

# UW GIS Interior Space Mapping

## CAD and GIS Integration

Presented by Aaron Chevront

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**W** CAPITAL PROJECTS OFFICE  
UNIVERSITY *of* WASHINGTON  
Finance & Facilities



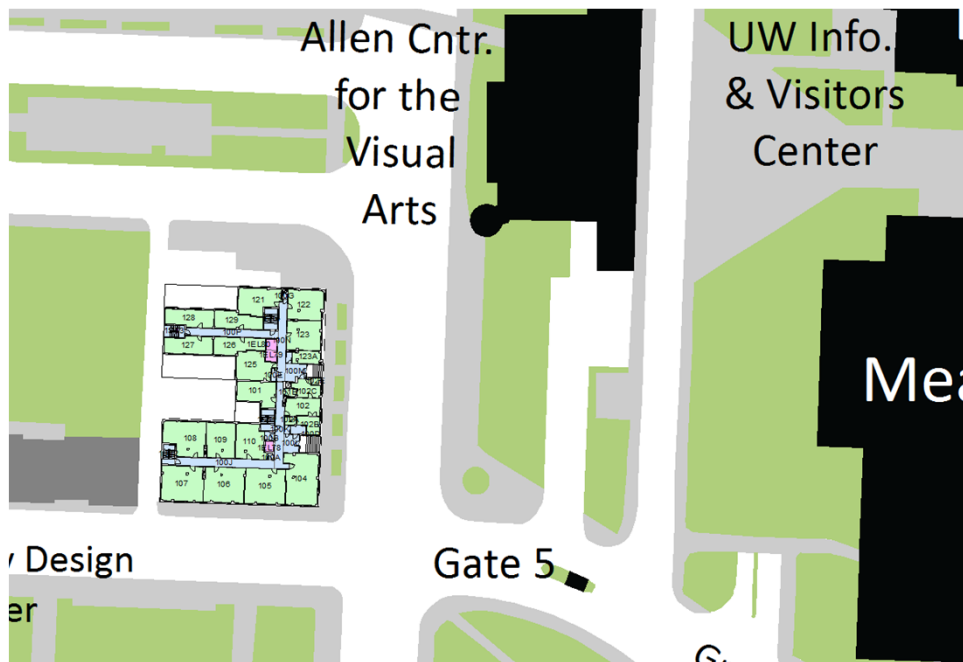
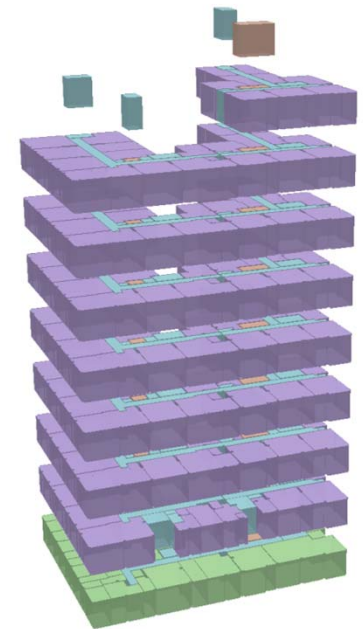
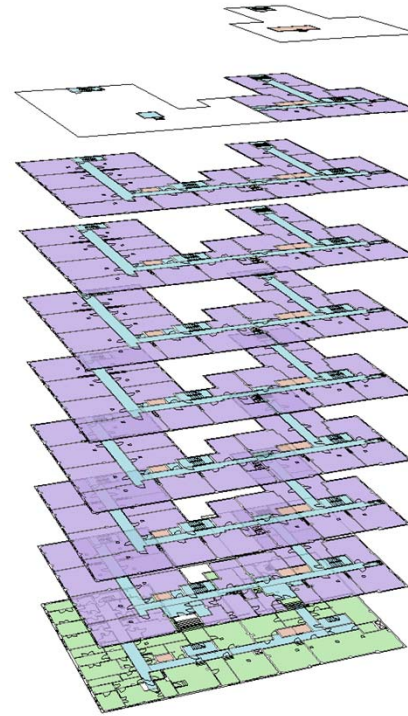
## Overview

- UW CAD/GIS History
- Drawing Prep
- Translation
- Utilization
- What's Next



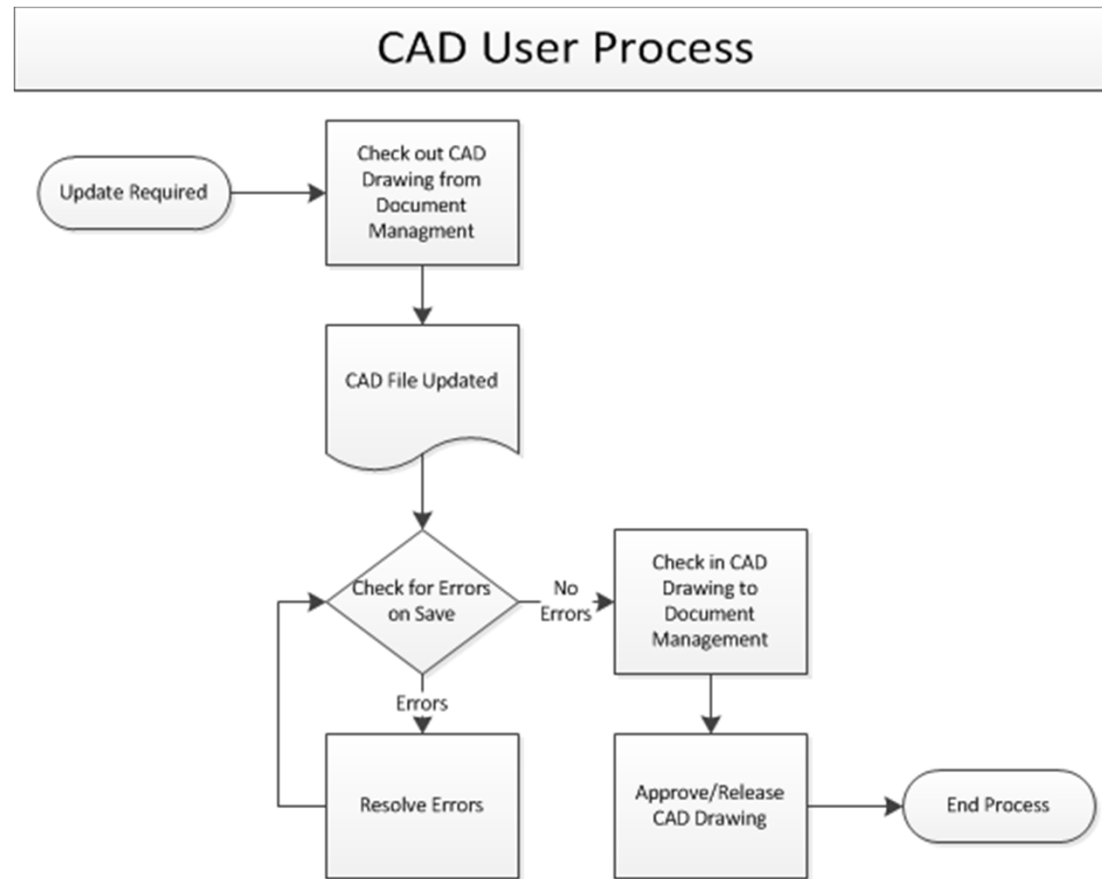
## UW CAD/GIS History - Now...

- Georeferenced
- Standardized
- Automatic GIS Translation





# Drawing Prep - Process



# Drawing Prep – Room Link

The image shows a CAD drawing of a floor plan with several rooms. Room 109 is highlighted with a red border. An 'Enhanced Attribute Editor' dialog box is open, displaying the following attributes for the selected room:

Tag	Prompt	Value
ROOM_NAME	Room Name	
ROOM_NU...	Room Number	109
ROOM_AREA	Room Area (sqft)	114 SQFT
FACNUM	FACNUM	1027
FLOOR	FLOOR	01
FACROOM	FACROOM	1027_01_109
FACFLOOR	FACFLOOR	1027_01

The dialog box also shows a 'Value' field containing '114 SQFT'. Other rooms visible in the drawing include room 112 (114 SQFT) and room 116 (437 SQFT). A north arrow and a 'TOP' button are visible in the top right corner of the drawing area.

