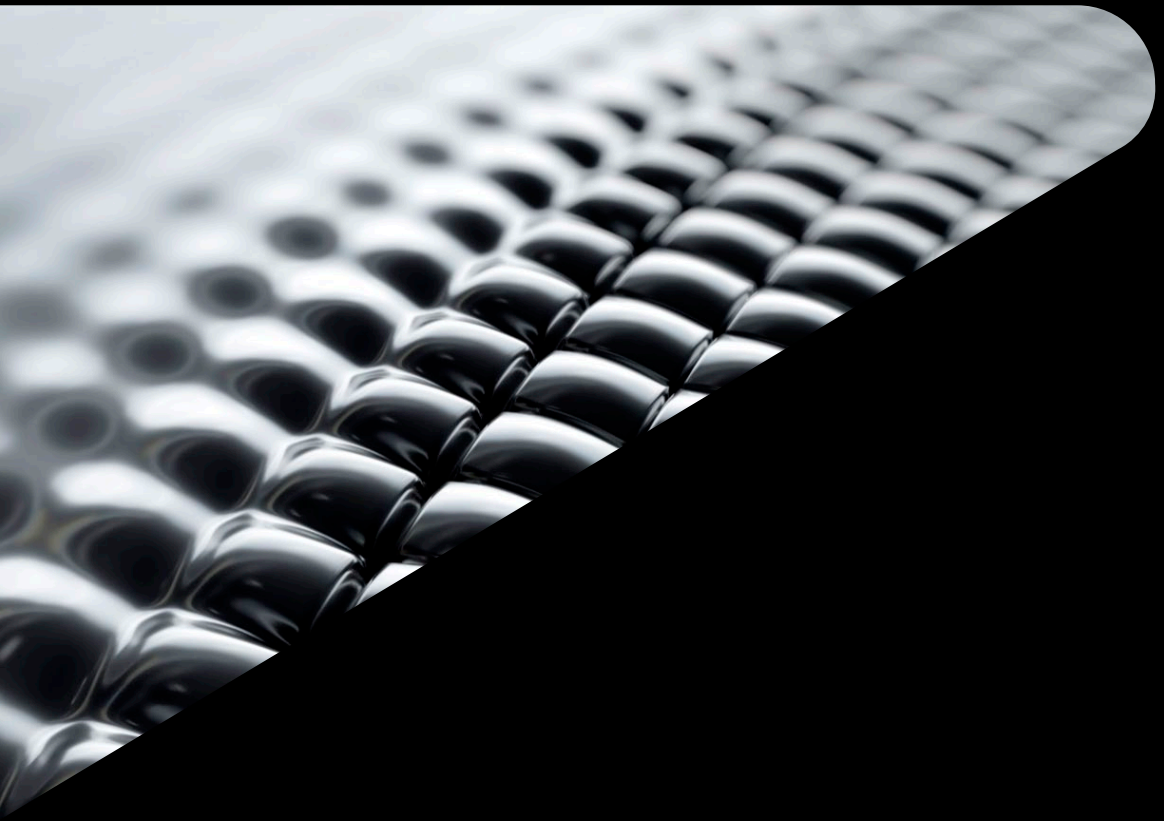
AUTODESK UNIVERSITY

Data-Driven Occupancy Load Workflow Using Revit

EvolveLAB Code Tools

Clara Fonte Boa
Design Technologist | EvolveLAB

Jim Greve
BIM Manager | EvolveLAB



Who are we?

EvolveLAB

- Automation & Interoperability Products
  - Helix, Glyph, EvolveGD, etc.
- Custom App Development
- BIM Support & Training
- Computational Design

"Helping Architects, Engineers, and Construction Professionals implement Design Technology"

Clara Fonte Boa

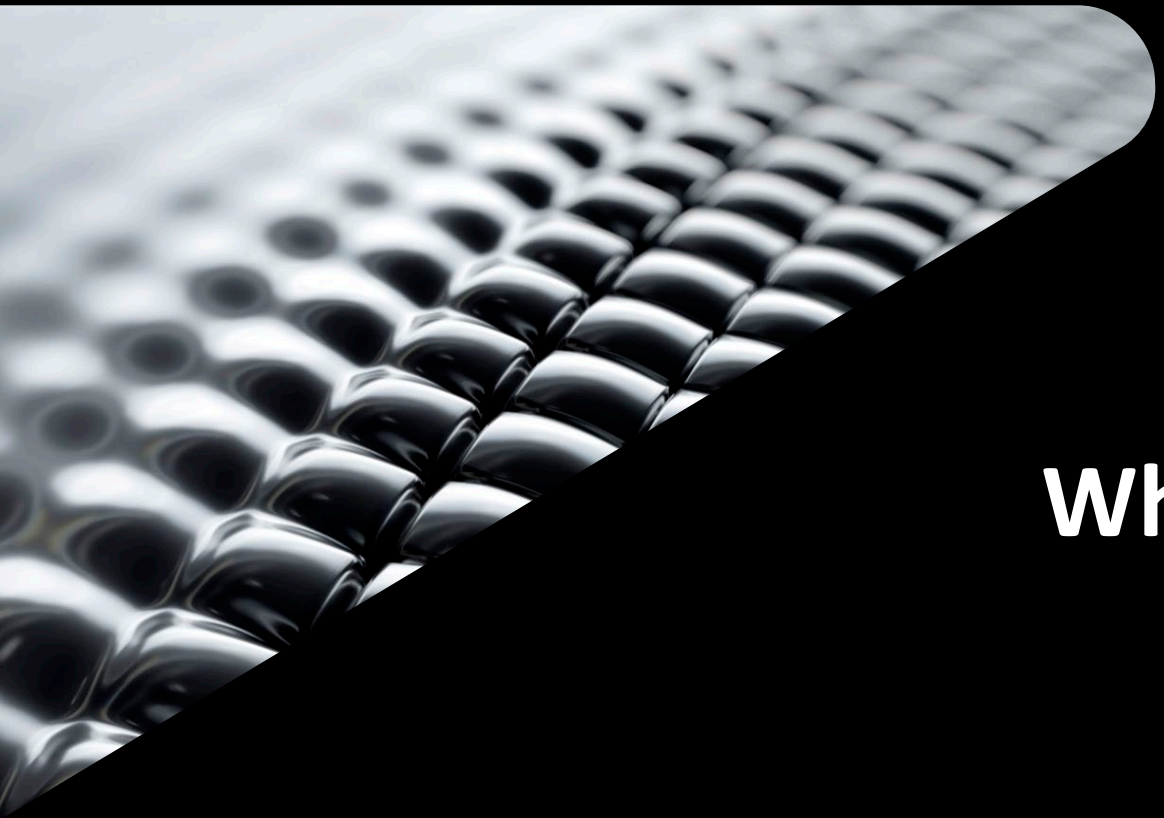
Design Technologist | EvolveLAB

- Universidade Federal de Ouro Preto, Brazil
  - 5-year Bach in Architecture, Urban Planning and Landscape Architecture.
  - 1-year at Dessau Institute of Architecture, Germany.
- 7 years Architecture
- 3 years as Design Technologist
  - BIM Management
  - Dynamo and light coding
  - UI/UX Design
- Lego Builds & Pottery

Jim Greve

BIM Manager| EvolveLAB

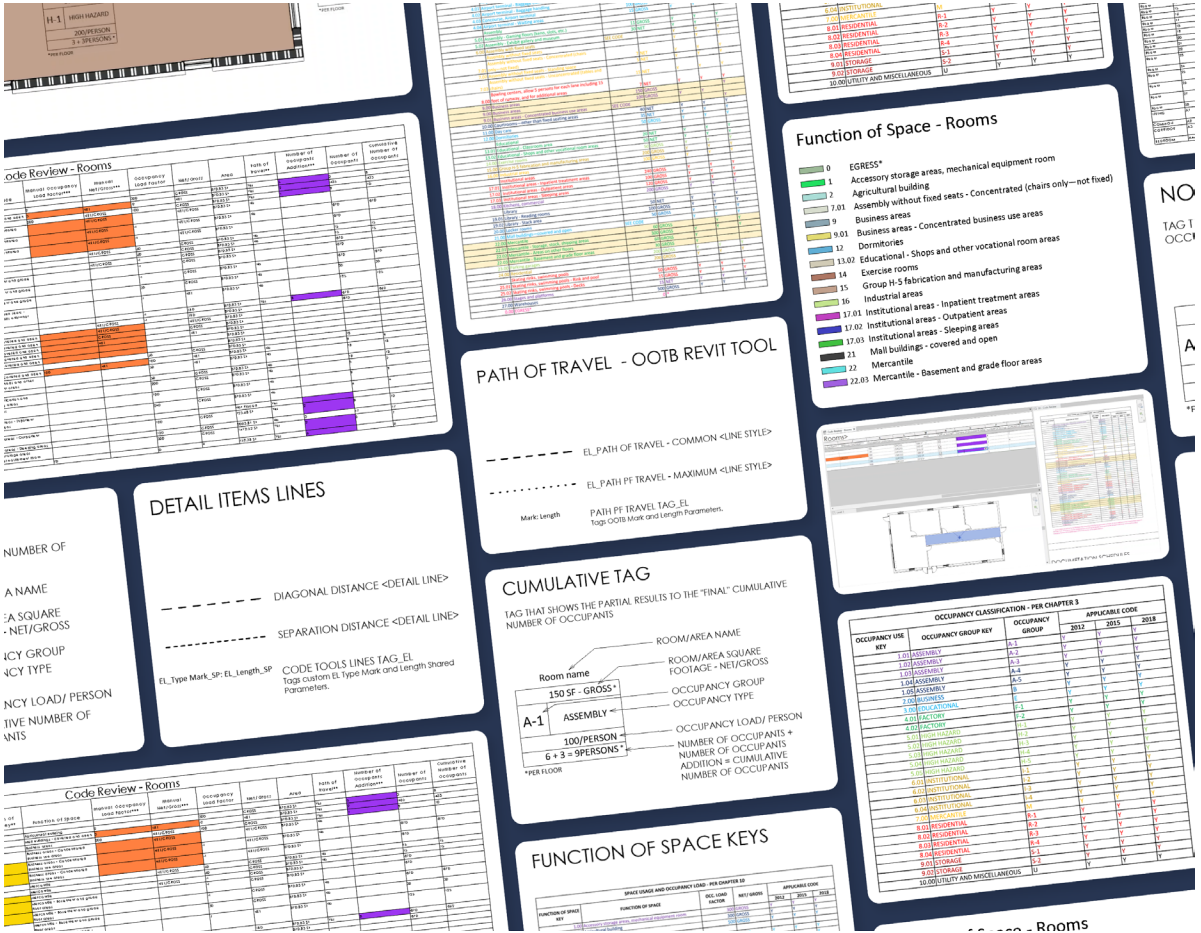
- 20 Years Design/Production Experience in the AEC Industry
  - CAD Tech to BIM Manager
  - Architectural Design
  - Multi-Discipline Design
  - Terrestrial LiDAR Specialist
    - Autodesk Recap
- BIM Management
  - Training
  - Client Relations
  - BIM Consulting
- Music Gear



Why are we here?

What are the Code Tools?

- Automated Code Analysis
- Occupancy Classification:
  - IBC, chapter 3
- Number of Occupants Calculation:
  - IBC, chapter 10
- Out of the Box Tools



Autodesk Revit 2021.1.2 - Code Tools_EL_(R21)_V3.02.01.rte - Sheet: 00 - Code Review

File | Architecture | Structure | Steel | Precast | Systems | Insert | Annotate | Analyze | Massing & Site | Collaborate | View | Manage | Add-Ins | EvolveLAB | Modify

Modify | Aligned | Linear | Angular | Radial | Diameter | Arc Length | Spot Elevation | Spot Coordinate | Spot Slope | Detail Line | Region | Component | Revision Cloud | Detail Group | Insulation | Text | Check Spelling | Find/ Replace | Tag by Category | Tag All | Beam Annotations | Multi- Category | Material Tag | Area Tag | Room Tag | Space Tag | View Reference | Tread Number | Multi- Rebar | Keynote | Duct Legend | Pipe Legend | Color Fill Legend | Symbol | Span Direction | Beam | Stair Path | Area | Path | Fabric

Select | Dimension | Detail | Text | Tag | Color Fill | Symbol

Properties

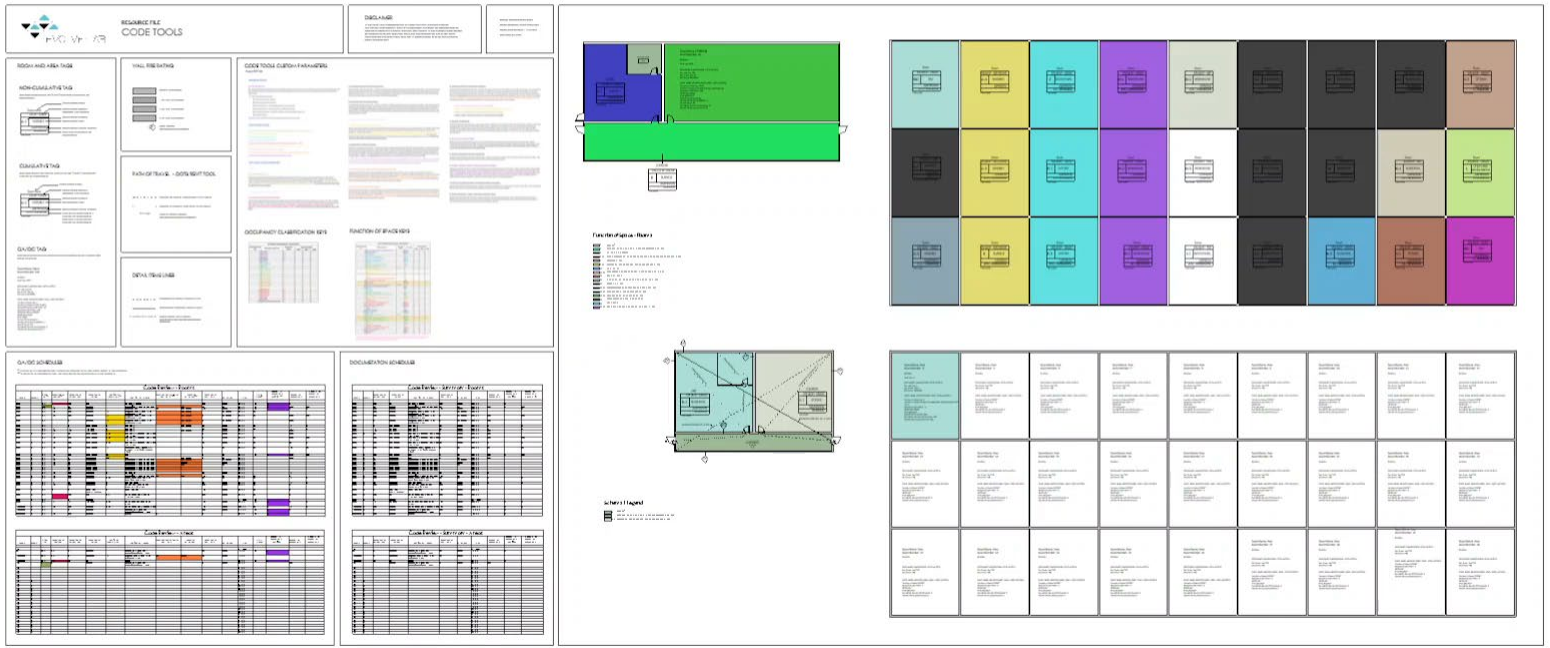
Sheet

Sheet: Code Review | Edit Type

Graphics	
Visibility/Graphics ...	Edit...
Scale	As indicated
Identity Data	
Dependency	Independent
Referencing Sheet	
Referencing Detail	
Current Revision Iss...	
Current Revision Iss...	
Current Revision Iss...	
Current Revision Date	
Current Revision De...	
Current Revision	
Approved By	Approver
Designed By	Designer
Checked By	Checker
Drawn By	Author
Sheet Number	00
Sheet Name	Code Review
Sheet Issue Date	10/03/18
EL_Filter_SP	
Appears In Sheet List	☑
Revisions on Sheet	Edit...
Other	
File Path	C:\Users\JimGreve\E...
Guide Grid	<None>

