

SPORTEVAC USER GUIDE



SportEvac User Guide

Training, Operation and Planning Software for your venue.

Ensure the safety of your visitors...

Developed by:





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Welcome

The SportEvac training system has been designed for your **venue managers, incident command team, and first responders** to enhance their ability to plan, train, and prepare for events such as spectator sports and other mass gatherings utilizing “what-if” scenarios. SportEvac contains a three dimensional (3D) and two dimensional (2D) model of a mid-size, collegiate style stadium called Stadium USA. Within this modeled environment, users can simulate various types of evacuation scenarios and simultaneously inject conditions and constraints as the simulated evacuations are executed.

This training system can be used for:

EVENT PREPAREDNESS AND PLANNING

- Allocating and manage personnel and physical resources in and around a venue
- Aid in enhancing and developing plans (evacuation, crisis communication etc.)
- Importing existing emergency plans, procedures etc.
- Clarifying unified roles and responsibilities
- Conducting sport stadium, arena and track **evacuation** and other emergency plan analyses
- Enhancing interagency coordination and communication

TRAINING

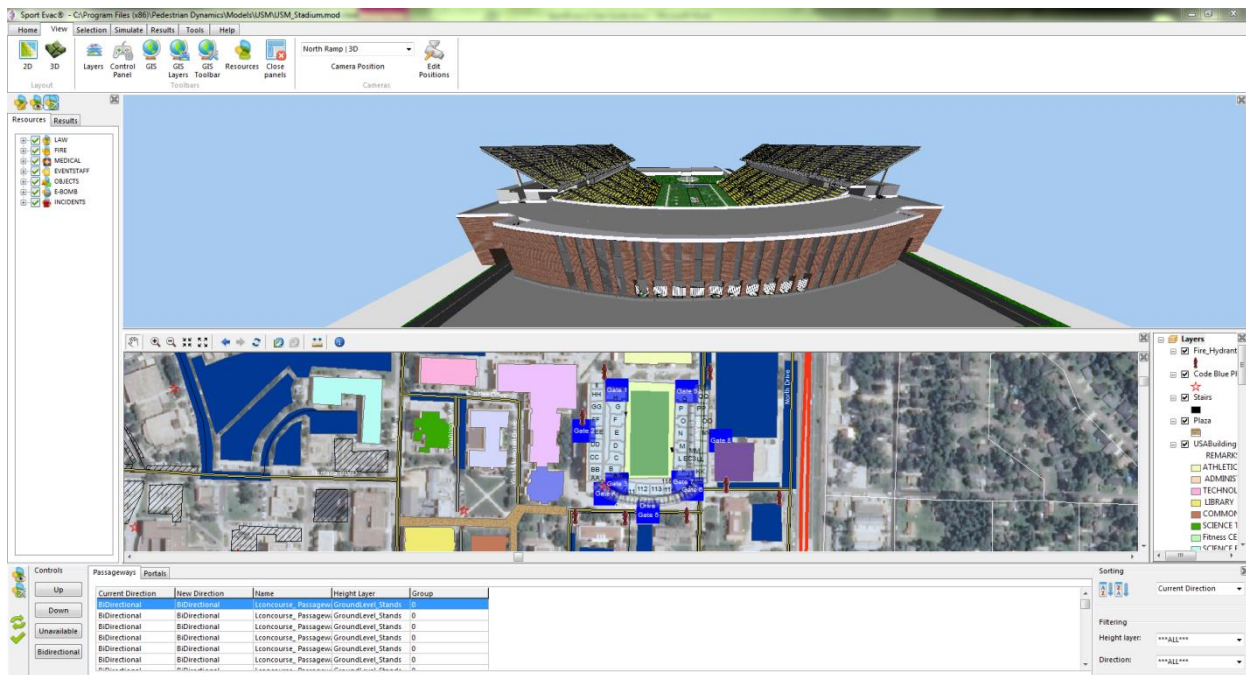
Train responders for weather, fan violence, acts of terrorism, crowd control, accidents and IED attacks. Utilize SportEvac for seminars, workshops, table top exercises and games to train incident command team, supervisors, line staff, etc.

- Create and respond to “what-if” scenarios
- Execute evacuation simulations
- Train personnel specifically for IED attacks utilizing the enclosed Electronic Bomb Card

RESPONSE AND IMPROVEMENT

- Review potential sport safety and security gaps in resources; and
- Identify opportunities for safety and security improvement

User Interface



SportEvac consist of five main windows to support decision making and scenario operations. The Main windows are the **3D View** accompanied by the **Resource Panel**, the **Map View** accompanied by the **Map Layers Window**, and the **Control Panel** window.

