

# BIM & LIGHTING DESIGN

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Josh Bornia





# OUTLINE

- WHAT IS BUILDING INFORMATION MODELING?
- COLLABORATION TOOLS FOR LIGHTING DESIGNERS
- PRE-REQUISITES TO START BIM LIGHTING PROJECT
- BIM (REVIT)
- BIM (REVIT & ELUMTOOLS)
- THE 'OLD FASHIONED' WAY (AGI 32)
- QUESTION PERIOD



# LEARNING OBJECTIVES

- WHEN TO USE ELUMTOOLS VS. AGI32
- MAIN DIFFERENCES BETWEEN ELUMTOOLS & AGI32
- TIPS & TRICKS
- CHOOSE WISELY

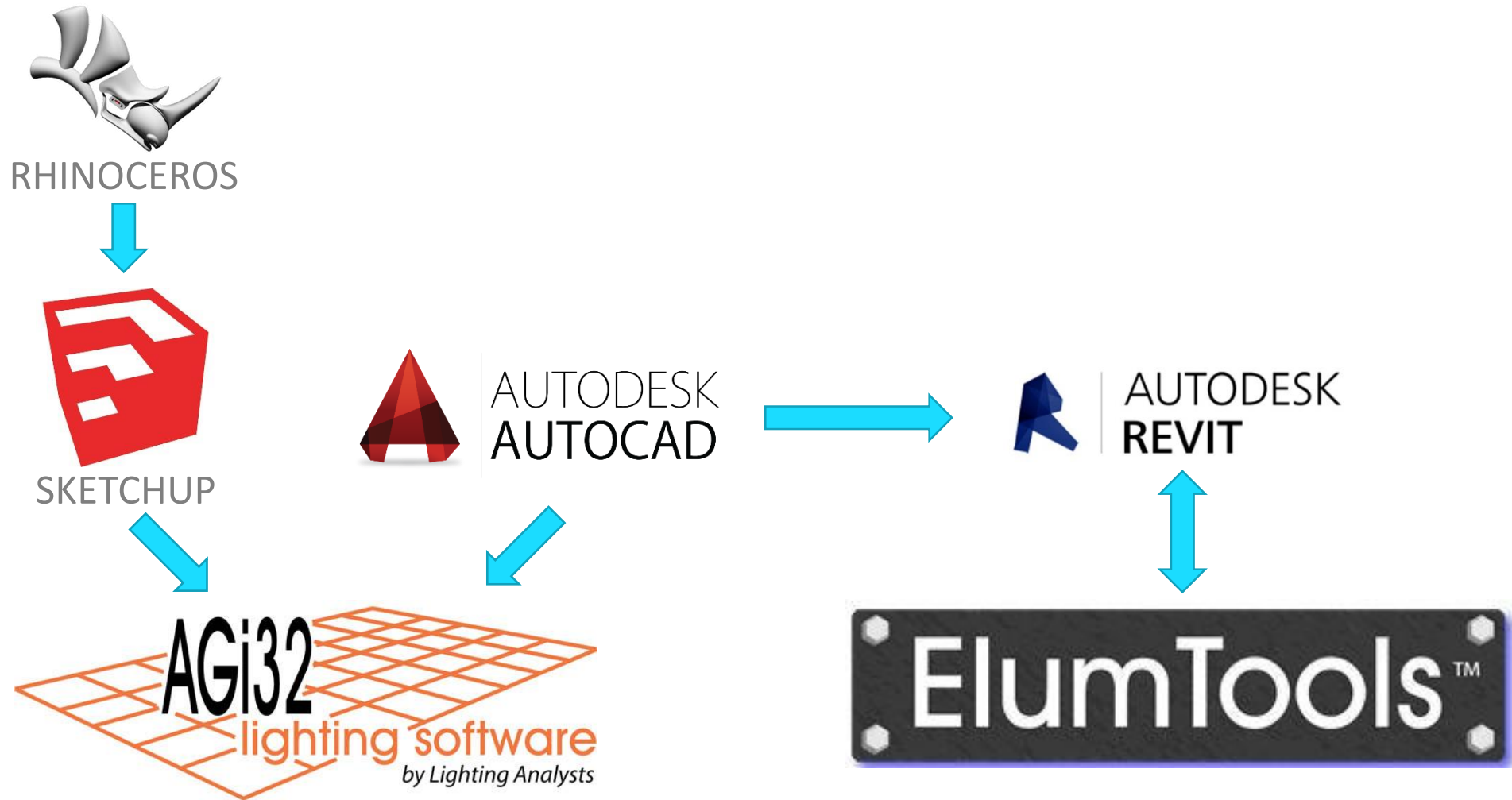


# WHAT IS BUILDING INFORMATION MODELING (BIM)?

- 3D MODELING SOFTWARE
- BUILT FROM PIECES THAT CONTAIN UNIQUE INFORMATION
- PIECES INTERACT WITH EACH OTHER AND FORM A WEB OF CONNECTIONS
- COLLABORATION TOOL



# COLLABORATION TOOLS FOR LIGHTING DESIGNERS





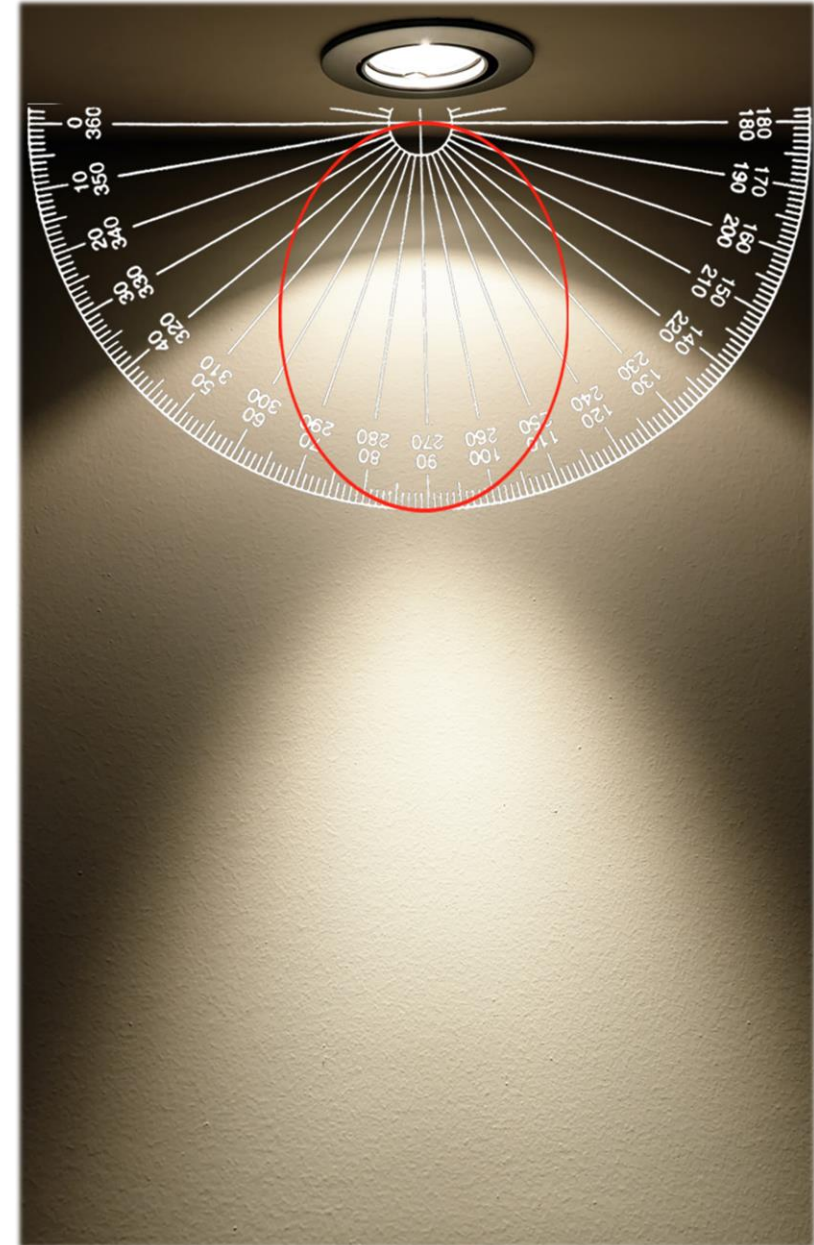
# LIGHTING DESIGN PRE-REQUISITES

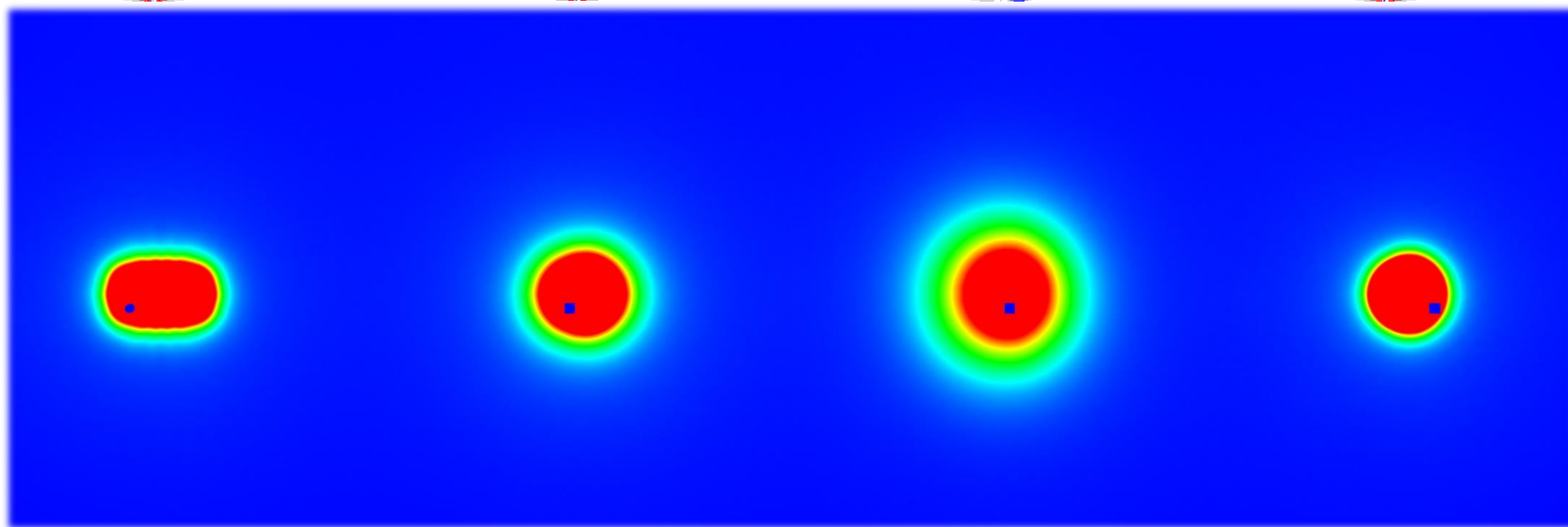
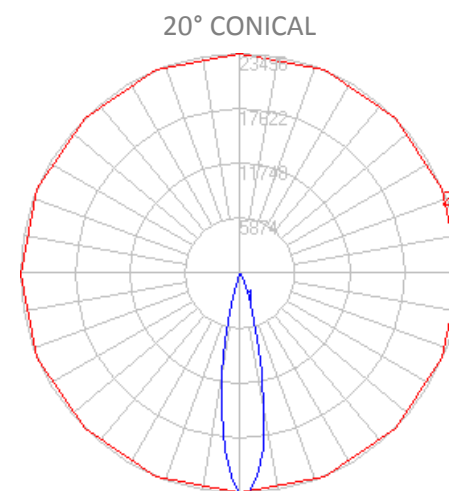
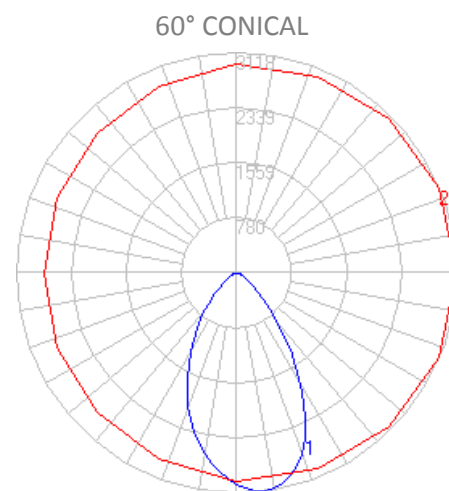
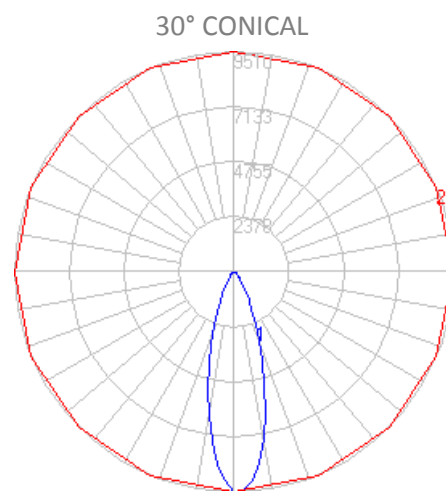
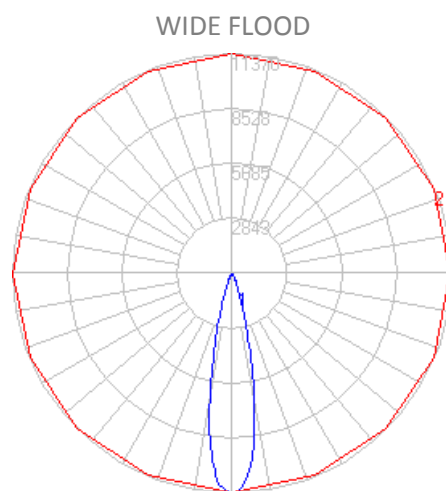
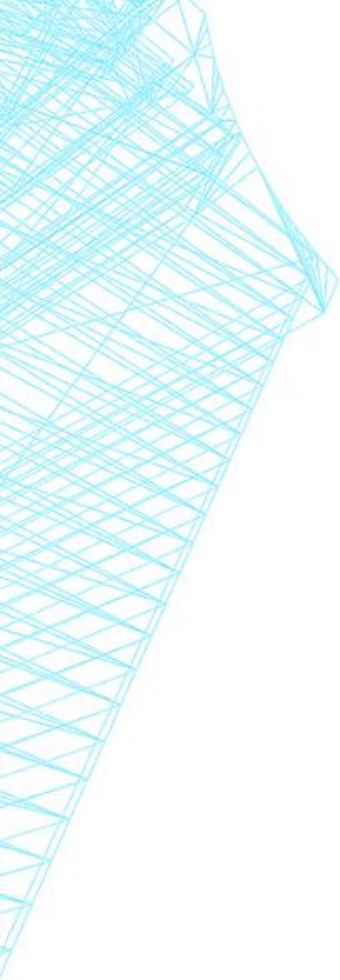
- DETERMINING THE *FUNCTION* OF THE SPACE
- PHOTOMETRIC FILES
- 3D MODELS
- SURFACE REFLECTIVITY ESTIMATION
- LIGHTING POWER DENSITY GOALS