Properties help | Apply

00 - Code Review



EVOLVELAB CODE TOOLS

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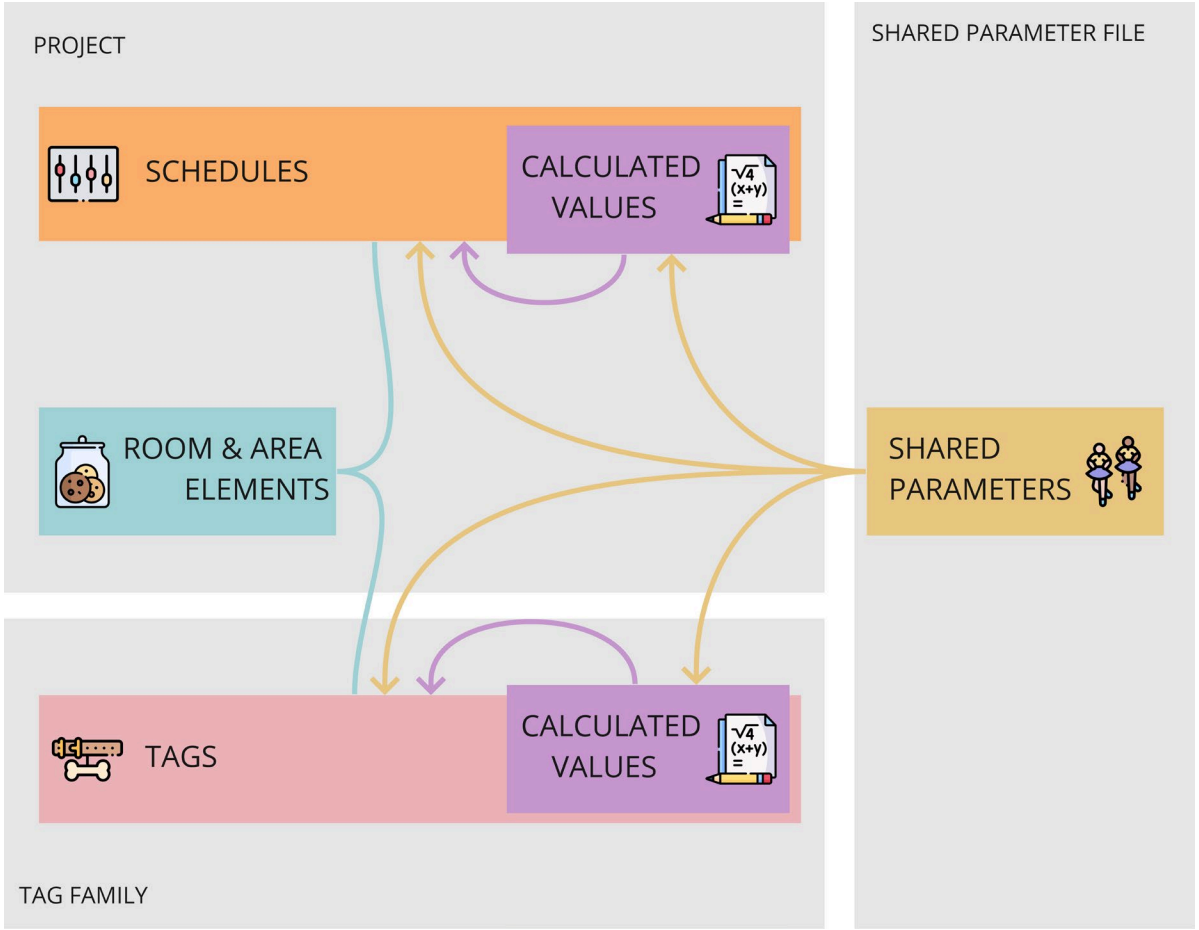
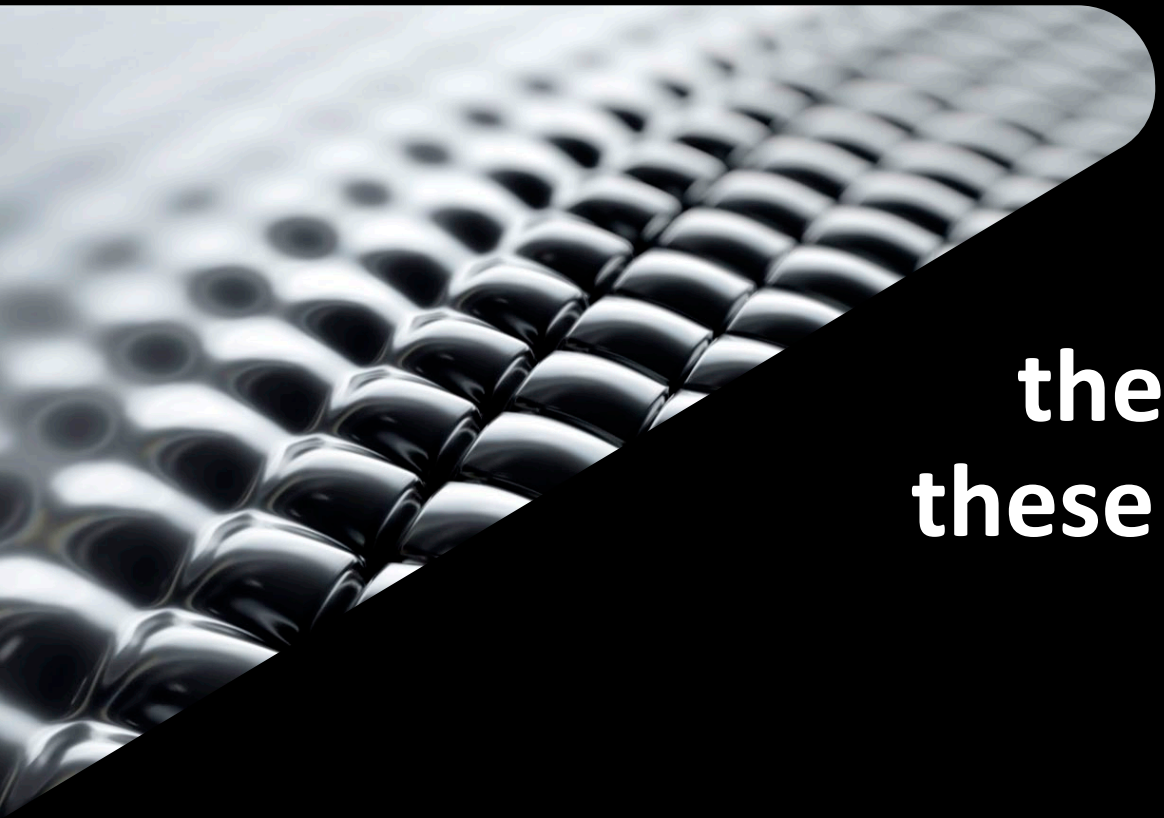
How do the Code Tools use Revit?

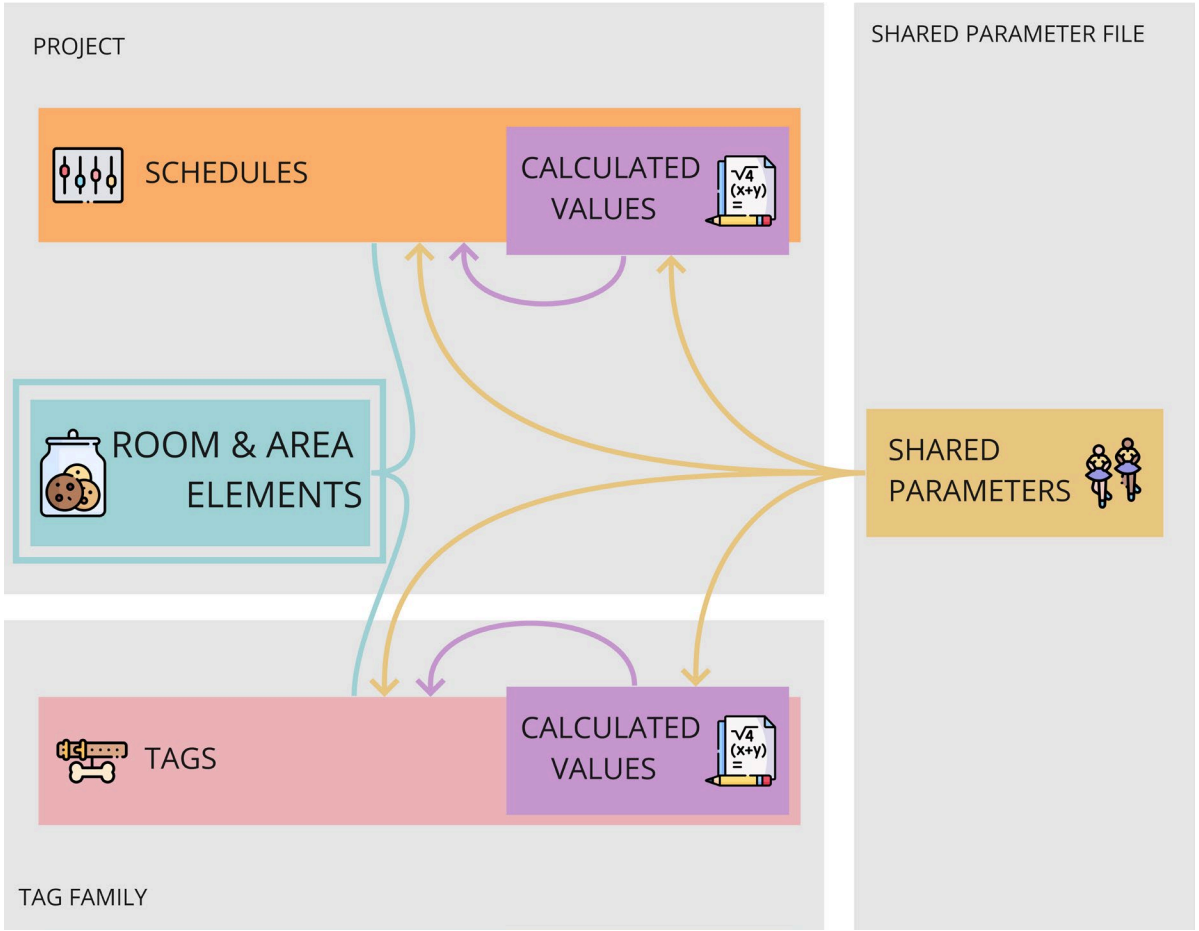


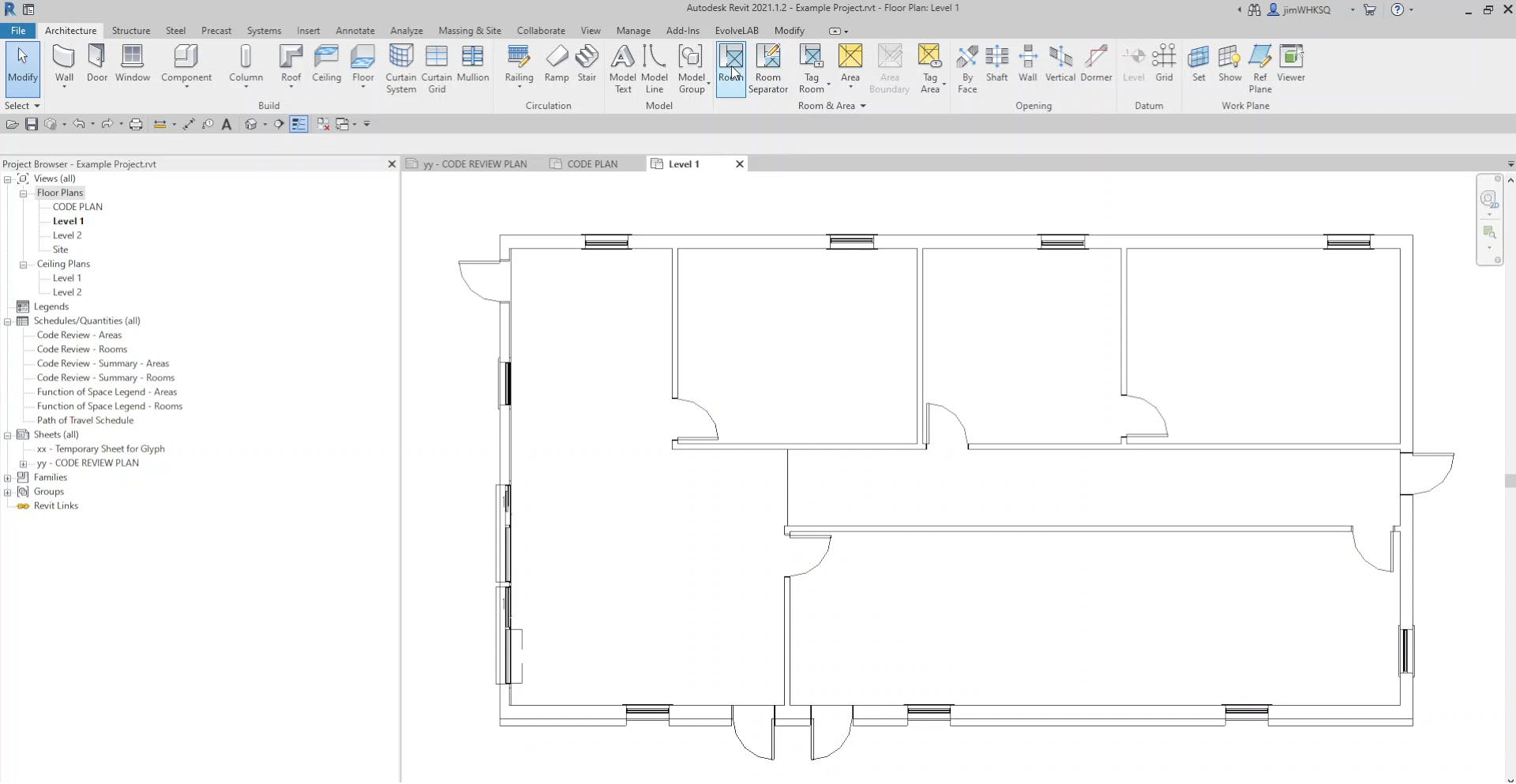


How do the Code Tools use these Revit features?

