AUTODESK UNIVERSITY 2013

Take a Walk with Me in Populate for Autodesk® 3ds Max® and Autodesk® 3ds Max® Design

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AV3498-L In this hands-on lab, you learn to use the tools and capabilities of the new Populate feature in Autodesk 3ds Max and 3ds Max Design. Together, we will put in walk flows and idle areas, adjust flow points and segments, create ramps, and dial in densities, distributions, and direction.

Learning Objectives

At the end of this class, you will be able to:

- Identify the capabilities and limitations of the Populate tools
- Master the technique of adding a Populate flow and idle area
- Manipulate flow paths and create ramps
- Adjust density, diversity, and direction of flows

About the Speaker

Eddie is a member of the Autodesk family representing Autodesk 3ds Max Design, Autodesk Showcase and Autodesk Revit among other titles. Prior to this adventure, Eddie has performed as a CAD manager where he successfully implemented Autodesk Revit and Autodesk Architectural Desktop for a number of firms in the Milwaukee area. Eddie has over 2 decades of experience developing architectural and visualization solutions. He has taught a variety of classes and is a recognized speaker at numerous seminars including siggraph, VIZ Masters, AIA and The Greenbuild Expo. Eddie is also a contributing animator for the Bradley Center, home of the Milwaukee Bucks, Admirals, and Marquette Golden Eagles. He is experienced as a CAD manager, designer, and visualization artist.
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Identify the capabilities and limitations of the Populate tools

The Populate toolset consists of three basic components:

- **Flow** A pathway for walkers that resembles a sidewalk or hallway. A flow consists of one or more connected straight-line flow segments that you create by clicking and moving the mouse in a viewport. When a flow is correctly formed, with permissible angles between segments and of inclines, parallel lines indicating pedestrian paths appear along its length. At the endpoints of each line are arrows indicating its flow direction. Also, red and blue marks on flows indicate starting points and walking directions of female and male people, respectively.

  You can edit existing flows by moving segments and their endpoints, known as *flow points*. You can also subdivide a flow to add complexity to the path. You can also create inclines and declines, also known as ramps, which have their own markings.

  Where two flows intersect, a green cross-shaped arrow appears. This indicates that walkers on one flow can change direction at random to move to the intersecting flow.

- **Idle Area** A region separate from the flows where people congregate, such as a park or traffic island. Settings include density and how the people form groups. Idle areas are always distinct from flows; Populate does not support the passage of people between the two.
- **People** The virtual humans in the Populate simulation. You can adjust their appearance by setting a skin type, from stick figure to high-resolution texture maps. Otherwise, you control Populate people indirectly by adjusting settings described in these topics.

  Note Flow and idle area objects do not render; their purpose is for visualizing and adjusting the simulation when setting up the scene.

Drawing a Flow

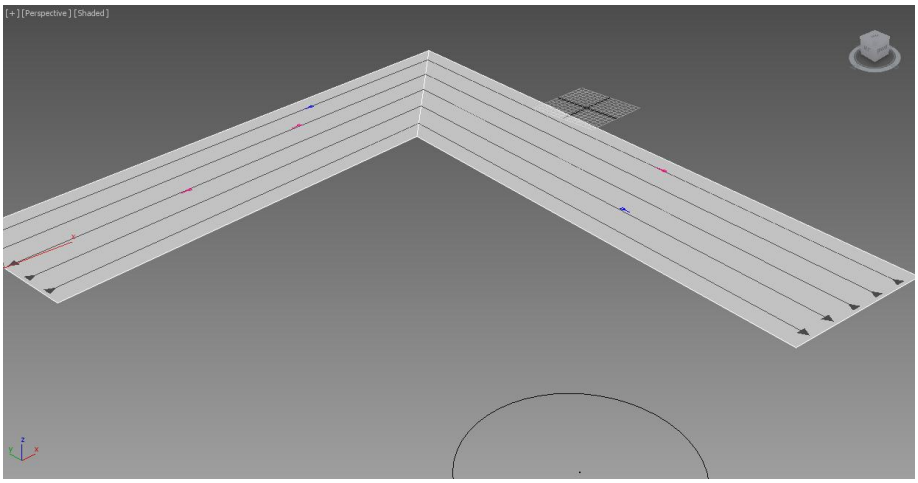
1. Start or reset 3ds Max and zoom the Perspective viewport out so the grid is relatively small.
2. Open the ribbon to the Populate tab and click the Create Flow button.

3. Click in the viewport to start the walkway, then move the mouse and click again to complete the first segment. Go on moving the mouse and clicking to create as many connected segments as you like. To finish, right-click in the viewport.

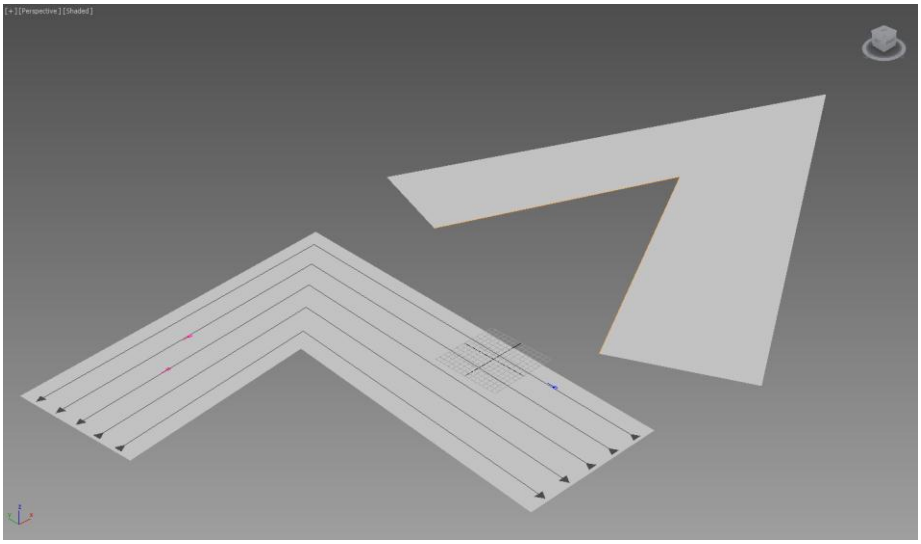
   The process of creating a flow is similar to creating a Line spline.

To complete creation of a flow, do either of the following:

- Right-click: Ends creation of the flow and deletes the current segment.
- Press Esc: Completes the current segment as if you clicked at the cursor location and then ends creation of the flow.

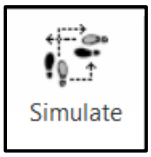


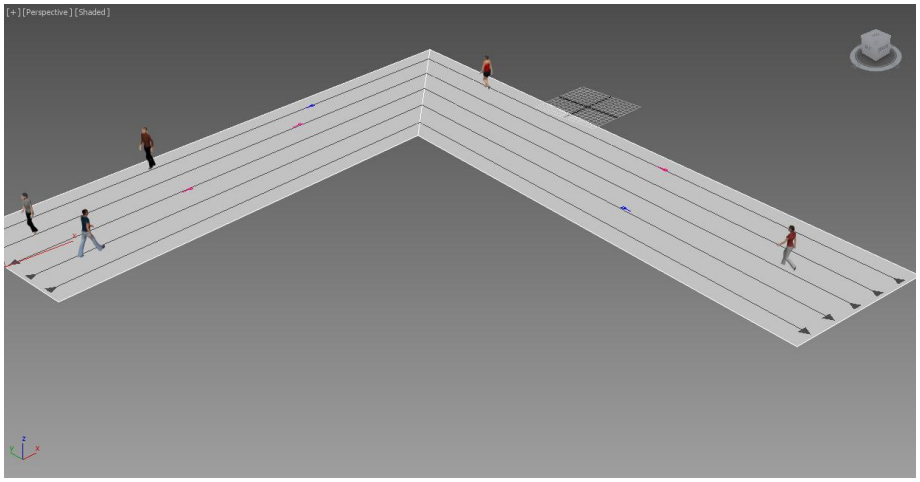
Note The lines on a flow indicate lanes of pedestrian traffic, while the red and blue marks indicate starting points and walking directions of female and male people, respectively. The arrows at the ends of each line also indicate walking direction. If you don't see any lines, there's a problem with the flow. This typically results from too small an angle between adjacent segments.