# PHOTOMETRIC FILE

5.000 10.000 15.000 20.000 25.000 30.000 35.000 40.000 45.000 50.000  
5.000 31.000 32.000 33.000 34.000 35.000 36.000 37.000 38.000 39.000  
5.000 46.000 47.000 48.000 49.000 50.000 51.000 52.000 53.000 54.000  
5.000 61.000 62.000 63.000 64.000 65.000 66.000 67.000 68.000 69.000  
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5.000 80.000 85.000 90.000 95.000 100.000 105.000 110.000 115.000 120.000  
5.000 155.000 160.000 165.000 170.000 175.000 180.000 185.000 190.000  
5.000 230.000 235.000 240.000 245.000 250.000 255.000 260.000 265.000  
5.000 305.000 310.000 315.000 320.000 325.000 330.000 335.000 340.000  
5.34 75.14 75.14 75.08 74.70 74.76 74.30 73.89 73.82 73.39 73.35 72.70  
5.13 70.55 70.17 69.43 69.14 68.29 67.81 66.85 66.36 65.60 64.87 64.17  
5.83 59.80 58.98 58.03 57.03 56.14 54.94 54.12 52.93 52.03 50.79 49.73  
5.06 44.02 42.62 41.54 40.23 39.10 37.87 36.57 35.41 34.04 32.91 31.61  
5.93 25.65 24.56 23.37 22.34 21.24 20.18 19.19 18.15 17.23 16.26 15.43  
5.09 11.36 10.64 10.03 9.38 8.80 8.22 7.70 7.20 6.72 6.33 5.87 5.49 5.11  
5.93 4.15 3.81 3.53 3.27 3.03 2.80 2.56 2.35 2.18 1.95 1.80 1.64 1.49 1.34  
5.27 1.07 1.02 0.92 0.80 0.63 0.55 0.53 0.51 0.50 0.45 0.45 0.38 0.30 0.22  
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5.79 59.99 58.88 58.16 57.03 56.23 55.07 54.10 53.03 51.89 50.97 49.70  
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5.99 4.11 3.78 3.53 3.25 2.99 2.82 2.54 2.37 2.18 1.94 1.80 1.64 1.46 1.31  
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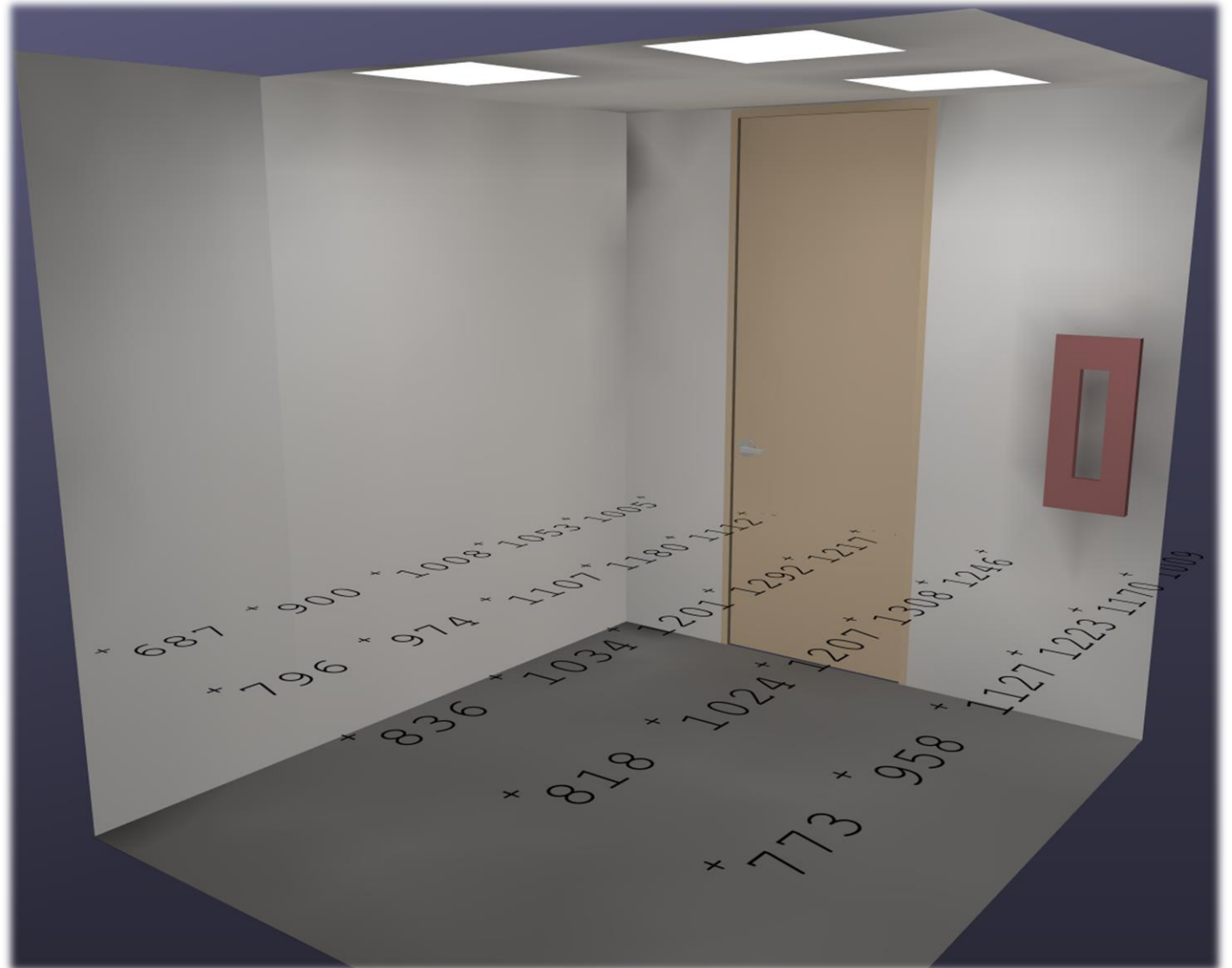