# Drawing Prep – Room Link

The image displays three overlapping AutoCAD dialog boxes used for configuring a room link attribute.

**Enhanced Attribute Editor:** Shows the attribute configuration for a block named 'room' with tag 'ROOM\_AREA'. The 'Value' field is set to '114 SQFT'. A table lists various attributes and their values:

Tag	Prompt	Value
ROOM_NAME	Room Name	
ROOM_NUM...	Room Number	109
ROOM_AREA	Room Area (sqft)	114 SQFT
FACNUM	FACNUM	1027
FLOOR	FLOOR	01
FACROOM	FACROOM	1027_01_109
FACFLOOR	FACFLOOR	1027_01

**Field:** Configures the field for the attribute. The 'Field category' is 'Objects' and the 'Object type' is 'Polyline'. The 'Property' list includes 'Area', which is selected. The 'Preview' shows '114 SQFT'. The 'Field expression' at the bottom is: `%%<\AcObjProp.16.2 Object(%%<\_ObjId 8796082793952>?).Area f "%lu2%pr0%ps[, SQFT]"%ct8 [0.006944444444444444]">`. A red box highlights the object ID `8796082793952`.

**Additional Format:** Configures the formatting of the field value. The 'Current value' is '16383' and the 'Preview' is '114 SQFT'. The 'Conversion factor' is set to `0.006944444444444444`. The 'Suffix' is 'SQFT'. The 'Number separators' are set to 'Period' for decimals and 'None' for thousands. The 'Zero suppression' options are 'Leading' and 'Trailing'.

# Drawing Prep – Error Checking

The image shows an AutoCAD drawing of a floor plan with several rooms labeled with their numbers and square footages. The rooms are: 103 (110 SQFT), 105 (114 SQFT), 107 (114 SQFT), 109 (114 SQFT), 102B (171 SQFT), 102 (66 SQFT), 102A (30 SQFT), and 58 (158 SQFT). A red box highlights an error message in the AutoCAD Text Window. The error message is as follows:

```
AutoCAD Text Window - 1027XP-01.dwg - Read Only
Edit
Command: re REGEN Regenerating model.
Command: vaultcheck
regen Regenerating model.
Command:
***ERROR** There are 1 room blocks That have more than 1 pline attached. The
following is a list of pline handle and room number where errors were found:"
("Pline ID" "Pline Handle" "Room Number")
("8796082793984" "4180" "102B")
("8796082793984" "4180" "100J") nil
Command:
```



# Drawing Prep – Featureclasses in CAD

The screenshot displays the AutoCAD 2012 interface with the ArcGIS ribbon active. The main drawing area shows a floor plan with rooms labeled with numbers and their square footages. The Properties panel on the left shows the current object is a Polyline with various settings. The Fields table below shows the data fields for the drawing.

Name	Type	Default Value	Text Size
FACFLOOR	Text	1027_01	0
FACNUM	Text	1027	0
FACROOM	Text		0
FLOOR	Text	01	0
ROOM_AREA	Text		0/0
ROOM_NUMBER	Text		0

Property	Value
Layer	A-AREA-PLIN

Property	Value
Color	ByLayer
Layer	A-AREA-PLIN
Linetype	ByLayer
Linetype scale	1.000000
Plot style	ByColor
Lineweight	ByLayer
Hyperlink	
Transparency	ByLayer
Thickness	0'-0"

Property	Value
Material	ByLayer

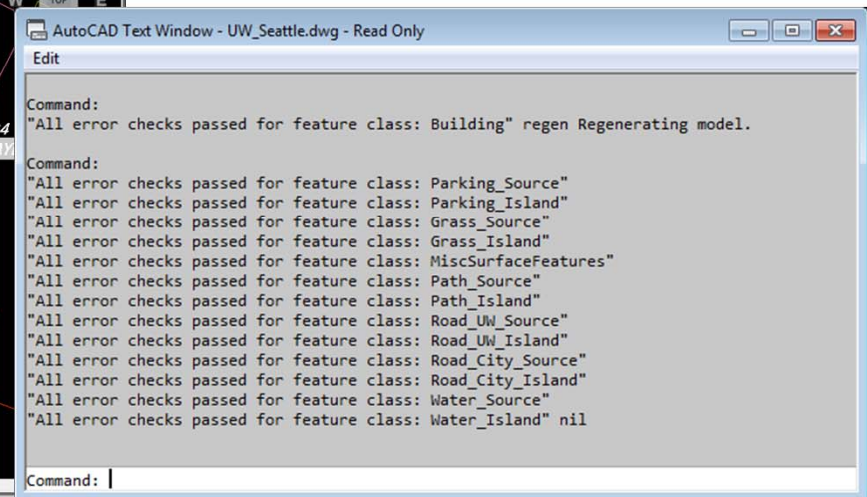
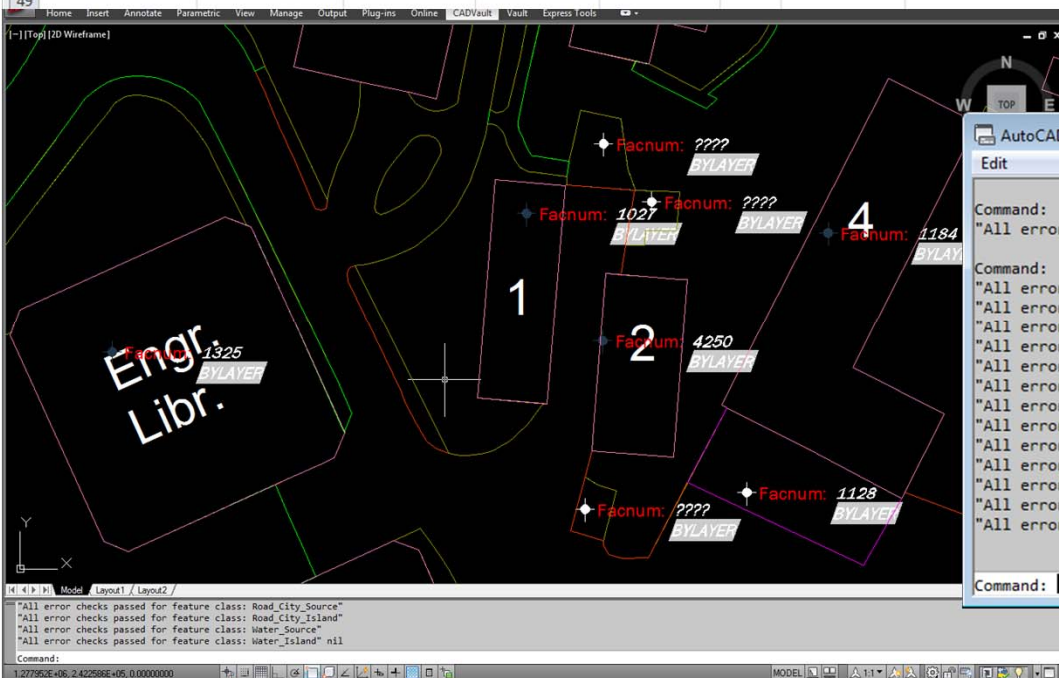
Property	Value
Vertex	1
Vertex X	0'-6"
Vertex Y	12'-11 1/2"
Start segment width	0'-0"
End segment width	0'-0"
Global width	0'-0"
Elevation	0'-0"
Area	15867.000000 sq. in. (110.1...)
Length	42'-0"

