Using Revit for Social Distancing Design

Pete Thompson & Minjie Wang
Senior Principal Engineer & Product Owner

Introduction
About the speaker

Pete Thompson

- Senior Principal Engineer in the Revit development team
- 28 years in dynamic simulation building performance, evacuation modelling & pedestrian dynamics
- PhD: wrote the pedestrian movement model Simulex
- Maintains an active role in research for pedestrian movement through collaboration with Lund University.
About the speaker

Minjie Wang

• Senior Product Owner in Revit development team
• 12 years working in Autodesk Revit product design and team management
• Now focusing on optimizing the Revit documentation and analysis to help architects, engineers and BIM managers to work efficiently.
People Flow Toolkit

**IS:** A set of tools for use when performing Route Analysis in Revit.

**WHY USE IT?** Because designing for social distancing presents new challenges to modify the layout of your buildings and spaces.

We are now “designing for life”
What we will cover

• **Background**: pedestrian dynamics & planning
• **People Flow Toolkit**: the main features within Revit
• **Design principles** to keep in mind
• **Demonstration** in a sample design
• **Summary**
People Flow Toolkit

A little background first...
Social distancing: new or old science?

- “Proxemics”
- Edward T. Hall, 1966

Spatial zones and distances are affected by culture, task and levels of stress.
“Pedestrian Planning & Design”

“Pedestrian Planning & Design”
JJ Fruin 1971

With 6 feet social distancing

LEVEL OF SERVICE ILLUSTRATIONS FOR WALKWAYS

Level of Service A

Level of Service B

Level of Service C

Level of Service D

Level of Service E

Level of Service F

LEVEL OF SERVICE STANDARDS FOR WALKWAYS
Volume (P) vs. Module (M)

(M) MODULE — SQUARE FEET AREA PER PEDESTRIAN

(P/F) PEDESTRIANS PER FOOT WIDTH PER MINUTE
Why does social distance matter?

UK gov. 2m = less risk

USA: CDC ➔ 6 feet+

WHO: 1m+ and mask
What distance do we use now?

- There are several possible ways of measuring the “social distance” between people.
  - Nose-to-nose?
  - Foot-to-foot?
  - Center to center?
- The most common measurement is the contact distance (i.e. the space between people).
Measuring social distance

Stay at least 6 feet (about 2 arms’ length) from other people.

Measuring social distance

Space between people is less than 2m

Line distance = 0.6m (body) + 2m social distance

2.6m
Grids and partitions to enforce distance

**Simple grid**
15 people/100m²

**“Beehive”**
17 people/100m²

**Partitioned queues**
40 – 70 people/100m²
Now: design in lanes & one-way flow

No Social Distancing

2m Social Distance
People Flow Toolkit

The main features within Revit
People Flow Toolkit

Supported in Revit 2020.2 and 2021

A set of tools for use when performing Route Analysis in Revit. These tools help automate, visualize and analyze the routes within customers’ models so they can understand the impacts of physical distancing in the context of their project.
People Flow Toolkit

Based on existing Route Analysis tool: Path of Travel

The Path of Travel element allows you to analyze travel distances and times between 2 selected points in your model.

Path of Travel Schedule

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Four Tools

MULTIPLE PATHS
Multiple routes between points for Path of Travel to show optional paths.

ONE-WAY INDICATOR
Family to represent direction of travel and that are respected by Path of Travel calculation

PEOPLE CONTENT
Family which block path of travel and are used for occupancy

SPATIAL GRID
Room based Grid overlay for visual indicator of special distancing
Places a room-based grid overlay to visualize spatial distancing in the room.

Creates multiple (alternative) Path of Travel routes from two end points.

Places a family in the model to indicate the direction of travel.

Places a family in the model to represent occupancy of a space and block Path of Travel lines.
One-way Indicator
Multiple Paths
Design principles to keep in mind
Decide which grid or partitioning works best

Use the patterns to help move / snap families in the room spaces
Use one-way flow wherever possible

ONE WAY FLOW

TWO WAY FLOW?
Don’t forget circulation space

Previous Seating - 30 pupils

Social distance grid - 10 pupil
Don’t forget about **fire safety**

**ONE WAY FLOW:** Wider doors still have only 30 people/minute

You might be able to split passageways to double the flow to 60 people/min, but this is likely to break multiple codes.

 ✓ Fire doors must close.
 ✓ **Passageways must meet minimum sizes required by fire codes.**
Demonstration in a sample design
The main takeaways

Keep in mind:

• Social distance is contact distance
• Different grids & partitions are available
• One-way flow is “the new normal”
• Don’t forget about fire safety

New tools in the toolkit

• New spatial planning:
  • spatial grids for rooms
  • One-way indicator: shared nested family
  • Analyze one-way routes
  • Multiple paths: more alternatives
  • Available for Revit 2020.2 and 2021

Questions or comments? – please join the Q&A session for session ID 473680