412

Table View Calc Repair Report

Features selected	Total Repair Cost	Total Use Cost
215	\$4,403,000	\$17,526,000



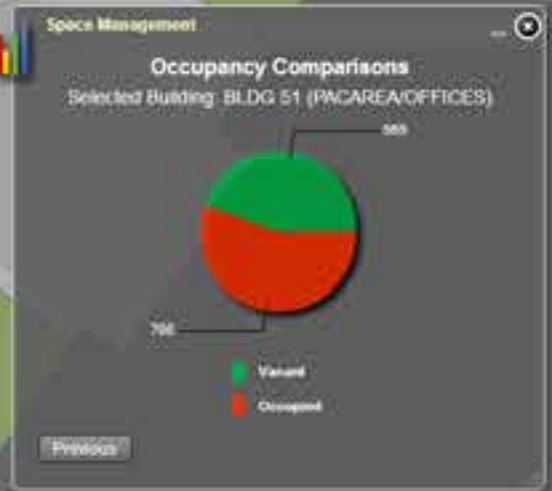
### Condition & Utilization

Drag the sliders to select matching buildings

200	100	100	100	100	100	200
0	0	10	0	-97	-1509	-1412
8.9	100	100	100	100	100	200
508	MI	UI	MU	FC	PI	FG
0	0	10	0	-97	-1509	-1412

Table View Calc Repair Report

Facilities selected	Total Repair Cost	Total Use Cost
215	\$4,403,000	\$17,526,000



### Floor C

- 2nd Floor
- Mezzanine
- 1st Floor
- Ground

# Implementation

## *ArcGIS for Facilities*

# ArcGIS for Facilities - Implementation

Portfolio



Operations

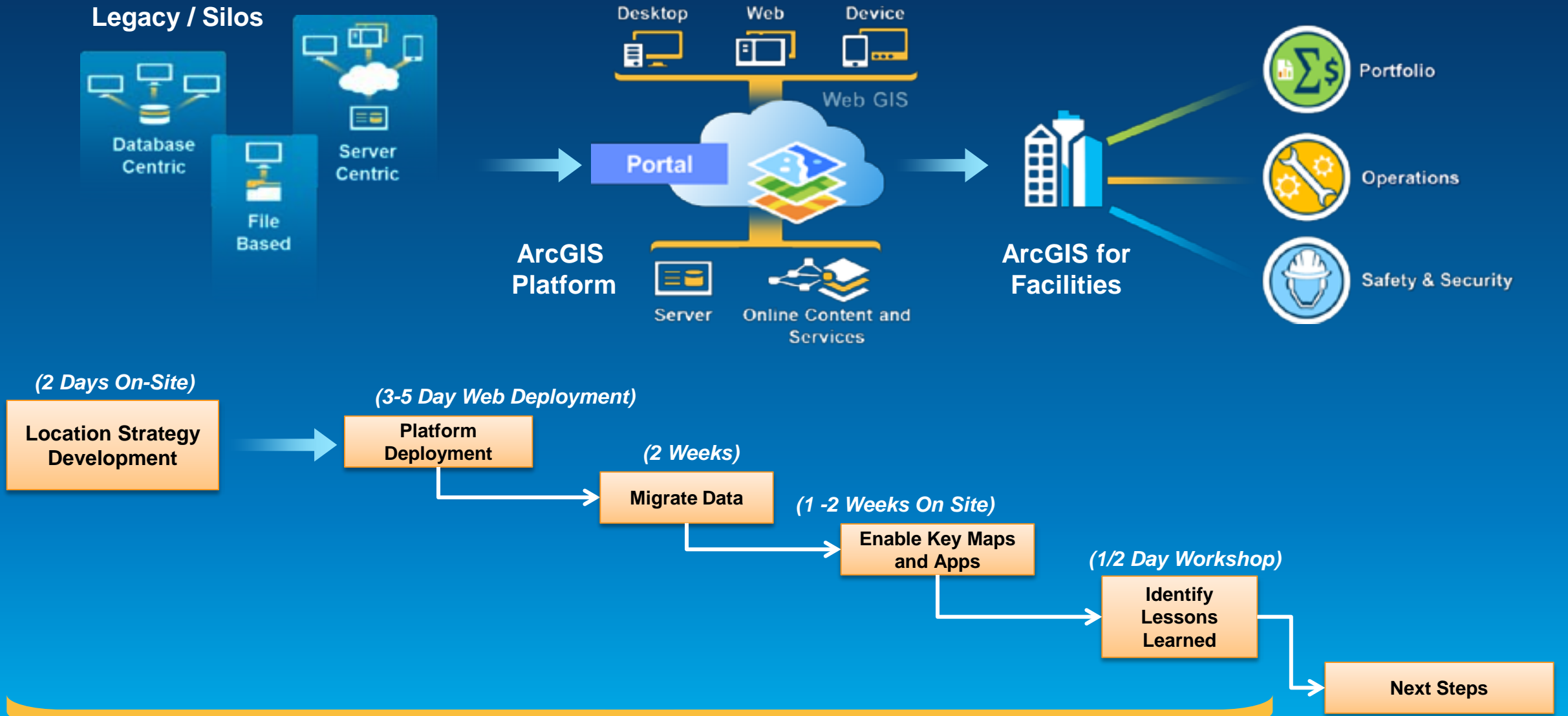


Safety & Security



- **DIY**
- **Professional Services**
  - **EEAP**
  - **Rent-A-Tech**
  - **Managed Services**
  - **Projects**
- **Partners**
- **Standardized Service Offerings**
  - **Platform Implementation Package**
  - **Facilities GIS PoC**
  - **Facilities GIS IT Roadmap**
  - **Facilities Data Migration Jumpstart**
  - **CityEngine Jumpstart**
  - **Web Launch GIS Kit**
  - **Server Jumpstart**

# ArcGIS Platform Implementation



**ArcGIS Platform Implementation Offering**

Move to Next Spiral

# Thank you...

GIS for Facilities & Campus Planning

- Please fill out the session survey:

**First Offering ID: XXXX**

**Second Offering ID: XXXX**

**Online – [www.esri.com/ucsessionsurveys](http://www.esri.com/ucsessionsurveys)**

**Paper – pick up and put in drop box**



Understanding our world.

## Notes to presenters:

- **Please include the following slide at the end of your presentation encouraging the audience to fill out the session surveys and how to do so.**
- **These slides should be included for:**
  - **75 minute Technical Workshops**
  - **30 minute Technical Workshops**
  - **Demo theaters (paper only)**