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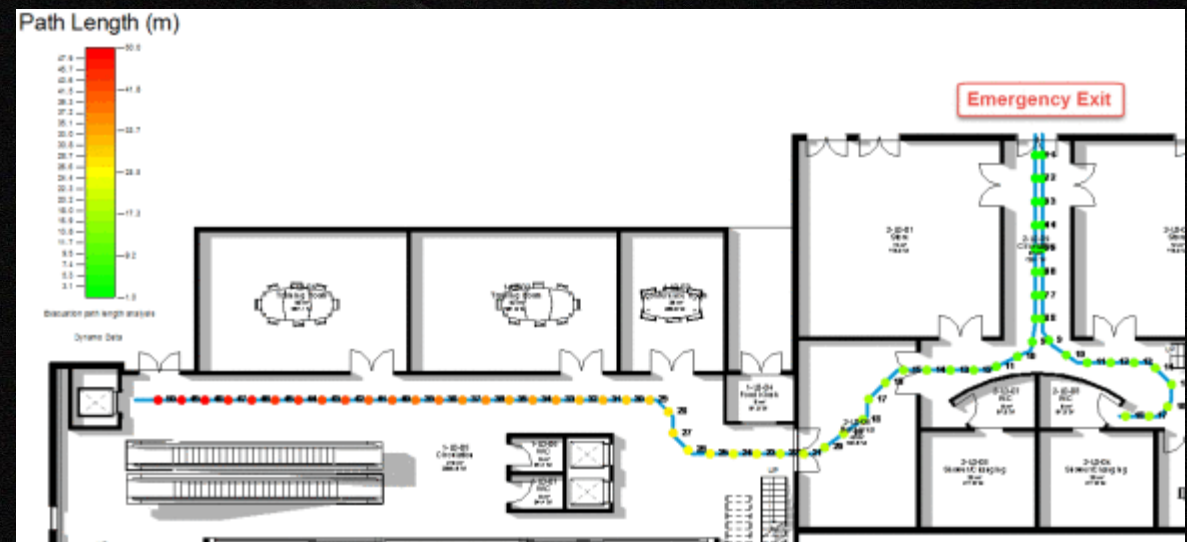