Room & Area Elements

- What are Rooms and Area Elements?
  - The cookie jar
- When to use each?
  - Rooms
    - Quicker
    - Uses walls & other elements
  - Areas
    - Versatile
    - Many types in same space





ROOMS

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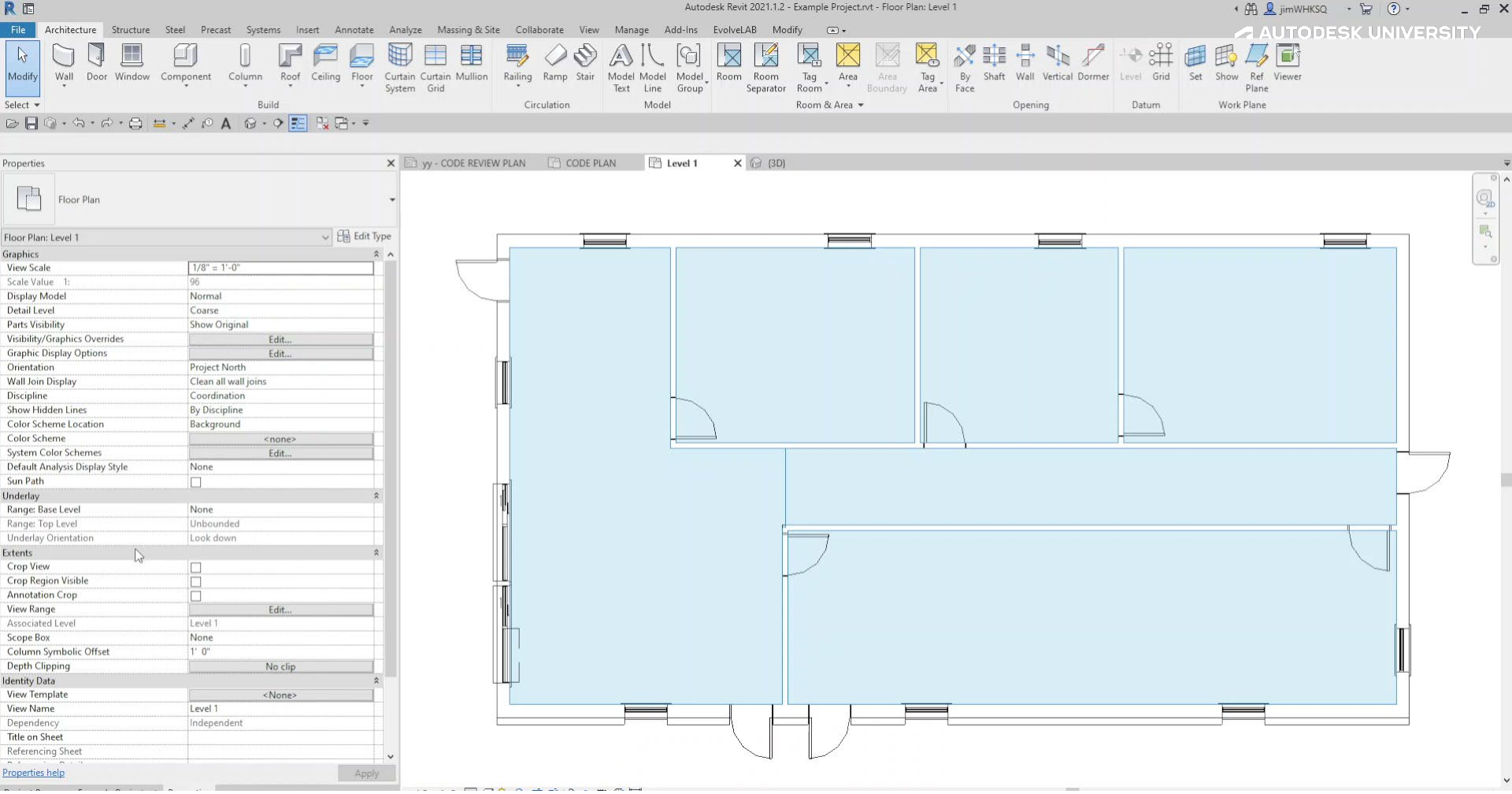
Autodesk Revit 2021.1.2 - Example Project.rvt - Floor Plan: Level 1
jimWHKSQ
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File
Architecture
Structure
Steel
Precast
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
EvolveLAB
Modify
Modify
Wall
Door
Window
Component
Column
Roof
Ceiling
Floor
Curtain System
Curtain Grid
Mullion
Railing
Ramp
Stair
Model Text
Model Line
Model Group
Room
Room Separator
Tag Room
Area
Area Boundary
Tag Area
By Face
Shaft
Wall
Vertical
Dormer
Level
Grid
Set
Show
Ref Plane
Viewer
Select
Build
Circulation
Model
Room & Area
Opening
Datum
Work Plane
Properties
Floor Plan
Floor Plan: Level 1
Edit Type
Graphics
View Scale
1/8" = 1'-0"
Scale Value 1:
96
Display Model
Normal
Detail Level
Coarse
Parts Visibility
Show Original
Visibility/Graphics Overrides
Edit...
Graphic Display Options
Edit...
Orientation
Project North
Wall Join Display
Clean all wall joins
Discipline
Coordination
Show Hidden Lines
By Discipline
Color Scheme Location
Background
Color Scheme
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System Color Schemes
Edit...
Default Analysis Display Style
None
Sun Path
Underlay
Range: Base Level
None
Range: Top Level
Unbounded
Underlay Orientation
Look down
Extents
Crop View
Crop Region Visible
Annotation Crop
View Range
Edit...
Associated Level
Level 1
Scope Box
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Column Symbolic Offset
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Depth Clipping
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Identity Data
View Template
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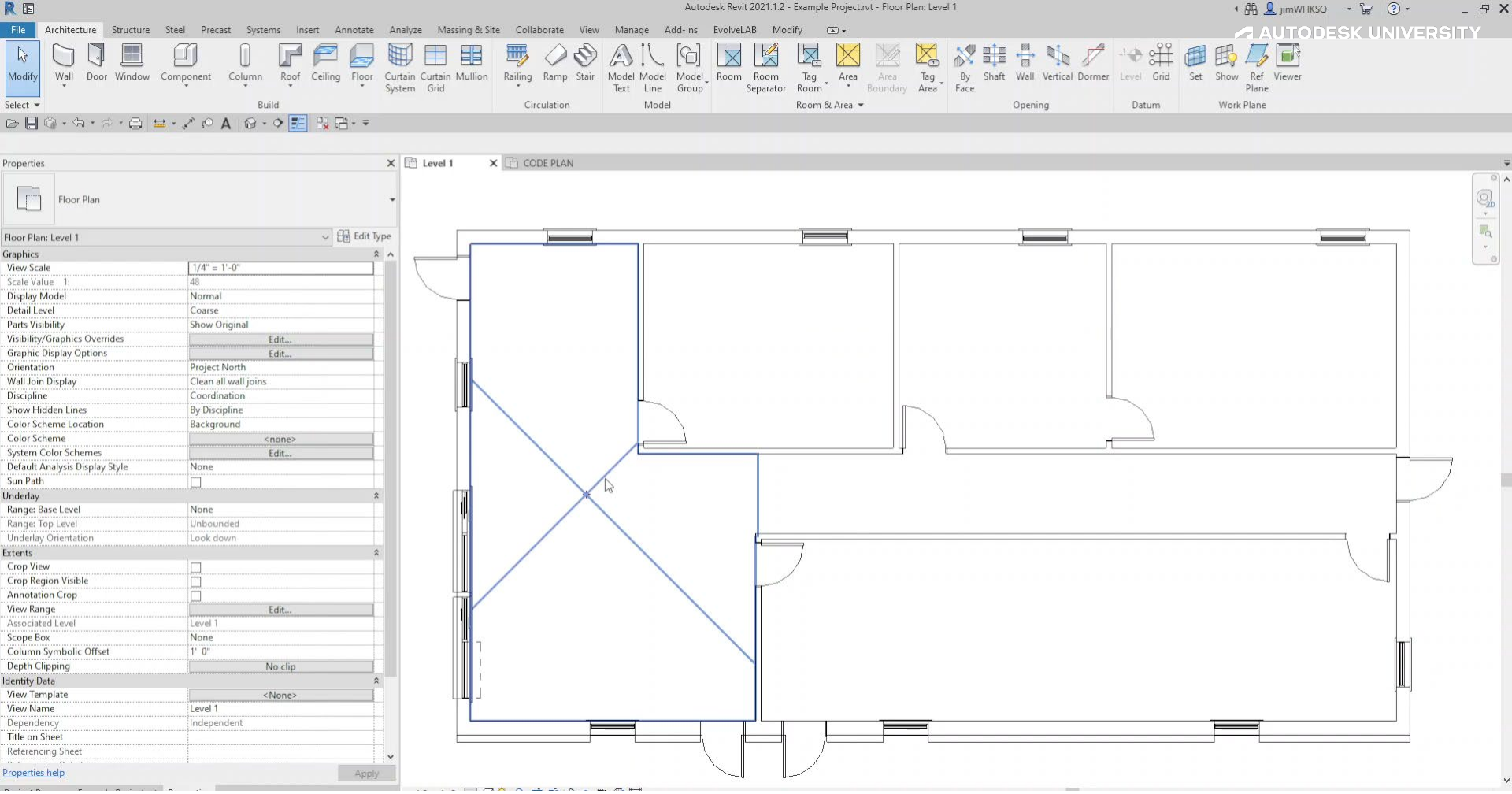
View Name
Level 1
Dependency
Independent
Title on Sheet
Referencing Sheet
Properties help
Apply
yy - CODE REVIEW PLAN
CODE PLAN
Level 1
(3D)

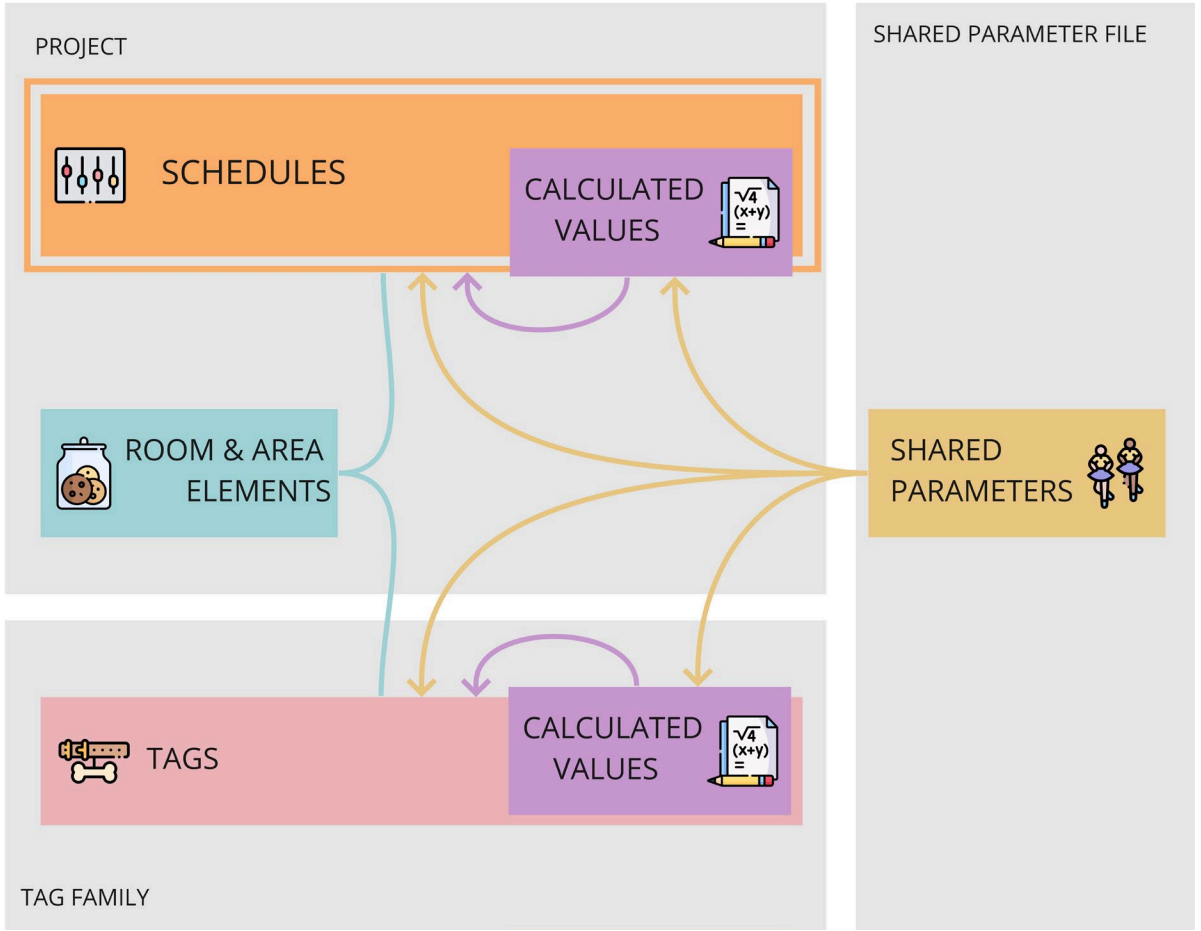
AREAS



ROOM PARAMETERS

Schedules

- What are schedules?
  - The user interface
- How do the Code Tools use schedules?
  - QA/QC schedules
    - Partial results
    - Conditional Formatting
      - Color Coding
  - Documentation schedules
    - Only relevant results
    - Ready for Code Plans



<Code Review - Rooms>

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Name	Number	Code Year***	Occupancy Use Key**	Occupancy Group Key	Occupancy Group	Function Of Space Key**	Function Of Space	Manual Occupancy Load Factor**	Manual Net/Gross***	Occupancy Load Factor	Net/Gross	Area	Path of Travel**	Number of Occupants Additio	Number Of Occupant	Cumulative Number Of
Room	1	2018	1	TBD	TBD	2	Agricultural building	2		300	GROSS	870.83 SF		3	3	8
Room	2	2020	1.01	A-1	ASSEMBLY	21	Mail buildings - covered and open	3	NET	-2	NET	870.83 SF		2	-435	-435
Room	3	2012	1.03	A-3	ASSEMBLY	9	Business areas	200	NET/GROSS	100	GROSS	870.83 SF		1	9	10
Room	4	2018	1.04	A-4	ASSEMBLY	9.01	Business areas - Concentrated business use		NET/GROSS		NET/GROSS	870.83 SF				
Room	5	2015	1.05	A-5	ASSEMBLY	9.01	Business areas - Concentrated business use		NET/GROSS	-1	NET/GROSS	870.83 SF			-870	-870
Room	6	2012	2	B	BUSINESS	9.01	Business areas - Concentrated business use		NET/GROSS	-1	NET/GROSS	870.83 SF			-870	
Room	7	2018	3	E	EDUCATIONAL	22	Mercantile		NET/GROSS	60	GROSS	870.83 SF			15	15
Room	8	2015	4.01	F-1	FACTORY	22	Mercantile			60	GROSS	870.83 SF			15	15
Room	9	2012	4.02	F-2	FACTORY	22	Mercantile		NET/GROSS	-1	GROSS	870.83 SF			-870	
Room	10	2018	5.01	H-1	HIGH HAZARD	22.03	Mercantile - Basement and grade floor are			-1	GROSS	870.83 SF			-870	
Room	11	2015	5.02	H-2	HIGH HAZARD	22.03	Mercantile - Basement and grade floor are			-1	GROSS	870.83 SF			-870	-870
Room	12	2012	5.03	H-3	HIGH HAZARD	22.03	Mercantile - Basement and grade floor are			30	GROSS	870.83 SF			30	30
Room	13	2018	5.04	H-4	HIGH HAZARD	7.01	Assembly without fixed seats - Concentra			7	NET	870.83 SF			125	125
Room	14	2018	5.05	H-5	HIGH HAZARD	100	TBD			-1	TBD	870.83 SF		2	-870	-862
Room	15	2018	6.01	I-1	INSTITUTIONAL	3333	TBD		NET/GROSS	-1	TBD	870.83 SF			-870	
Room	16	2012	6.02	I-2	INSTITUTIONAL	21	Mail buildings - covered and open		NET/GROSS		NET/GROSS	870.83 SF				
Room	17	2018	6.03	I-3	INSTITUTIONAL	21	Mail buildings - covered and open		GROSS		GROSS	870.83 SF				
Room	18	2015	6.04	I-4	INSTITUTIONAL	21	Mail buildings - covered and open		NET		NET	870.83 SF				
Room	19	2012	7	M	MERCANTILE	21	Mail buildings - covered and open					870.83 SF				
Room	20	2018	7	M	MERCANTILE	21	Mail buildings - covered and open					870.83 SF				
Room	21	2018	8.02	R-2	RESIDENTIAL	12	Dormitories			50	GROSS	870.83 SF			18	
Room	22	2018	8.03	R-3	RESIDENTIAL	21	Mail buildings - covered and open	100	NET	100	NET	870.83 SF			9	9
Room	23	2018	8.04	R-4	RESIDENTIAL	13.02	Educational - Shops and other vocational r			50	NET	870.83 SF			18	18
Room	24	2018	9.01	S-1	STORAGE	14	Exercise rooms			50	GROSS	870.83 SF			18	18
Room	25	2018	9.02	S-2	STORAGE	15	Group H-5 fabrication and manufacturing a			200	GROSS	870.83 SF			5	5
Room	26	2018	10	U	UTILITY AND MISCELLANEO	16	Industrial areas			100	GROSS	870.83 SF			9	9
Room	27	2018	11	TBD	TBD	17.01	Institutional areas - Inpatient treatment ar			240	GROSS	870.83 SF			4	4
Room	28	2019	2	B	BUSINESS							Not Placed				
LIVING	A1	2018	4.01	F-1	FACTORY	17.02	Institutional areas - Outpatient areas			100	GROSS	725.68 SF		2	8	10
COMMON	A2	2018	1.03	A-3	ASSEMBLY	17.03	Institutional areas - Sleeping areas			120	GROSS	2003.81 SF		3	17	17
CORRIDOR	A3	2018	2	B	BUSINESS	1	Accessory storage areas, mechanical equ			300	GROSS	1412.52 SF		2	5	7
BEDROOM	A4	2018	1.02	A-2	ASSEMBLY	0	EGRESS*	70		0	*	152.38 SF		2		6