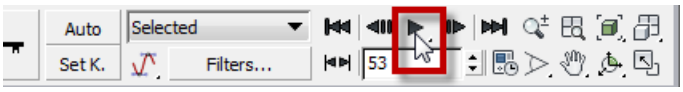
Valid flows show paths, invalid paths are empty.

4. In the Populate ribbon, select the Simulate button to generate the Populate Crowd





5. In the lower right corner of the 3ds Max Design, select the Play Animation button to see the simulation results.

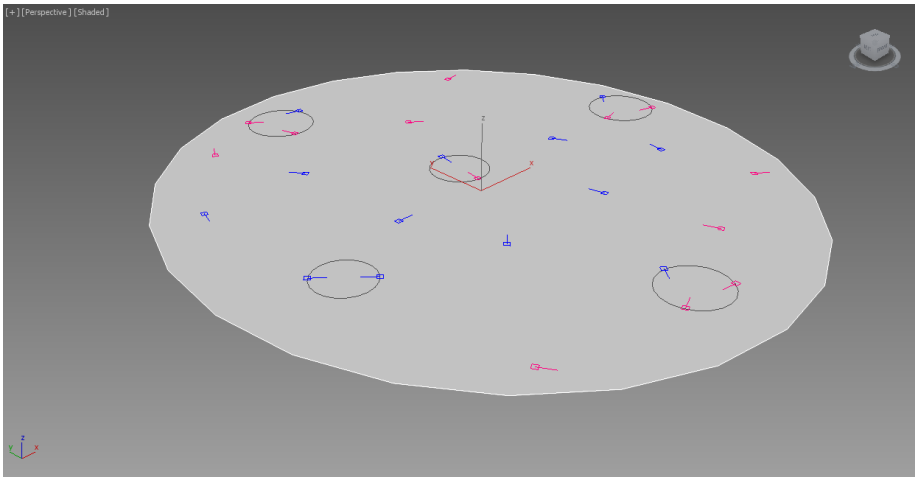


Creating an Idle Area

An idle area is a region in a Populate simulation where people congregate. People on idle areas show typical "hanging-out" behaviors such as chatting, gesturing, talking on phones, and so on.

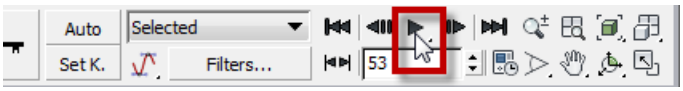
1. Start or reset 3ds Max and zoom the Perspective viewport out so the grid is relatively small
2. Open the ribbon to the Populate tab and click the Circular idle area button.

3. Pick and Drag a circle until Group Circles and individual markers start to show.
4. Release the left mouse button to create the idle area.



5. In the Populate ribbon, select the Simulate button to generate the Populate Crowd

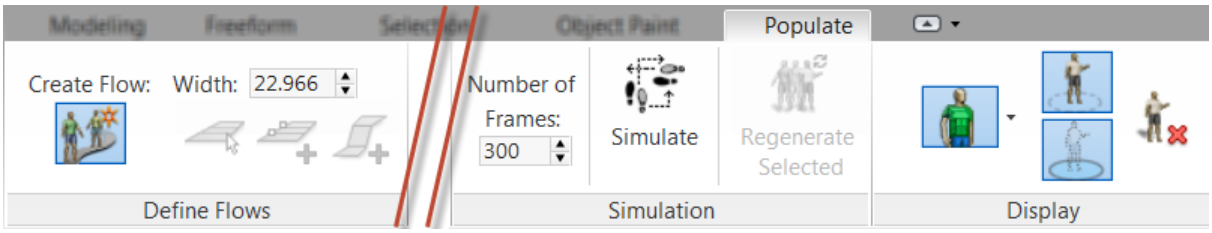
6. In the lower right corner of the 3ds Max Design, select the Play Animation button to see the simulation results.



Master the technique of adding a Populate flow and idle area

Creating a Flow

1. Start or reset 3ds Max
2. Set the View to Top with the (t) keyboard shortcut
3. Use the (g) keyboard shortcut to turn off the grid.
4. Open the ribbon to the Populate tab



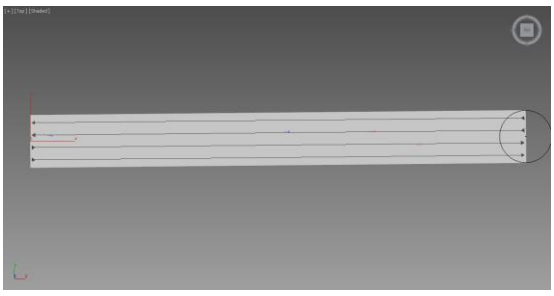
Width
The width of the next flow to be created. This setting does not affect existing flows; to modify the size of an existing, selected flow, use the Width setting on the Flows rollout.

Number of Frames
The length, in frames, of the animation generated when simulating. To change the length, adjust this value and then click Simulate again. If Number of Frames is greater than the active time segment, simulating increases the active time segment accordingly.

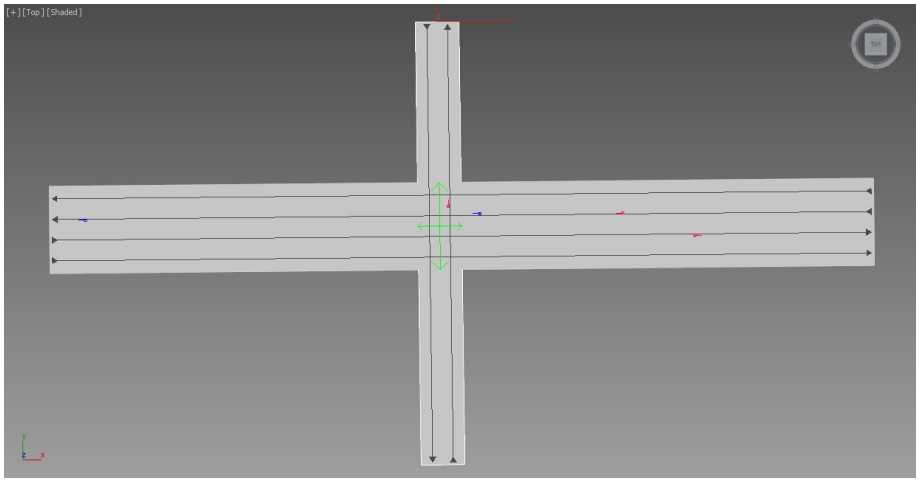
The maximum value is 10000. The simulation always starts at frame 0.

5. Set the Width: to 18.
6. Select the Create Flow button

7. Zoom the view so the size of the brush is about 1/5 or 1/6 the height of the viewport.
8. Drag a Flow from the left side of the viewport to the right

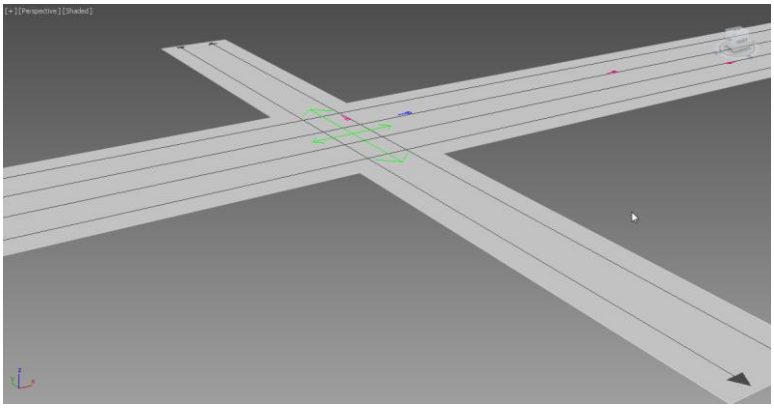


9. Repeat steps 5 thru 8 with a Width: value of 9 and the Flow created from top to bottom.

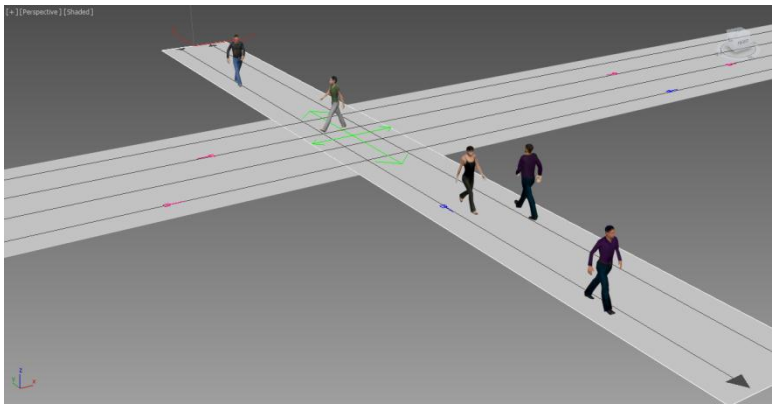


Notice the green arrows that have appeared at the intersection.

