SEATING CAPACITY TOOL

USER MANUAL

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Contents

SEATING CAPACITY TOOL

1. Overview

Seating Capacity Tool is a Python-based tool developed in ArcGIS for estimating the classroom seating capacity and revising the classroom furniture plan based on specified social distancing parameter. This tool is created in ArcMap 10.7. Additionally, it is made available as SC_Map9-0_9-1 and SC_Map10 for compatibility with ArcMap 9.0 and above. The salient features of the tool are that it is easy to use and requires minimal data inputs from users. The two prominent user specified inputs required by the tool are – polygon shapefile representing seating area within a classroom, and distance required to be maintained between each seat. The tool ensures that each seat in the revised classroom furniture plan is at specified safe distance.

Note: This document uses classroom modeling as an example. The tool usage can be extended to any type of room.

2. System Requirements

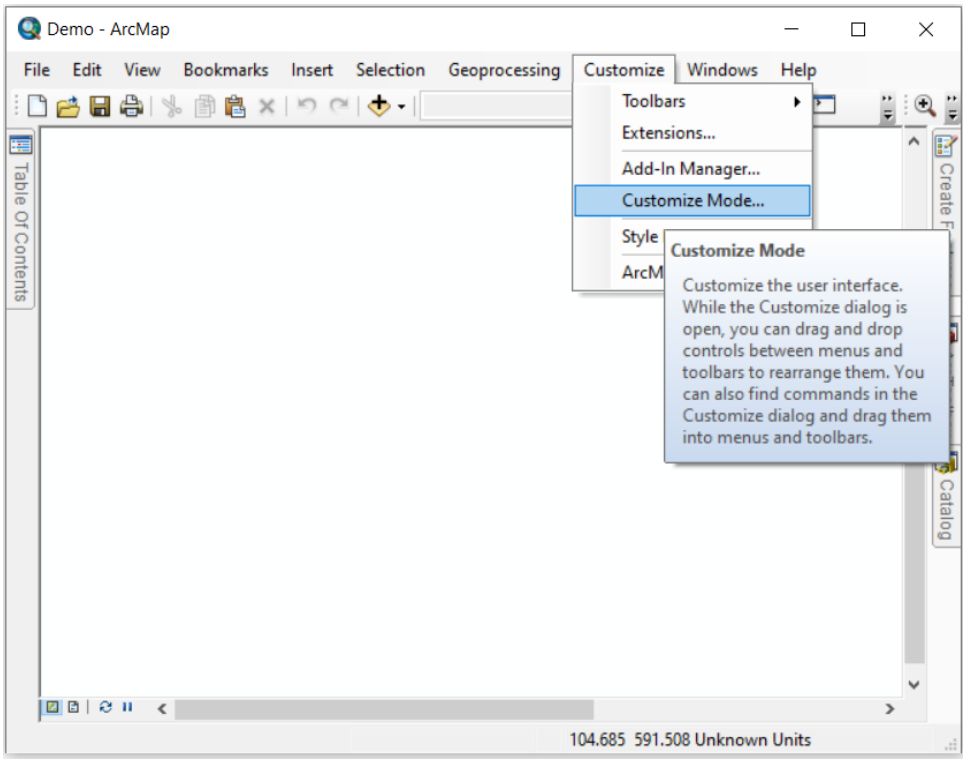
Download the TBX file and Python-Script for the Seating Capacity Tool on your system. You should have ArcGIS installed on your system to use this tool.

3. Adding Seating Capacity Tool to ArcMap

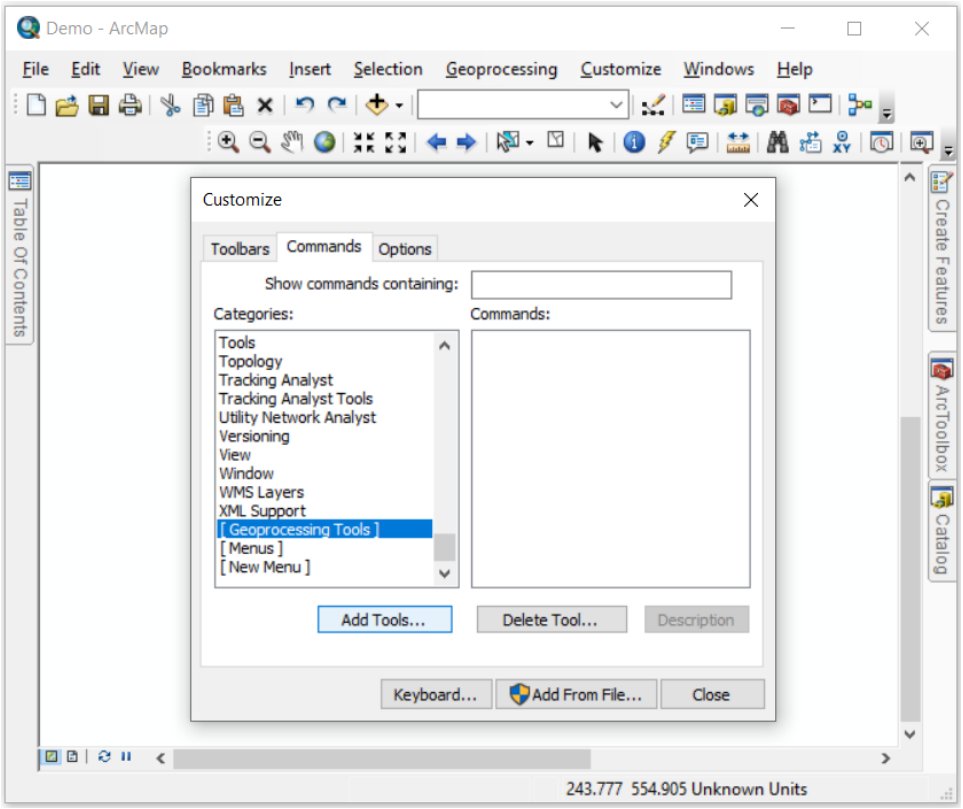
This section of the document follows guidelines for Adding and removing tools on menus and toolbars provided by ESRI.

Follow below steps to add Seating Capacity Tool in ArcMap 10.