QA/QC SCHEDULE

OCCUPANCY CLASSIFICATION - PER CHAPTER 3					
OCCUPANCY USE KEY	OCCUPANCY GROUP KEY	OCCUPANCY GROUP	APPLICABLE CODE		
			2012	2015	2018
1.01	ASSEMBLY	A-1	Y	Y	Y
1.02	ASSEMBLY	A-2	Y	Y	Y
1.03	ASSEMBLY	A-3	Y	Y	Y
1.04	ASSEMBLY	A-4	Y	Y	Y
1.05	ASSEMBLY	A-5	Y	Y	Y
2.00	BUSINESS	B	Y	Y	Y
3.00	EDUCATIONAL	E	Y	Y	Y
4.01	FACTORY	F-1	Y	Y	Y
4.02	FACTORY	F-2	Y	Y	Y
5.01	HIGH HAZARD	H-1	Y	Y	Y
5.02	HIGH HAZARD	H-2	Y	Y	Y
5.03	HIGH HAZARD	H-3	Y	Y	Y
5.04	HIGH HAZARD	H-4	Y	Y	Y
5.05	HIGH HAZARD	H-5	Y	Y	Y
6.01	INSTITUTIONAL	I-1	Y	Y	Y
6.02	INSTITUTIONAL	I-2	Y	Y	Y
6.03	INSTITUTIONAL	I-3	Y	Y	Y
6.04	INSTITUTIONAL	I-4	Y	Y	Y
7.00	MERCANTILE	M	Y	Y	Y
8.01	RESIDENTIAL	R-1	Y	Y	Y
8.02	RESIDENTIAL	R-2	Y	Y	Y
8.03	RESIDENTIAL	R-3	Y	Y	Y
8.04	RESIDENTIAL	R-4	Y	Y	Y
9.01	STORAGE	S-1	Y	Y	Y
9.02	STORAGE	S-2	Y	Y	Y
10.00	UTILITY AND MISCELLANEOUS	U	Y	Y	Y

SPACE USAGE AND OCCUPANCY LOAD - PER CHAPTER 10						
FUNCTION OF SPACE KEY	FUNCTION OF SPACE	OCC. LOAD FACTOR	NET/ GROSS	APPLICABLE CODE		
				2012	2015	2018
1.00	Accessory storage areas, mechanical equipment room	300	GROSS	Y	Y	Y
2.00	Agricultural building	300	GROSS	Y	Y	Y
3.00	Aircraft hangars	500	GROSS	Y	Y	Y
	Airport terminal					
4.01	Airport terminal - Baggage claim	20	GROSS	Y	Y	Y
4.02	Airport terminal - Baggage handling	300	GROSS	Y	Y	Y
4.03	Concourse, Airport terminal	100	GROSS	Y	Y	Y
4.04	Airport terminal - Waiting areas	15	GROSS	Y	Y	Y
	Assembly					
5.01	Assembly - Gaming floors (keno, slots, etc.)	11	GROSS	Y	Y	Y
5.02	Assembly - Exhibit gallery and museum	30	NET	Y	Y	Y
6.00	Assembly with fixed seats	SEE CODE		Y	Y	Y
	Assembly without fixed seats			Y	Y	Y
7.01	Assembly without fixed seats - Concentrated (chairs only—not fixed)	7	NET	Y	Y	Y
7.02	Assembly without fixed seats - Standing space	5	NET	Y	Y	Y
7.03	Assembly without fixed seats - Unconcentrated (tables and chairs)	15	NET	Y	Y	Y
8.00	Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7	NET	Y	Y	Y
9.00	Business areas	150	GROSS			Y
9.00	Business areas	100	GROSS	Y	Y	
9.01	Business areas - Concentrated business use areas	SEE CODE				Y
10.00	Courtrooms—other than fixed seating areas	40	NET	Y	Y	Y
11.00	Day care	35	NET	Y	Y	Y
12.00	Dormitories	50	GROSS	Y	Y	Y
	Educational					
13.01	Educational - Classroom area	20	NET	Y	Y	Y
13.02	Educational - Shops and other vocational room areas	50	NET	Y	Y	Y
14.00	Exercise rooms	50	GROSS	Y	Y	Y
15.00	Group H-5 fabrication and manufacturing areas	200	GROSS	Y	Y	Y
16.00	Industrial areas	100	GROSS	Y	Y	Y
	Institutional areas					
17.01	Institutional areas - Inpatient treatment areas	240	GROSS	Y	Y	Y
17.02	Institutional areas - Outpatient areas	100	GROSS	Y	Y	Y
17.03	Institutional areas - Sleeping areas	120	GROSS	Y	Y	Y
18.00	Kitchens, commercial	200	GROSS	Y	Y	Y
	Library					
19.01	Library - Reading rooms	50	NET	Y	Y	Y
19.02	Library - Stack area	100	GROSS	Y	Y	Y
20.00	Locker rooms	50	GROSS	Y	Y	Y
21.00	Mall buildings—covered and open	SEE CODE		Y	Y	Y
22.00	Mercantile	60	GROSS		Y	Y
22.01	Mercantile - Storage, stock, shipping areas	300	GROSS	Y	Y	Y
22.02	Mercantile - Areas on other floors	60	GROSS	Y		
22.03	Mercantile - Basement and grade floor areas	30	GROSS	Y		
23.00	Parking garages	200	GROSS	Y	Y	Y
24.00	Residential	200	GROSS	Y	Y	Y
	Skating rinks, swimming pools					
25.01	Skating rinks, swimming pools - Rink and pool	50	GROSS	Y	Y	Y
25.02	Skating rinks, swimming pools - Decks	15	GROSS	Y	Y	Y
26.00	Stages and platforms	15	NET	Y	Y	Y
27.00	Warehouses	500	GROSS	Y	Y	Y
0.00	EGRESS*	0	*			

IBC NUMERICAL KEYS

Autodesk Revit 2021.1.2 - Project1 - Schedule: Code Review - Rooms

jimWHKSQ

File | Architecture | Structure | Steel | Precast | Systems | Insert | Annotate | Analyze | Massing & Site | Collaborate | View | Manage | Add-Ins | EvolveLAB | Modify | Modify Schedule/Quantities

Properties | Rooms | Name | Format Unit | Calculated | Combine Parameters | Insert | Delete | Resize | Hide | Unhide All | Insert | Insert Data Row | Delete | Resize | Merge Unmerge | Insert Image | Clear Cell | Group | Ungroup | Freeze Header | Shading | Borders | Reset | Font | Align Horizontal | Align Vertical | Highlight in Model | Show | Hide | Isolate | Explain

Properties | Parameters | Columns | Rows | Titles & Headers | Appearance | Element | Not Placed/Unenclosed | Error

Modify Schedule/Quantities

Properties

Schedule

Schedule: Code Review - Roo | Edit Type

Identity Data
- View Template: Code Schedules
- View Name: Code Review - Rooms
- Dependency: Independent
- EL_Filter_SP: Code Review - QA/QC

Phasing
- Phase: New Construction

Other
- Fields: Edit...
- Filter: Edit...
- Sorting/Grouping: Edit...
- Formatting: Edit...
- Appearance: Edit...
- Embedded Schedule: Edit...

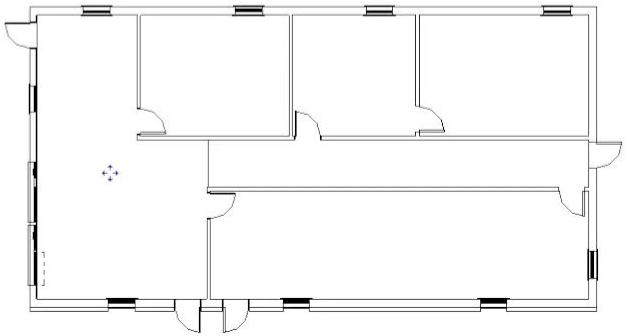
Properties help | Apply

Code Review - Rooms

<Code Revi

A	B	C	D	E	F	G	H	I
Name	Number	Code Year*	Occupancy Use Key	Occupancy Group Ke	Occupancy Group	Function Of Space Key*	Function Of Space	Manual Occupa
LOBBY	101							
OFFICE 1	102							
OFFICE 2	103							
STORAGE	104							
CORRIDOR	105							
WORKSHOP	106							

Level 1



00 - Code Review

Occupancy Group and Occupancy Group Key will be assigned as "TBD". A value for this parameter must always be inputted for a Space.

OCCUPANCY CLASSIFICATION KEYS

OCCUPANCY CLASSIFICATION - PER CHAPTER 3					
OCCUPANCY USE KEY	OCCUPANCY GROUP KEY	OCCUPANCY GROUP	APPLICABLE CODE		
			2012	2015	2018
1.01	ASSEMBLY	A-1	Y	Y	Y
1.02	ASSEMBLY	A-2	Y	Y	Y
1.03	ASSEMBLY	A-3	Y	Y	Y
1.04	ASSEMBLY	A-4	Y	Y	Y
1.05	ASSEMBLY	A-5	Y	Y	Y
2.00	BUSINESS	B	Y	Y	Y
3.00	EDUCATIONAL	E	Y	Y	Y
4.01	FACTORY	F-1	Y	Y	Y
4.02	FACTORY	F-2	Y	Y	Y
5.01	HIGH HAZARD	H-1	Y	Y	Y
5.02	HIGH HAZARD	H-2	Y	Y	Y
5.03	HIGH HAZARD	H-3	Y	Y	Y
5.04	HIGH HAZARD	H-4	Y	Y	Y
5.05	HIGH HAZARD	H-5	Y	Y	Y
6.01	INSTITUTIONAL	I-1	Y	Y	Y
6.02	INSTITUTIONAL	I-2	Y	Y	Y
6.03	INSTITUTIONAL	I-3	Y	Y	Y
6.04	INSTITUTIONAL	I-4	Y	Y	Y
7.00	MERCANTILE	M	Y	Y	Y
8.01	RESIDENTIAL	R-1	Y	Y	Y
8.02	RESIDENTIAL	R-2	Y	Y	Y
8.03	RESIDENTIAL	R-3	Y	Y	Y
8.04	RESIDENTIAL	R-4	Y	Y	Y
9.01	STORAGE	S-1	Y	Y	Y
9.02	STORAGE	S-2	Y	Y	Y
10.00	UTILITY AND MISCELLANEOUS	U	Y	Y	Y

SCHEDULES

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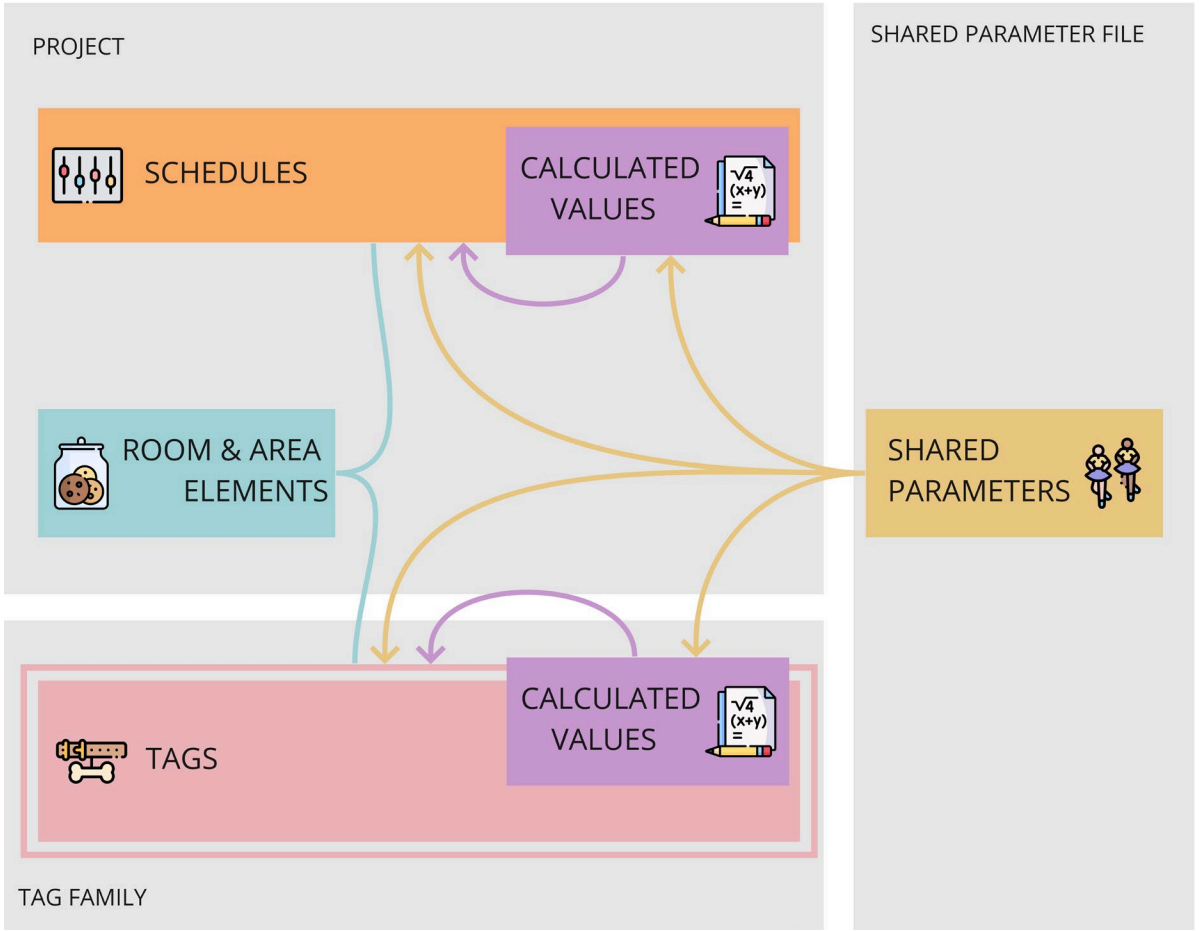
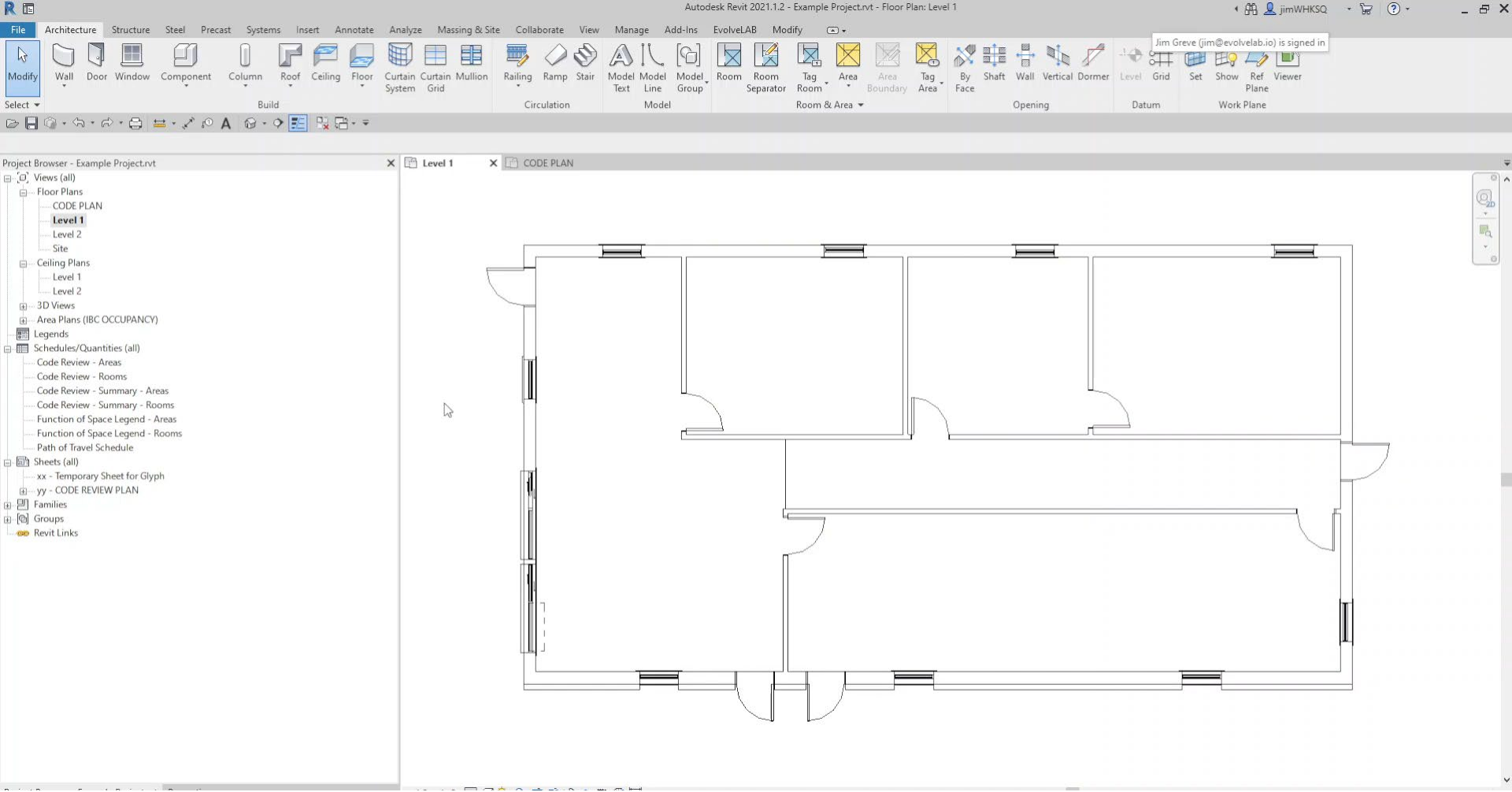
Tags

- What are Tags?
  - Annotation Families that returns data related to model elements.
- How do the Code Tools use tags?
  - Report Room/Area data in plan.
  - Report data related to the schedules.