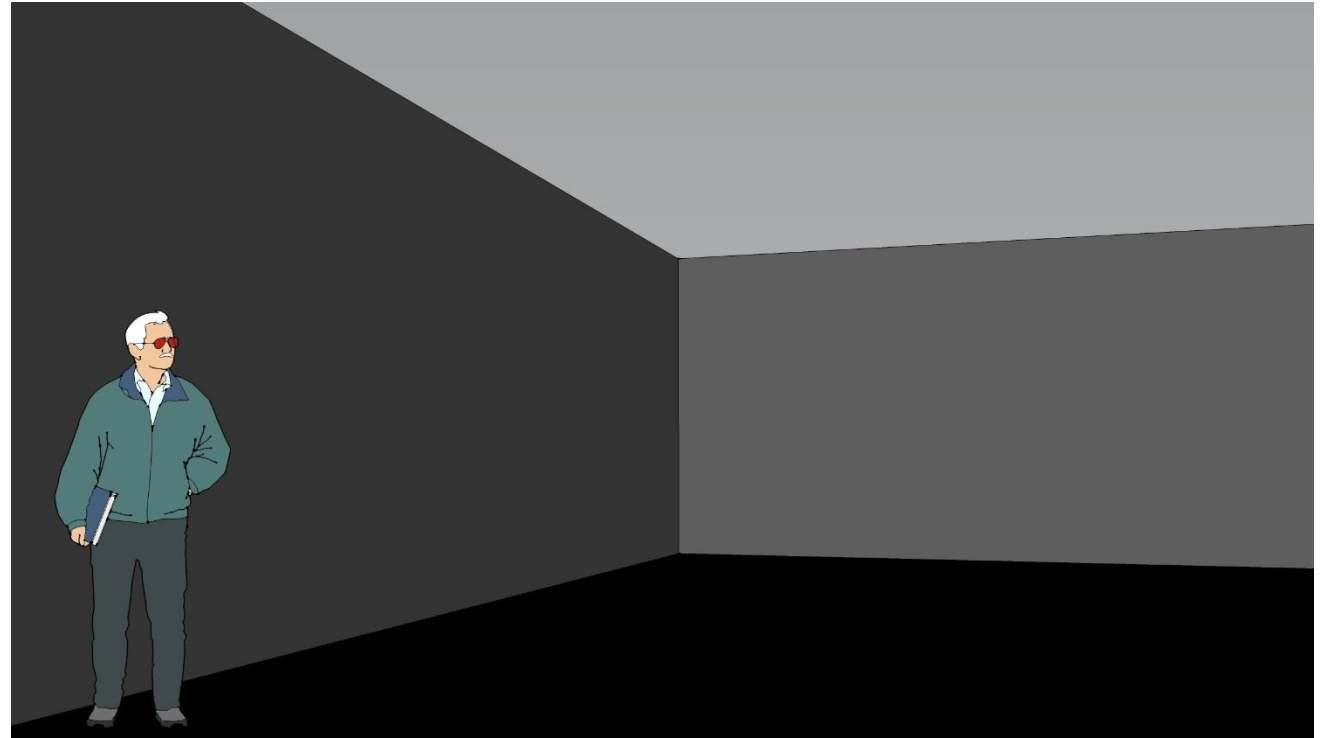
# 3D MODEL

MEDICAL EXAM ROOM



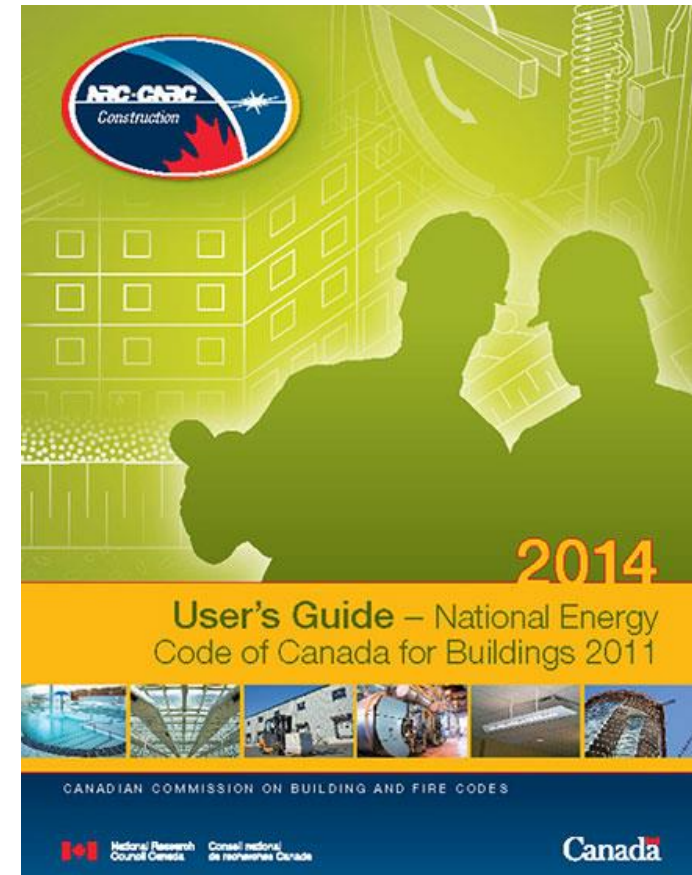
# SURFACE INFORMATION

- ABSORPTION VS REFLECTIVITY
- WALLS, CEILINGS & FLOORS HAVE INFORMATION
- EXAMPLE:
  - 80% CEILING REFLECTIVITY
  - 50% WALL REFLECTIVITY
  - 20% FLOOR REFLECTIVITY

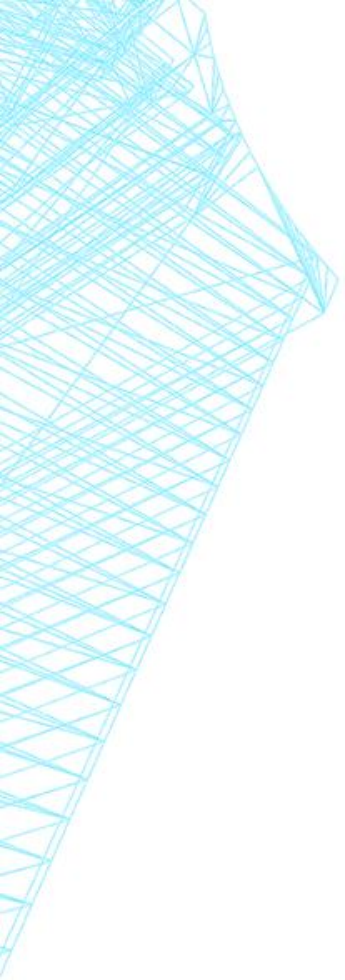


# LIGHTING POWER DENSITY

- DESIGN STARTING POINT
- BUILDINGS MUST ABIDE BY THE NATIONAL ENERGY CODE
  - OFFICE: 9.7 W/m<sup>2</sup>
  - CLASSROOM: 10.7 W/m<sup>2</sup>
  - HOSPITAL: 13.0 W/m<sup>2</sup>







# BUILDING INFORMATION MODELING (BIM)



- DOMINANT BIM FORMAT IN NORTH AMERICA
- CREATED BY AUTODESK (AUTOCAD)
- POWERFUL SOFTWARE, COMBINING MANY DISCIPLINES INTO ONE BUILDING MODEL.
- ALLOWS MANY PEOPLE TO WORK SIMULTANEOUSLY IN A MODEL