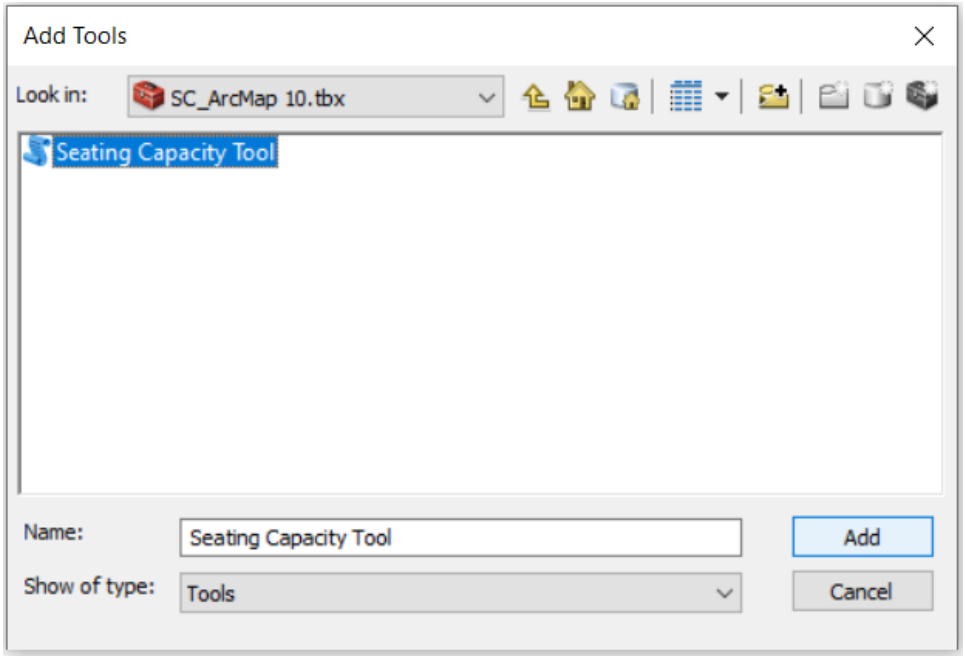
1. Open ArcMap
2. Click **Customize** > **Customize Mode** as shown below.



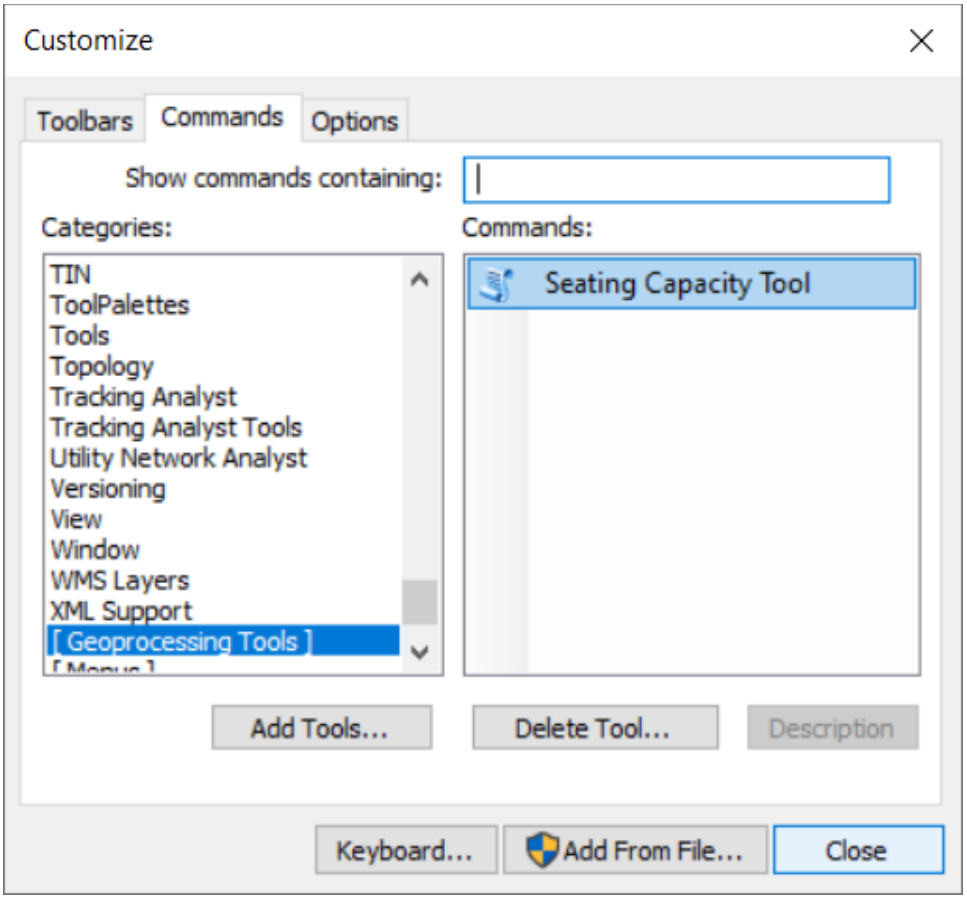
3. Customize Mode window opens. Click **Command Tab.**
4. Search **[Geoprocessing Tools]** under **Categories.**
5. Click the **Add Tools** button.



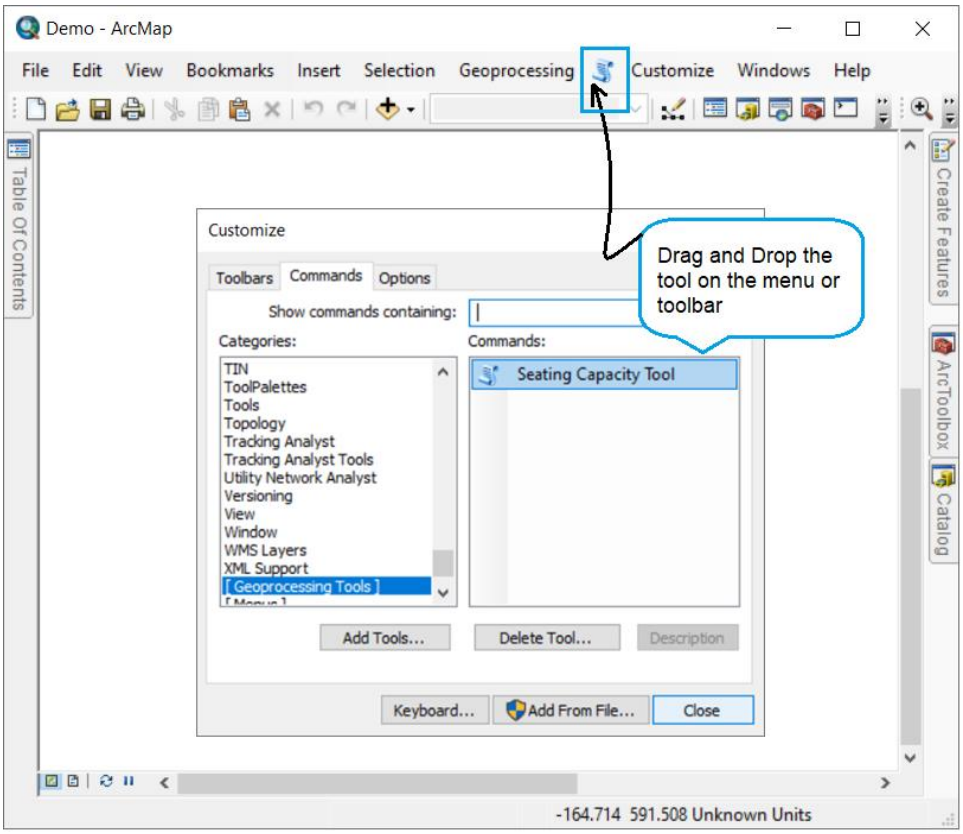
6. Browse to the folder containing Seating Capacity Tool. Select the tool and Click **Add** button.