TAGS

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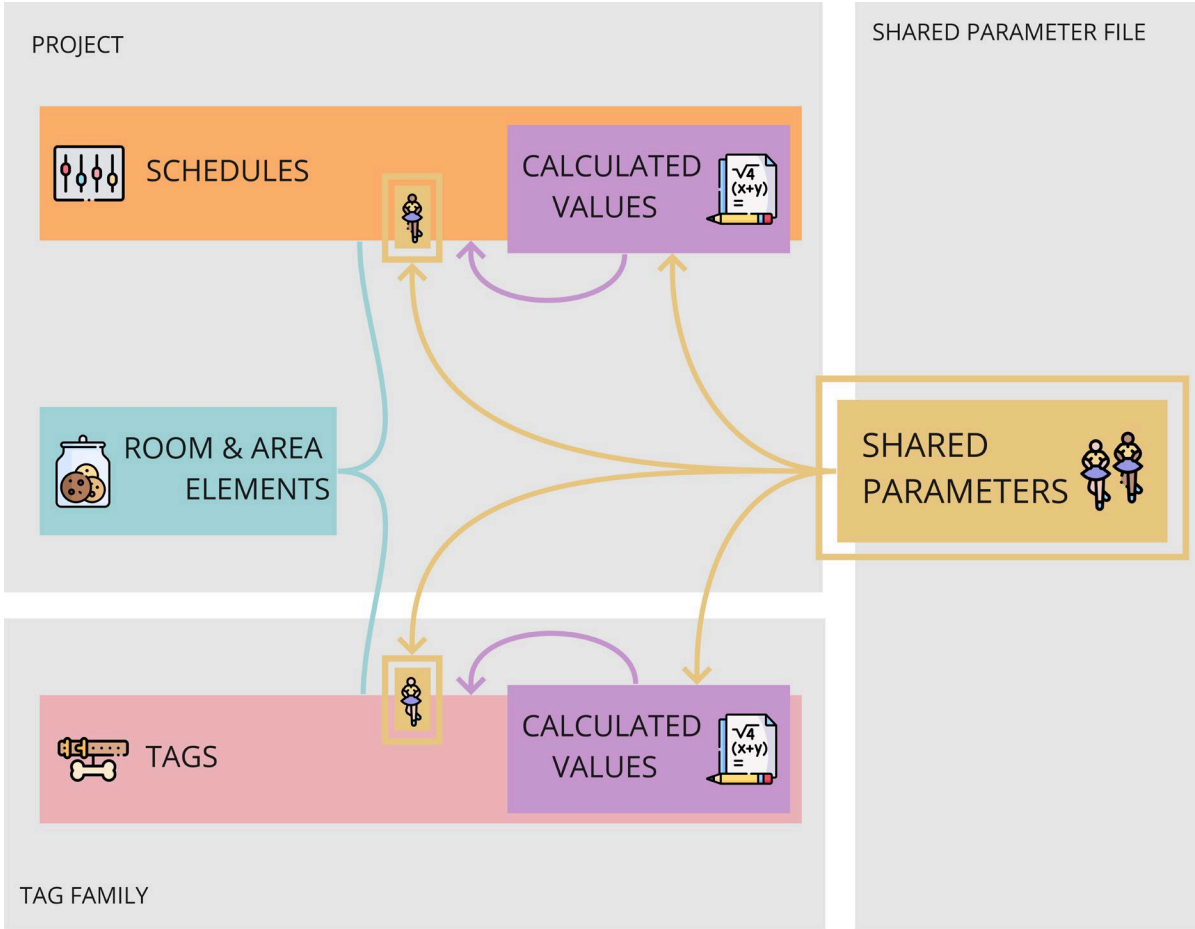
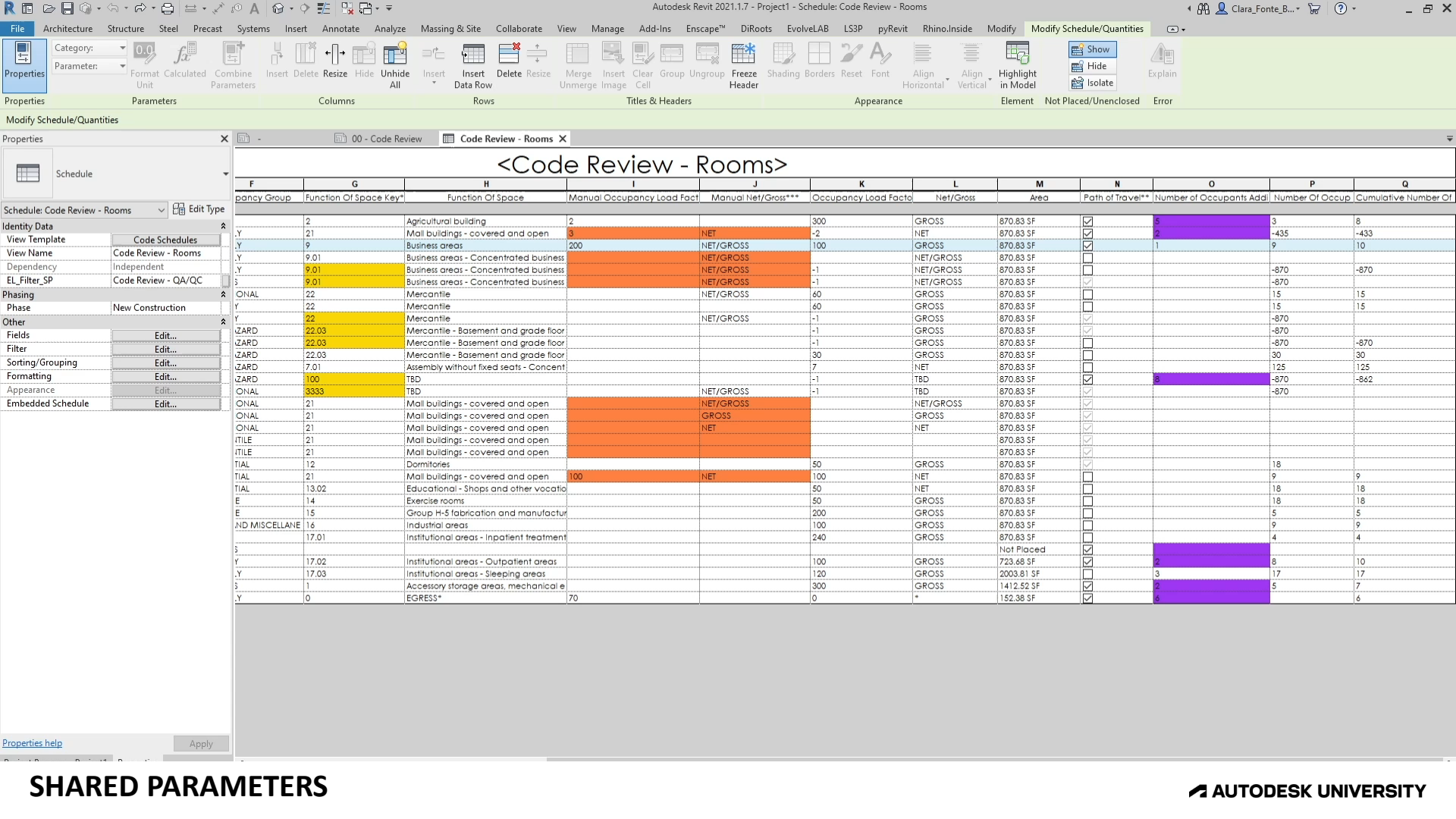
Shared Parameters

- What are Shared Parameters?
  - Custom parameters
    - Project Parameter
    - Family Parameter
    - Exterior File
- Why is it important?
  - Synchronization




Autodesk Revit 2021.1.7 - Project1 - Schedule: Code Review - Rooms
Clara_Fonte_B...
File
Architecture
Structure
Steel
Precast
Systems
Insert
Annotate
Analyze
Massing & Site
Collaborate
View
Manage
Add-Ins
Enscape™
DiRoots
EvolveLAB
LS3P
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Modify
Modify Schedule/Quantities
Properties
Category:
Parameter:
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Parameters
Insert
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Data Row
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in Model
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Isolate
Explain
Properties
Parameters
Columns
Rows
Titles & Headers
Appearance
Element
Not Placed/Unenclosed
Error
Modify Schedule/Quantities
Properties
Schedule
Schedule: Code Review - Rooms
Edit Type
Identity Data
View Template
Code Schedules
View Name
Code Review - Rooms
Dependency
Independent
EL_Filter_SP
Code Review - QA/QC
Phasing
Phase
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Other
Fields
Edit...
Filter
Edit...
Sorting/Grouping
Edit...
Formatting
Edit...
Appearance
Edit...
Embedded Schedule
Edit...
Properties help
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Code Review - Rooms
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2 Agricultural building 2 300 GROSS 870.83 SF 5 3 8
.Y 21 Mall buildings - covered and open 3 NET -2 NET 870.83 SF 2 -435 -433
.Y 9 Business areas 200 NET/GROSS 100 GROSS 870.83 SF 1 9 10
.Y 9.01 Business areas - Concentrated business NET/GROSS NET/GROSS 870.83 SF
.Y 9.01 Business areas - Concentrated business NET/GROSS -1 NET/GROSS 870.83 SF -870 -870
S 9.01 Business areas - Concentrated business NET/GROSS -1 NET/GROSS 870.83 SF -870
ONAL 22 Mercantile NET/GROSS 60 GROSS 870.83 SF 15 15
Y 22 Mercantile 60 GROSS 870.83 SF 15 15
Y 22 Mercantile NET/GROSS -1 GROSS 870.83 SF -870
ZARD 22.03 Mercantile - Basement and grade floor -1 GROSS 870.83 SF -870
ZARD 22.03 Mercantile - Basement and grade floor -1 GROSS 870.83 SF -870 -870
ZARD 22.03 Mercantile - Basement and grade floor 30 GROSS 870.83 SF 30 30
ZARD 7.01 Assembly without fixed seats - Concent 7 NET 870.83 SF 125 125
ZARD 100 TBD -1 TBD 870.83 SF 3 -870 -862
ONAL 3333 TBD NET/GROSS -1 TBD 870.83 SF -870
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TIAL 21 Mall buildings - covered and open 100 NET 100 NET 870.83 SF 9 9
TIAL 13.02 Educational - Shops and other vocatio 50 NET 870.83 SF 18 18
E 14 Exercise rooms 50 GROSS 870.83 SF 18 18
E 15 Group H-5 fabrication and manufactur 200 GROSS 870.83 SF 5 5
ND MISCELLANE 16 Industrial areas 100 GROSS 870.83 SF 9 9
17.01 Institutional areas - Inpatient treatment 240 GROSS 870.83 SF 4 4
S Not Placed
Y 17.02 Institutional areas - Outpatient areas 100 GROSS 723.68 SF 2 8 10
.Y 17.03 Institutional areas - Sleeping areas 120 GROSS 2003.81 SF 3 17 17
S 1 Accessory storage areas, mechanical e 300 GROSS 1412.52 SF 2 5 7
.Y 0 EGRESS* 70 0 * 152.38 SF 6 6
SHARED PARAMETERS
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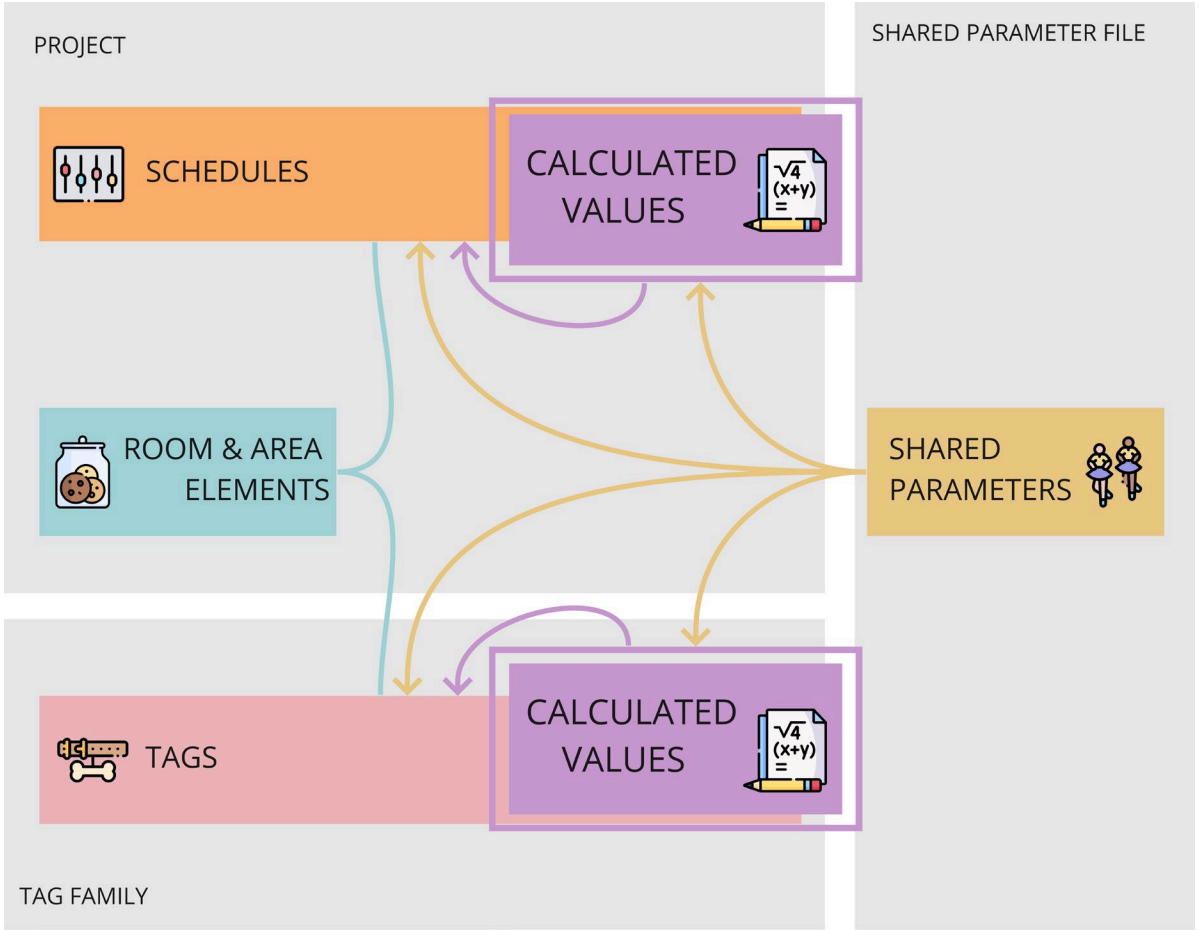
Calculated Values