Property	Value
Closed	Yes
Linetype generation	Disabled

Property	Value
ROOM_AREA	110
ROOM_NUMBER	103
FACFLOOR	1027_01
FACNUM	1027
FACROOM	1027_01_103
FLOOR	01

# Drawing Prep – Basemap

	A	B	C	H	I	J	K	L	M
1	single	single	single	single	single	single	multiple	multiple	multiple
2	drawing name	feature class name	feature class type	data block name	data block layer	ID Field	other fields	entity layers (CAD Layer Names)	Representations (Layer = Rule ID)
8	UW_Seattle.dwg	Building	Polygon	BuildingData	BLDG-DATA		FACNUM,RULEID	BLDG-UW,BLDG-UW-UG,BLDG-NONUW	BLDG-UW=1,BLDG-UW-UG=2,BLDG-NONUW=3
9	UW_Seattle.dwg	Parking_Source	Polygon	ParkingData	PRKG-DATA		FACNUM,RULEID	PRKG-UW,PRKG-UW-UG,PRKG-UW-OFF,PRKG-UW-UNLABEL	PRKG-UW=1,PRKG-UW-UG=2,PRKG-UW-OFF=3,PRKG-UW-UNLABEL=4
10	UW_Seattle.dwg	Parking_Island	Polygon					PRKG-UW-ISLAND	
11	UW_Seattle.dwg	Grass_Source	Polygon				RULEID	GRASS	GRASS=1
12	UW_Seattle.dwg	Grass_Island	Polygon					GRASS-ISLAND	
13	UW_Seattle.dwg	MiscSurfaceFeatures	Polyline				RULEID	MISC-FENCE,MISC-SURF-FEAT	MISC-FENCE=1,MISC-SURF-FEAT=2
14	UW_Seattle.dwg	Path_Source	Polygon				RULEID	PATH	PATH=1
15	UW_Seattle.dwg	Path_Island	Polygon					PATH-ISLAND	
16	UW_Seattle.dwg	Road_UW_Source	Polygon				RULEID	STREET-UW	STREET-UW=1
17	UW_Seattle.dwg	Road_UW_Island	Polygon					STREET-UW-ISLAND	
18	UW_Seattle.dwg	Road_City_Source	Polygon				RULEID	STREET-NONUW	STREET-NONUW=1
19	UW_Seattle.dwg	Road_City_Island	Polygon					STREET-NONUW-ISLAND	
20	UW_Seattle.dwg	Water_Source	Polygon				RULEID	Water_Source	Water_Source=1
21	UW_Seattle.dwg	Water_Island	Polygon					Water_Island	



# Translation – World File

The image illustrates the process of attaching an external reference in AutoCAD. It features three main components:

- External Reference Properties Palette:** Located on the left, it shows the configuration for the external reference '1027XP-01'. The 'Geometry' section is highlighted with a purple box, showing the insertion point (X: 1277987.7471, Y: 242258.2573) and scale (X: 0.0833, Y: 0.0833, Z: 0.0833). The 'Misc' section also shows the name '1027XP-01', path '\\1027\_UFA-UNIV.F', rotation '85', block unit 'Inches', and unit factor '1.0000'.
- Attach External Reference Dialog Box:** Located on the right, it shows the 'Attach' tab selected. The 'Name' is '1027XP-01'. The 'Scale' section has 'Specify On-screen' checked, with X, Y, and Z scales all set to '1/12'. The 'Path type' is 'Relative path'. The 'Reference Type' is set to 'Overlay'. The 'Block Unit' is 'Inches' and the 'Factor' is '1.0000'.
- AutoCAD Text Window:** Located at the bottom right, it displays the command used to create the world file:

```
Command:  
Command:  
PROJCS["NAD_1983_StatePlane_Washington_North_FIPS_4601_Feet",GEOGCS["GCS_North_American_1983",DATUM["D_North_American_1983",SPHEROID["GRS_1980",6378137.0,298.257222101]],PRIMEM["Greenwich",0.0],UNIT["Degree",0.0174532925199433]],PROJECTION["Lambert_Conformal_Conic"],PARAMETER["False_Easting",1640416.666666667],PARAMETER["False_Northing",0.0],PARAMETER["Central_Meridian",-120.8333333333333],PARAMETER["Standard_Parallel_1",47.5],PARAMETER["Standard_Parallel_2",48.73333333333333],PARAMETER["Latitude_Of_Origin",47.0],UNIT["Foot_US",0.3048006096012192],AUTHORITY["EPSG",2285]]
```



# Translation – World File

```

Visual LISP for AutoCAD <Drawing1.dwg> - [CreateWorldFile.LSP]
File Edit Search View Project Debug Tools Window Help
car
(defun c:CreateWorldFile (/ block ins ang scale dist ent pt1 pt2 pt3x pt
(while
  (progn
    (setq ent (car (entsel "\nSelect Block: ")))
    (cond ((eq 'ENAME (type ent))
          (cond ((not (eq "INSERT" (caddr (setq block (entget ent)))))
                (t nil))) ; Exit Loop
          (t (princ "\n** Nothing Selected **")))))
    (if block
      (progn
        (setq pt1 "0,0"
              pt2 "1000,1000"
              ins (cdr (assoc 10 block))
              pt3x ins
              pt3 (strcat (rtos (car pt3x) 2 10) "," (rtos (cadr pt3x) 2 10))
              ang (cdr (assoc 50 block))
              scale (cdr (assoc 41 block))
              dist (* scale (sqrt (* 2 (* 1000 1000))))
              pt4x (polar ins (* (* pi 0.25) ang) dist)
              pt4 (strcat (rtos (car pt4x) 2 10) "," (rtos (cadr pt4x) 2 10))
              )
          (if (setq filename (getfiled "Save World File As" "esri_cad" "wld" 1))
            (progn
              (setq file (open filename "w"))
              (write-line (strcat pt1 " " pt3) file)
              (write-line (strcat pt2 " " pt4) file)
              (close file)
              )
            )
          )
        )
      )
    )
  )
  )
(alert "You must pick a block")
(princ)

```

Geometry	
Insertion point X	1277987.7471
Insertion point Y	242258.2573
Insertion point Z	0.0000
Scale X	0.0833
Scale Y	0.0833
Scale Z	0.0833

```

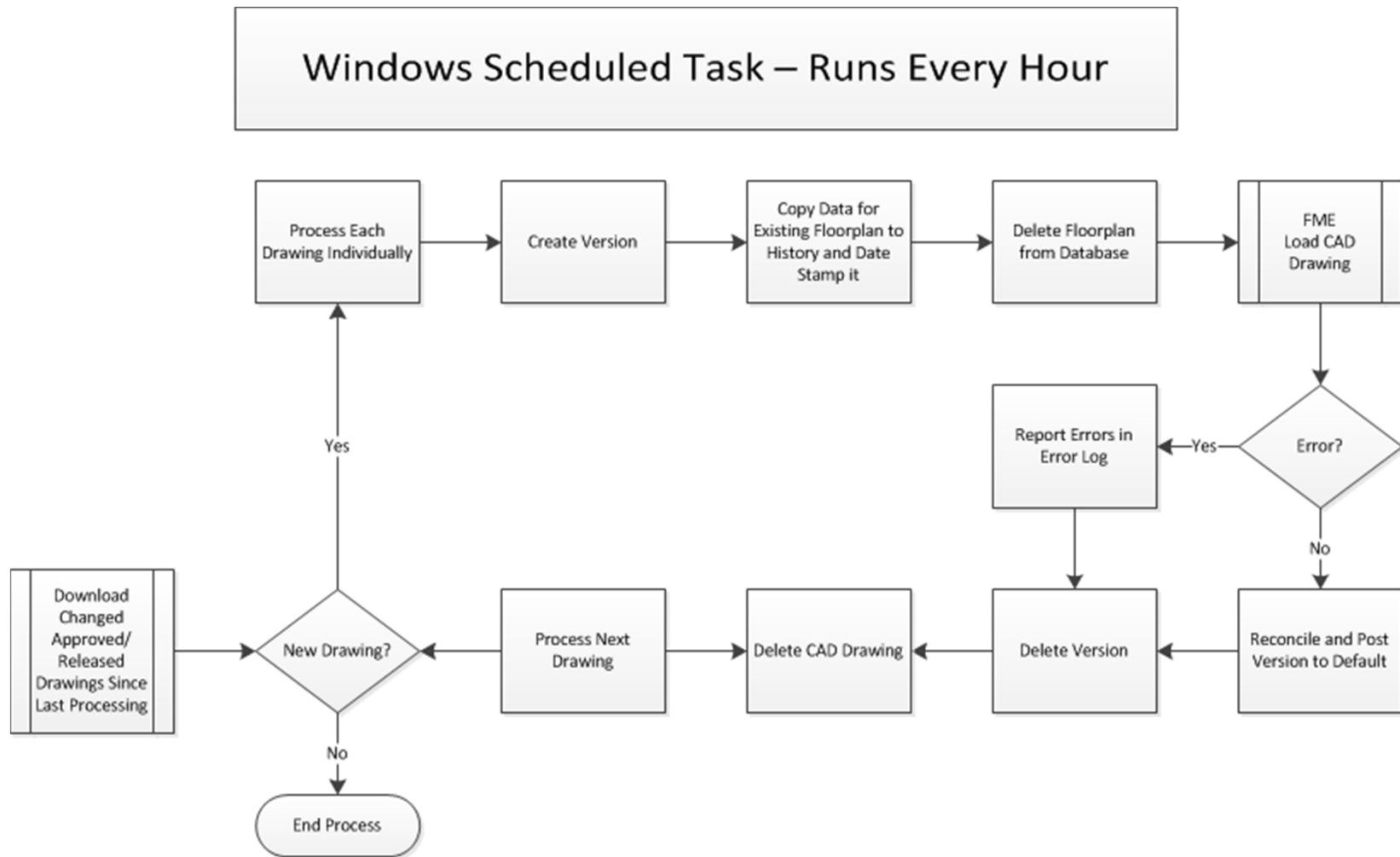
C:\Users\aaroch\Desktop\esri_cad.wld - Notepad++
File Edit Search View Encoding Language Settings Macro Run Plugins
Window ?
esri_cad.wld
0,0 1277987.747071849,242258.2572975850
2 1000,1000 1277911.365514297,242348.0055374276
3
leng Ln:1 Col:1 Sel:0 Dos\Windows ANSI INS