7. Now, the **Seating Capacity Tool** is available under [Geoprocessing Tools] Category.



8. Drag and drop the tool from the **Commands** list on the menu or toolbar as shown below.



Caution: ArcMap stores a reference to the tool (the path to the toolbox) when you add a custom tool to the Commands panel. When you run the tool by clicking its button or menu item, ArcMap finds the tool by the stored reference. If you delete or move the toolbox, ArcMap cannot find the tool and an error occurs.

Note: You can remove the tool by clicking **Delete Tool** button available below Command panel.

4. How Seating Capacity Tool works

4.1. Summary

The Seating Capacity tool estimates the revised seating capacity for a given feature class. It creates a polygon feature class representing the suitable revised locations for seats.

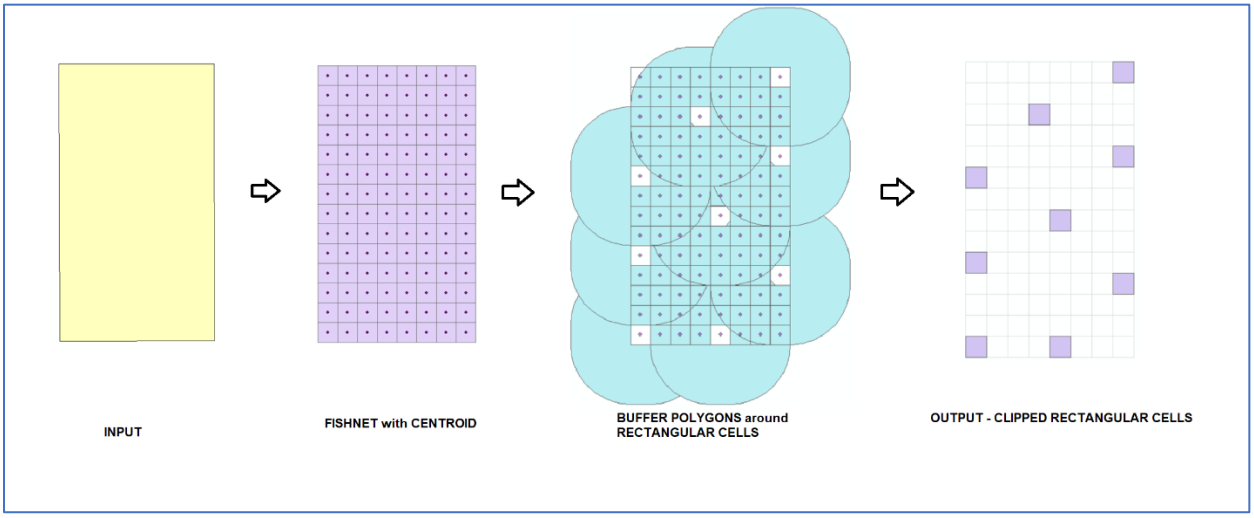
GIS processes performed by the tool are:

Creates fishnet of rectangular cells.

Creates buffer polygons around the rectangular cells of fishnet.

Extracts or clip rectangular cells from fishnet.

4.2. Illustration



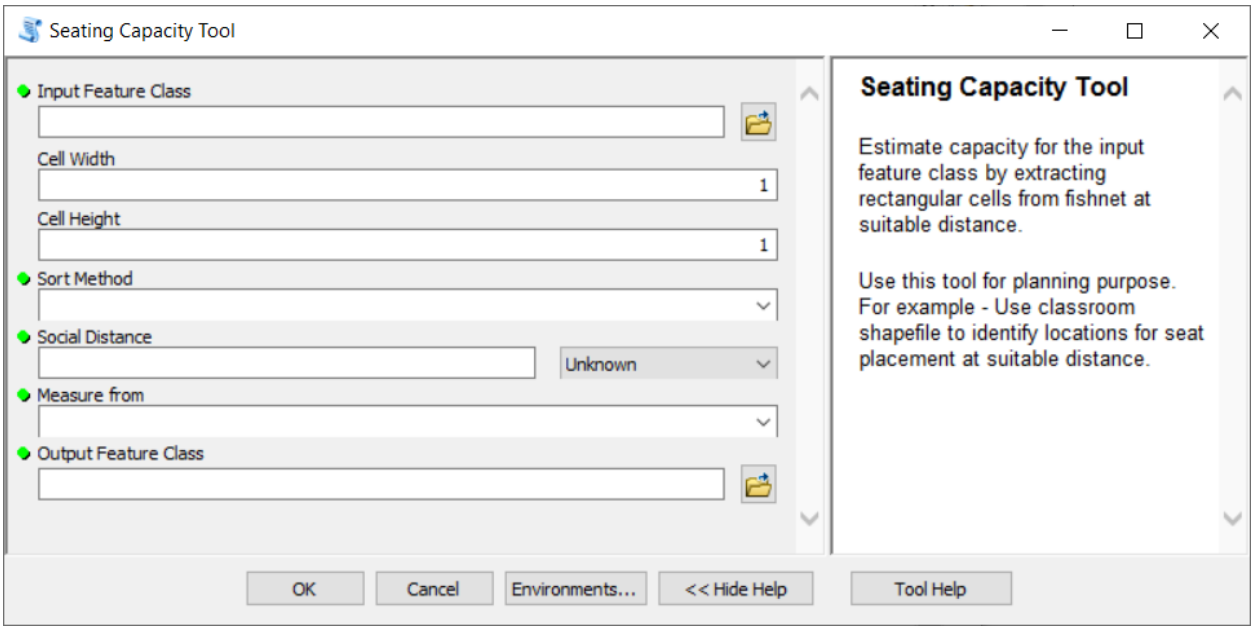
4.3. Syntax

SeatingCap (Input_Feature_Class, Cell_Width, Cell_Height, Sort_Method, Social_Distance, Measure_from, Output_Feature_Class)