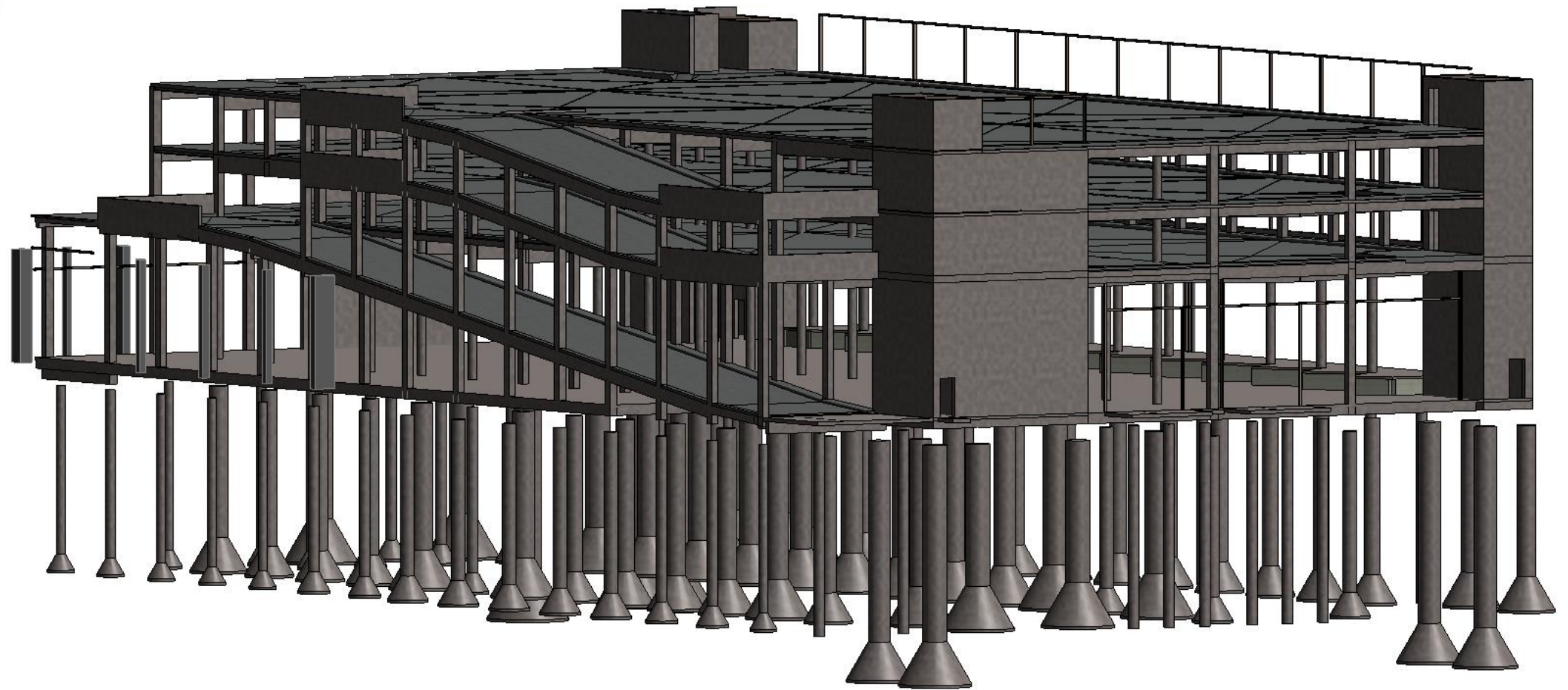
# ELUMTOOLS FOR REVIT





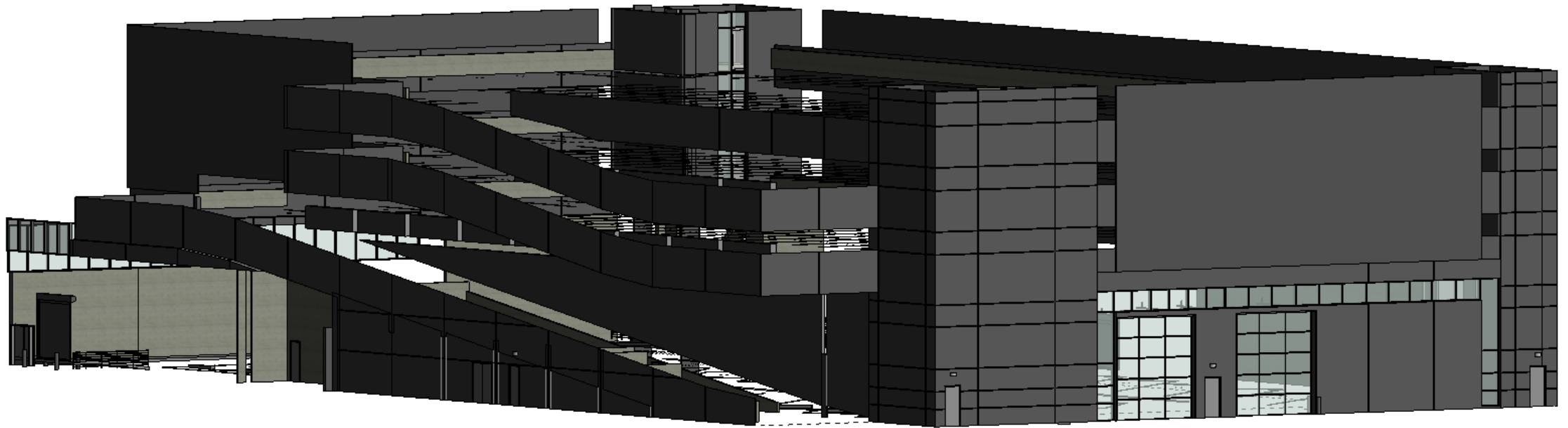
# LINKED MODELS

## STRUCTURE



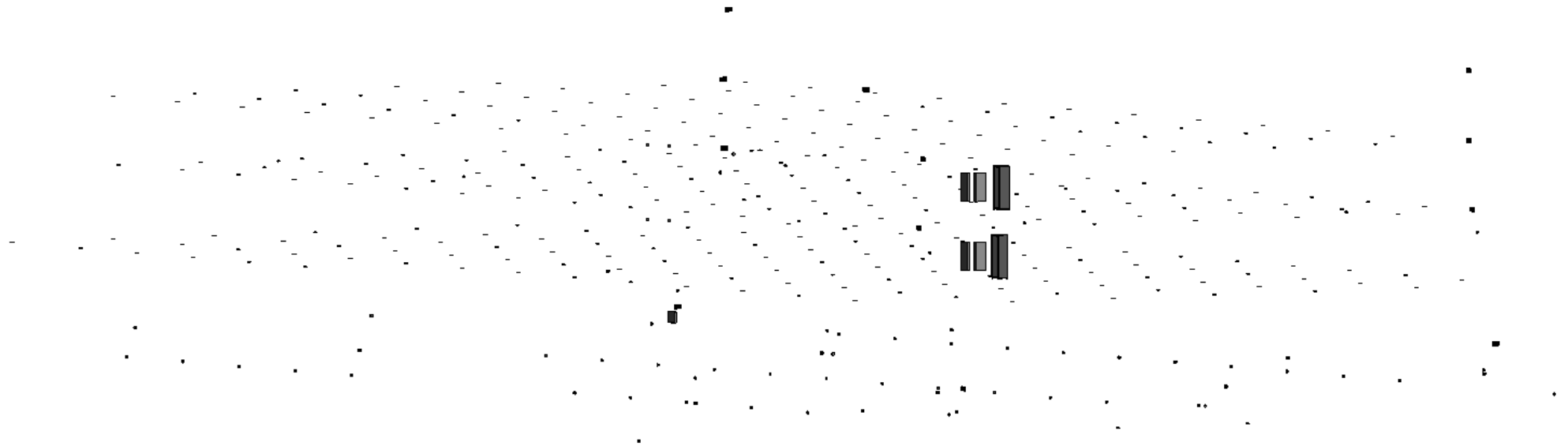
# LINKED MODELS

## ENVELOPE



# LINKED MODELS

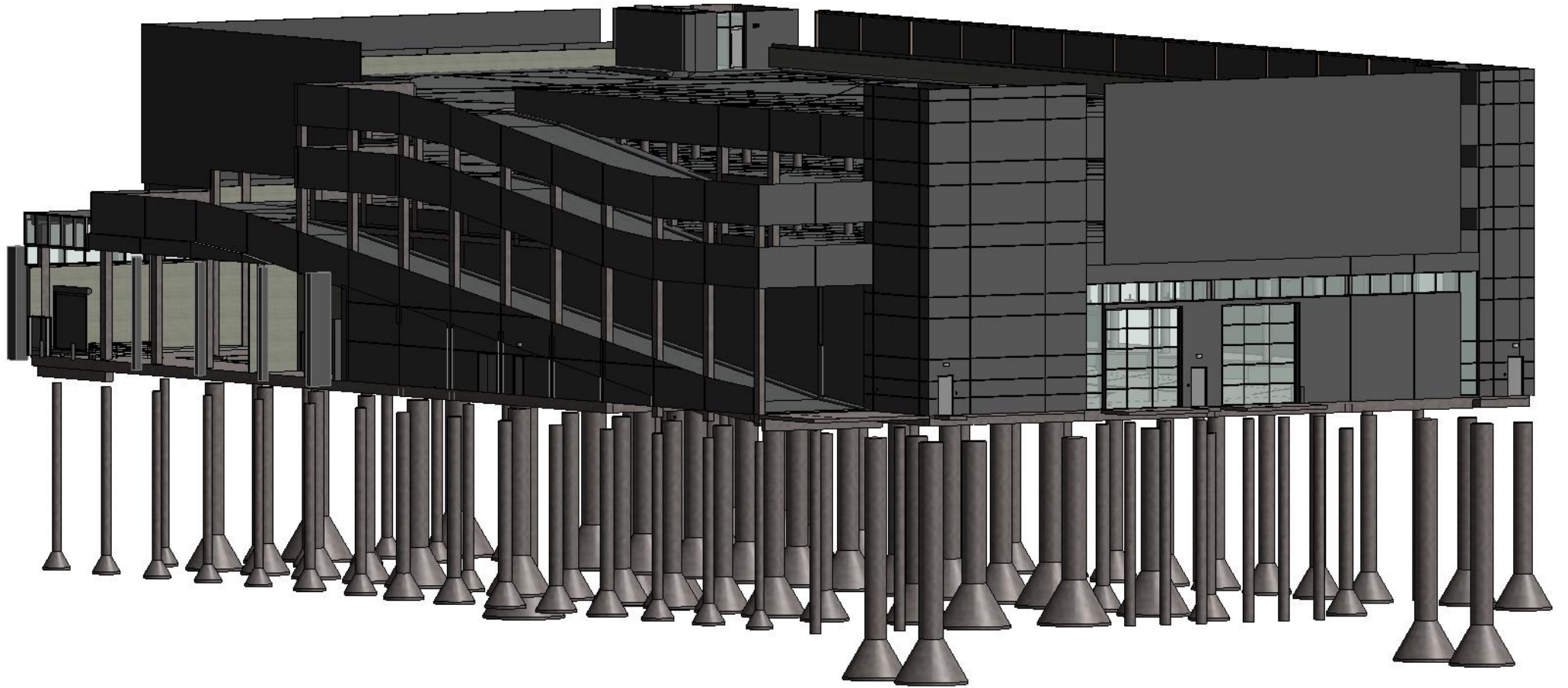
ELECTRICAL





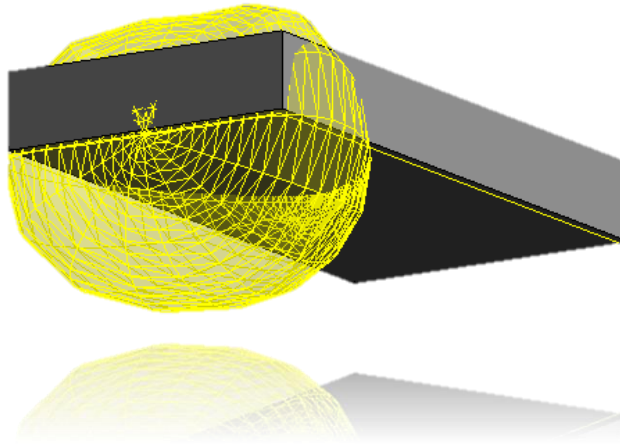
# LINKED MODELS

COMBINED

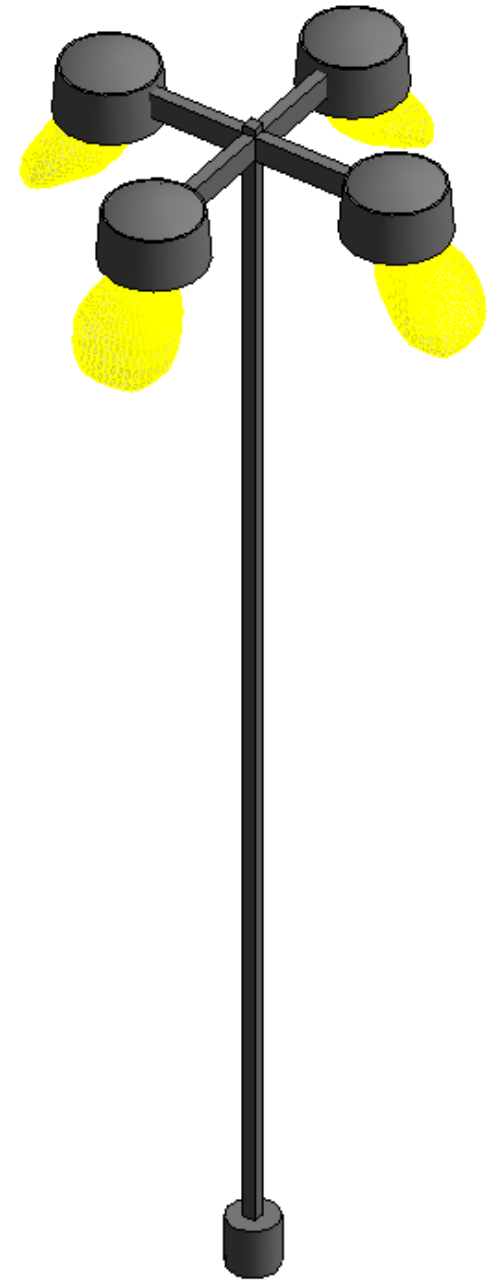
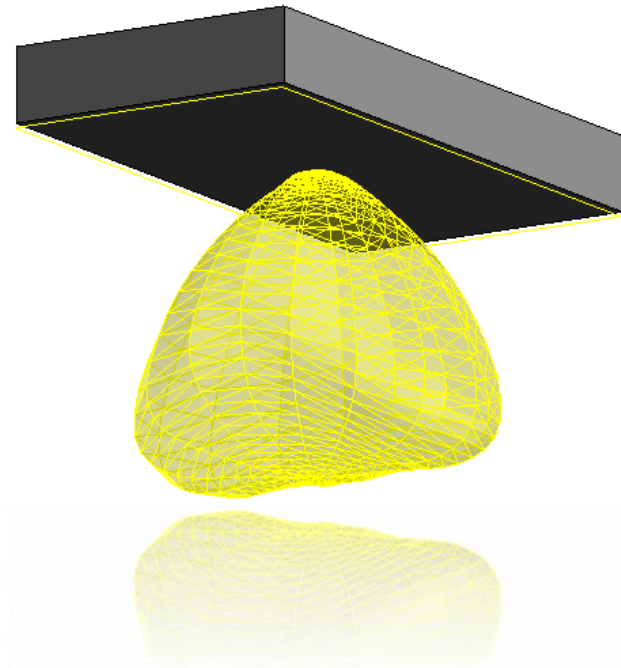