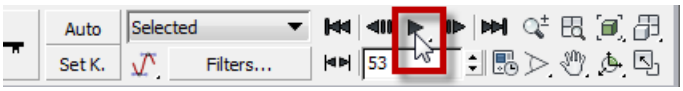
10. Use the Keyboard Shortcut (p) to move to a perspective view.
11. Roll the view to see the intersection from a more natural view.



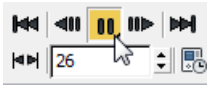
12. In the Populate ribbon, select the Simulate button to generate the Populate Crowd



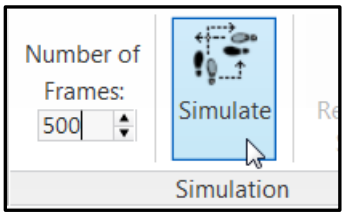
13. In the lower right corner of the 3ds Max Design, select the Play Animation button to see the simulation results.



14. After observing the results, use the Stop Animation button to Stop the populate pedestrians



15. Change the number of frames to 500 and ReSimulate



    Notice the number of frames in the timeline has increased to reflect the new value

16. Again, Use the Play Animation and Stop Animation buttons to see the results
17. Repeat Step 15 with the value of 250
    Notice the number of Frames in the timeline has not changed
18. Again, Use the Play Animation and Stop Animation buttons to see the results
    Notice that the pedestrians freeze from frame 250 to 500

The Idle Interface

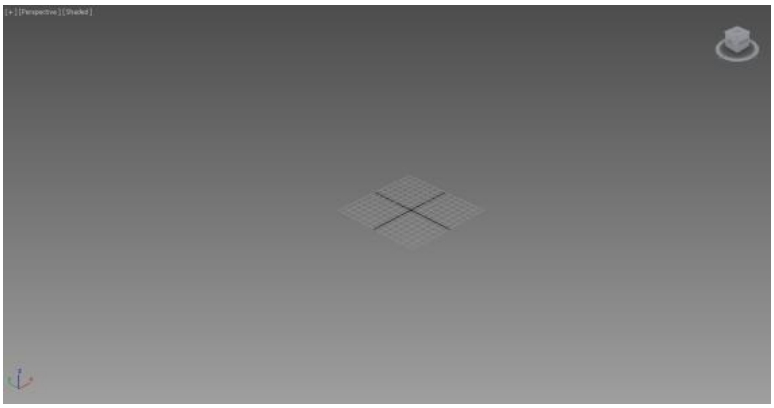
When you first start to draw an idle area, a black X might appear on the surface; this indicates that the area is too small to support people, or the dimensions are wrong. As you continue to draw, symbols appear on the idle area indicating where people begin the simulation. Red icons indicate females and blue icons indicate males, and the lines emanating from the icons show each person's facing direction. Circles show where groups are standing; each group can contain two or three people. Those not in groups are considered "singles."

You can create an idle area on any surface or on the home grid. If a single idle area is selected when you create a new one, the new idle area is drawn at the same height as the selected one. So to start on a different surface, make sure no idle area is already selected.

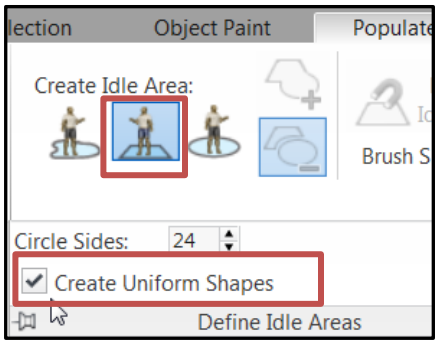
You can move and scale idle areas using standard transform tools. You can also rotate an idle area, but only about its vertical axis (that is, within the XY plane). Idle areas are always parallel to the home grid.

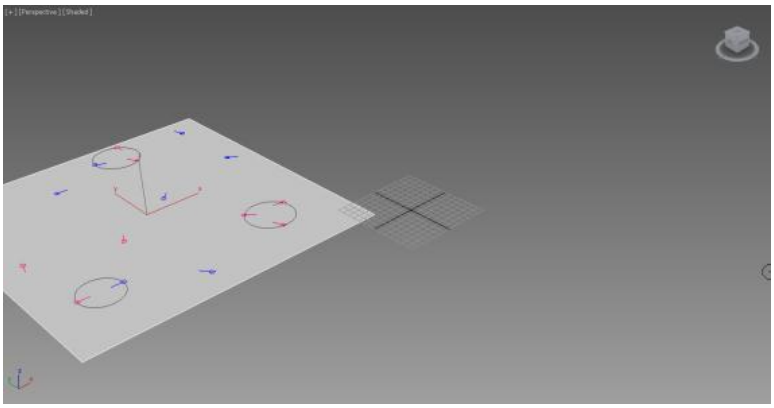
Idle areas

1. Start or reset 3ds Max and zoom the Perspective viewport out so the grid is relatively small.



2. Open the ribbon to the Populate tab and click the Create Rectangle Idle Area button.
3. Expose the Define Idle Area options and check the Create Uniform Shapes option
4. Pick and Drag a square until Group Circles and Individual markers start to show.

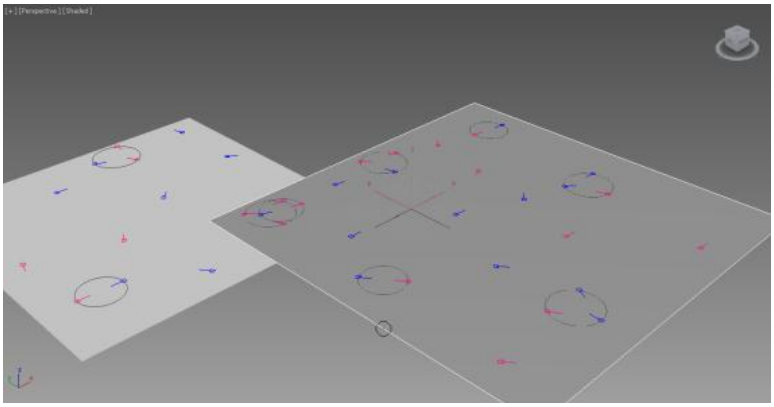




Add to Idle Area

Enables increasing the size of an existing idle area. After clicking Add To Idle Area, select an idle area, choose the shape to add (Free, Rectangle, or Circle), then drag out the shape of the new idle area so that it overlaps the selected area. After you finish drawing, the two idle areas are combined into one.

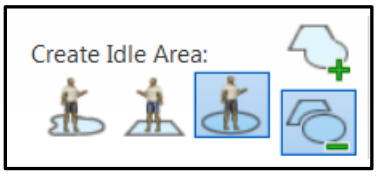
5. Select the Add to Idle Area button
6. Verify the previously Idle Area is selected
7. Drag out another overlapping Idle Area



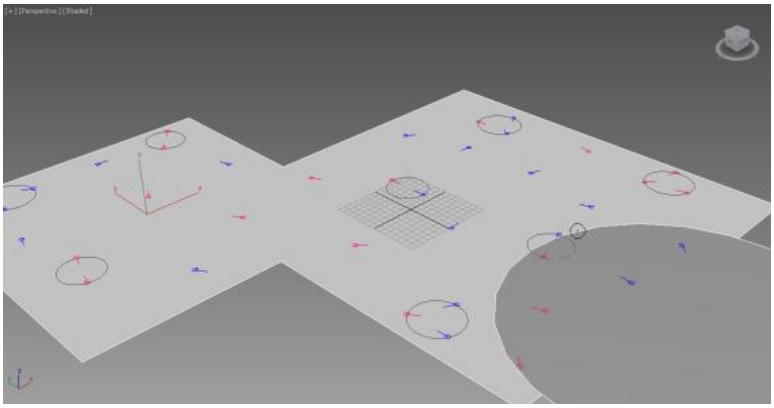
Subtract from Idle Area

Enables decreasing the size of an existing idle area. After clicking Subtract From Idle Area, select an idle area, choose the shape to subtract (Free, Rectangle, or Circle), then drag out the shape of the new idle area so that it overlaps the selected area. After you finish drawing, the overlapping portion of the new area is deleted from the existing one.