# Evacuation Path Analysis

With Dynamo

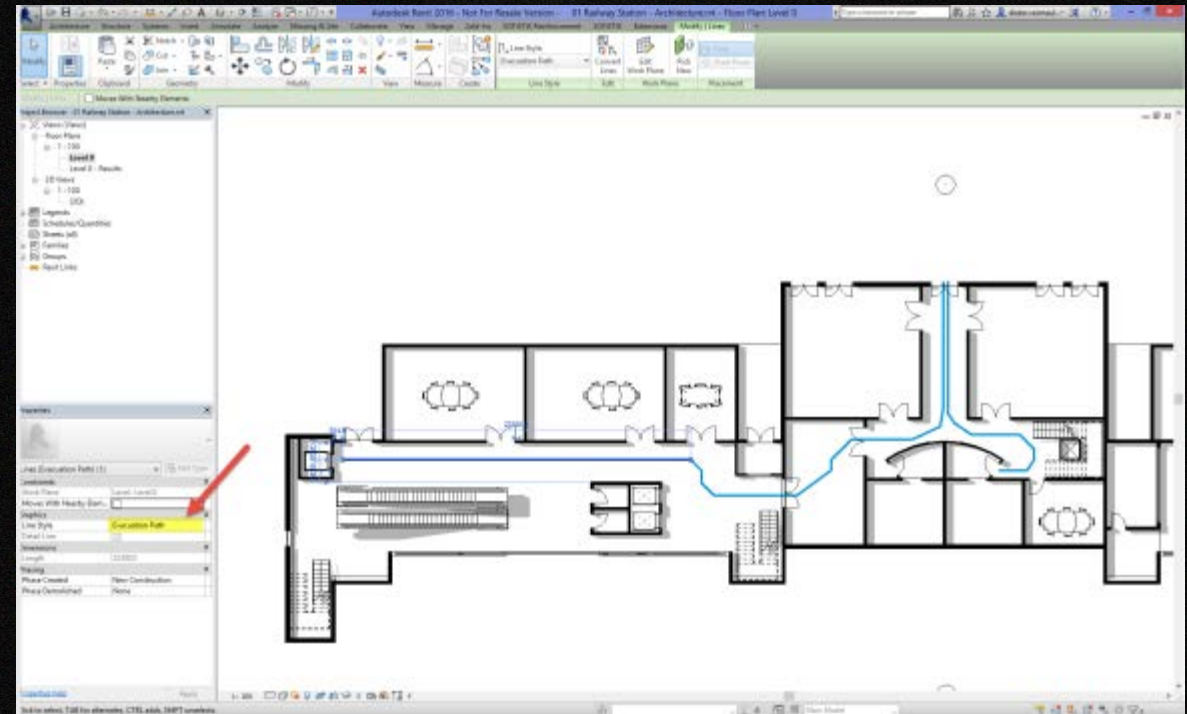


More and more I've been challenged and inspired to find new ways to perform custom architectural analysis. In this post I want to share with you a short and simple (for once) Dynamo script that can be used to analyze the evacuation paths in your building design in Revit. The script (that you can download at the bottom of this post) will calculate the accumulated distance from several points to a selected emergency exit and display the results in a selected Revit view.





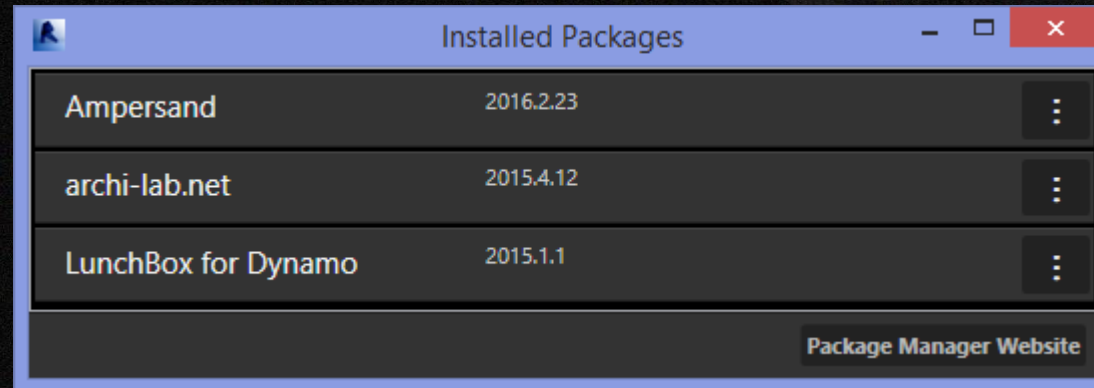
Before you start setting up or running the script you need to draw the evacuation paths in your Revit model. In this case *Model Lines* are used with a specific, newly created line style called “Evacuation Path”.





It's also necessary to have these next Dynamo packages installed:

- Lunchbox
- Grimshaw (archi-lab.net)
- Ampersand





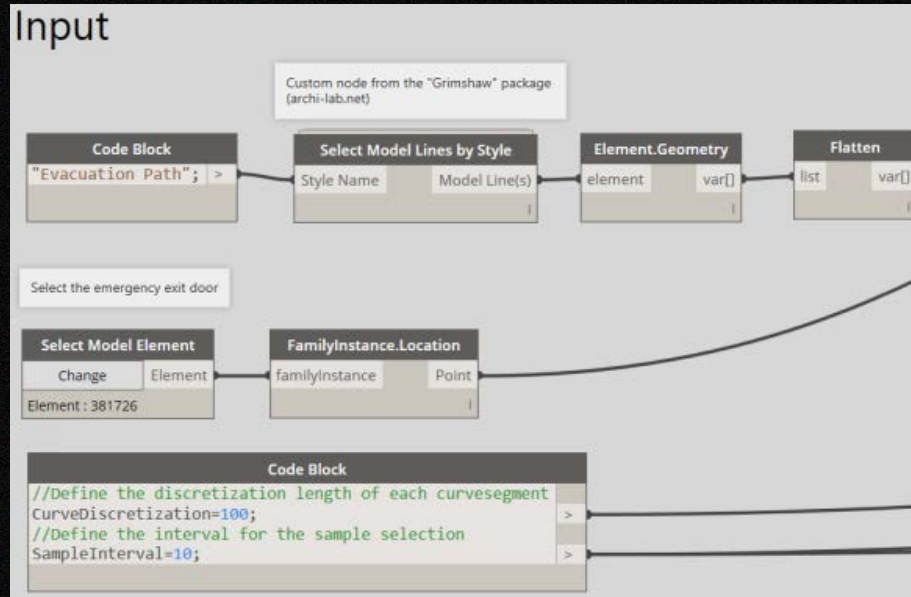
When you then open the Dynamo script “Evacuation Path Analysis.dyn” you will see 4 parts.