```

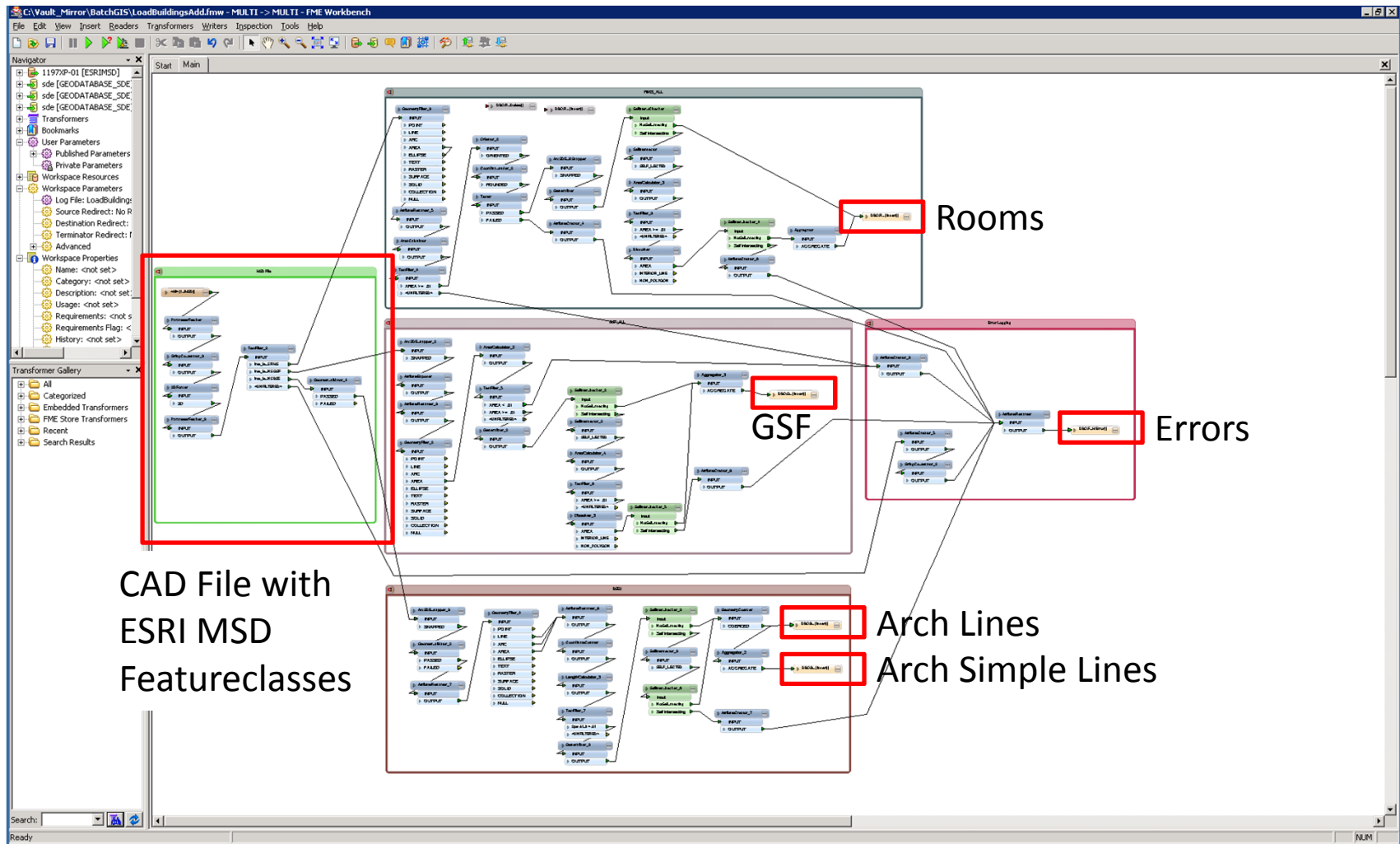
Floor Plan Origin



# Translation – Floorplan Automated Processing



# Translation – Floorplan FME Process



# Translation – Floorplan Log Tables

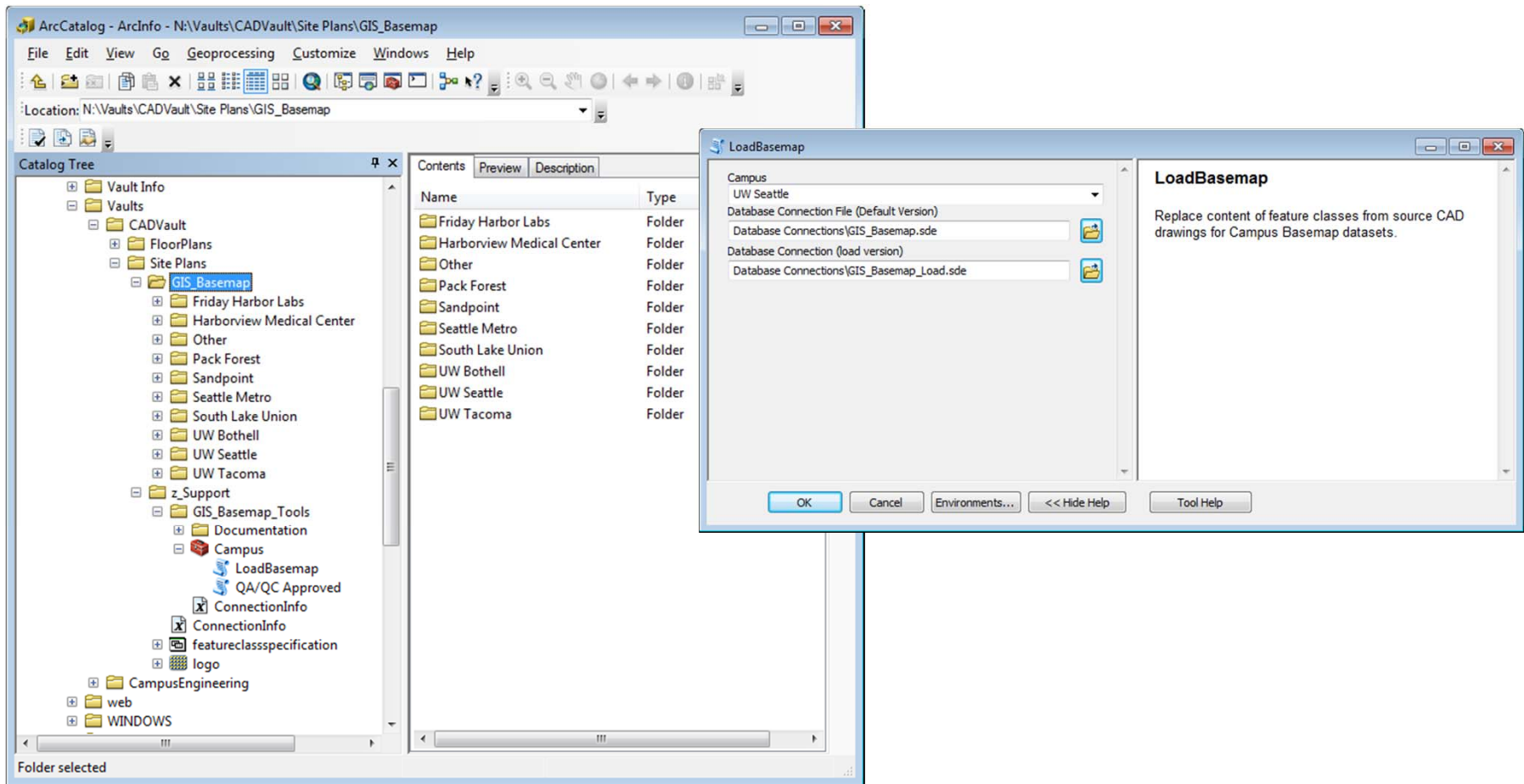
## Processing Log

OBJECTID *	LOAD_DATE	FACNUM	FLOOR	LAYERS	MODE	COMPLETED	ERRORS	LAST_USER	PROC_TIME	GlobalID *
458434	5/13/2013 1:05:36 PM	1168	05	ALL	REPLACE	True	False	aaronch	255	{BB1C5824-B1FF-4BD9-BA08-F5E8A5298548}
458834	5/13/2013 1:12:27 PM	1304	01	ALL	REPLACE	True	False	aaronch	371	{EA08554C-E185-468A-B06C-C87312F8B1F2}
459234	5/13/2013 2:03:50 PM	1226	01	ALL	REPLACE	True	False	aaronch	146	{F49913B3-94C1-4B94-B056-495D6F6DFAE}
459634	5/15/2013 2:03:19 PM	1493	01	ALL	REPLACE	True	False	aaronch	118	{056744A8-22E5-4DFE-96D0-3E0D09A890B8}
460034	5/15/2013 2:05:54 PM	1493	09	ALL	REPLACE	True	False	aaronch	116	{D5E508D8-1119-4B9B-B74E-FD84AD154988}
460434	5/16/2013 12:07:21 PM	1192	02	ALL	REPLACE	True	False	aaronch	357	{523B3911-379D-40FE-BE9A-0FB9CCEC0A8B}
460834	5/16/2013 2:03:24 PM	1484	01	ALL	REPLACE	True	False	aaronch	120	{5C0CA8C0-5B59-41A9-A4D3-ECCDD1764EEB}
461234	5/16/2013 2:06:08 PM	1484	02	AL						
461634	5/16/2013 2:08:48 PM	1489	01	AL						
462034	5/16/2013 2:11:29 PM	1492	01	AL						
462434	5/17/2013 5:04:01 PM	6140	01	AL						
462834	5/17/2013 5:07:09 PM	6140	02	AL						
463234	5/17/2013 5:10:13 PM	6140	03	AL						
463634	5/17/2013 5:13:10 PM	6140	04	AL						
464034	5/17/2013 5:16:06 PM	6140	05	AL						
464434	5/17/2013 5:18:58 PM	6140	06	AL						
464834	5/17/2013 5:21:51 PM	6140	07	AL						
465234	5/17/2013 5:24:29 PM	6140	08	AL						
465634	5/17/2013 5:27:05 PM	6140	RF	AL						
466034	5/20/2013 10:03:23 AM	1490	01	AL						
466434	5/21/2013 11:04:53 AM	4353	B1	AL						
466834	5/21/2013 12:04:25 PM	1485	01	AL						
467234	5/21/2013 2:05:45 PM	4353	01	AL						
467634	5/21/2013 2:10:02 PM	6140	07	AL						
468034	5/21/2013 3:06:50 PM	4595	03	AL						

## Error Log

OBJECTID *	AUTOCAD_HAND	LAYER	FACNUM	FLOOR	FACFLOOR	FACROOM	IN_DATE	LAST_USER	REASON	FIXED
2172	3319A		0		1259_02		1/2/2013 11:10:16 AM	aaronch	FACROOM is blank or null	YES {6BF5F1}
2173	3319B		0		1259_02		1/2/2013 11:10:16 AM	aaronch	FACROOM is blank or null	YES {F8FD86}
2174	4A7A		0		4039_01		1/7/2013 12:06:24 PM	aaronch	FACROOM is blank or null	YES {073492}
2175	4A7A		0		4039_01		1/7/2013 4:02:16 PM	aaronch	FACROOM is blank or null	YES {939426}
2176	10FCA		0		3997_01		1/7/2013 6:02:29 PM	aaronch	FACROOM is blank or null	YES {FDD426}