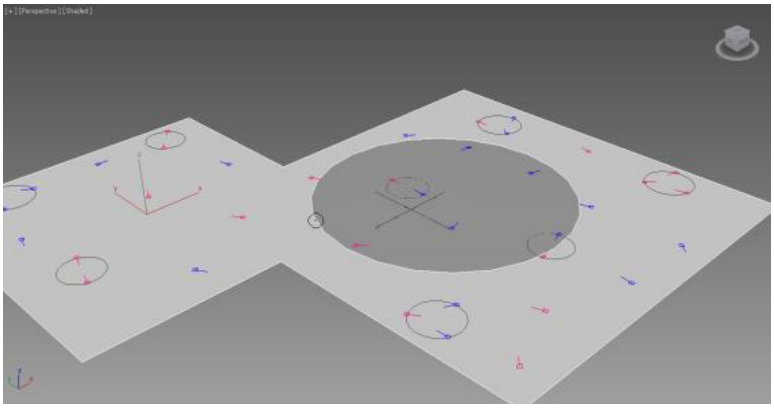
8. Select the Subtract from Idle Area button and move to a Create a Circular area shape



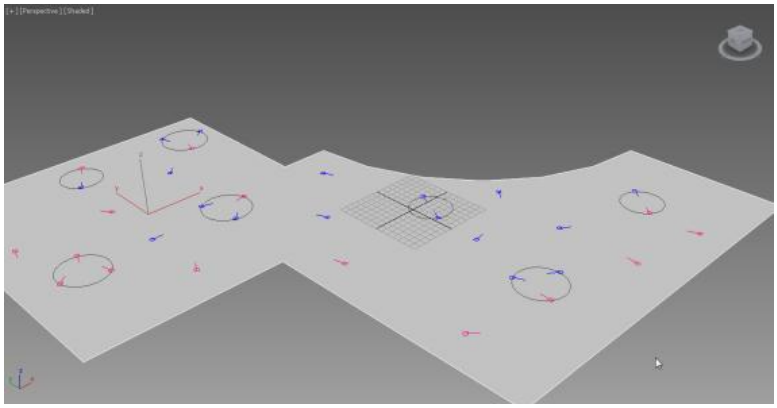
9. Pick and drag a circular idle area that intersects large idle area.



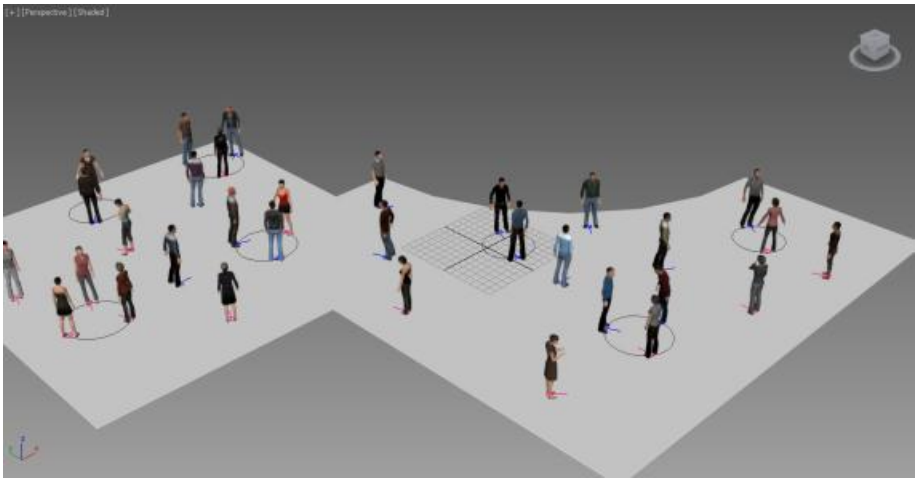
Or



10. Release to see the result of the Boolean



11. Use the Simulate and Playback buttons to see the results

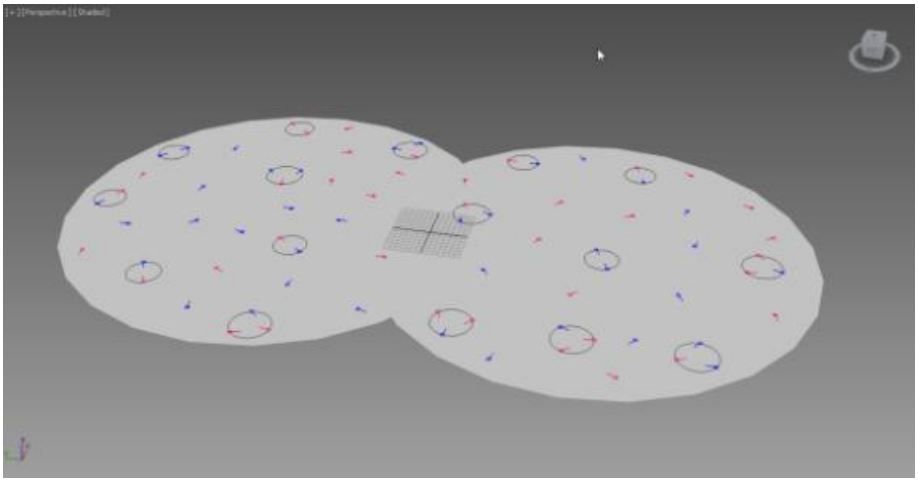


Modify Idle Areas

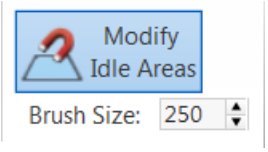
Enables changing the shape of a single idle area by moving its vertices with a paintbrush-type interface. To use, select an idle area, click Modify Idle Area, adjust the brush size if necessary (see following), and then drag over the idle area to move its vertices. Vertices near the center of the brush circle move the farthest, with the effect falling off toward the edges of the brush.

Adding and move sections to the existing flow

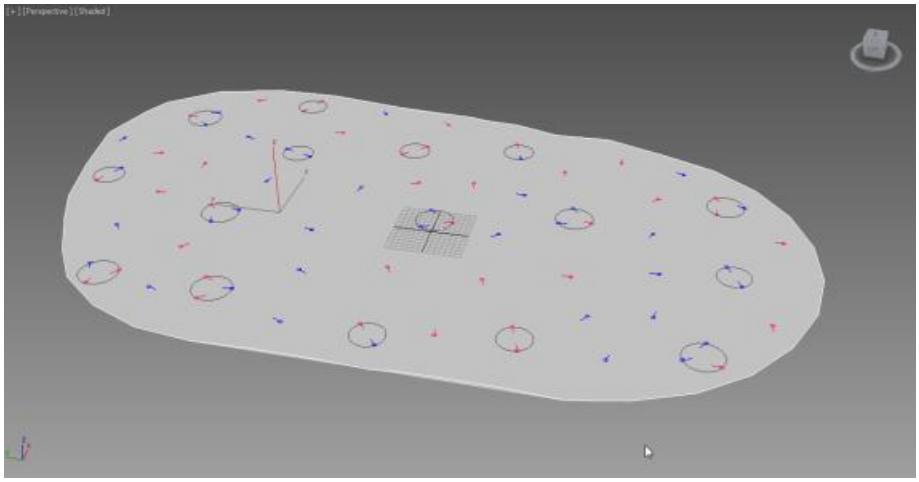
1. Start or reset 3ds Max
2. Draw a figure 8 shape with Create Free Idle Area or open 01 Idle Area.max



3. Select the IdleArea001
4. In the Populate Ribbon, select the Modify Idle Areas button and increase the Brush Size: to 250.