Parameter	Explanation	Data Type
Input_Feature_Class	Specifies the extent of the fishnet.	Polygon Feature Class
Cell_Height	Determines the height of each cell of the fishnet.	Double
Cell_Width	Determines the width of each cell of the fishnet.	Double
Sort_Method	Determines the sequence for creating buffer polygons around cells. UL – From upper left corner of the fishnet. UR – From upper right corner of the fishnet. LL – From lower left corner of the fishnet. LR – From lower right corner of the fishnet.	String
Social_Distance	Specifies the distance around the cell that will be buffered.	Linear Unit
Measure_from	Specifies the starting point to apply social distance. CENTER – The social distance is measured from the center of the cell that will be buffered.	String

	BOUNDARY – The social distance is measured from the boundary of the cell that will be buffered.	
Output_Feature_Class	Output Feature Class	Shapefile

4.4. User Interface



5. Tutorial

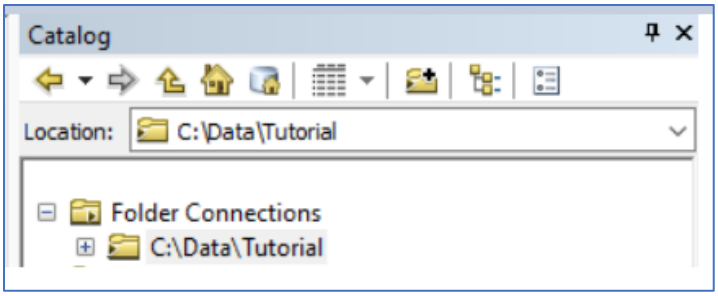
To use this tutorial, you need to have ArcGIS installed with the Seating Capacity Tool added to the toolbox or menu bar as discussed in section 3. Tool script and the tutorial data downloaded on your system. After downloading the data, you can extract it wherever you like. In this exercise, the default location of the data is C:\Data\Tutorial.

5.1. Exercise 1

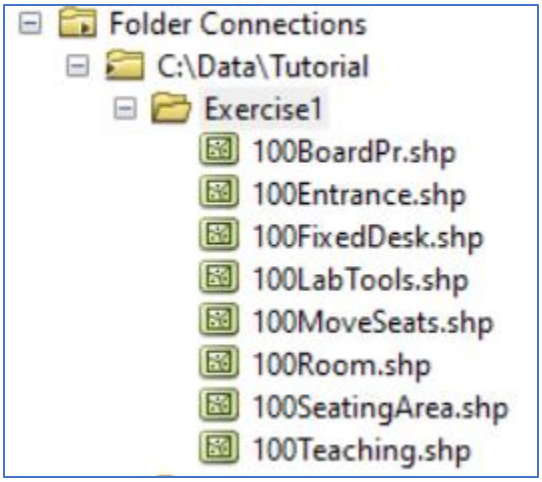
Data Path: C:\Data\Tutorial\Exercise1

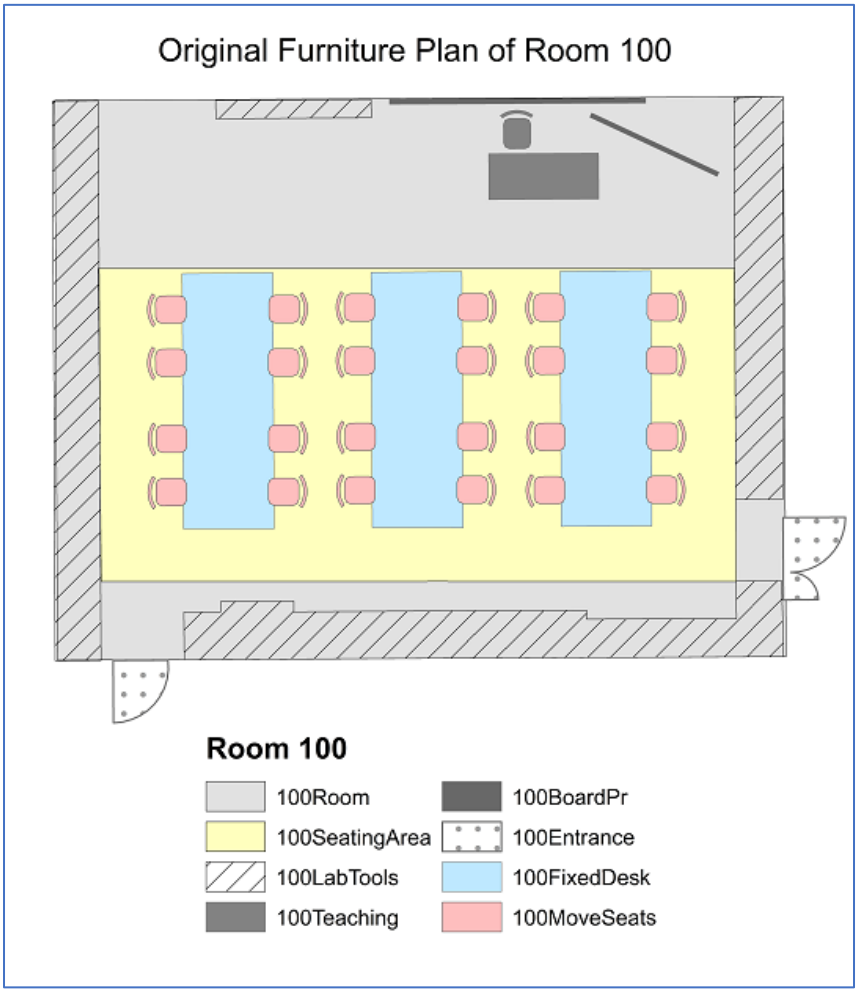
Goal: To estimate seating capacity for room with movable seats and fixed desks.