2177	140CD		0		1223_10		3/4/2013 12:19:35 PM	aaronch	FACROOM is blank or null	YES {CECB5C}
2178	3DE8	DBO.BSE_ALL	5973	04	5973_04		3/4/2013 1:23:40 PM	aaronch	Failed to load features from C:\Vault_Mirror\	YES {2EFFBA}
2179	49E83		0		6091_01		3/11/2013 4:01:58 PM	aaronch	FACROOM is blank or null	YES {E8DA44}
2180	140CD		0		1223_10		3/11/2013 5:02:52 PM	aaronch	FACROOM is blank or null	YES {DEC188}
2181	10FCA		0		3997_01		3/11/2013 6:09:43 PM	aaronch	FACROOM is blank or null	YES {C2A902}
2182	3DE8	DBO.BSE_ALL	5973	04	5973_04		3/11/2013 6:16:25 PM	aaronch	Failed to load features from C:\Vault_Mirror\	YES {FB9C32}
2183	49E83		0		6091_01		3/11/2013 6:18:46 PM	aaronch	FACROOM is blank or null	YES {A47FC5}
2184	140CD		0		1223_10		4/12/2013 4:02:49 PM	aaronch	FACROOM is blank or null	YES {06DD03}
2185	431E	DBO.BSE_ALL	5973	04	5973_04		4/25/2013 9:47:03 AM	aaronch	Failed to load features from C:\Vault_Mirror\	YES {2E261E}
3386	1126XP-01.dwg	BSE	1126	01	1126_01		4/25/2013 12:48:22 PM	aaronch	cad file validation failed - check that the file	YES {3F1095}
3786	431E	DBO.BSE_ALL	5973	04	5973_04		4/25/2013 3:39:03 PM	aaronch	Failed to load features from C:\Vault_Mirror\	<Null> {DE2998}

# Translation – Basemap Load Tool





# Translation – Basemap Log Tables

## Processing Log

ArcCatalog - ArcInfo - Database Connections\GIS\_Basemap.sde\GIS\_Basemap.DBO.BASEMAP\_LOG

File Edit View Go Geoprocessing Customize Windows Help

Location: Database Connections\GIS\_Basemap.sde\GIS\_Basemap.DBO.BASEMAP\_LOG

OBJECTID *	LOAD_DATE	LAYERS	ERRORS	LAST_USER	OPERATION
1	5/21/2013 1:46:59 PM	Building	False	aaronch	Load features
2	5/21/2013 1:46:59 PM	Grass_Island	False	aaronch	Load features
3	5/21/2013 1:46:59 PM	Grass_Source	False	aaronch	Load features
4	5/21/2013 1:46:59 PM	Grass			
5	5/21/2013 1:46:59 PM	MiscSurfaceFeatures			
6	5/21/2013 1:46:59 PM	Parking_Island			
7	5/21/2013 1:46:59 PM	Parking_Source			
8	5/21/2013 1:46:59 PM	Parking			
9	5/21/2013 1:46:59 PM	Path_Island			
10	5/21/2013 1:46:59 PM	Path_Source			
11	5/21/2013 1:46:59 PM	Path			
12	5/21/2013 1:46:59 PM	Road_City_Island			
13	5/21/2013 1:46:59 PM	Road_City_Source			
14	5/21/2013 1:46:59 PM	Road_City			
15	5/21/2013 1:46:59 PM	Road_UW_Island			
16	5/21/2013 1:46:59 PM	Road_UW_Source			
17	5/21/2013 1:46:59 PM	Road_UW			
18	5/21/2013 1:46:59 PM	Water_Island			
19	5/21/2013 1:46:59 PM	Water_Source			
20	5/21/2013 1:46:59 PM	Water			