- **3D View** (top-center window): The 3D environment of Stadium USA; allows for visualization of assets and simulated events
- **Resource Panel** (left window): A editable list of assets and updated resources as they are added/deleted from the 3D view
- **Map View** (bottom-center window): 2D GIS map of the infrastructure around Stadium USA; allows the user to see assets placed in the 3D view, identify possible evacuation routes, measure distances and areas, and identify critical infrastructure in the area.
Note: The 2D GIS map is only available with a valid ESRI ArcGIS license installed! Without this license the Map View panel is grayed and will not display the infrastructure around Stadium USA.
- **Map Layers Window** (center right): A tool where individual map layers can be turned on and off
- **Control Panel** (bottom window): Allows user to interact with simulated aspects of the simulation, e.g. closing/opening portals or doors

Note: All windows may be closed via the small x in the upper right corner of each window



3D View Navigation

Navigation in the 3D View can be accomplished with mouse and keyboard.

Mouse Commands

Left Mouse Button	Pans the view
Right Mouse Button	Pivots the view
Left and Right Mouse Button	Forward and backward movement
Left Mouse Button and Scroll Wheel	Adjusts the yaw
Scroll Wheel	2D view zoom

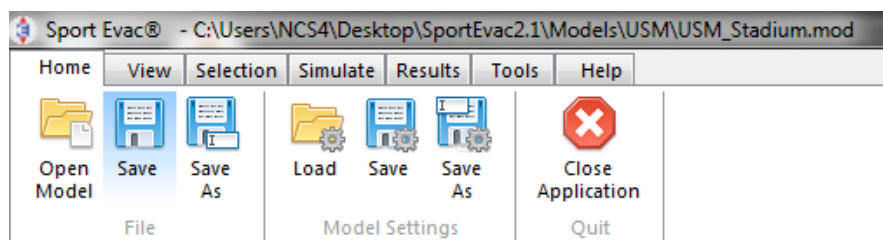
Key Board Commands

W	Movement Forward
A	Left
S	Movement Backward
D	Right
Z	Movement up along the Z-axis
X,C	Movement down along the Z-axis
Arrow Key Up	Pivot Up
Arrow Key Down	Pivot Down
Arrow Key Left	Pivot Left
Arrow Key Right	Pivot Right
Space Bar	Toggles the ability to control the view using keyboard shortcuts
Ctrl + selected resource + mouse	User can move selected resource by moving the mouse left, right, up and down
Ctrl + Shift + selected resource + mouse	User can move selected resource vertically by moving the mouse up and down

Menu Ribbon

The menu ribbon located at the top of the user interface contains several tabs. Home, View, Selection, Simulate, Results, Tools and Help tabs offer various tools to aid the user.

Home



The Home tab allows the user to open and save a model. Here, they can also save the availability of passageways and portals, and reopen that particular configuration. Finally, the user can close the application from the Home menu.

File

- Open Model: Dialogue to open 3D models
- Save: Allows the user to overwrite the current model with updated resources, such as the placement of IDEs or resources.
- Save As: Allows the user to save a new model with updated resources, thus also keeping the old one unchanged.

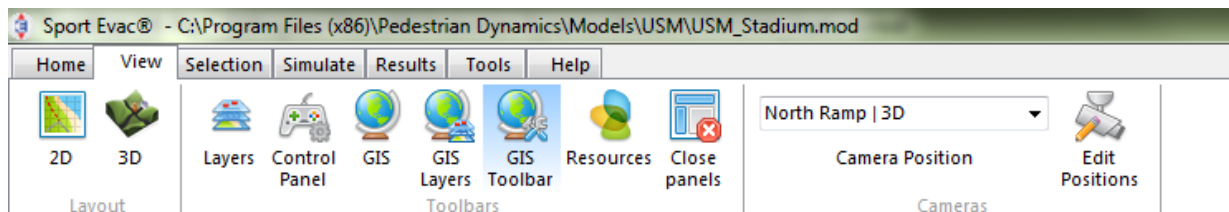
Settings

- Load: Allows for the use of previously generated settings.
- Save: Allows the user to save current settings. If settings have not been loaded, prompts the user to create a new settings file.
- Save As: Allows the user to create new settings file.

Quit

- Close Application: Will close SportEvac and exit the application.

View



The View tab allows the user to manipulate what is seen on screen. This includes the enabling and disabling the panels as well as viewing predefined camera views. It also allows the user to add their own customized camera views.

Layout

- 2D: Displays top down 2D view of Stadium USA, similar to architecture illustrations.
- 3D: Displays a 3D view of the Stadium USA model. (Default)

Toolbars

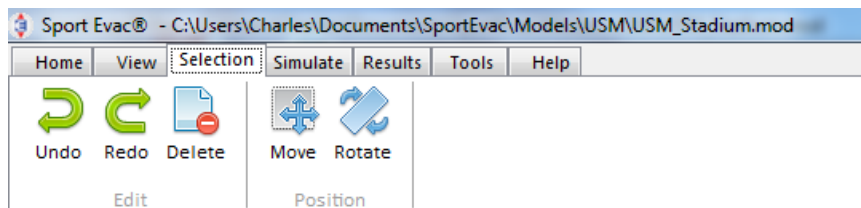
- Layers: Displays Height Layer visibility tools for 2D and 3D model views. The Layers tool is displayed on the right side of the 2D or 3D model view. This will allow the user to focus visibility on a single portion of the model. To display only one layer, select the layer's name in the list then press "Show active". To display all again, press "Show all".
- Control Panel: Displays the Control Panel. The control panel is used to view the status of passageways/portals and to change their direction.
- GIS: Displays GIS map.
- GIS Layers: Displays GIS Layers control. This allows the user to control what GIS resources are illustrated on the GIS map.
- GIS Toolbar: Displays GIS functionality tools.
- Resources: Displays the Resources panel. The Resources panel allows the user to place specific resources and/or IEDs to the model.
- Close Panels: This option will close all panels except 3D view.