5. Place the center of the brush on the edge of the idle area and start “pulling” the edges to reshape the area.

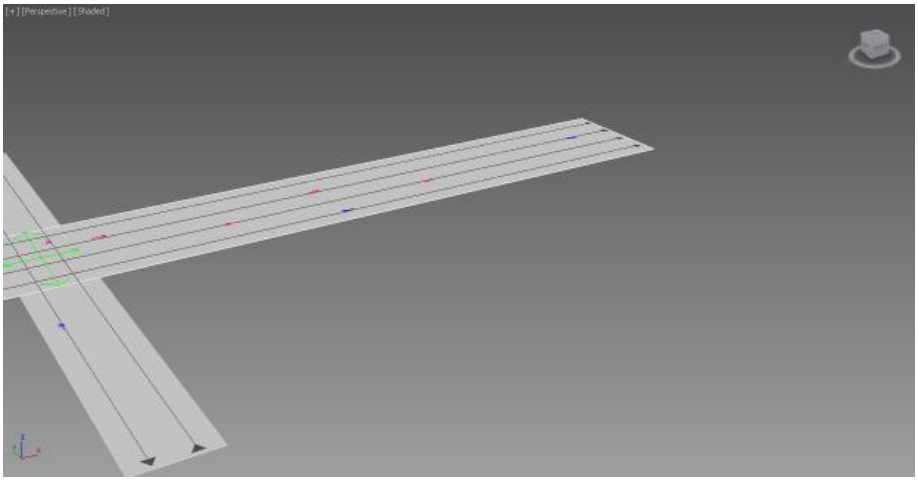


6. Change the brush size to affect smaller segments
7. Notice as the edges are adjusted, the chat circles and individuals re-position to accommodate the new shape
8. Use the Simulate and Playback buttons to see the results

Manipulate flow paths and create ramps

Adding and move sections to the existing flow

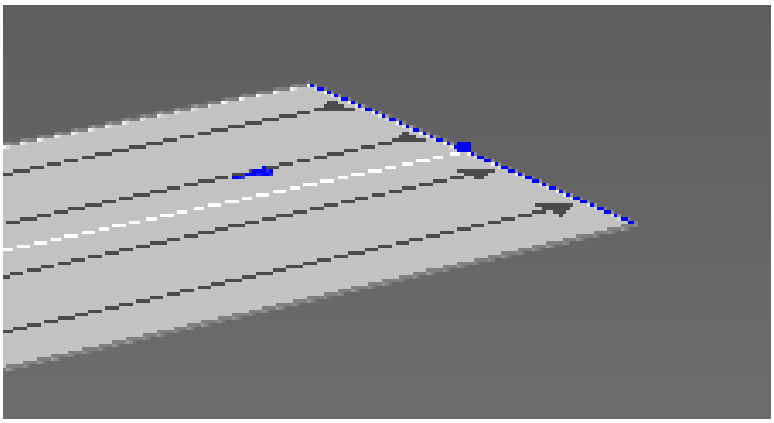
1. Continue working in this file or open 02 Pedestrian Flow.max
2. Select Flow001 (the wider flow)
3. Pan and zoom to see the far right end of the flow



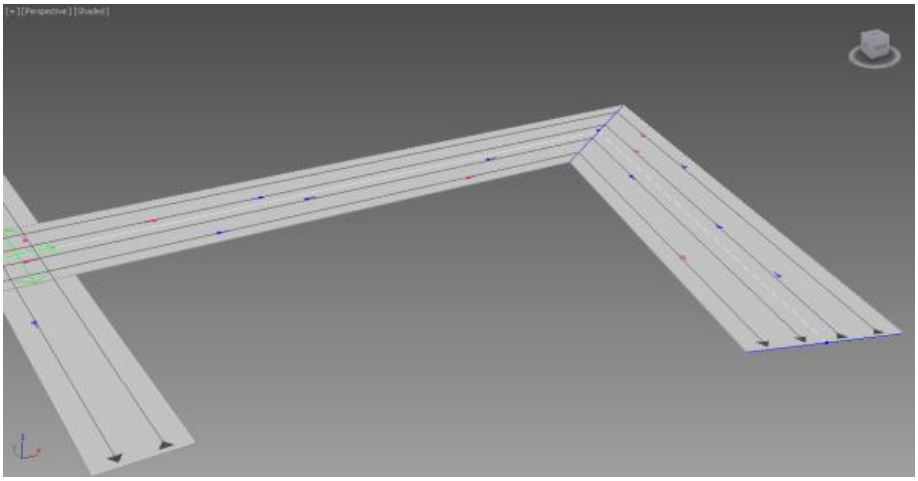
4. Select the Edit Flow button

5. Select the Ad Flow button

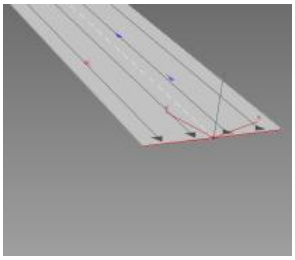
Notice the end has changed to a blue line with a blue grip node in the middle



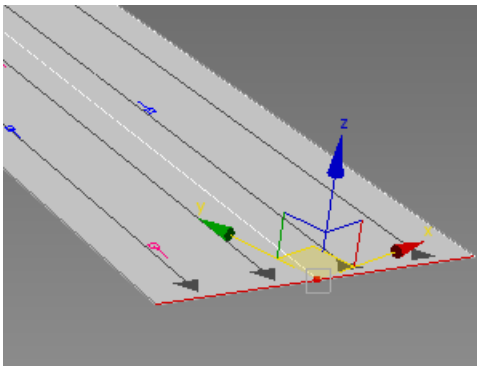
6. Position the cursor over the blue dot until the green box appears
7. Pick and drag a new section of the flow at approximately a -90° angle



8. Right mouse button click to end the creation
9. With the Edit Flow button still active, select the new edge created at the end of the new flow segment. The blue edge should highlight red.
10. Right Click to bring up the Quad Menu
11. In the transform area, select Move

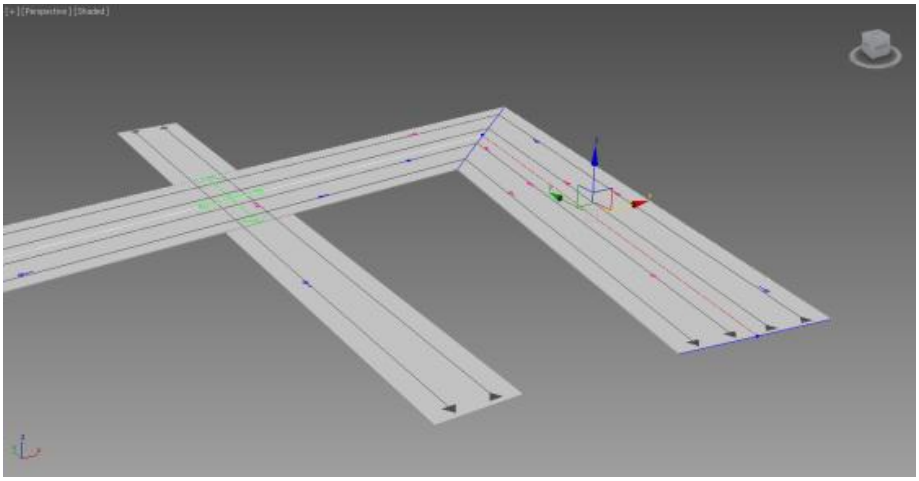


12. Position your cursor over the red X, green Y or connecting square between the two to reposition the end of the flow segment.



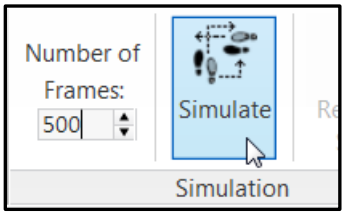
Note Moving the segment in the blue Z direction will move the entire flow in the Z direction.