1. Input geometry in Dynamo
2. Evacuation path direction
3. Accumulated distance to the emergency exit
4. View the analysis results in Revit



# Input geometry in Dynamo





- In this part the model lines of style *Evacuation Path* are selected and their geometry is generated in Dynamo. For this selection the custom node *Select Model Lines by Style* from the [Grimshaw](#) (archi-lab.net) package is used.
- You will also need to select the door that will function as the emergency exit. This will be used further in the script to detect the evacuation direction.

- The "CurveDiscretization" is needed for dividing the resulting paths (polycurves) in equal parts (see later in this post).
- The "SampleInterval" is a number that will be needed to indicated how much of the results are shown in Revit, as we don't need to see the results for every divided piece (see later in this post).

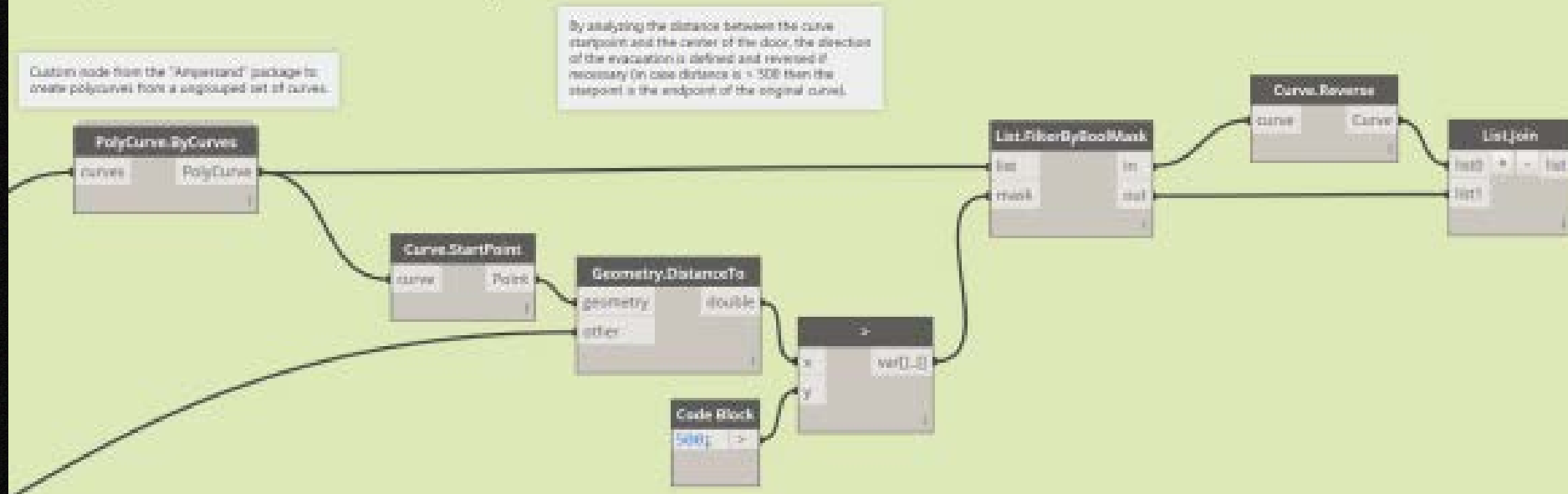




Evacuation path direction



## Analysis of the evacuation path curve direction



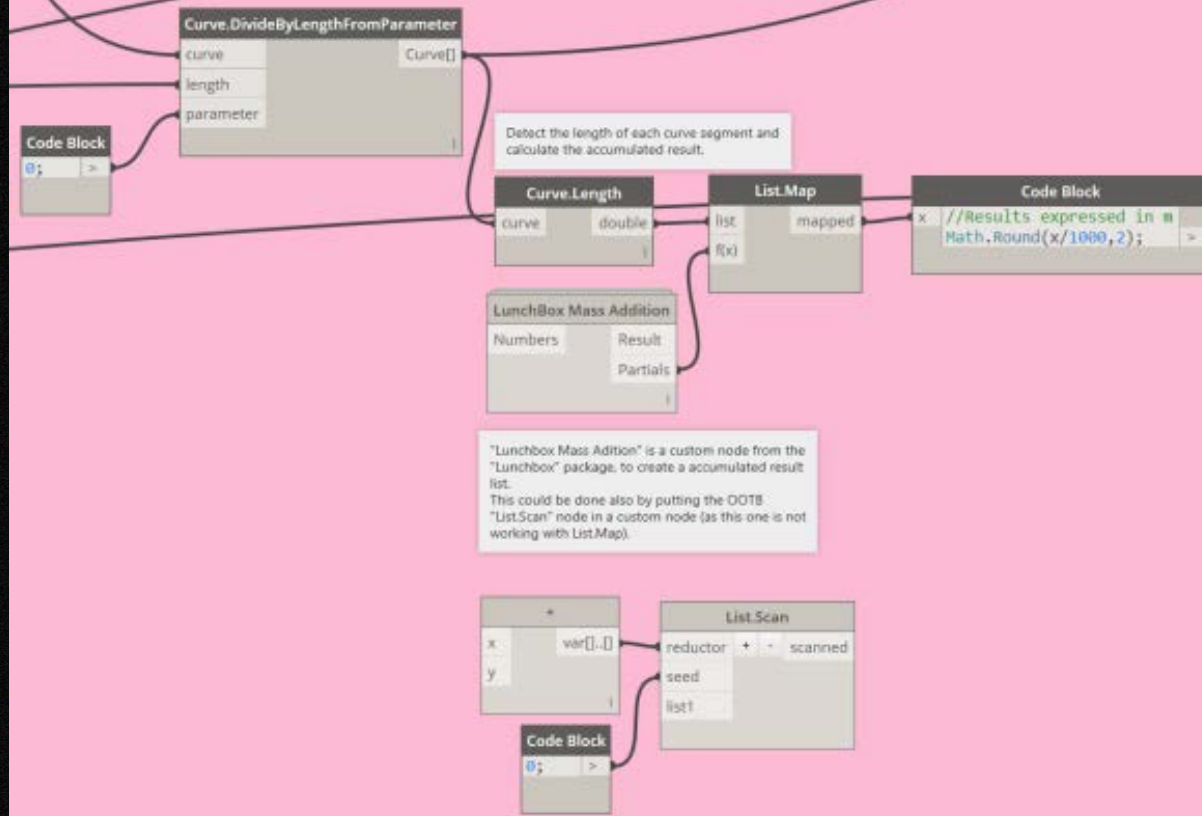
- The curves resulting from the Element.Geometry output from previous step are put together into one or more polycurves, using the PolyCurve.ByCurves node, which joins an unordered list of curves. This node is installed with the Ampersand package.
- It's also difficult to control the direction of each designed model line, as you might have drawn them in non-ordered way. That's why in this part of the script the distance between the start point of each path and the location point of the exit door is evaluated. When > 500 mm, then it is assumed that the Curve.Startpoint shows the point at the other end of the polycurve. In that case the curve will be reversed.



Accumulated distance to  
the emergency exit



Analyze the accumulated distance from a point on the path to the emergency exit



- In the third part of the script the length of the curve segments are analyzed (and they should be equal for all segments except the last one in this case), and the accumulated result is returned. This is done with the *Lunchbox Mass Addition* node which is available in the node library when the [Lunchbox](#) package is installed. This could be done also with the *List.Scan* node from the out-of-the-box Dynamo library, but this can not handle nested lists.
- Finally the result is converted from mm to m (assuming that the project units are set to mm).