1. Open **Catalog** Panel in ArcMap and make **Folder Connection** to C:\Data\Tutorial.

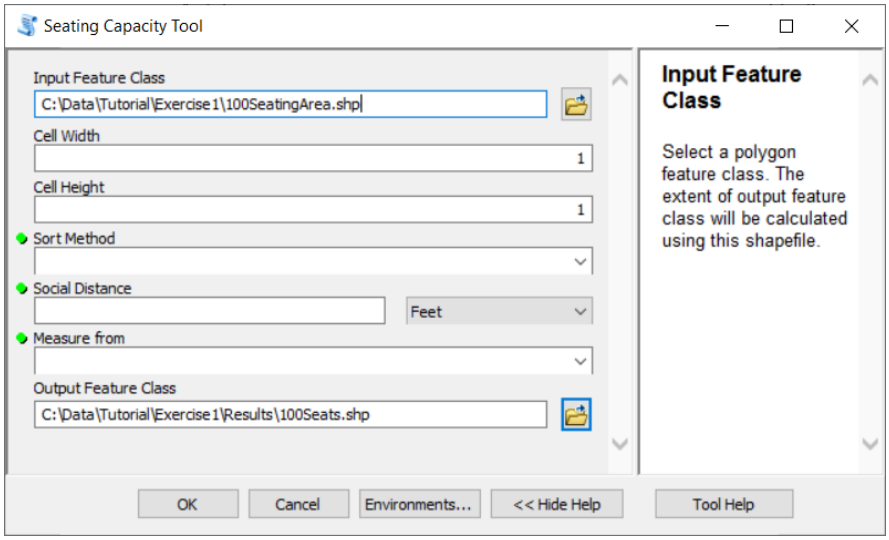


2. Expand C:\Data\Tutorial\Exercise1 and add all available shapefiles to the Data Frame.

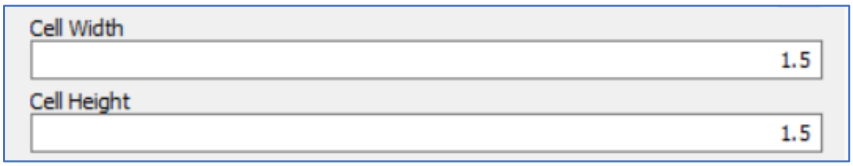




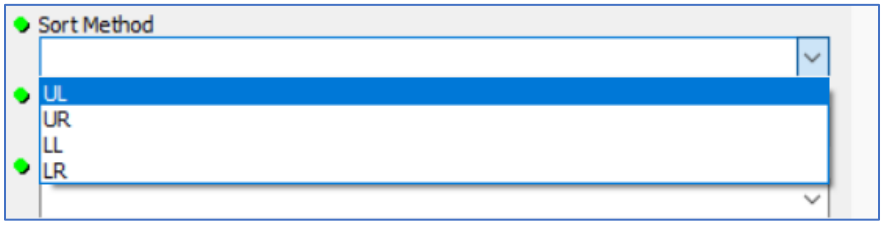
3. Click **Seating Capacity Tool**. Seating Capacity Tool window opens. To select **Input Feature Class** – Browse to the folder location for **100SeatingArea.shp**



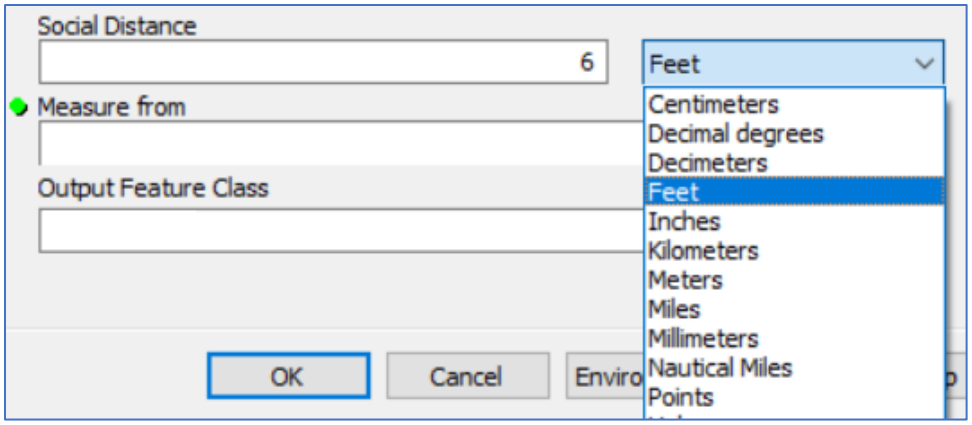
4. The default Cell Width and Cell Height is 1 feet. You can use any dimensions to represent seats in your revised furniture plan. In this exercise, the dimensions for **Cell Width** and **Cell Height** used are **1.5 feet** to represent **100MoveSeats.shp**



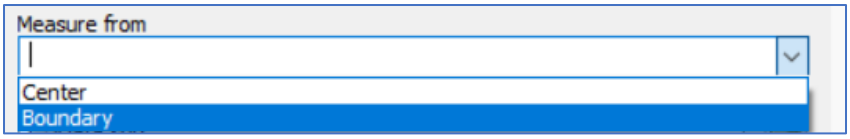
5. Select **Sort Method** from the available list. In this exercise, **UL** – Upper Left Corner of the 100SeatingArea.shp is selected as the starting point for analysis.



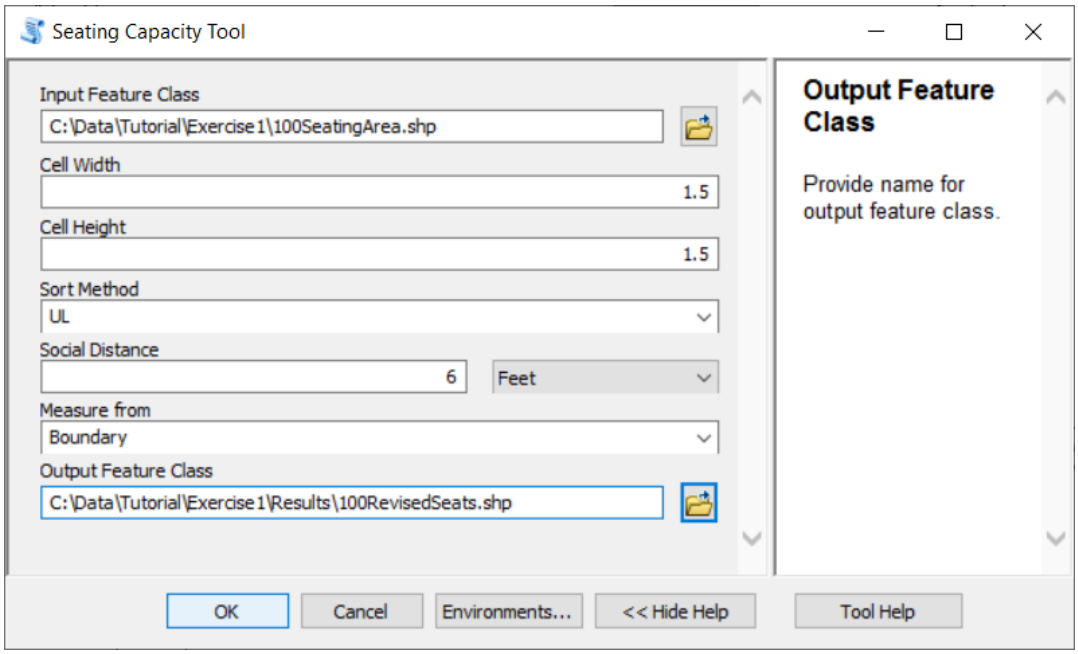
6. Enter **Social Distance** and **unit of measurement**. In this exercise, a social distance of 6 feet is used.



7. Select **Measure from** parameter input from the available list. In this exercise, the value selected is '**Boundary'**.