# FAMILIES & PHOTOMETRY FILES

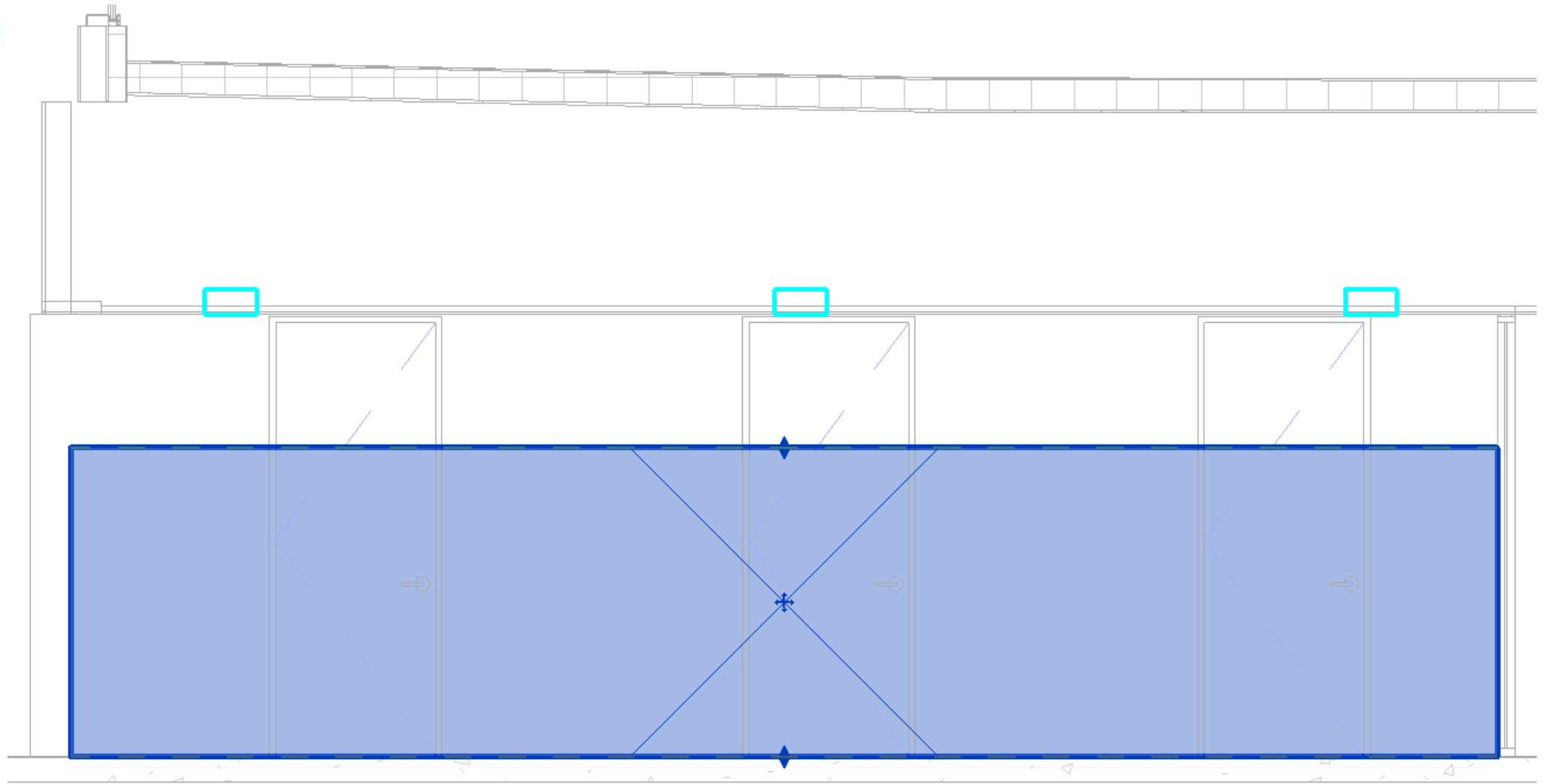
2x4 TROFFER  
BAD LIGHT SOURCE



2x4 TROFFER  
CORRECT LIGHT SOURCE

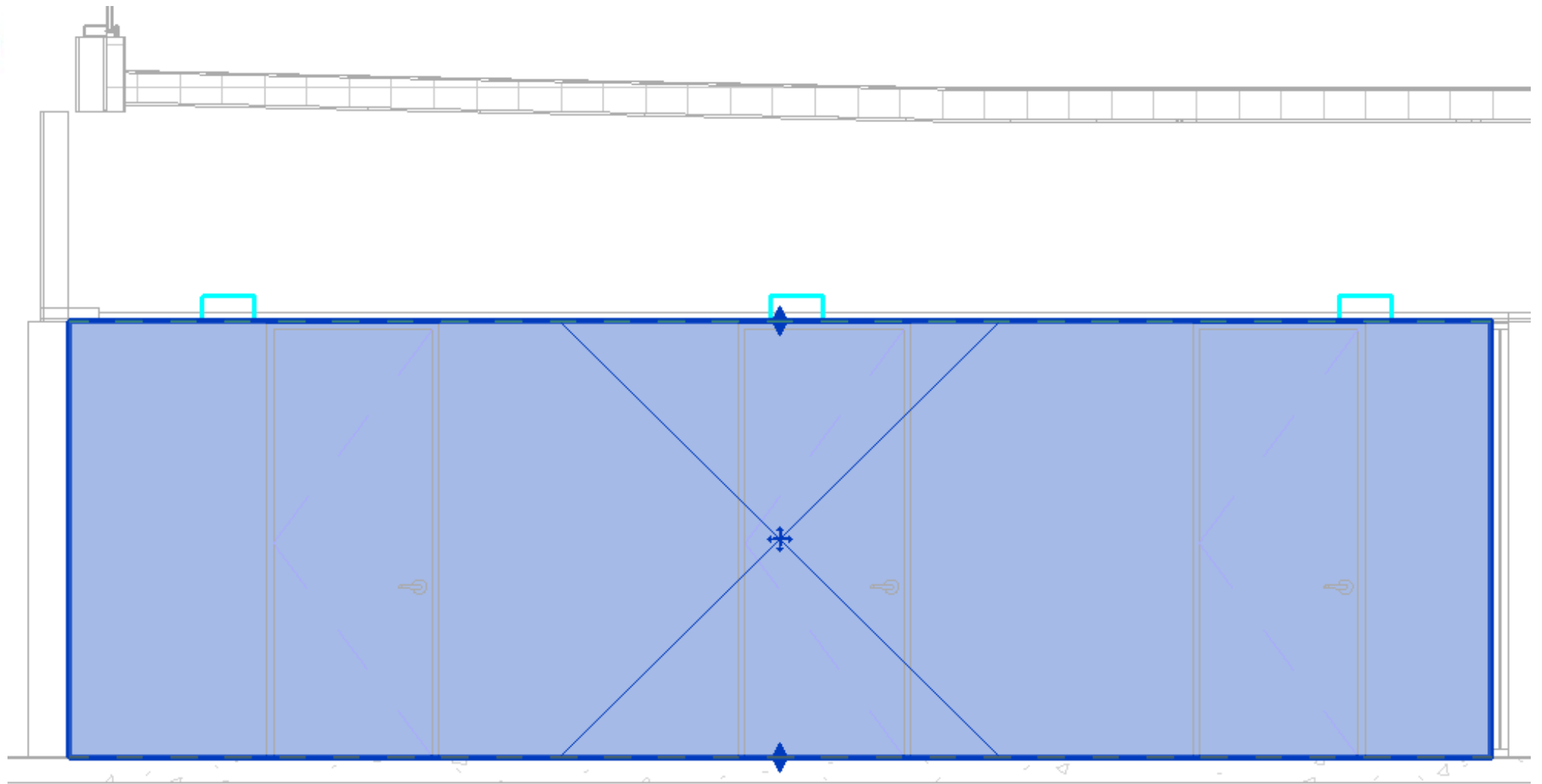


# SPACES & ROOMS



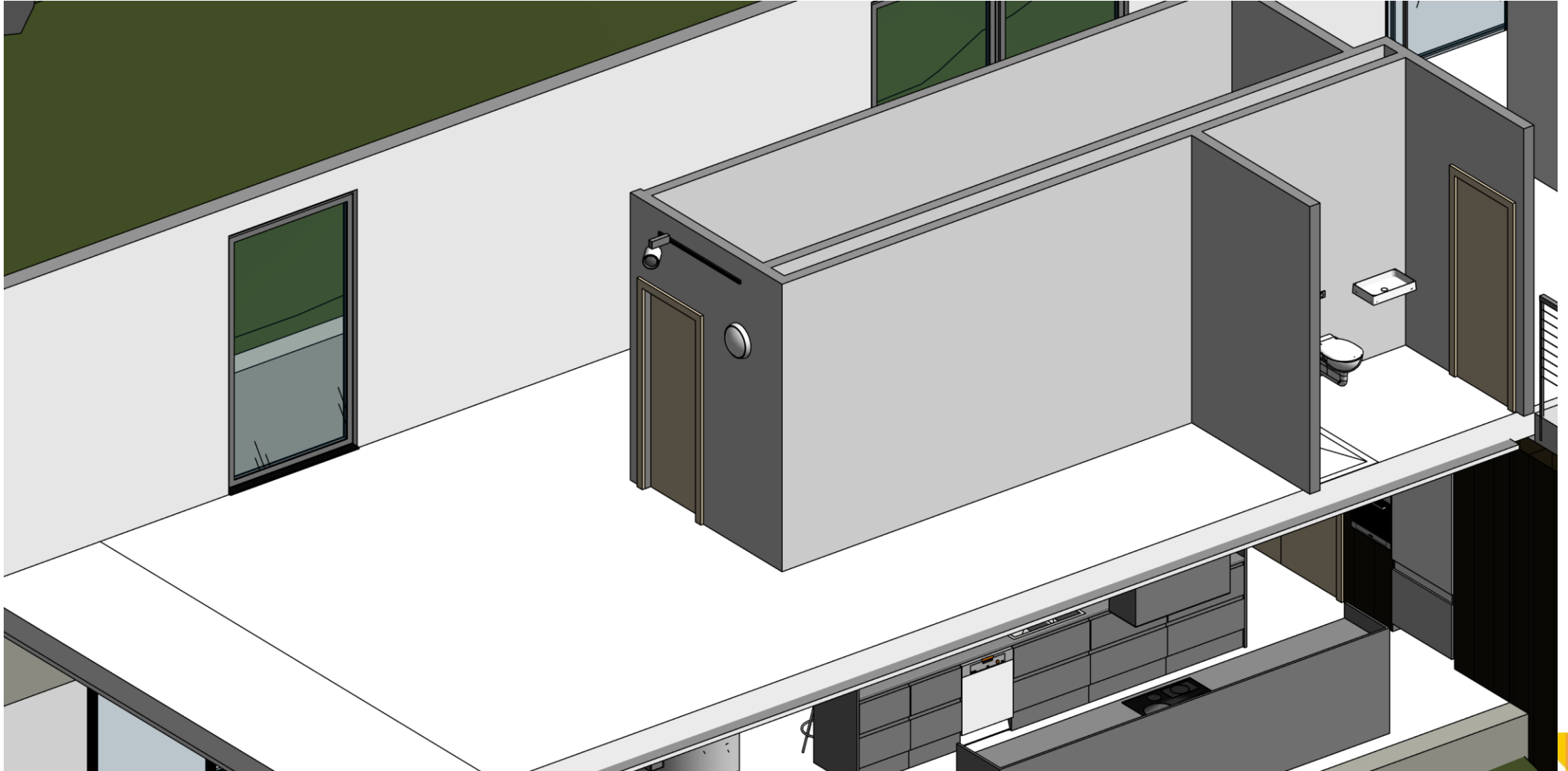


# SPACES & ROOMS



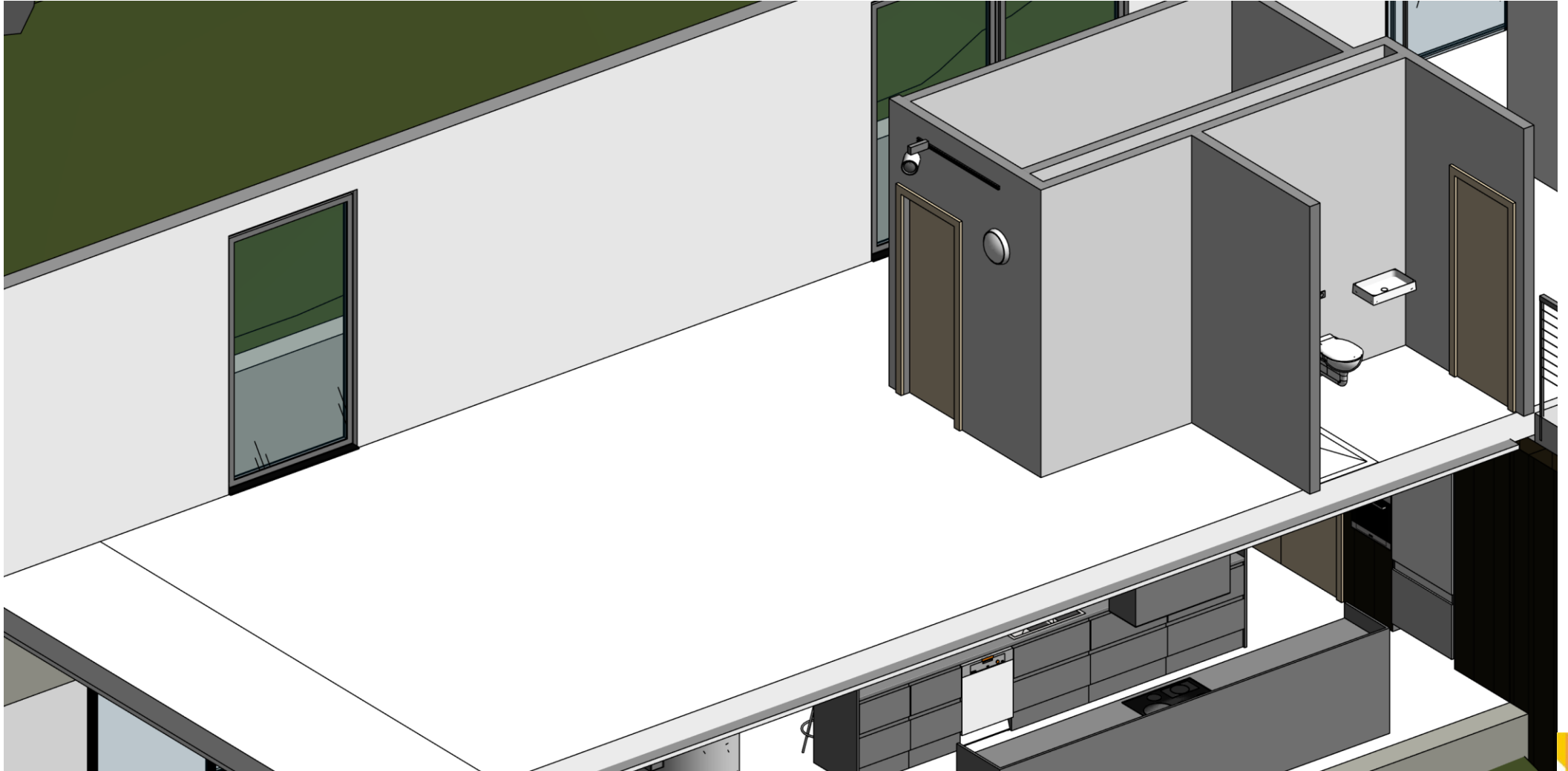
# 3D MODEL

## AUTOMATIC FIXTURE HOSTING



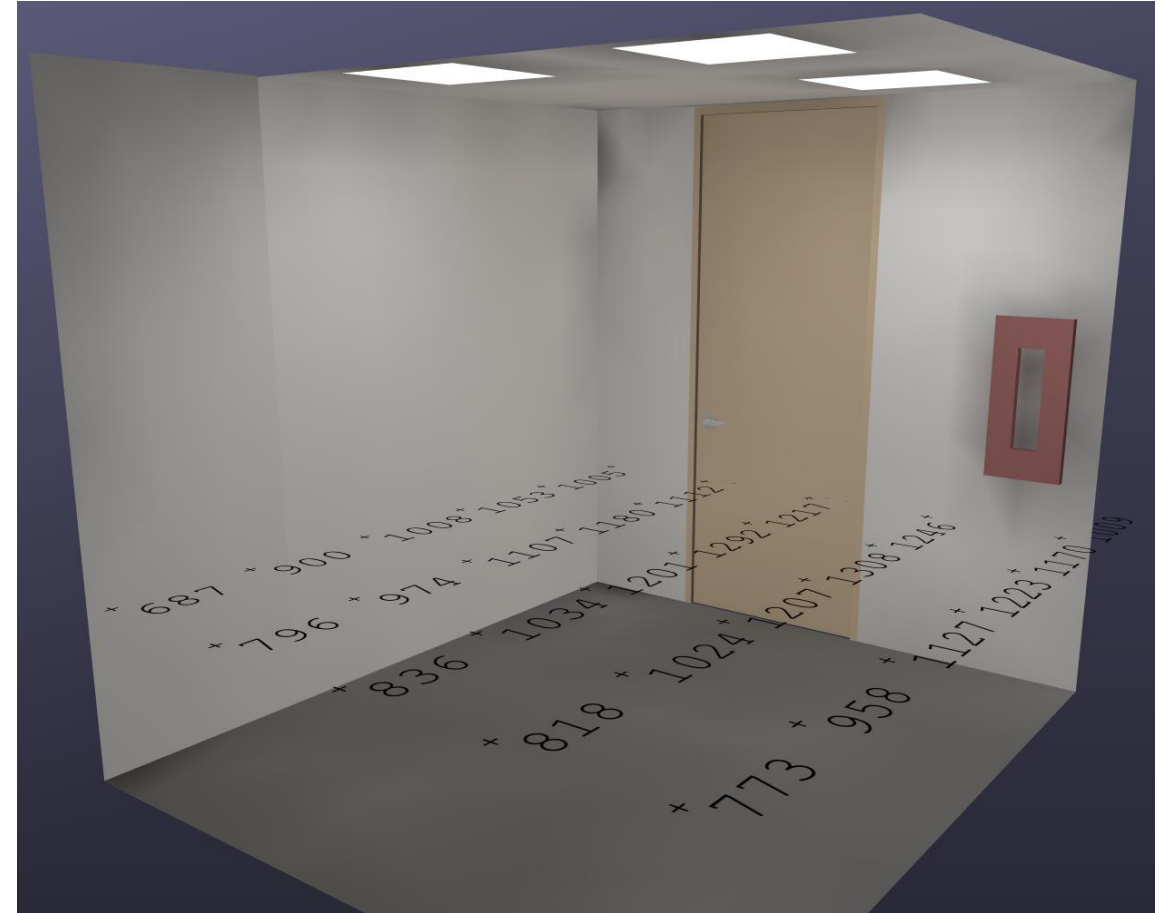