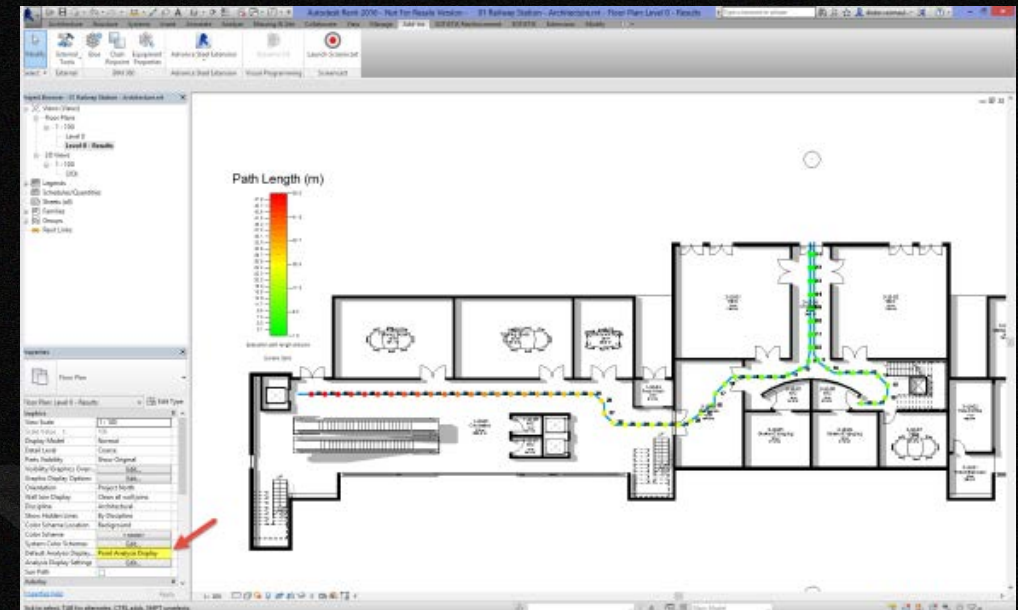
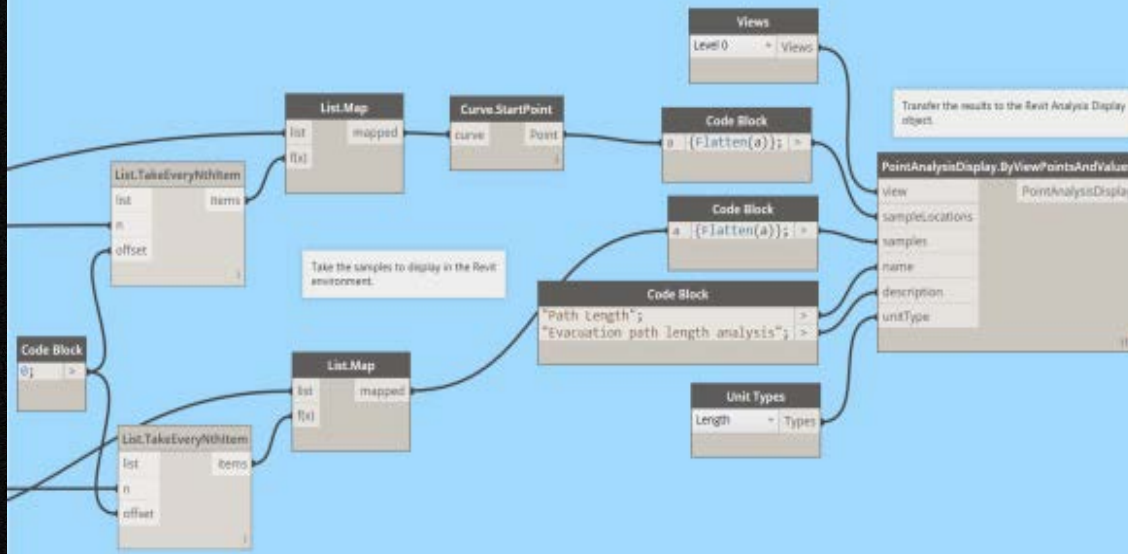




View the analysis results  
in Revit



## Transfer the results to Revit



- In this last step every n-th result (defined by the “SampleInterval” variable, defined at the front of the script) for every n-th start point of the curve is taken. Then these results are transferred to the *PointAnalysisDisplay* node which will generate an analysis display in the selected view in Revit.
- In Revit you can view and manage the appearance of the analysis results with the “Default Analysis Display” parameter of the view. In the dataset included in this post there is already a definition made, called “Point Analysis Display”.



# Thank you