Preview: Table

## Error Log

ArcCatalog - ArcInfo - Database Connections\GIS\_Basemap.sde\GIS\_Basemap.DBO.BASEMAP\_ERROR\_LOG

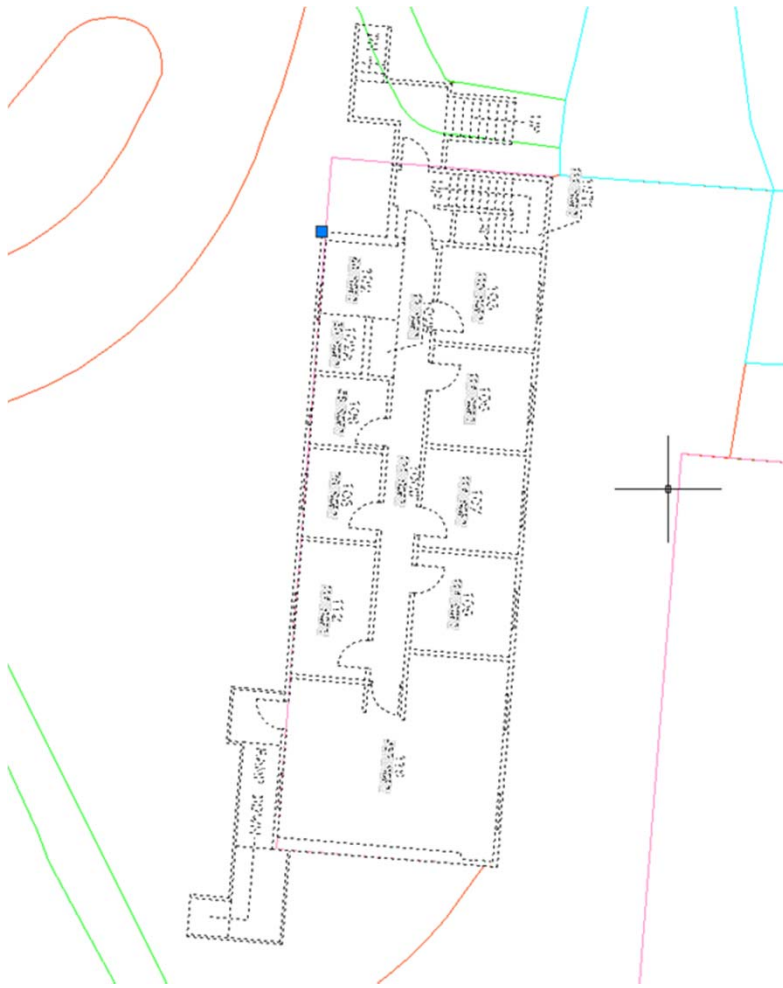
File Edit View Go Geoprocessing Customize Windows Help

Location: Database Connections\GIS\_Basemap.sde\GIS\_Basemap.DBO.BASEMAP\_ERROR\_LOG

OBJECTID *	AUTOCAD_HANDLE	IN_DATE	LAST_USER	LAYER	REASON	FIXED
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Preview: Table

# Translation – Before and After



# Utilization – Web Applications

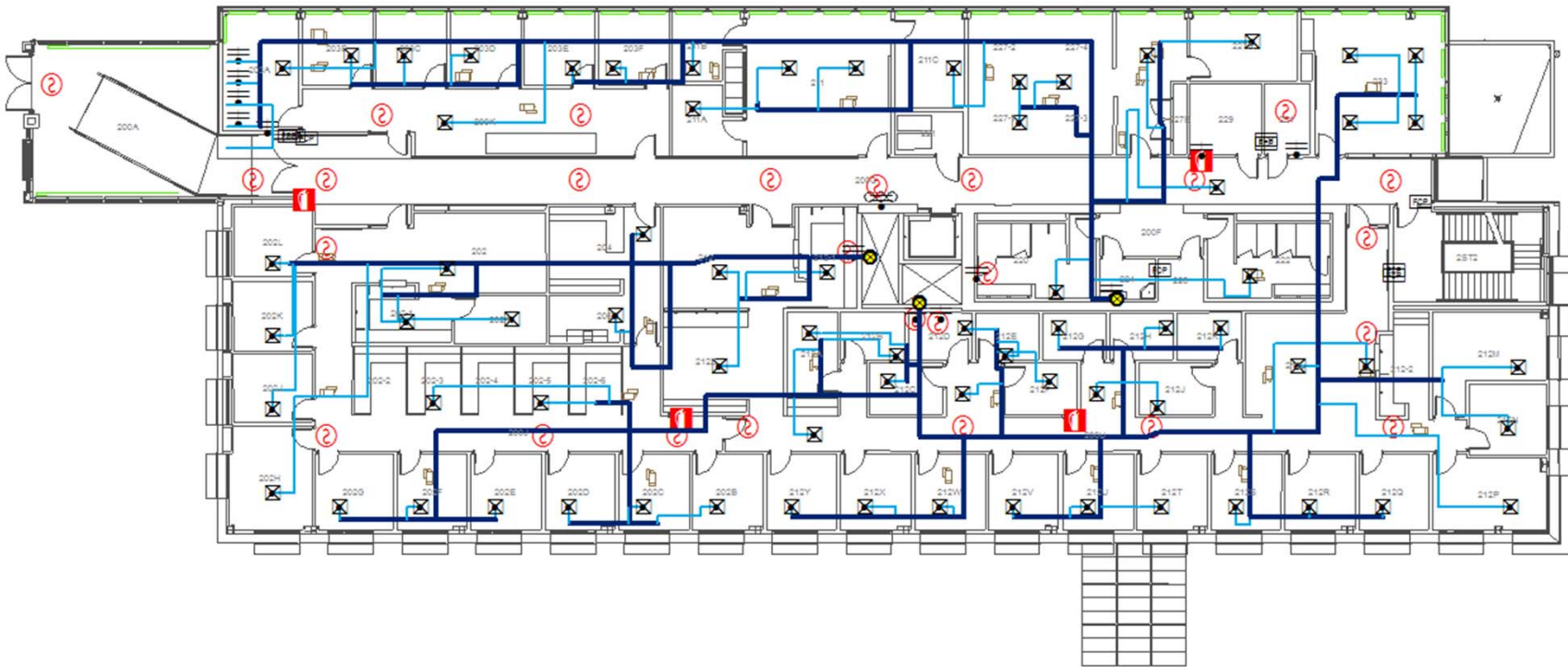
Flex

Javascript

The screenshot shows the 'CAPITAL PROJECTS OFFICE' web application for the University of Washington. The interface includes a header with the university logo, navigation tabs for 'UW Seattle', 'UNIV FAC ANNEX 1', and 'FACNUM: 1027'. A search bar for 'Room:' is present, along with a 'View 3D (Beta)' button. A 'Select Floor' dropdown menu is open, showing '2nd Floor' and '1st Floor' options. A 'Show Buildings' menu is also visible with 'All', 'Selected', and 'None' options. The main area displays a 3D floor plan of a building with various rooms labeled with numbers such as 102, 103, 105, 106, 107, 108, 109, 110, 112, and 116. A large black box with the number '2' is overlaid on the right side of the floor plan.