# 3D MODEL

## AUTOMATIC FIXTURE HOSTING



# 3D MODEL

'COMPLICATED' DOESN'T NECESSARILY MEAN 'BETTER'



MEDICAL EXAM ROOM



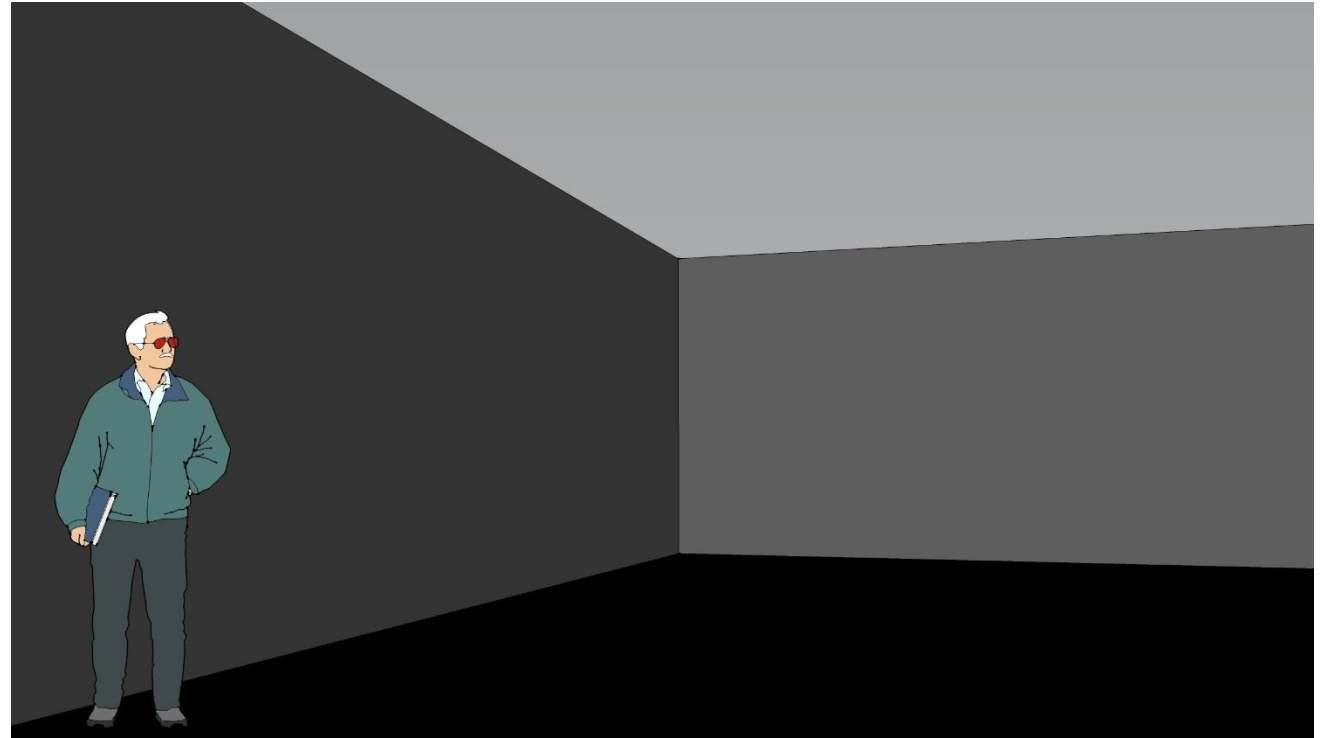
# 3D MODEL

## 3D PLACEMENT OF FIXTURES



# SURFACE INFORMATION

- WALLS, CEILINGS, FLOORS ARE MODELED
- PULLED FROM THE INTERIOR DESIGN MODEL
- AUTO-UPDATES
- SAVES TIME
- MORE ACCURATE



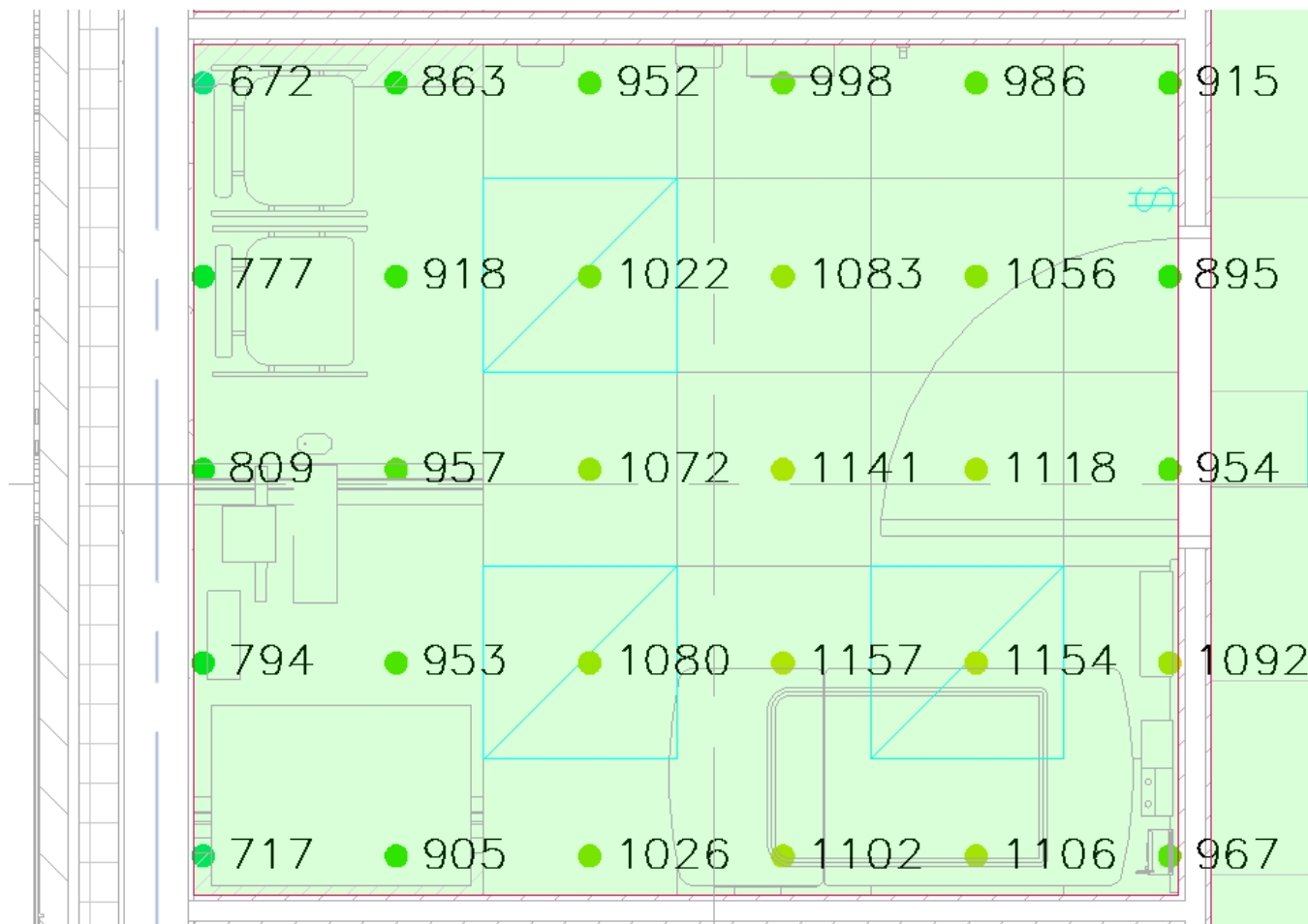
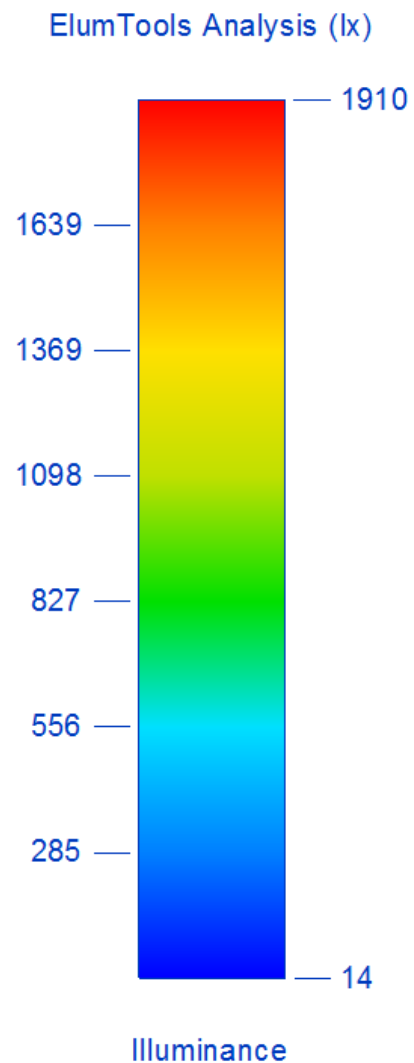
# LIGHTING POWER DENSITY