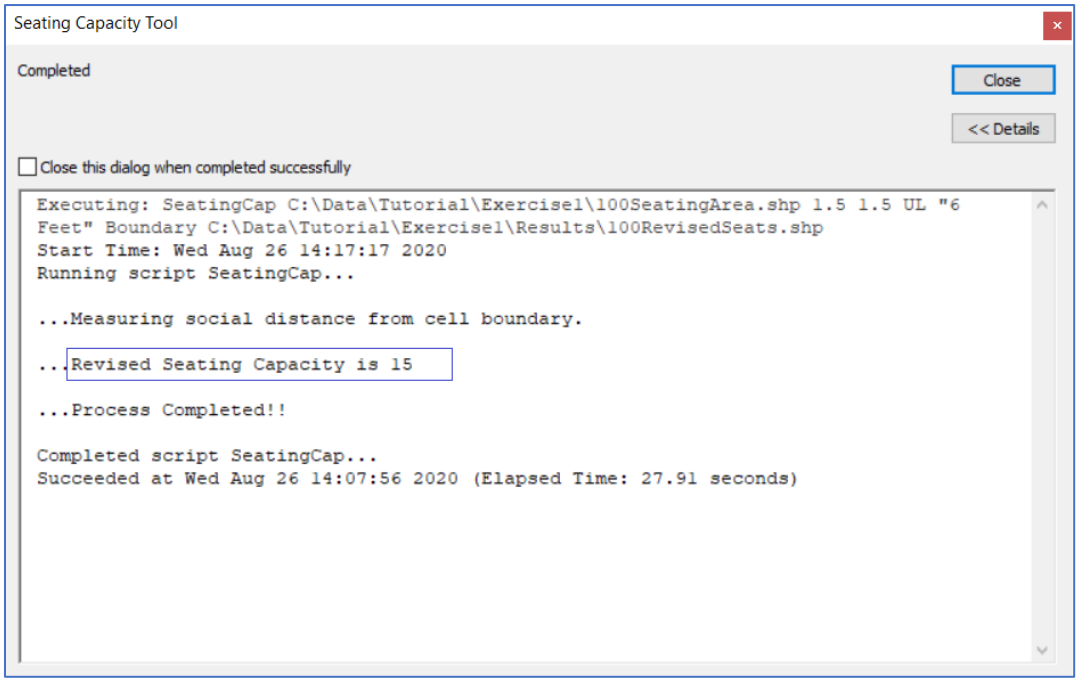


8. Enter name for **Output Feature Class**. In this exercise, the output feature class is named ' **100RevisedSeats.shp** in folder **C:\Data\Tutorial\Exercise1\Results**

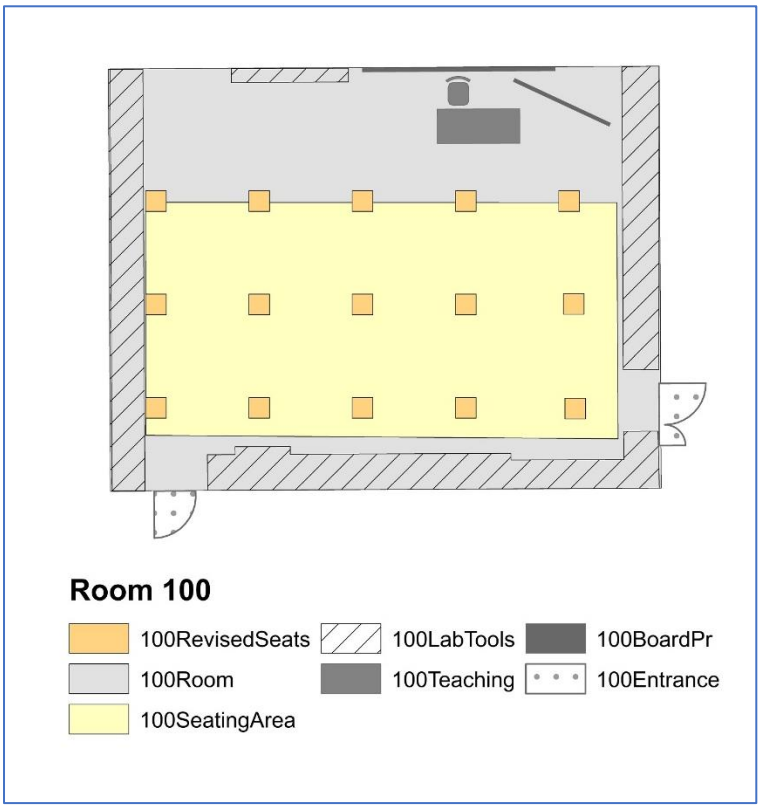


9. Click **OK** button.

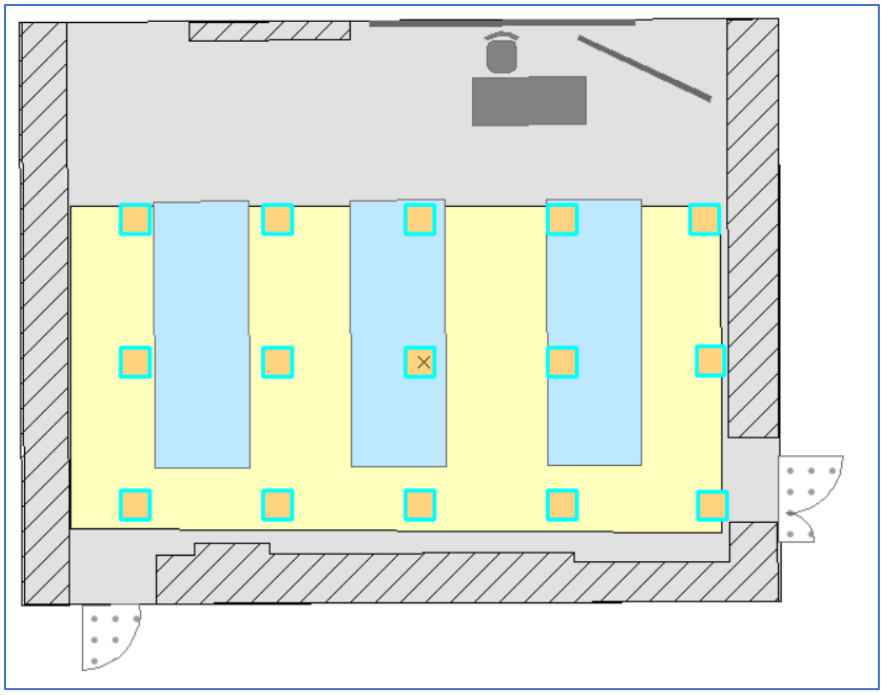
After the tool execution is completed, you will see the **revised seating capacity count** on the execution dialog box.