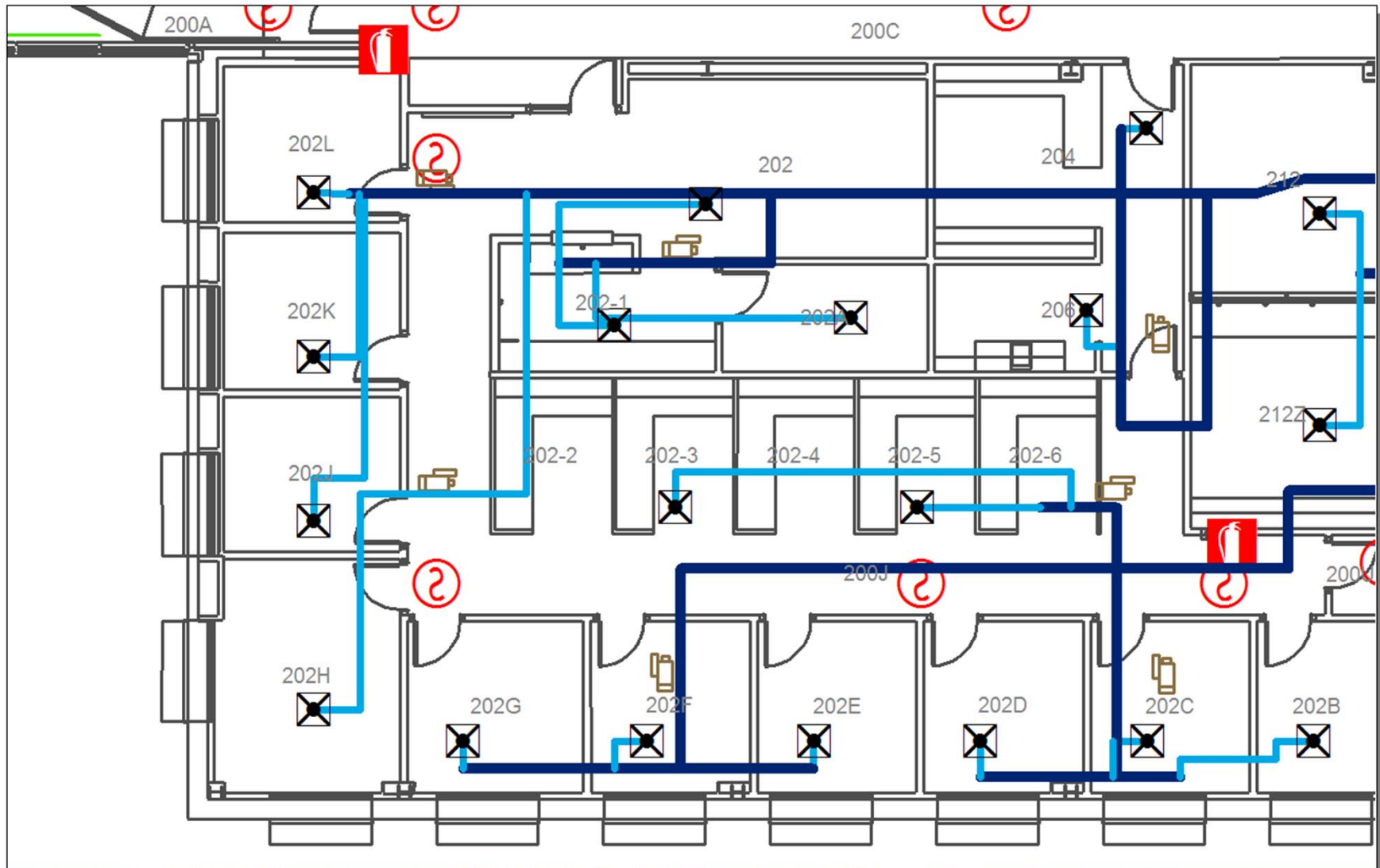
The user profile card for Aaron Chevront, CAD Compliance Coordinator, Business Services Group: Information Services, is shown. It includes a profile picture, contact information (Schedule, Map, Chat, Projects), and a detailed floor plan of University Facilities Annex 1, Room 216. The floor plan shows a grid of rooms with numbers 202, 203, 205, 206, 207, 208-1, 208-2, 209, 210, 211, 212, 215, 216, 200A, 200B, 200C, 200D, 200E, 200F, 200G, 200H, 200I, 200J, 200K, and 200L. Room 216 is highlighted in yellow. The card also includes a small version of the user profile and contact information.