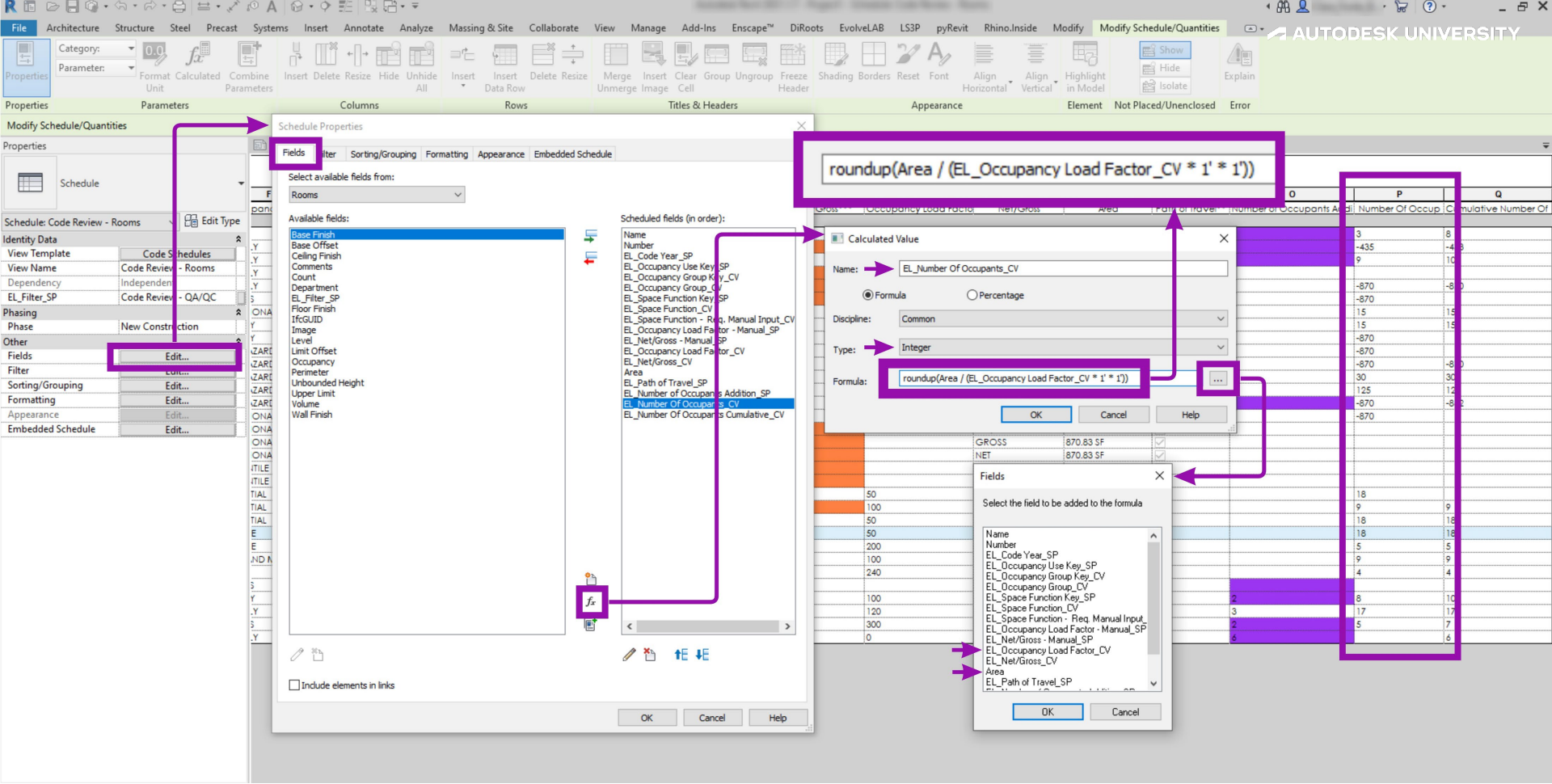
- What are Calculated Values?
  - Special type of parameters that processes data from other parameters
    - Formulas
  - Can be placed in:
    - Schedules
    - Families
    - Tag Family Labels



Code Review - Rooms

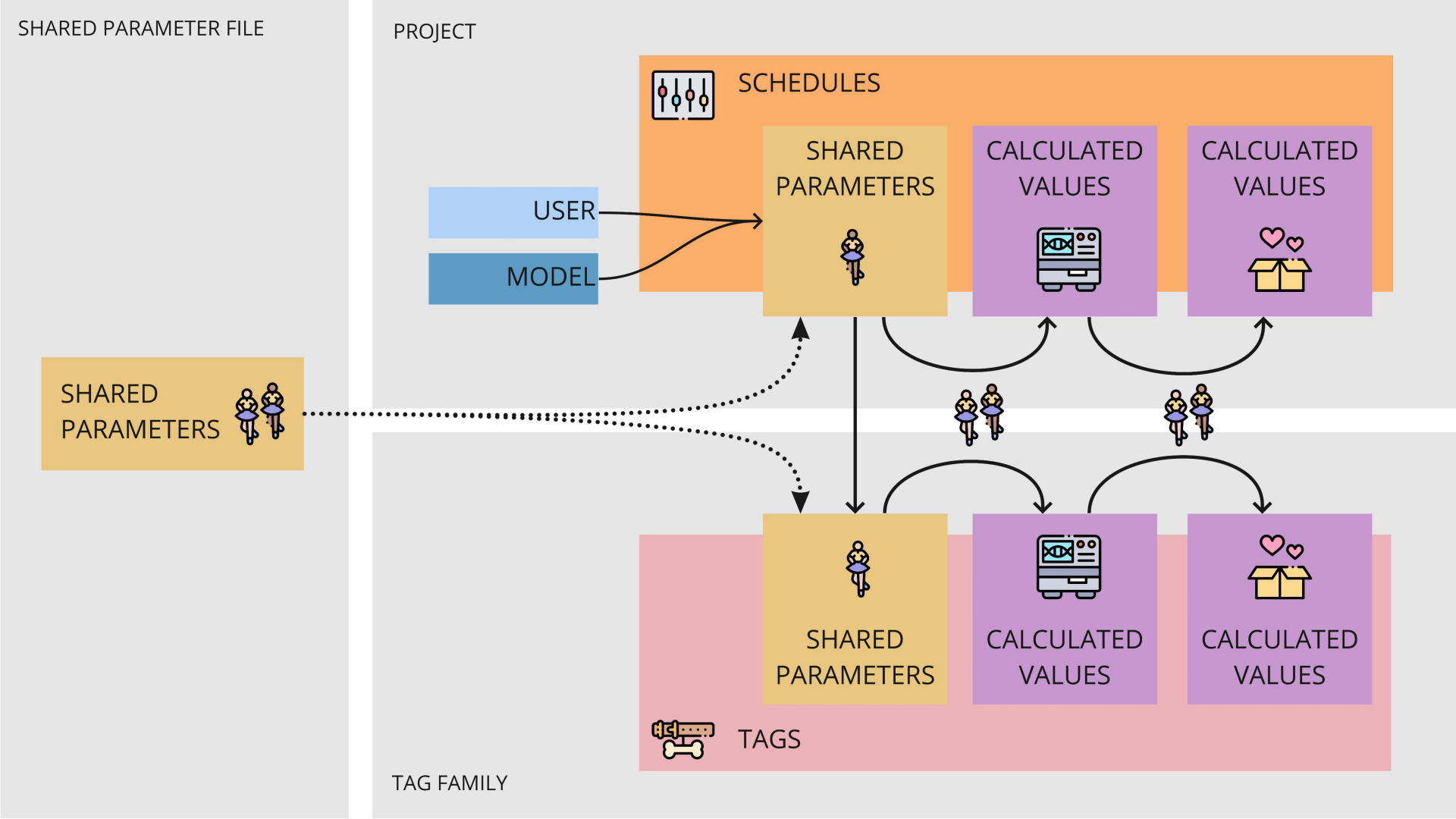
Name	Number	Cod Year*	Occupancy Use Key**	Occupancy Group Key	Occupancy Group	Function Of Space Key**	Function Of Space	Manual Occupancy Load Factor***	Manual Net/Gross***	Occupancy Load Factor	Net/Gross	Area	Path of Travel**	Number of Occupants Addition***	Number Of Occupants	Cumulative Number Of Occupants
Room	1	20	1	TBD	TBD	2	Agricultural building	2		300	GROSS	870.83 SF	Yes	5	0	8
Room	2	20					Mall buildings - covered and open	5	NET	-2	NET	870.83 SF	Yes	5	-435	-433
Room	3	2012	1.03	A-3	ASSEMBLY	9	Business areas	200	NET/GROSS	100	GROSS	870.83 SF	Yes	1	9	10
Room	4	2018	1.04	A-4	ASSEMBLY	9.0	Business areas - Concentrated business use areas		NET/GROSS		NET/GROSS	870.83 SF	No			
Room	5	2015	1.05	A-5	ASSEMBLY	9.0	Business areas - Concentrated business use areas		NET/GROSS	-1	NET/GROSS	870.83 SF	No		-870	-870
Room	6	2012	2	B	BUSINESS	9.0	Business areas - Concentrated business use areas		NET/GROSS	-1	NET/GROSS	870.83 SF			-870	
Room	7	2018	3	E	EDUCATIONAL	22	Mercantile		NET/GROSS	60	GROSS	870.83 SF	No		15	15
Room	8	2015	4.01	F-1	FACTORY	22	Mercantile			60	GROSS	870.83 SF	No		15	15
Room	9	2012	4.02	F-2	FACTORY	22	Mercantile		NET/GROSS	-1	GROSS	870.83 SF			-870	
Room	10	2018	5.01	H-1	HIGH HAZARD	22.0	Mercantile - Basement and grade floor areas			-1	GROSS	870.83 SF			-870	
Room	11	2015	5.02	H-2	HIGH HAZARD	22.0	Mercantile - Basement and grade floor areas			-1	GROSS	870.83 SF	No		-870	-870
Room	12	2012	5.03	H-3	HIGH HAZARD	22.0	Mercantile - Basement and grade floor areas			30	GROSS	870.83 SF	No		30	30
Room	13	2018	5.04	H-4	HIGH HAZARD	7.0	Assembly without fixed seats - Concentrated (chairs only—not fixed)			7	NET	870.83 SF	No		125	125
Room	14	2018	5.05	H-5	HIGH HAZARD	100	TBD			-1	TBD	870.83 SF	Yes	5	-870	-862
Room	15	2018	6.01	I-1	INSTITUTIONAL	33.0	TBD		NET/GROSS	-1	TBD	870.83 SF			-870	
Room	16	2012	6.02	I-2	INSTITUTIONAL	21	Mall buildings - covered and open		NET/GROSS		NET/GROSS	870.83 SF				
Room	17	2018	6.03	I-3	INSTITUTIONAL	21	Mall buildings - covered and open		GROSS		GROSS	870.83 SF				
Room	18	2015	6.04	I-4	INSTITUTIONAL	21	Mall buildings - covered and open		NET		NET	870.83 SF				
Room	19	2012	7	M	MERCANTILE	21	Mall buildings - covered and open					870.83 SF				
Room	20	2018	7	M	MERCANTILE	21	Mall buildings - covered and open					870.83 SF				
Room	21	2018	8.02	R-2	RESIDENTIAL	12	Dormitories			50	GROSS	870.83 SF			18	
Room	22	2018	8.03	R-3	RESIDENTIAL	21	Mall buildings - covered and open	100	NET	100	NET	870.83 SF	No		9	9
Room	23	2018	8.04	R-4	RESIDENTIAL	13.0	Educational - Shops and other vocational room areas			50	NET	870.83 SF	No		18	18
Room	24	2018	9.01	S-1	STORAGE	14	Exercise rooms			50	GROSS	870.83 SF	No		18	18
Room	25	2018	9.02	S-2	STORAGE	15	Group H-5 fabrication and manufacturing areas			200	GROSS	870.83 SF	No		5	5
Room	26	2018	10	U	UTILITY AND	16	Industrial areas			100	GROSS	870.83 SF	No		9	9
Room	27	20	11	TBD	TBD	17.0	Institutional areas - Inpatient treatment areas			240	GROSS	870.83 SF	No		4	4
Room	28	20										Not Placed	Yes			
LIVING	A1	2018	4.01	F-1	FACTORY	17.0	Institutional areas - Outpatient areas			100	GROSS	723.68 SF	Yes	2	8	10
COMMON	A2	2018	1.03	A-3	ASSEMBLY	17.0	Institutional areas - Sleeping areas			120	GROSS	2003.81 SF	No	3	17	17
CORRIDOR	A3	2018	2	B	BUSINESS	1	Accessory storage areas, mechanical equipment room			300	GROSS	1412.52 SF	Yes	2	5	7
BEDROOM	A4	2018	1.02	A-2	ASSEMBLY	0	EGRESS*	70		0	*	152.38 SF	Yes	6		6

CALCULATED VALUES



CALCULATED VALUES

How do all the features work together?


SHARED PARAMETER FILE
PROJECT
SCHEDULES
SHARED PARAMETERS
CALCULATED VALUES
CALCULATED VALUES
USER
MODEL
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SHARED PARAMETERS
CALCULATED VALUES
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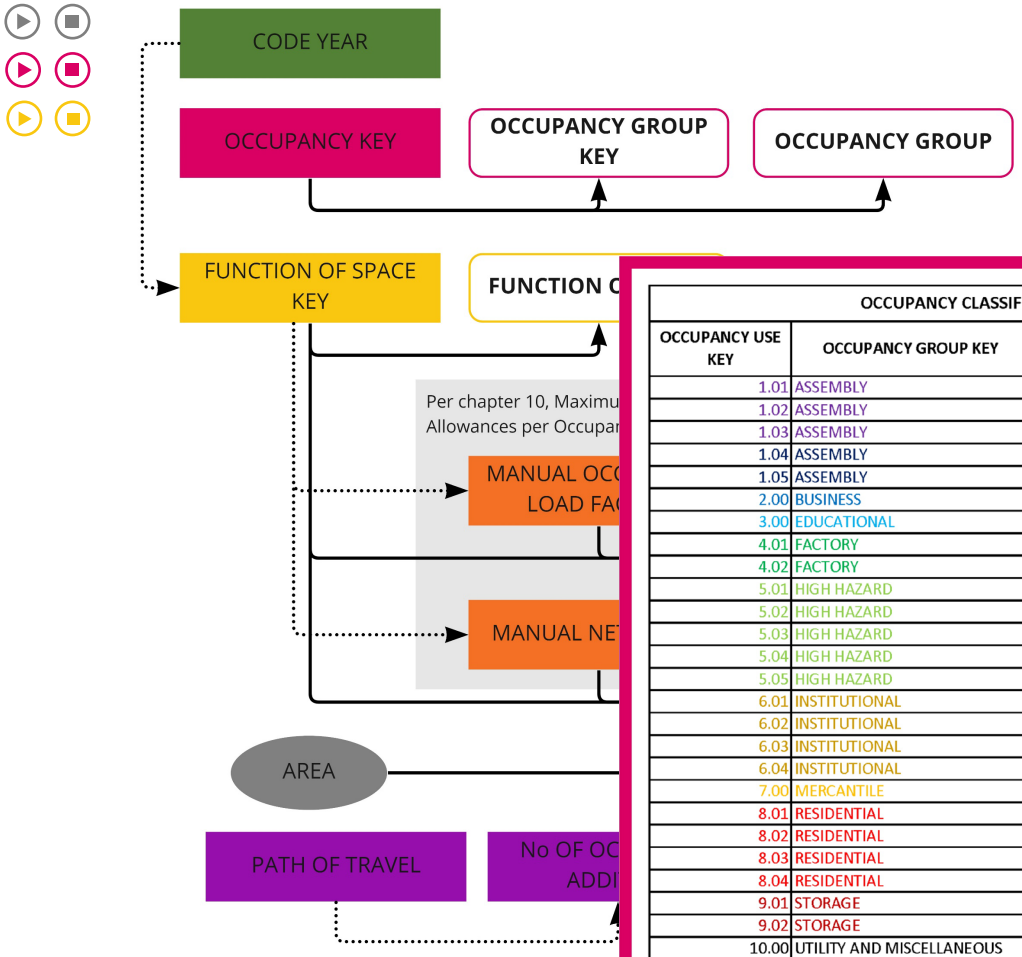
TAGS
TAG FAMILY

What is the Code Tools Calculation Process?