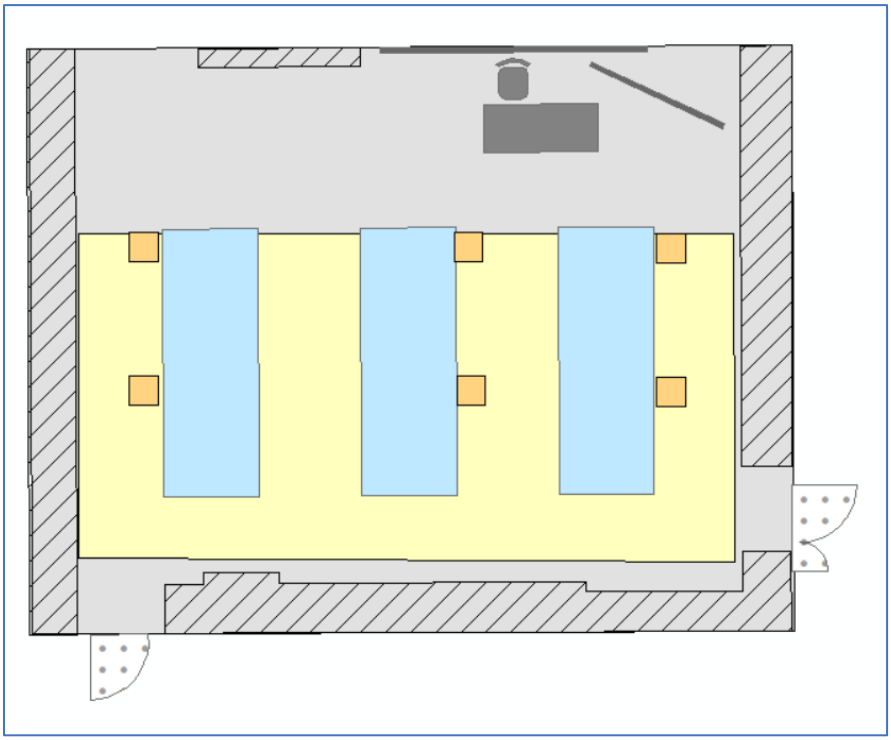
10. In **Catalog Panel**, browse to the folder **C:\Data\Tutorial\Results**. Add **100RevisedSeats.shp** to the Data Frame.



11. Since the desk in room 100 are fixed, we need to move the revised seats to appropriate locations in such a way that the distance between the revised seats are maintained and students can use desk for writing/lab purpose.
12. Click the **Editor Toolbar** button on the **Standard** toolbar to display the **Editor** toolbar. Click **Start Editing**.
13. **Right-Click** 100RevisedSeats.shp, go to **Edit Features** and select **Start Editing**.
14. **Right-Click** 100RevisedSeats.shp, go to **Selection** and click **Select All.**
15. **Move** 100RevisedSeats.shp.



16. You can see that few revised seats do not accessibility to the fixed desks. In this case, you need to select such seats and delete it.



17. Thus, due to fixed desk constraint, the revised seating capacity count changed from 15 to 6.

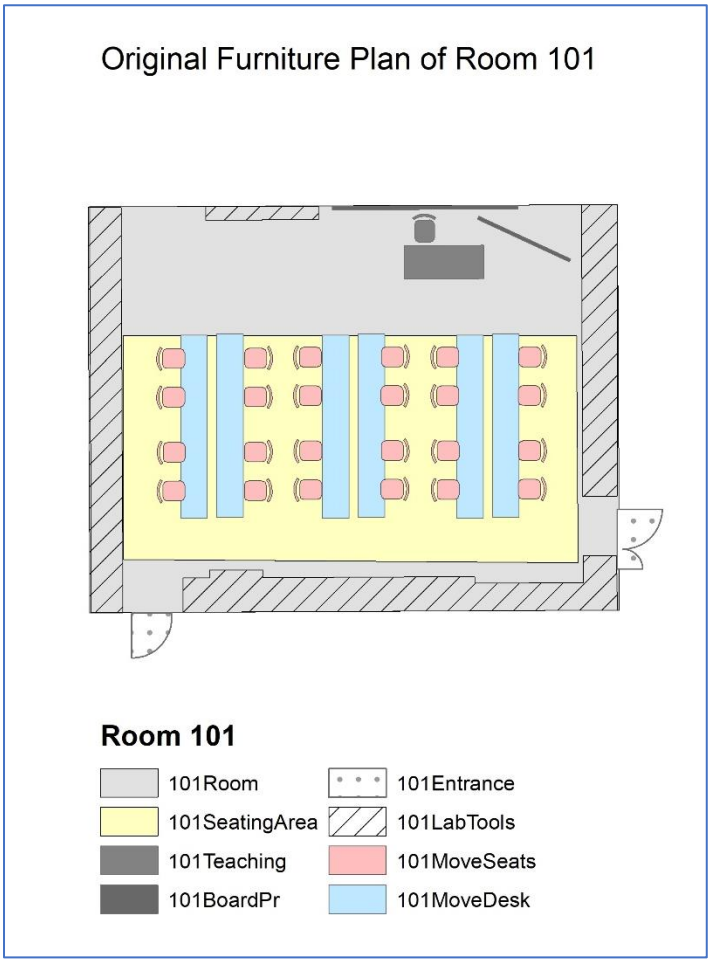
5.2. Exercise 2

Data Path: C:\Data\Tutorial\Exercise2

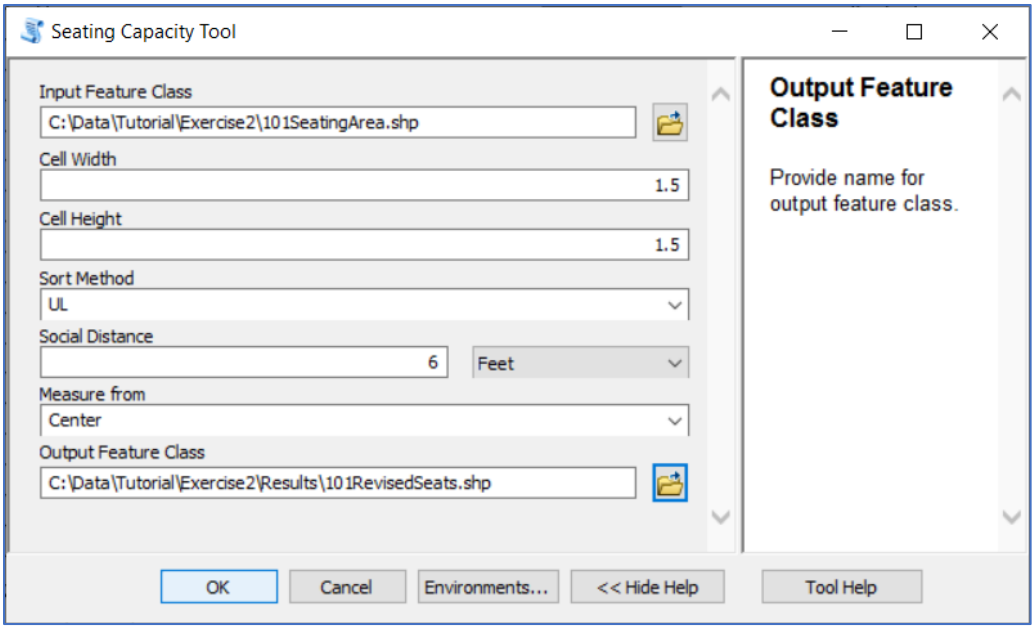
Goal: To estimate seating capacity for room with movable seats and movable desks.