13. Select the white dashed line down the middle of the flow segment. Selected segments turn red.
14. Still using the move transform, reposition the segment closer to the thinner Flow002

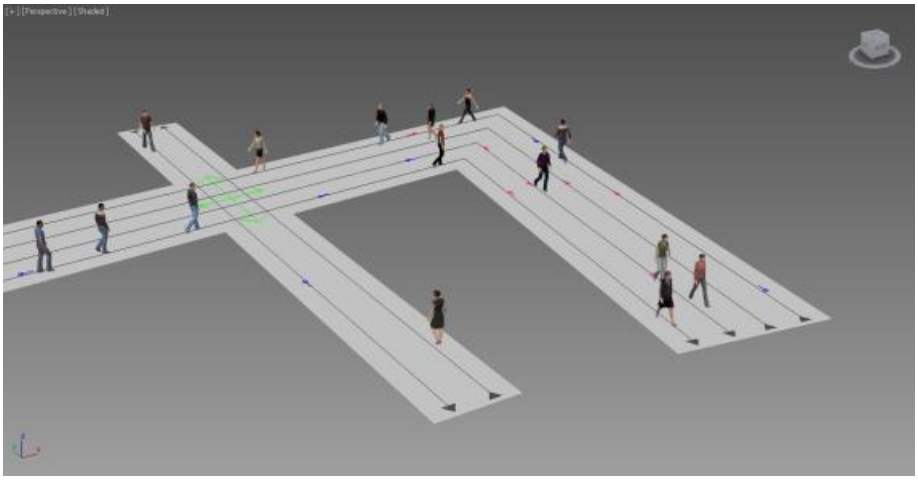


Notice that the Populate pedestrians are no longer associated with the flow.

15. Verify that the Number of Frames: is set to 500 in the Populate ribbon and select the Simulate button to regenerate the pedestrians in the flow



16. Use the Play Animation and Stop Animation buttons to see the results

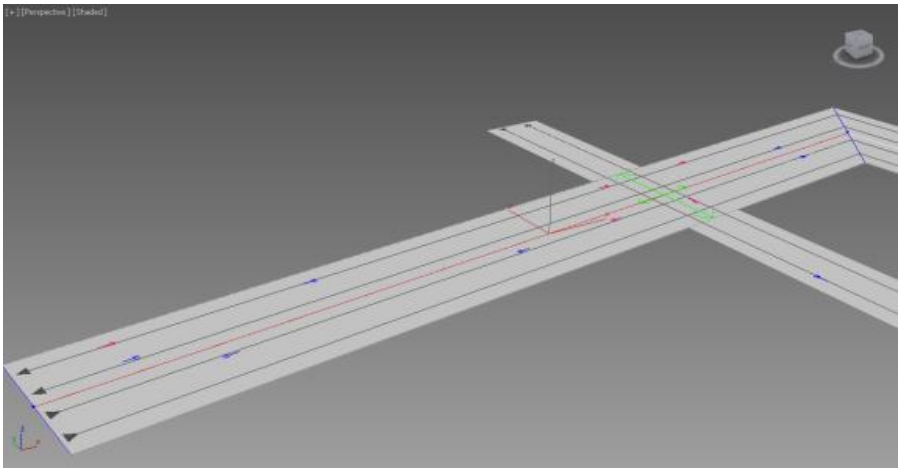


Adding a Ramp to the existing flow

1. Continue working in this file or open 03 Pedestrian Flow.max
2. Zoom and pan to see the left side of Flow001

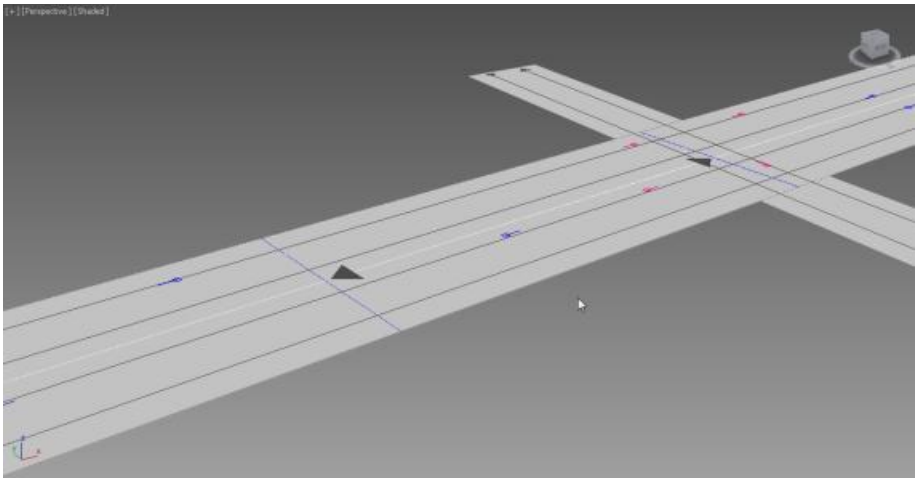
3. Select Flow001(the wider of your 2 flows)
4. Select the Edit Flow button

5. Select the white center stripe to turn it red.

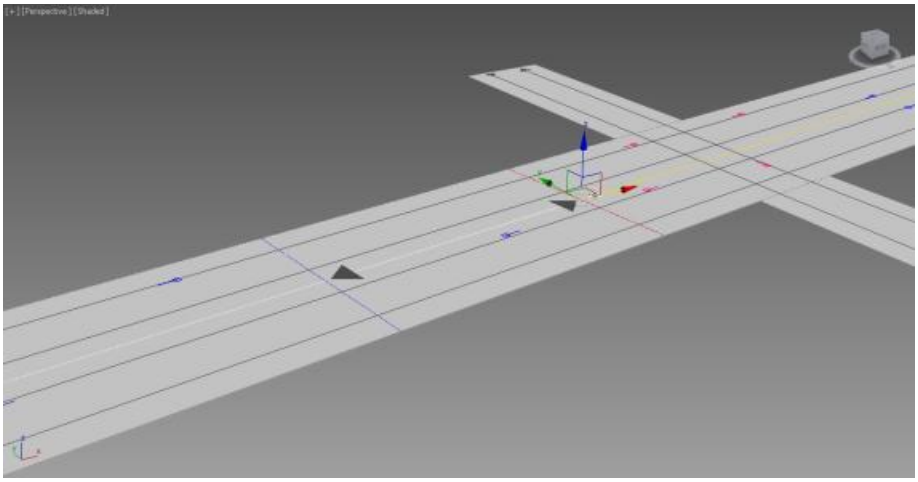


6. You should now have access to the Create a ramp button. Select it

7. The ramp divisions will be inserted with arrows used to indicate the beginning and end of the ramp segments

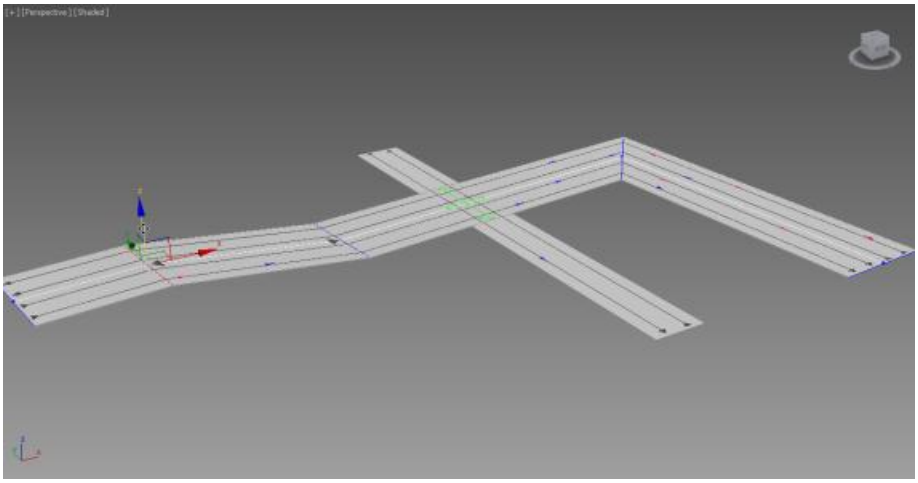


8. Select the segment indicator on the far right and use the Move transform in the X direction to slide it out of the intersection. Keep moving it to the left until the Green intersection arrows reappear.