# Utilization – Asset Management

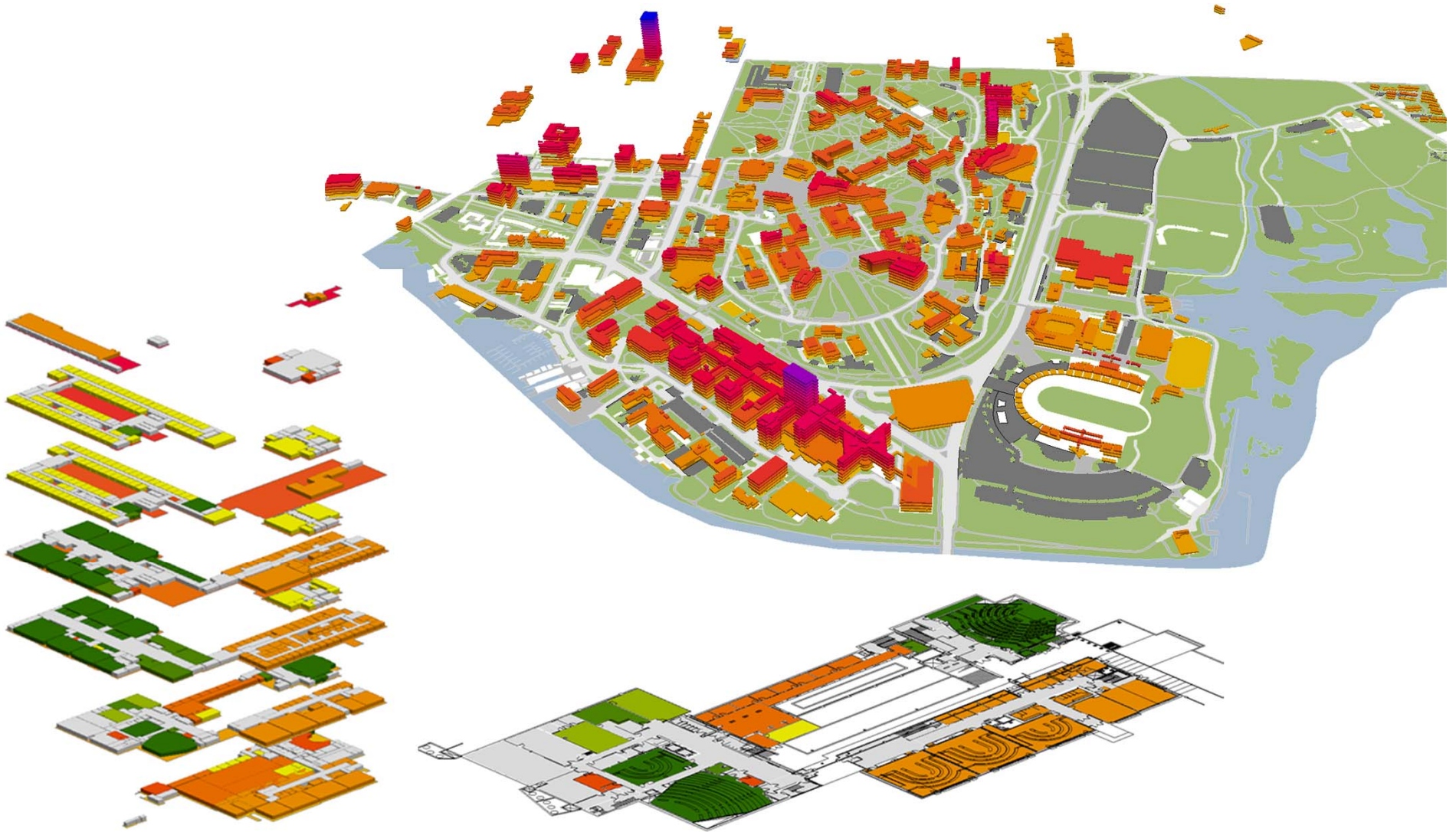




# Utilization – Asset Management



## Utilization – 2D & Schematic 3D

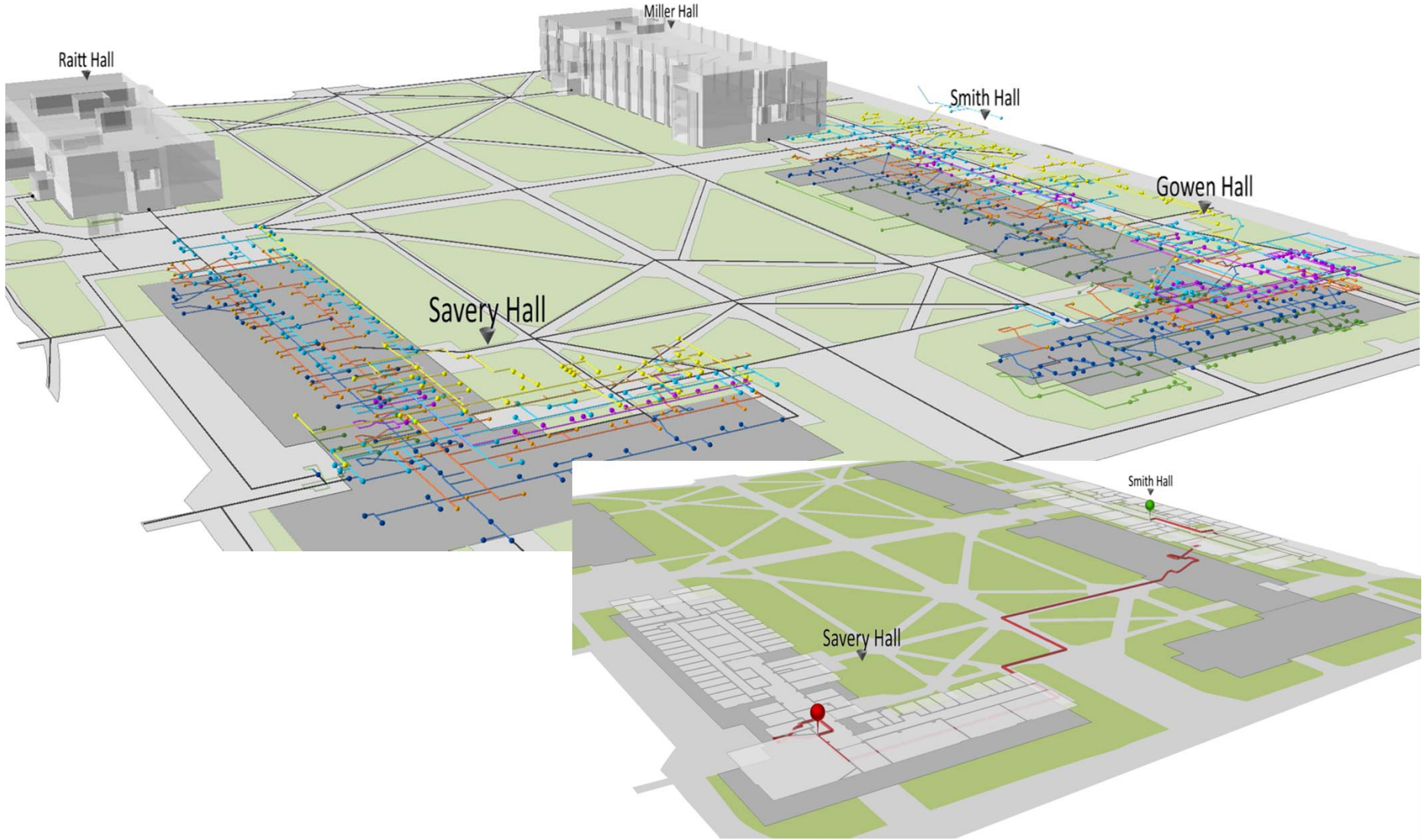


## What's Next?

- Automate supporting infrastructure
- Way-finding
- Mobile Devices
- Larger Audience
- Crowdsourcing
- InVision FM from PenBay Solutions
- More Data, More Data, More Data...

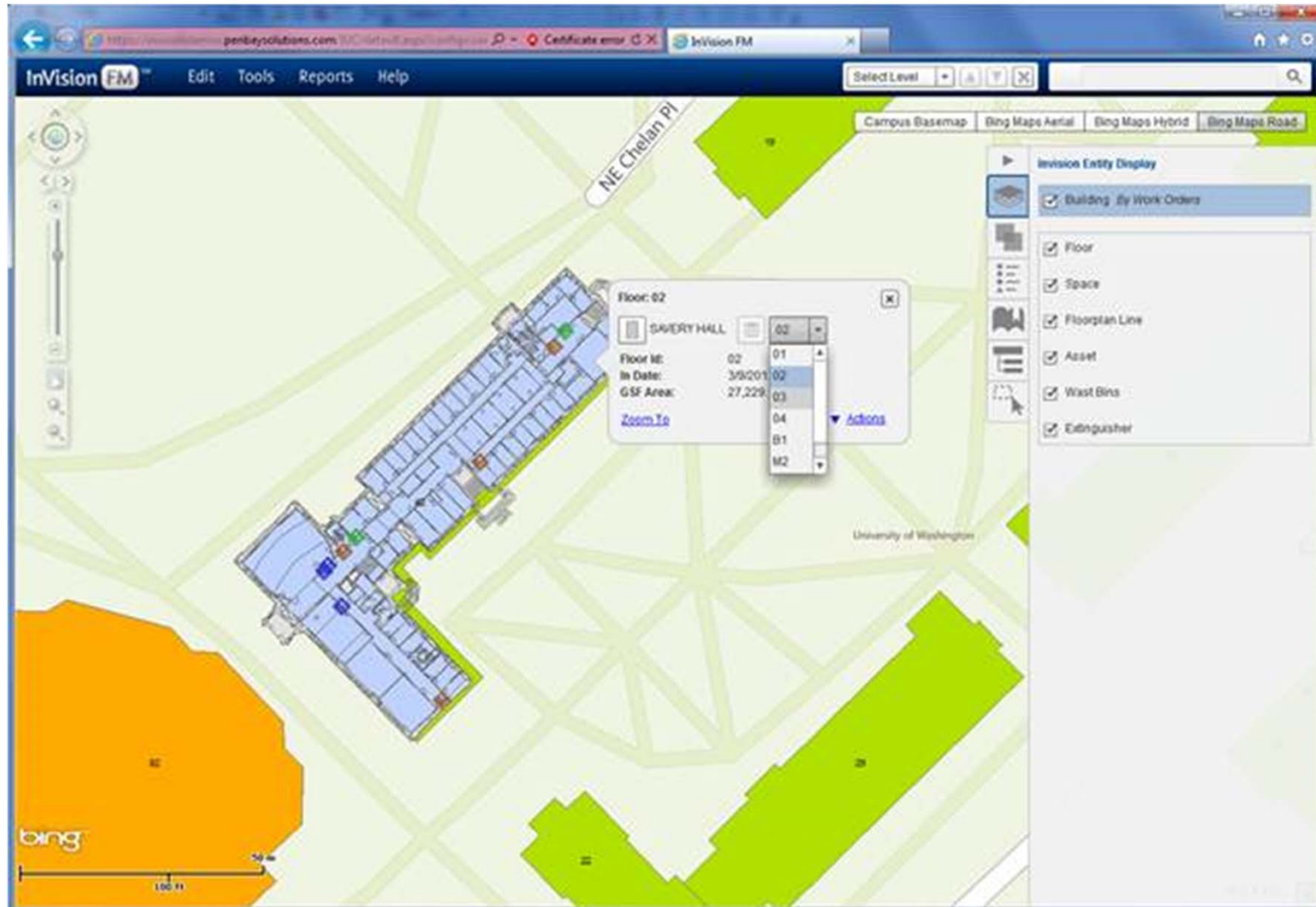


# Way-finding





# InVision FM



## Q&A

### Contact Info:

Aaron Chevront  
Capital Projects Office  
University of Washington  
aaronch@uw.edu  
206.616.4489