See section 5.1 Exercise 1 for figures/illustrations.

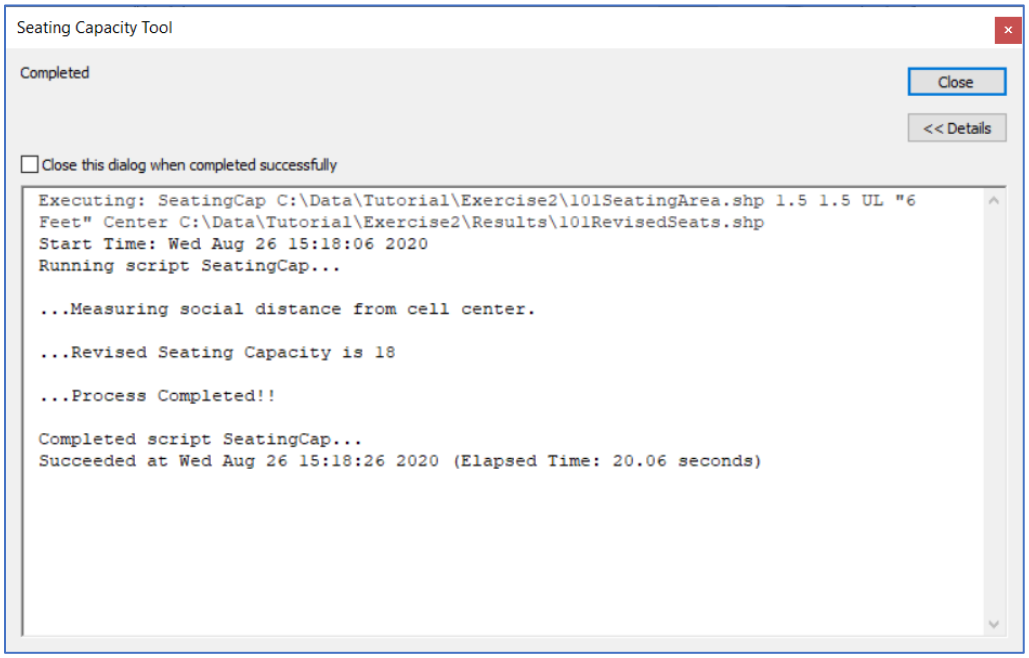
1. Under **Folder Connection**, expand **C:\Data\Tutorial\Exercise2** in **Catalog Panel** and add all available shapefiles to the **Data Frame**.

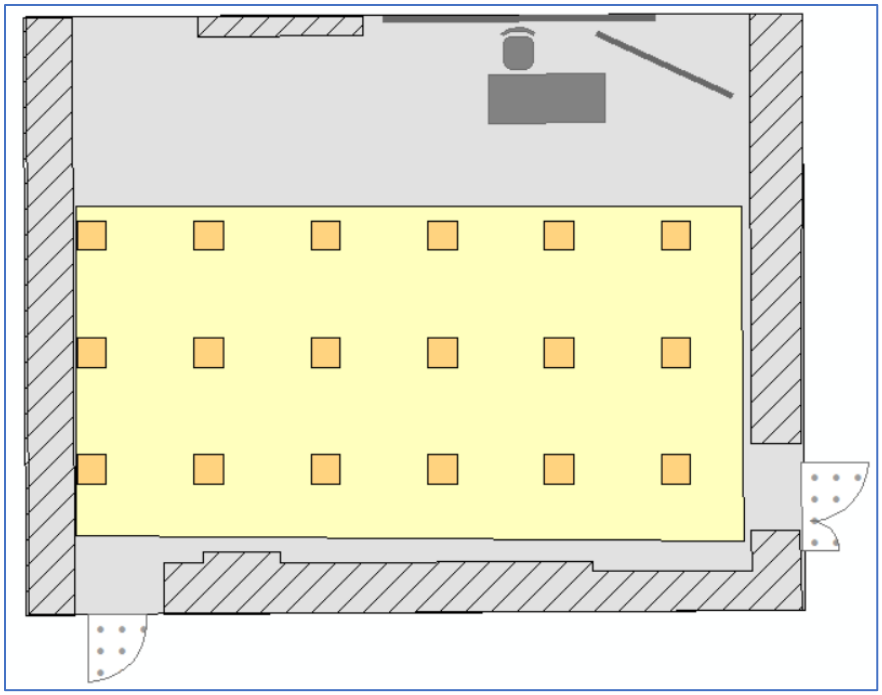


2. Click **Seating Capacity Tool**. Seating Capacity Tool window opens. To select **Input Feature Class** – Browse to the folder location for **101SeatingArea.shp**
3. The default Cell Width and Cell Height is 1 feet. You can use any dimensions to represent seats in your revised furniture plan. In this exercise, the dimensions for **Cell Width** and **Cell Height** used are **1.5 feet** to represent **101MoveSeats.shp**
4. Select **Sort Method** from the available list. In this exercise, **UL** – Upper Left Corner of the 101SeatingArea.shp is selected as the starting point for analysis.
5. Enter **Social Distance** and **unit of measurement**. In this exercise, a social distance of 6 feet is used.
6. Select **Measure from** parameter input from the available list. In this exercise, the value selected is '**Center'**.
7. Enter name for **Output Feature Class**. In this exercise, the output feature class is named ' **101RevisedSeats.shp** in folder **C:\Data\Tutorial\Exercise2\Results**



8. Click **OK** button.





9. Since the desk in room 100 are movable, we can move desk near to the obtained revised seats.
10. Click the **Editor Toolbar** button on the **Standard** toolbar to display the **Editor** toolbar. Click **Start Editing**.
11. **Right-Click** 101MoveDesk.shp, go to **Edit Features** and select **Start Editing**.
12. **Select** features from 101MoveDesk.shp and **Move** to appropriate locations.