## REAL-TIME LPD CALCULATIONS

<EL-LPD Schedule>						
A	B	C	D	E	F	G
Name	Number	Actual LTG. Load	Watts	Area	LPD-W/m <sup>2</sup>	LPD-W/ft <sup>2</sup>
WAITING	0500	503 VA	503 W	104 m <sup>2</sup>	4.83 W/m <sup>2</sup>	0.448666
WC	0501	30 VA	30 W	5 m <sup>2</sup>	5.74 W/m <sup>2</sup>	0.532808
WC	0502	30 VA	30 W	5 m <sup>2</sup>	5.71 W/m <sup>2</sup>	0.530582
CLINIC MANAGER	0504	172 VA	172 W	14 m <sup>2</sup>	12.69 W/m <sup>2</sup>	1.178901
STAFF WC	0505	30 VA	30 W	4 m <sup>2</sup>	7.30 W/m <sup>2</sup>	0.678114
LPN	0506	258 VA	258 W	17 m <sup>2</sup>	15.41 W/m <sup>2</sup>	1.431247
LPN WAITING ROOM	0507	80 VA	80 W	10 m <sup>2</sup>	7.64 W/m <sup>2</sup>	0.70973
BARIATRIC WASHROOM	0508	30 VA	30 W	8 m <sup>2</sup>	3.83 W/m <sup>2</sup>	0.355529
BF WC	0509	30 VA	30 W	6 m <sup>2</sup>	5.22 W/m <sup>2</sup>	0.484869
LARGE EXAM	0510	258 VA	258 W	16 m <sup>2</sup>	16.01 W/m <sup>2</sup>	1.48735

# ELUMTOOLS FOR REVIT

## SIMPLE ROOM CALCULATIONS





# ELUMTOOLS FOR REVIT

## EMERGENCY LIGHTING CALCULATIONS



# ELUMTOOLS FOR REVIT

QUICK & EASY RENDERS



# ELUMTOOLS FOR REVIT

QUICK & EASY RENDERS





# ELUMTOOLS FOR REVIT

## SHORTFALLS

- CALCULATION POINT PLACEMENT
- ADDED COMPLEXITY LEAVES ROOM FOR ERROR
- CAN'T CREATE SCENES
- A POPULATED MODEL MUST EXIST BEFORE DOING CALCULATIONS





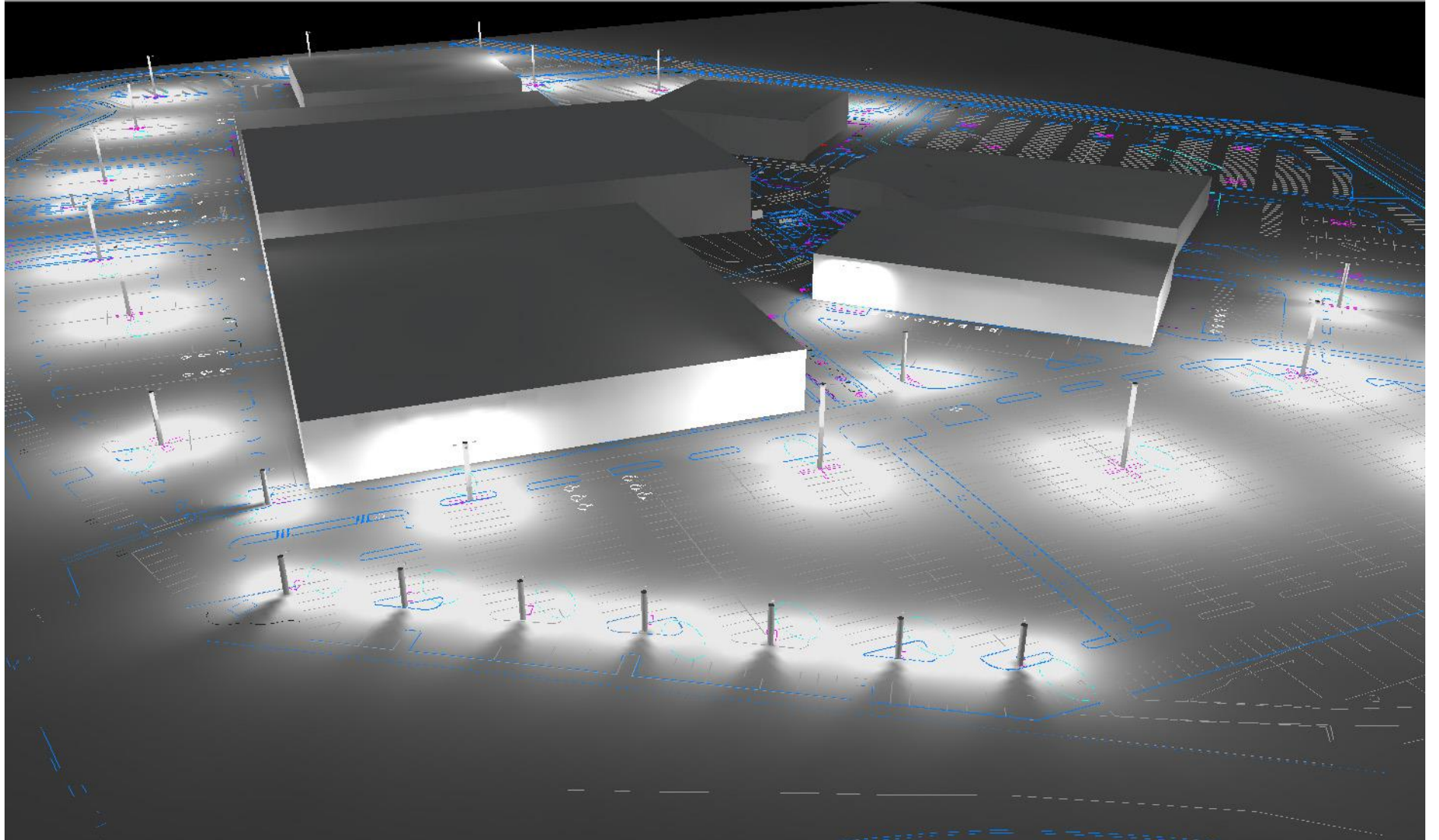
# TIPS AND TRICKS

- USE WORKSETS FOR VARIOUS LAYOUTS
- STANDARDIZE REFLECTIVITY
- TURN OFF FURNITURE
- CHECK SPACES
- CHECK LIGHT SOURCES / FAMILIES