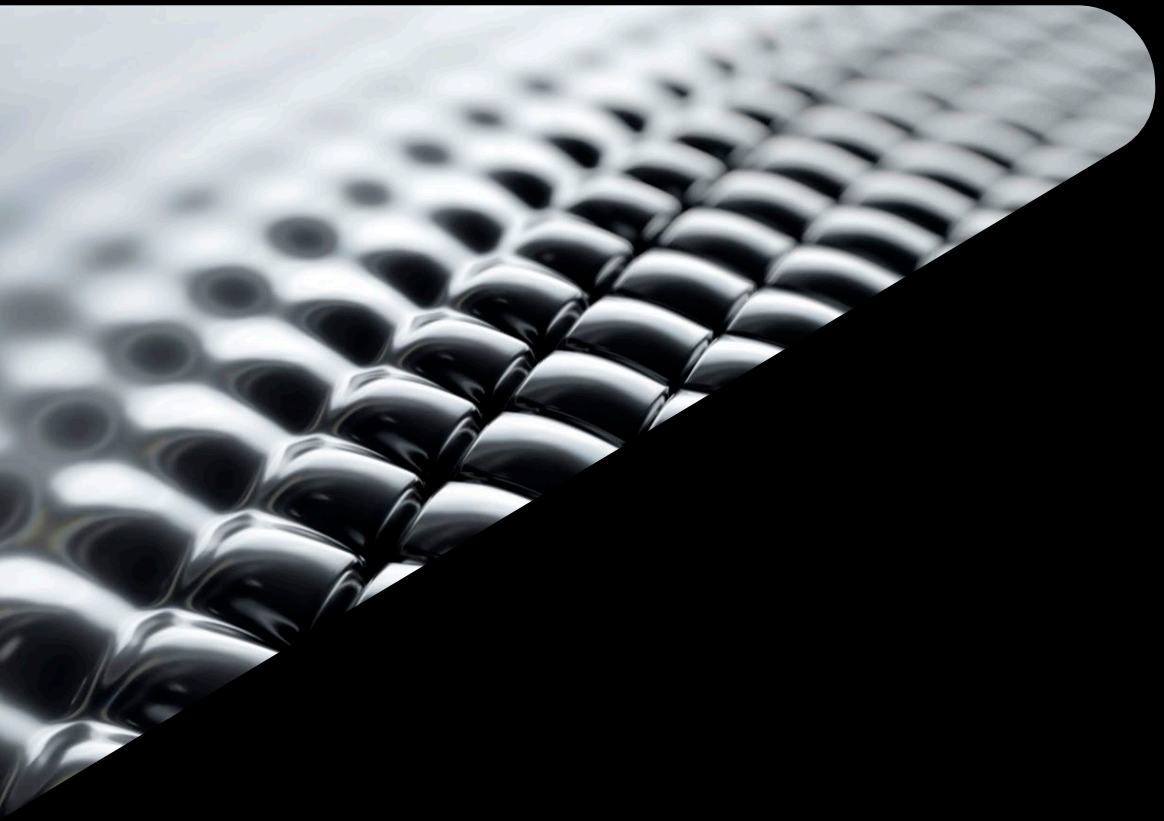
OCCUPANCY CLASSIFICATI

OCCUPANCY USE KEY	OCCUPANCY GROUP KEY	C
1.01	ASSEMBLY	A-1
1.02	ASSEMBLY	A-2
1.03	ASSEMBLY	A-3
1.04	ASSEMBLY	A-4
1.05	ASSEMBLY	A-5
2.00	BUSINESS	B
3.00	EDUCATIONAL	E
4.01	FACTORY	F-1
4.02	FACTORY	F-2
5.01	HIGH HAZARD	H-1
5.02	HIGH HAZARD	H-2
5.03	HIGH HAZARD	H-3
5.04	HIGH HAZARD	H-4
5.05	HIGH HAZARD	H-5
6.01	INSTITUTIONAL	I-1
6.02	INSTITUTIONAL	I-2
6.03	INSTITUTIONAL	I-3
6.04	INSTITUTIONAL	I-4
7.00	MERCANTILE	M
8.01	RESIDENTIAL	R-1
8.02	RESIDENTIAL	R-2
8.03	RESIDENTIAL	R-3
8.04	RESIDENTIAL	R-4
9.01	STORAGE	S-1
9.02	STORAGE	S-2
10.00	UTILITY AND MISCELLANEOUS	U

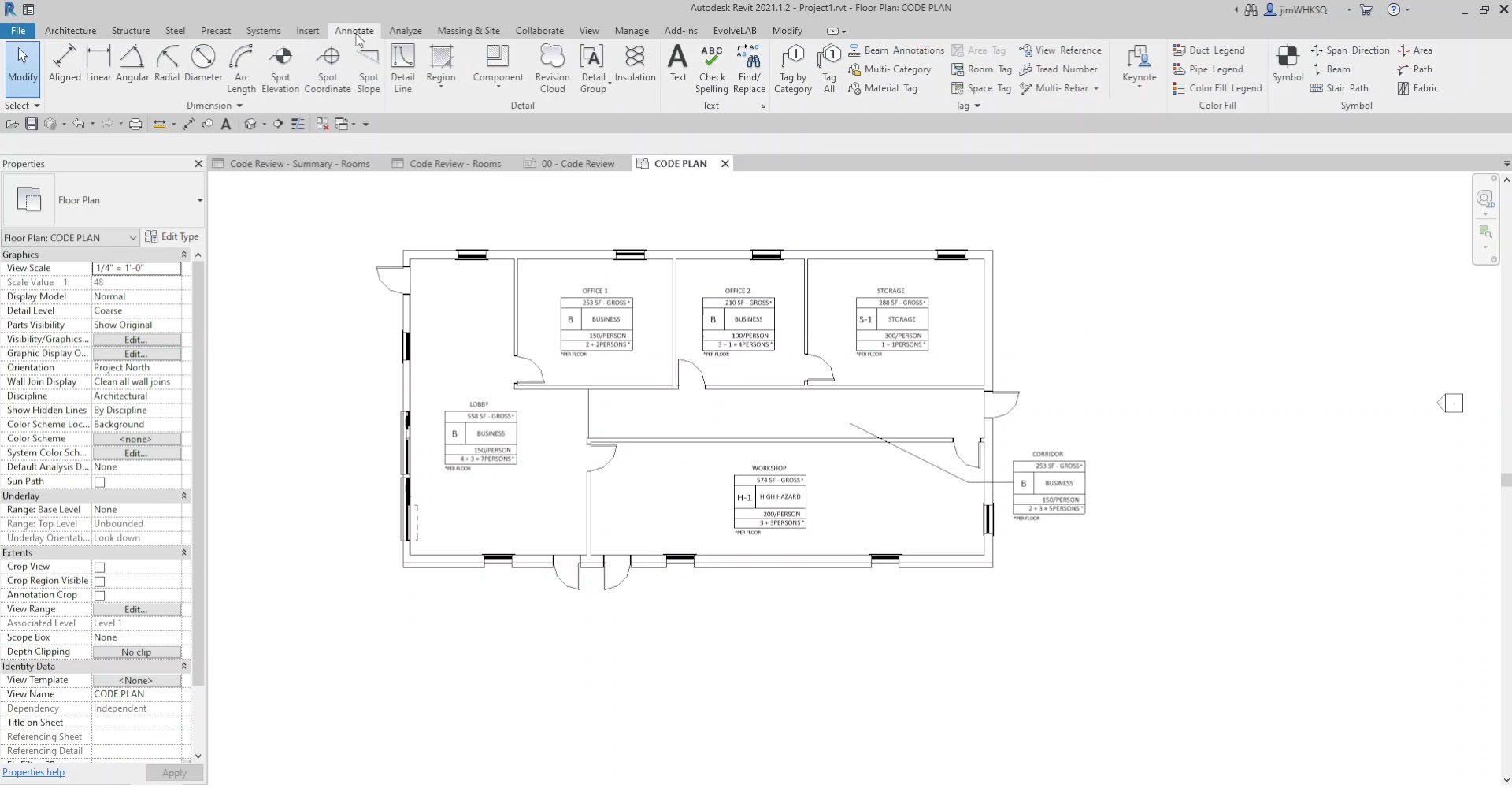
SPACE USAGE AND OCCUPANCY LOAD - PER CHAPTER 10

FUNCTION OF SPACE KEY	FUNCTION OF SPACE	OCC. LOAD FACTOR	NET/ GROSS	APPLICABLE CODE 2012	2015	2018
1.00	Accessory storage areas, mechanical equipment room	300	GROSS	Y	Y	Y
2.00	Agricultural building	300	GROSS	Y	Y	Y
3.00	Aircraft hangars	500	GROSS	Y	Y	Y
	Airport terminal					
4.01	Airport terminal - Baggage claim	20	GROSS	Y	Y	Y
4.02	Airport terminal - Baggage handling	300	GROSS	Y	Y	Y
4.03	Concourse, Airport terminal	100	GROSS	Y	Y	Y
4.04	Airport terminal - Waiting areas	15	GROSS	Y	Y	Y
	Assembly					
5.01	Assembly - Gaming floors (keno, slots, etc.)	11	GROSS	Y	Y	Y
5.02	Assembly - Exhibit gallery and museum	30	NET	Y	Y	Y
6.00	Assembly with fixed seats	SEE CODE		Y	Y	Y
	Assembly without fixed seats			Y	Y	Y
7.01	Assembly without fixed seats - Concentrated (chairs only—not fixed)	7	NET	Y	Y	Y
7.02	Assembly without fixed seats - Standing space	5	NET	Y	Y	Y
7.03	Assembly without fixed seats - Unconcentrated (tables and chairs)	15	NET	Y	Y	Y
8.00	Bowling centers, allow 5 persons for each lane including 15 feet of runway, and for additional areas	7	NET	Y	Y	Y
9.00	Business areas	150	GROSS			Y
9.00	Business areas	100	GROSS	Y	Y	
9.01	Business areas - Concentrated business use areas	SEE CODE				Y
10.00	Courtrooms—other than fixed seating areas	40	NET	Y	Y	Y
11.00	Day care	35	NET	Y	Y	Y
12.00	Dormitories	50	GROSS	Y	Y	Y
	Educational					
13.01	Educational - Classroom area	20	NET	Y	Y	Y
13.02	Educational - Shops and other vocational room areas	50	NET	Y	Y	Y
14.00	Exercise rooms	50	GROSS	Y	Y	Y
15.00	Group H-5 fabrication and manufacturing areas	200	GROSS	Y	Y	Y
16.00	Industrial areas	100	GROSS	Y	Y	Y
	Institutional areas					
17.01	Institutional areas - Inpatient treatment areas	240	GROSS	Y	Y	Y
17.02	Institutional areas - Outpatient areas	100	GROSS	Y	Y	Y
17.03	Institutional areas - Sleeping areas	120	GROSS	Y	Y	Y
18.00	Kitchens, commercial	200	GROSS	Y	Y	Y
	Library					
19.01	Library - Reading rooms	50	NET	Y	Y	Y
19.02	Library - Stack area	100	GROSS	Y	Y	Y
20.00	Locker rooms	50	GROSS	Y	Y	Y
21.00	Mall buildings—covered and open	SEE CODE		Y	Y	Y
22.00	Mercantile	60	GROSS		Y	Y
22.01	Mercantile - Storage, stock, shipping areas	300	GROSS	Y	Y	Y
22.02	Mercantile - Areas on other floors	60	GROSS	Y		
22.03	Mercantile - Basement and grade floor areas	30	GROSS	Y		
23.00	Parking garages	200	GROSS	Y	Y	Y
24.00	Residential	200	GROSS	Y	Y	Y
	Skating rinks, swimming pools					
25.01	Skating rinks, swimming pools - Rink and pool	50	GROSS	Y	Y	Y
25.02	Skating rinks, swimming pools - Decks	15	GROSS	Y	Y	Y
26.00	Stages and platforms	15	NET	Y	Y	Y
27.00	Warehouses	500	GROSS	Y	Y	Y
0.00	EGRESS*	0	*			

* - Egress value is not defined by the Maximum Floor Area Allowances Per Occupant table in Chapter 10, but an addition to help integrate those spaces in the Code Tools. These Spaces skip the standard process of defining the Number of Occupants by the Occupant Load Factor and instead has only a Cumulative Number Of Occupants based solely in the Number of Occupants Addition.