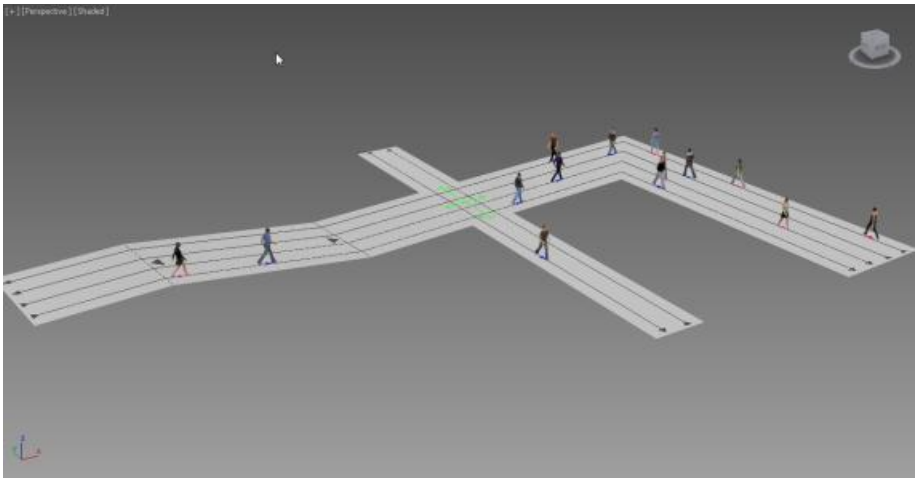
Note: If the start and end segments of the ramp get to close, the flow will no longer be valid.

9. Select the left end of the ramp, again use the move transform in the X direction to lengthen the ramp segment and us the Z direction to move the ramp segment up.



Note: If the pitch of the ramp becomes too steep, the flow will no longer be valid. If the end of the ramp is too close to the intersection, and the green arrows disappear, the thinner flow may need to be moved to re-establish the connection.

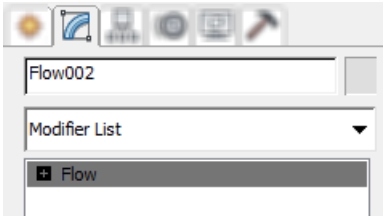
10. Use the Simulate and Playback buttons to see the results



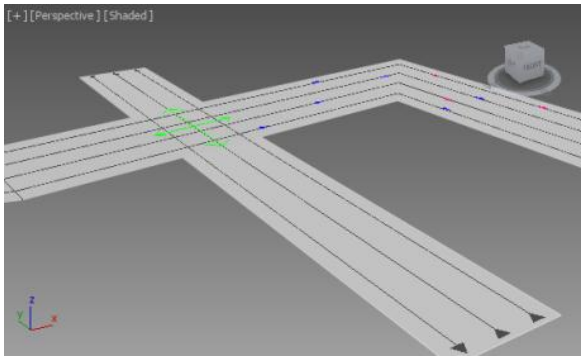
Adjust density, diversity, and direction of flows

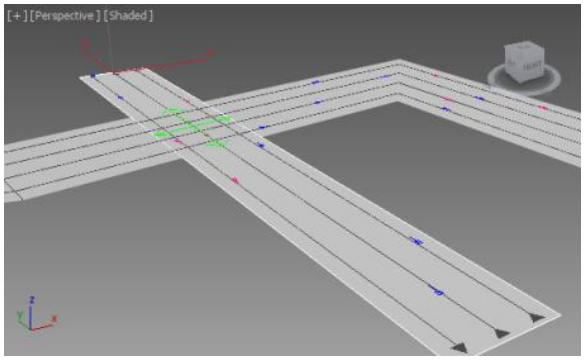
Flows

1. Continue using the file or open file 04 Pedestrian Flow. Max
2. Select the thinner flow (Flow002).
3. In the Command Panel, Select the Modify tab.

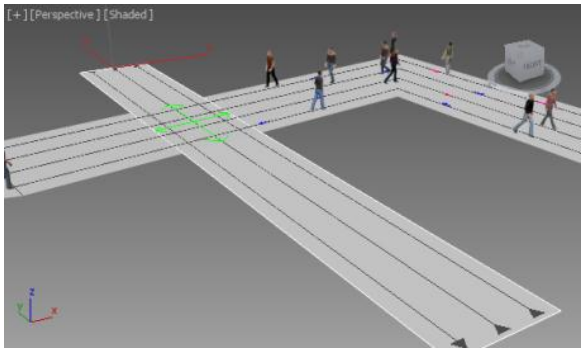


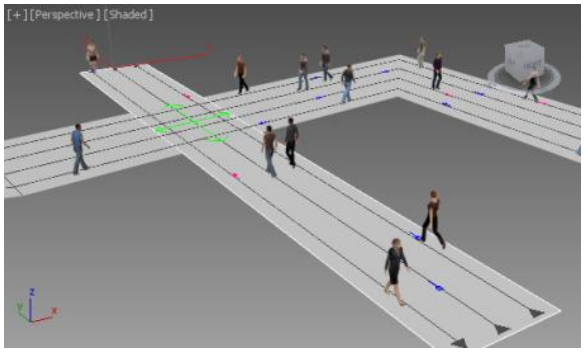
4. Change the Width: to 12’ and the Lane Spacing: to 4’
5. Notice the result.
6. Manipulate the Density slider to see the results on the selected Flow. With the slider positioned to the far left, notice that the number of pedestrian markers becomes minimal and with the slider moved to the far right, the number of markers increases.





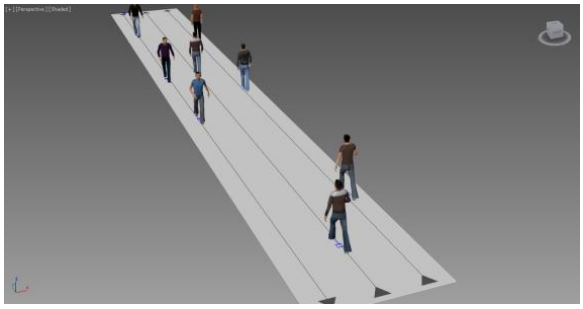
7. Use the Simulate and Playback buttons to see the results

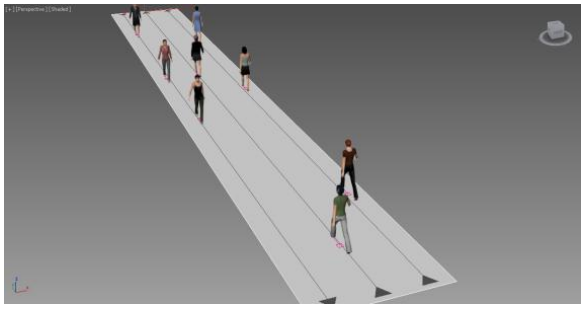




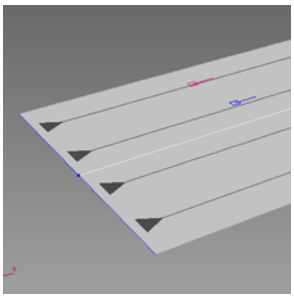
The number of people only updates with a with the Simulate button.

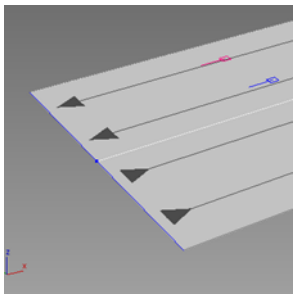
8. Select the Delete People button to remove the current pedestrians.
9. Verify that Flow02 is still selected.
10. Move the Density Slider to the maximum
11. Slide the gender slider from Male to Female. Notice that the colors are changing to reflect the different gender. (Blue marker = male, Pink markers = female)

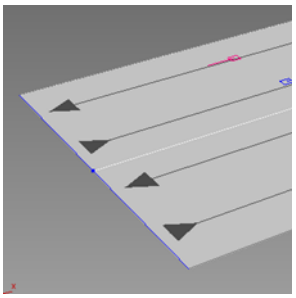


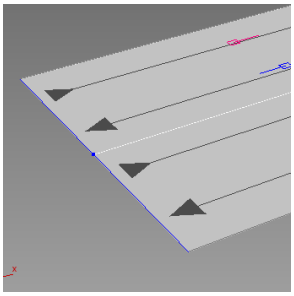


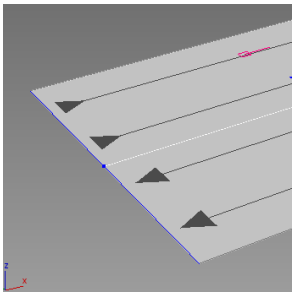
12. Move the Direction slider to the far left to read Forward. Notice that the direction indicators at the beginning and end of the lane markers now point in the same direction.
13. Drag the Direction slider through the remaining 5 direction options. With each option, again, notice the resulting direction for the lanes.