# THE 'OLD FASHIONED' WAY

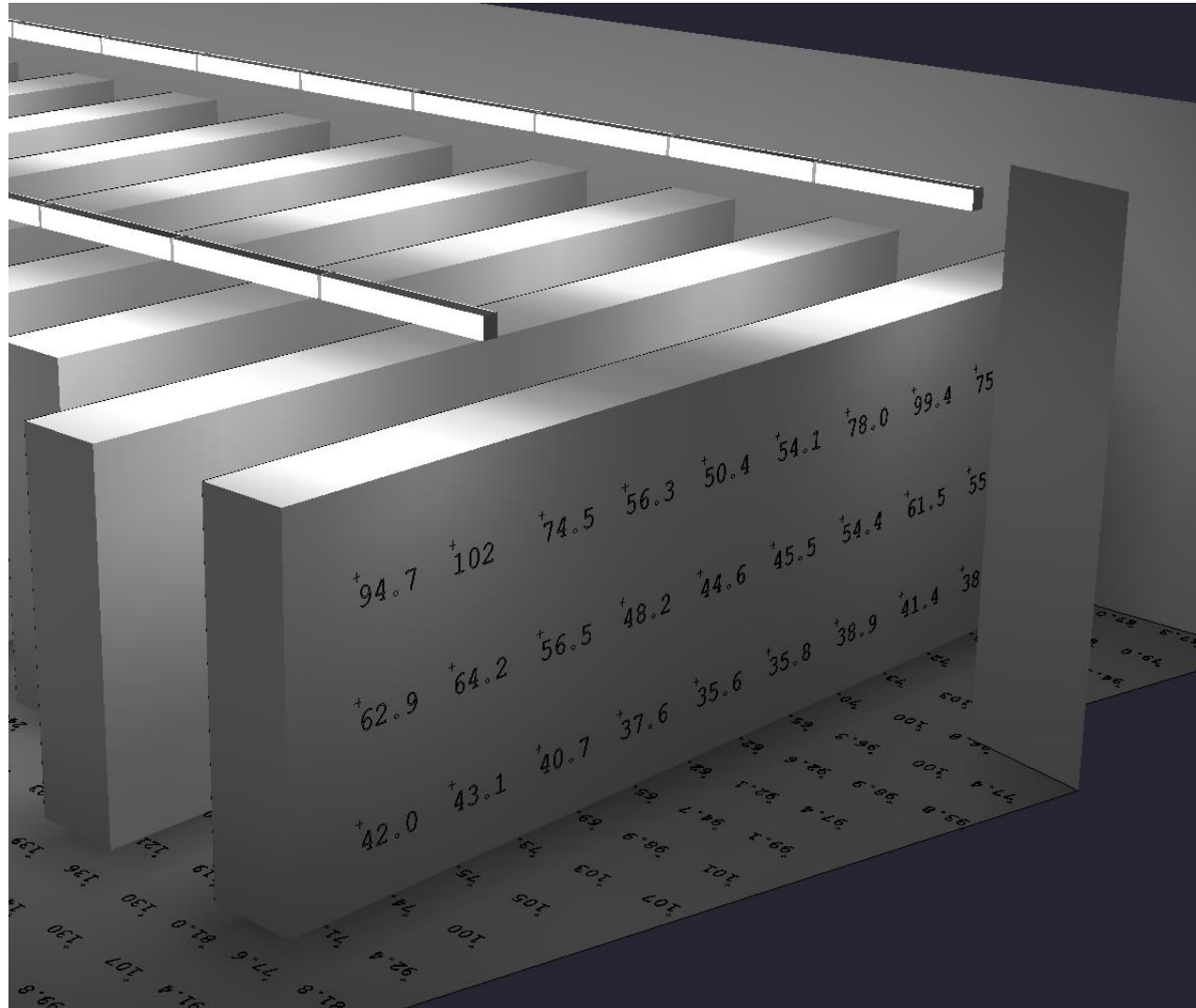


# AGI32



# AGI32

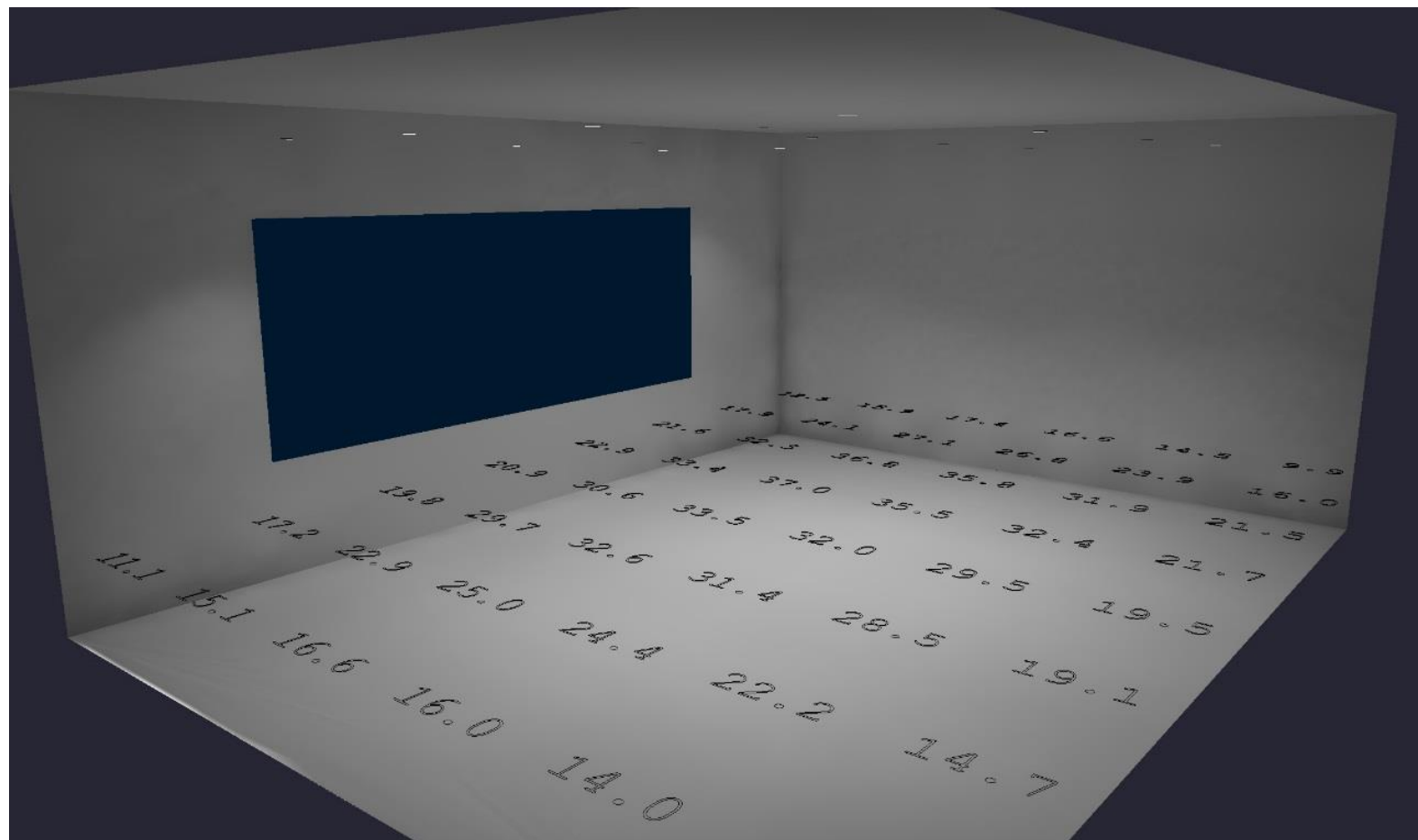
## PLACING CALCULATION POINTS ANYWHERE





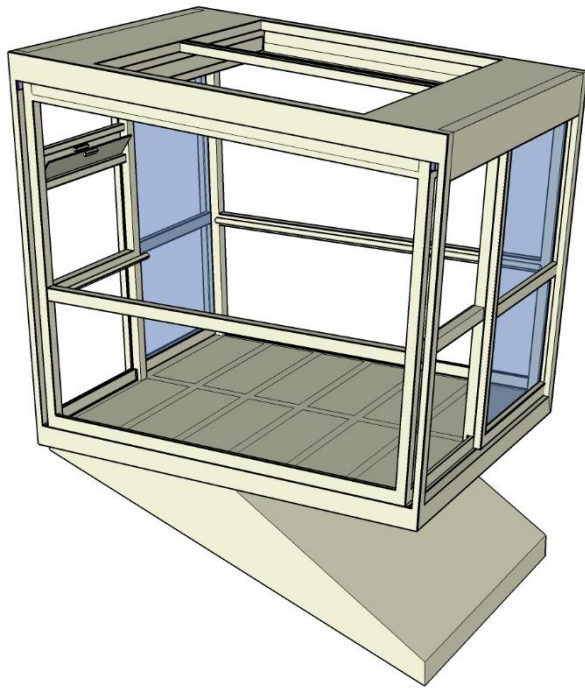
# AGI32

## SIMPLE ROOM CALCULATIONS



# AGI32

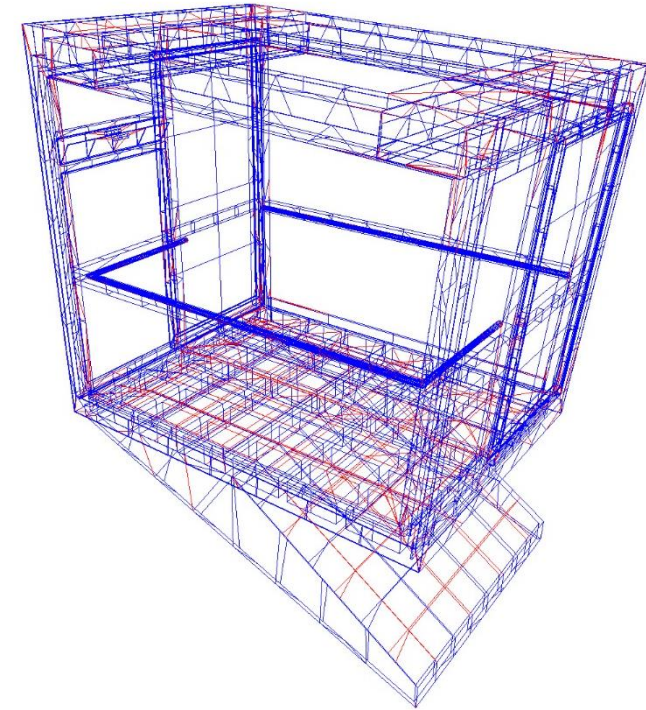
ARCHITECTURE DESIGN TOOLS -> AGI32



.SKP FILE



.LAI FILE



.AGI FILE



# AGI32

## SCENE CONTROL



# AGI32

## SCENE CONTROL





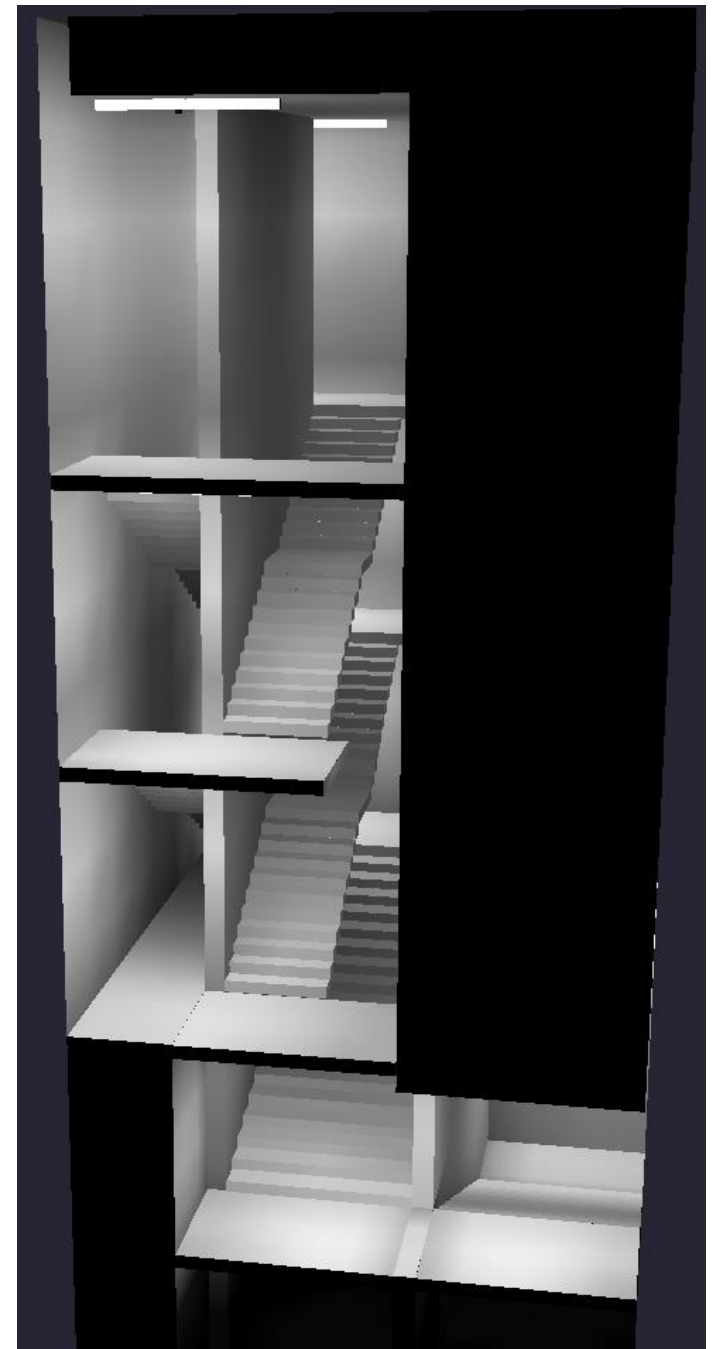
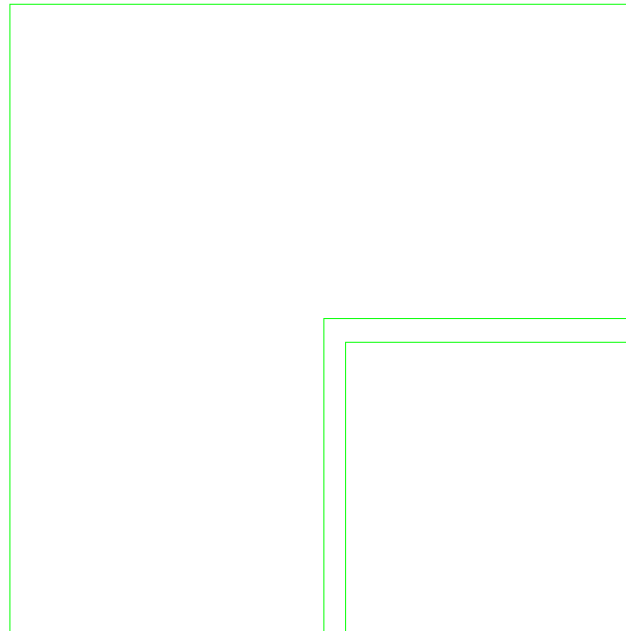
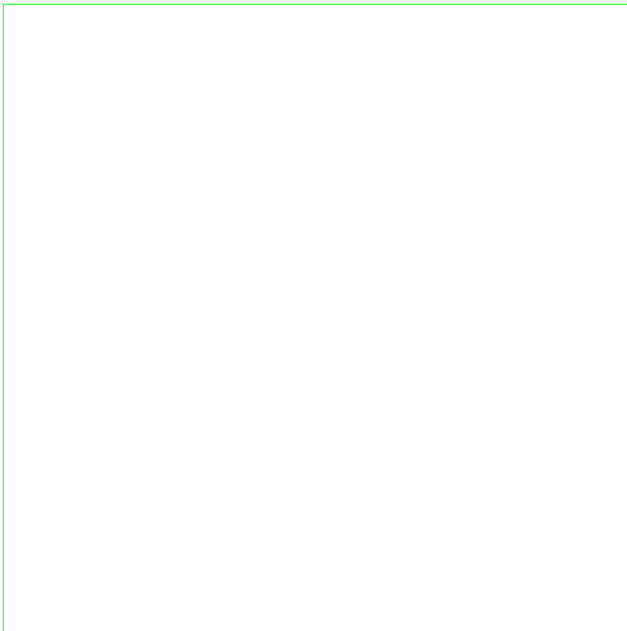
# AGI32

## SCENE CONTROL

# AGI32

## SHORTFALLS

- MAY BE TIME CONSUMING
  - MULTI-LEVEL
  - STAIRS
- HARD TO MODIFY ROOM SHAPE
  - DYNAMIC EDIT NOT FRIENDLY





# TIPS AND TRICKS

- ALWAYS WORK ON PLAN VIEW
- TEST PHOTOMETRIC FILE
- IMPORT SKETCHUP MODELS IF AVAILABLE
- USE AUTOCAD BASE PLAN TO HELP BUILD THE 3D MODEL
- SCENE MANAGER IS YOUR FRIEND



# SUMMARY

- INTUITION IS IMPORTANT AND IS GAINED THROUGH EXPERIENCE. SOFTWARE IS ONLY AS SMART AS THE INFORMATION YOU PROVIDE.
- BIM IS A COLLABORATIVE TOOL THAT SAVES TIME
- BIM PLAYS A STRONG ROLE IN THE LIGHTING DESIGN WORKFLOW.
- CHOOSE YOUR TOOL APPROPRIATELY





# WHAT WE LEARNED

- WHEN TO USE ELUMTOOLS VS. AGI32
- MAIN DIFFERENCES BETWEEN ELUMTOOLS & AGI32
- TIPS & TRICKS
- CHOOSE WISELY