Extra Tools



COLOR LEGEND

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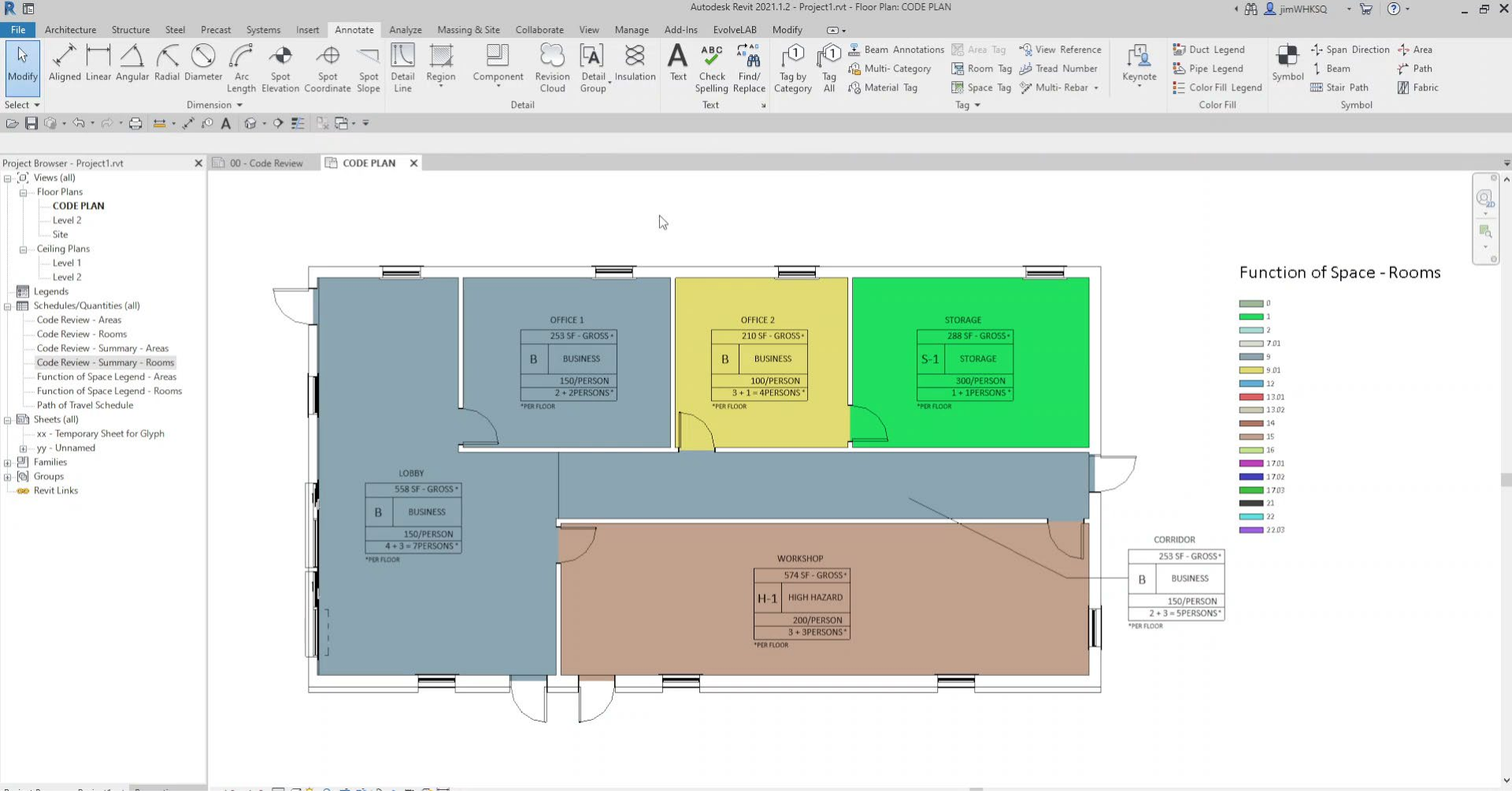
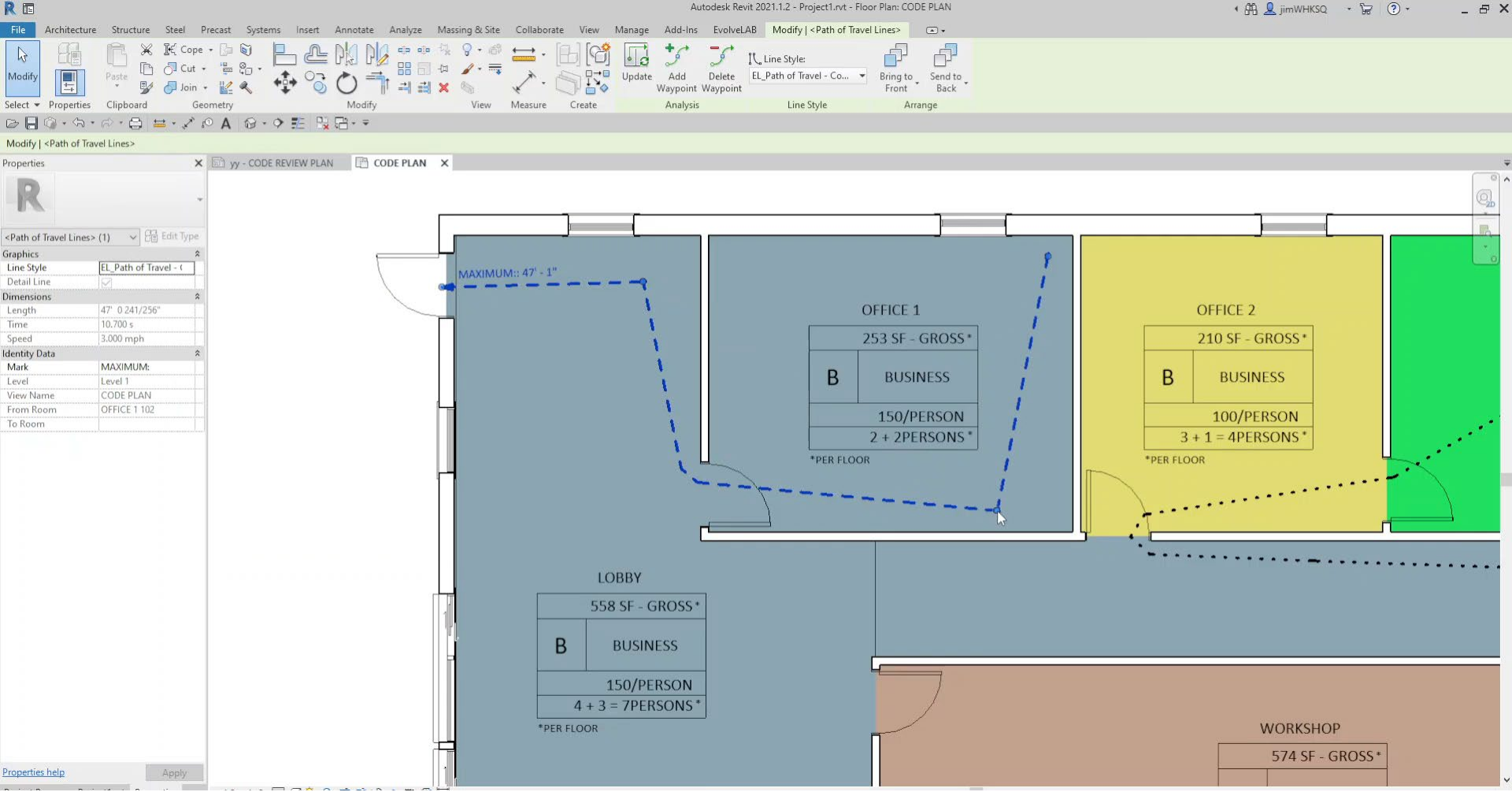
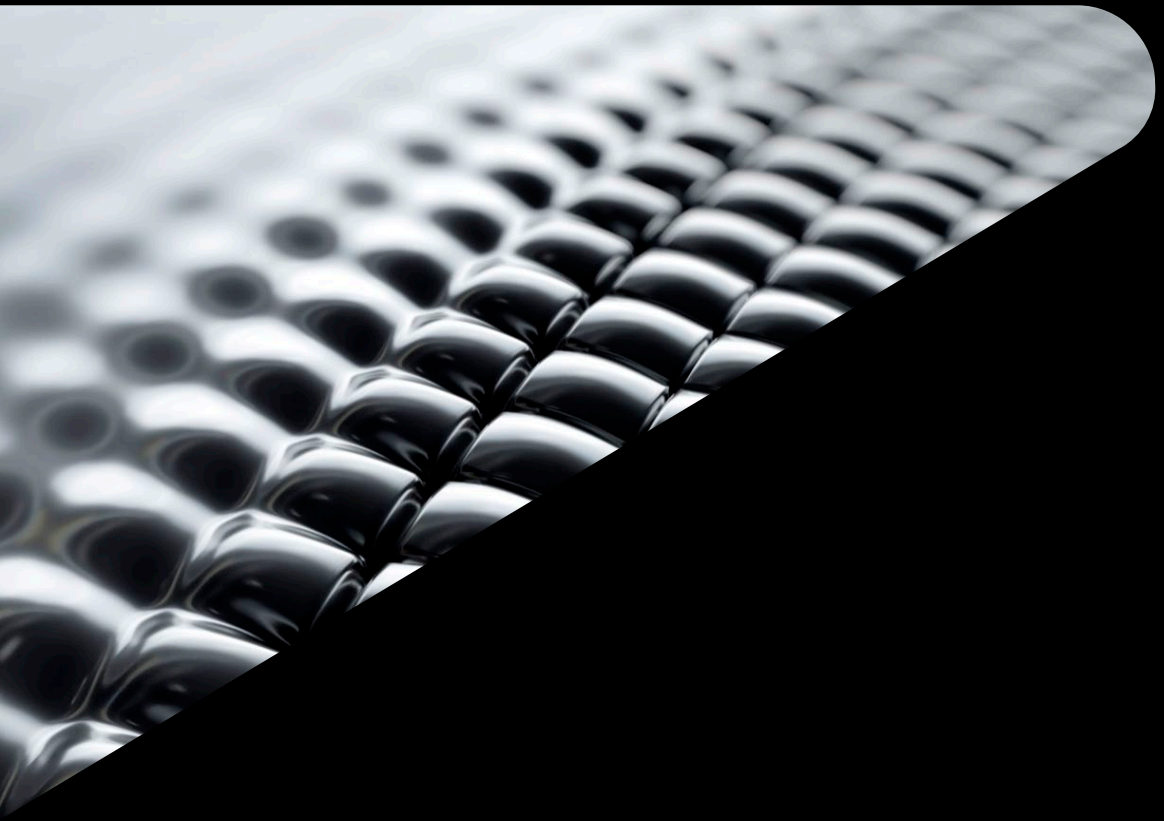


PATH OF TRAVEL

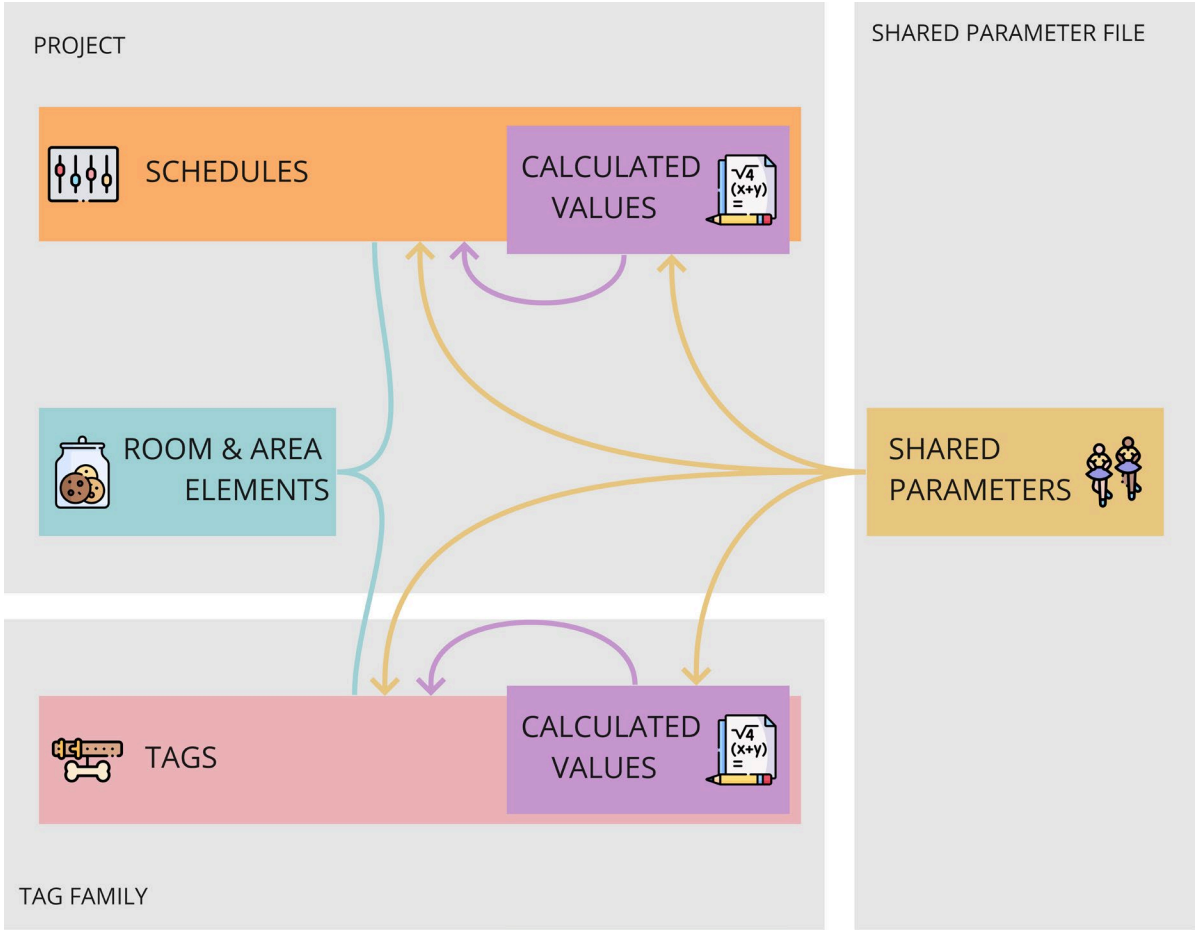


FIRE RATING FILTER OVERRIDES



What have we learned?

How do the Code Tools use Revit?



Autodesk Revit 2021.1.2 - Project1 - Schedule: Code Review - Rooms

jimWHKSQ

File | Architecture | Structure | Steel | Precast | Systems | Insert | Annotate | Analyze | Massing & Site | Collaborate | View | Manage | Add-Ins | EvolveLAB | Modify | Modify Schedule/Quantities

Properties | Rooms | Name | Format Unit | Calculated | Combine Parameters | Insert | Delete | Resize | Hide | Unhide All | Insert | Insert Data Row | Delete | Resize | Merge Unmerge | Insert Image | Clear Cell | Group | Ungroup | Freeze Header | Shading | Borders | Reset | Font | Align Horizontal | Align Vertical | Highlight in Model | Show | Hide | Isolate | Explain

Properties | Parameters | Columns | Rows | Titles & Headers | Appearance | Element | Not Placed/Unenclosed | Error

Modify Schedule/Quantities

Properties

Schedule

Schedule: Code Review - Roo | Edit Type

Identity Data
- View Template: Code Schedules
- View Name: Code Review - Rooms
- Dependency: Independent
- EL_Filter_SP: Code Review - QA/QC

Phasing
- Phase: New Construction

Other
- Fields: Edit...
- Filter: Edit...
- Sorting/Grouping: Edit...
- Formatting: Edit...
- Appearance: Edit...
- Embedded Schedule: Edit...

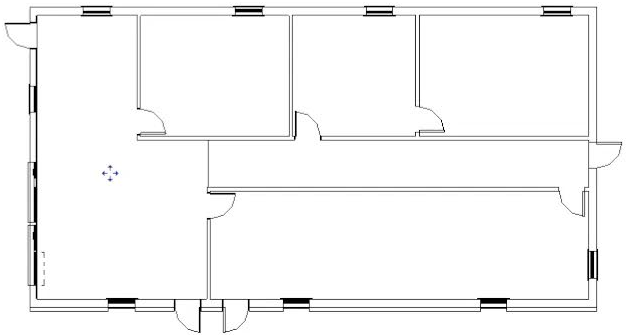
Properties help | Apply

Code Review - Rooms

<Code Revi

A	B	C	D	E	F	G	H	I
Name	Number	Code Year*	Occupancy Use Key	Occupancy Group Ke	Occupancy Group	Function Of Space Key*	Function Of Space	Manual Occupa
LOBBY	101							
OFFICE 1	102							
OFFICE 2	103							
STORAGE	104							
CORRIDOR	105							
WORKSHOP	106							

Level 1



00 - Code Review

Occupancy Group and Occupancy Group Key will be assigned as "TBD". A value for this parameter must always be inputted for a Space.

OCCUPANCY CLASSIFICATION KEYS

OCCUPANCY CLASSIFICATION - PER CHAPTER 3					
OCCUPANCY USE KEY	OCCUPANCY GROUP KEY	OCCUPANCY GROUP	APPLICABLE CODE		
			2012	2015	2018
1.01	ASSEMBLY	A-1	Y	Y	Y
1.02	ASSEMBLY	A-2	Y	Y	Y
1.03	ASSEMBLY	A-3	Y	Y	Y
1.04	ASSEMBLY	A-4	Y	Y	Y
1.05	ASSEMBLY	A-5	Y	Y	Y
2.00	BUSINESS	B	Y	Y	Y
3.00	EDUCATIONAL	E	Y	Y	Y
4.01	FACTORY	F-1	Y	Y	Y
4.02	FACTORY	F-2	Y	Y	Y
5.01	HIGH HAZARD	H-1	Y	Y	Y
5.02	HIGH HAZARD	H-2	Y	Y	Y
5.03	HIGH HAZARD	H-3	Y	Y	Y
5.04	HIGH HAZARD	H-4	Y	Y	Y
5.05	HIGH HAZARD	H-5	Y	Y	Y
6.01	INSTITUTIONAL	I-1	Y	Y	Y
6.02	INSTITUTIONAL	I-2	Y	Y	Y
6.03	INSTITUTIONAL	I-3	Y	Y	Y
6.04	INSTITUTIONAL	I-4	Y	Y	Y
7.00	MERCANTILE	M	Y	Y	Y
8.01	RESIDENTIAL	R-1	Y	Y	Y
8.02	RESIDENTIAL	R-2	Y	Y	Y
8.03	RESIDENTIAL	R-3	Y	Y	Y
8.04	RESIDENTIAL	R-4	Y	Y	Y
9.01	STORAGE	S-1	Y	Y	Y
9.02	STORAGE	S-2	Y	Y	Y
10.00	UTILITY AND MISCELLANEOUS	U	Y	Y	Y

EVOLVELAB CODE TOOLS - SUMMARY

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Copyright Mentions

- Icons
  - Freepik – Flaticon
    - Cookie icons created by Freepik - Flaticon
    - Adjust icons created by Freepik - Flaticon
    - Slider icons created by Freepik - Flaticon
    - Math icons created by Freepik - Flaticon
    - Lab icons created by Freepik - Flaticon
    - Love icons created by Freepik - Flaticon
    - Choreography icons created by Freepik - Flaticon

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