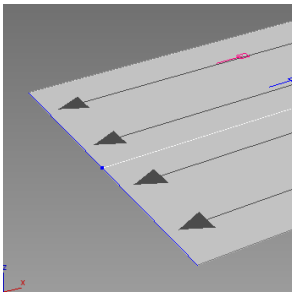

Forward


Hug Right


Weave Right

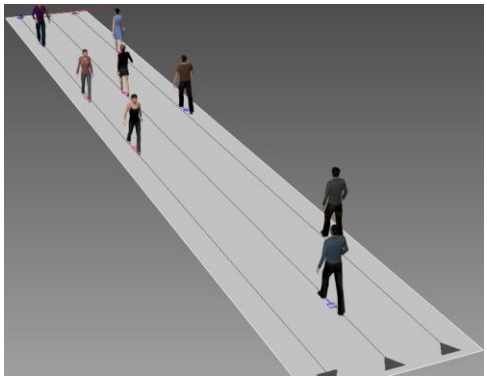

Weave Left

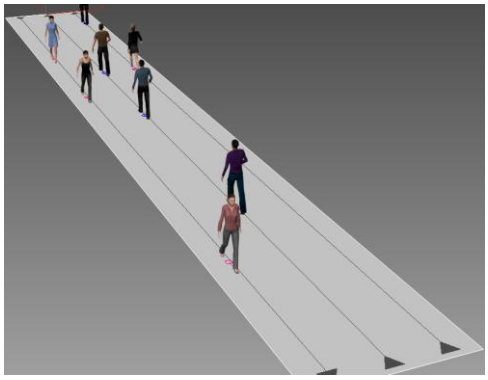

Hug Left


Backward

Samples

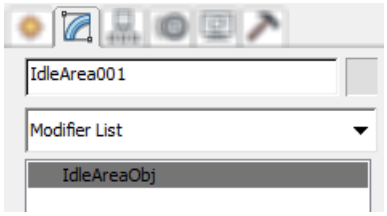
Samples values help randomize the positions and genders on the flow.


Positions: 1
Gender: 1

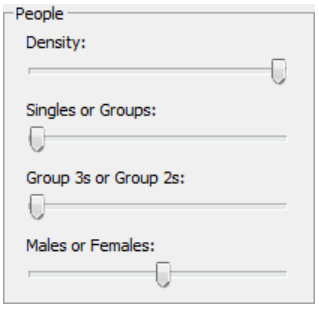

Positions: 5
Gender: 5

Idle Areas

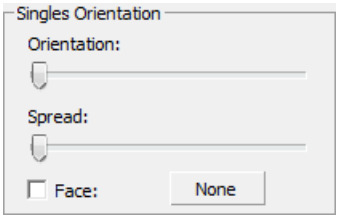
1. Open file 02 Idle Area.max
2. Select the Idle Area (IdleArea001).
3. In the Command Panel, Select the Modify tab.



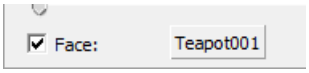
4. Manipulate the sliders in the People area to see the results.
5. Finish with the Density at maximum; Singles at maximum; and Gender at 50%.



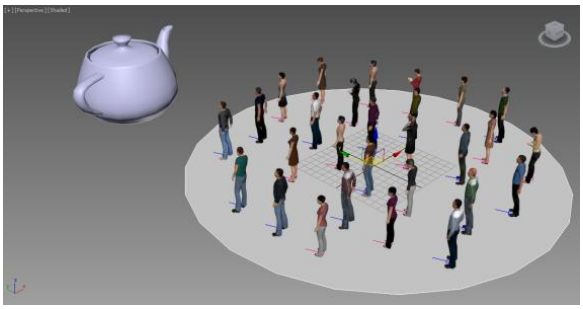
6. In the Singles Orientation area, manipulate the Orientation and Spread sliders. Finish with the Orientation and Spread set to the far left.

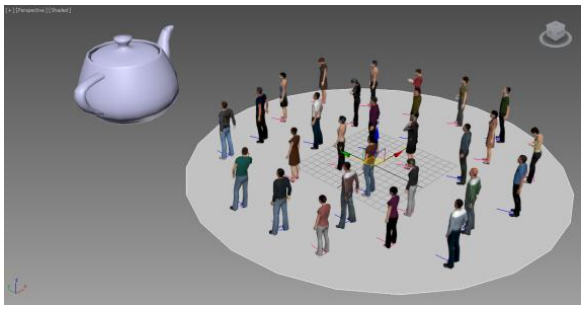


7. Use the Simulate button to generate your crowd.
8. Check the Face option and select the None button. Now select the teapot on the left.



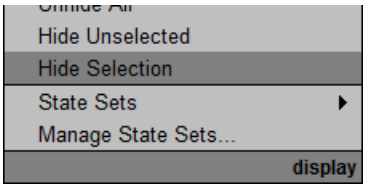
9. Use the Simulate button to generate your crowd. Notice the subtle difference of having all the people looking at an object as opposed to looking in the same direction.





10. Select the teapot and move it to the middle of the idle area
11. Use the Simulate button to regenerate your crowd.
12. Select the people that now interfere with the teapot

13. Right Click over the person/people and select Hide Selection in the pop up Quad Menu.



Samples group

Like the Samples for flows, these settings provide randomization seeds for various factors related to idle areas. After changing a Samples setting, re-simulate to see the results.

Display

 **Stick Figures** Crowd members appear as simple skeletal frameworks. The stick figures don't render, so use this option mainly to improve feedback when setting up the scene.

 **Custom Skin** Applies an empty gray material to each character. Use the Material Editor to modify the material.

 **Crowd Skin** Applies a low-resolution textured material to each character. This is the default option and is useful for most applications.

 **High Res Skin** Applies a high-resolution textured material to each character. If the necessary data is not installed, you're taken to a Web site where you can download the installer.

 **Show Environment Objects** Toggles visibility of the flows and idle areas without affecting the people.

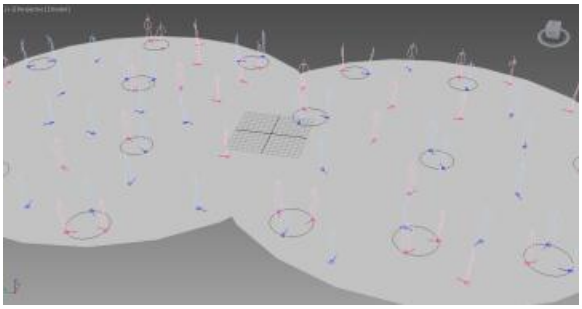
 **Show People** Toggles visibility of the people without affecting the flows and idle areas.

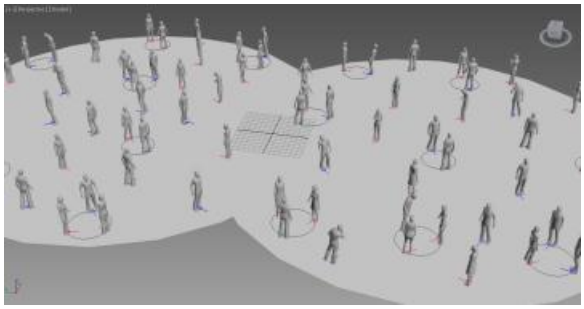
 **Delete People** Removes all people from the simulation while leaving the flows and idle areas and their properties.

Tip: To reduce the size of the scene file, use Delete People before saving, then re-simulate after opening the file. Note, however, that if you follow this method after regenerating any crowd members, upon opening and re-simulating the regenerated people will revert to their original appearance.

1. Open file 01 Idle Area.max
2. Zoom in a bit closer

3. Change the Display type pulldown to Stick Figure.
4. Use the Simulate button to generate your crowd.
5. Repeat Step 3 to apply the Custom and Crowd Skin. The High Res Skin requires a separate download and install. Class computers may not have access to this download.


Stick Figures


Custom Skin


Crowd Skin


High Res Skin

6. Select the Show Environments Objects button to toggle the Idle Areas, Chat Circles and People Markers on and off. To be clear, these objects will not render but this toggle can remove the object in the scene.
7. Repeat Step 6 for the Show People button
8. Select the Delete People button

Conclusion

The Populate toolset lets you add animated characters to your scene quickly and easily. In this session, you have learned to have characters walk along paths, or "flows," and others hang out in "idle" areas. We have learned that the flows can be a simple or as complex as you like, and can include shallow inclines and declines.