Cameras

- Camera Position: A tool to rapidly select predefined list of various camera views.
- Edit Positions: Allows for the editing of existing views and creation of new views.

Note: When adding/editing a camera view, the model must be saved for those views to exist the next time the model is opened.

Selection



The Selection Tab provides tools to manipulate resources in the 3D environment.

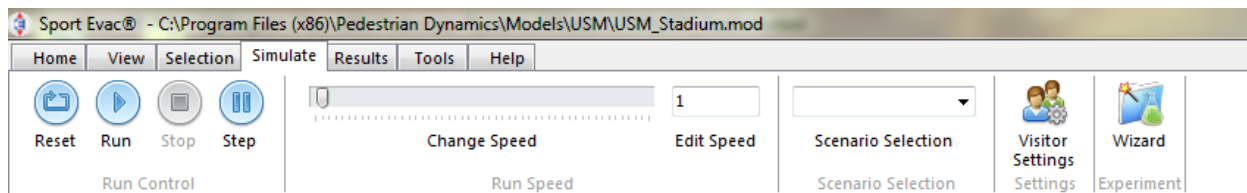
Edit

- Undo: Undoes the moving of a resource
- Redo: Redoes the moving of a resource
- Delete: Removes selected resource from 3D view as well as from Resources tree.

Position

- Move: Provides tool to change the location of a resource to a specific XYZ coordinate.
- Rotate: Provides tool to rotate the direction of the currently selected resource.

Simulate



The Simulate tab provides all of the necessary controls to select and run a simulation, edit seating fill rates, and run experiments.

Run Control

- Reset: Stops and resets the running simulation.
- Run: Starts the simulation based on the currently selected scenario or continues an already involved simulation.
- Stop: Pauses the currently running simulation.
- Step: Pauses a running simulation and executes the next step.



Run Speed

The speed of the simulation is based on the number of seconds of simulation time executed in one real time second. The user can edit the run speed in two ways:

- Change Speed: Drag bar to increase or decrease speed of the simulation.
- Edit Speed: Directly enter numerical value of desired simulation speed.

Note: The simulation will only run as fast as the hardware allows it. The simulation may never reach the ratio that was set.

Settings

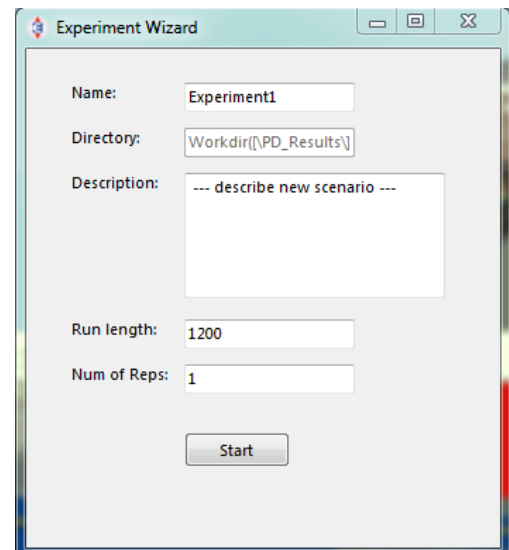
- Scenario Selection: Select from predefined scenarios. All scenarios are completed according to the fill rates.
 - Ingress – An empty stadium is. People enter and sit.
 - Egress – A full stadium is emptied. Depending on where they are seated, spectators head for specific exits.
 - Evacuation – A full stadium is emptied. Spectators exit through the fastest route
 - Fill Stadium –A stadium is immediately filled.
 - Fire Partial – A full stadium evacuates according to a fire route.
- Visitor Settings: Brings up a tool to view current stand statistics and to edit seating capacity per section of the stadium. On the right is a table with various data points. Fill Rate (%) can be edited by using the Fill Rate update button on the right.
 - Name: Name of stand section
 - Capacity: Total capacity available.
 - Current #: Current total of agents seated in the section
 - Full (%): Percentage of total capacity
 - Fill Rate (%): Percentage of total capacity to be utilized.
 - Fill Rate Update: Offers a field where the user can input a new Fill Rate for the currently selected stand section.
 - Sorting: This will sort the table based on selected criteria, e.g. Name, Capacity, Current #.

Experiment

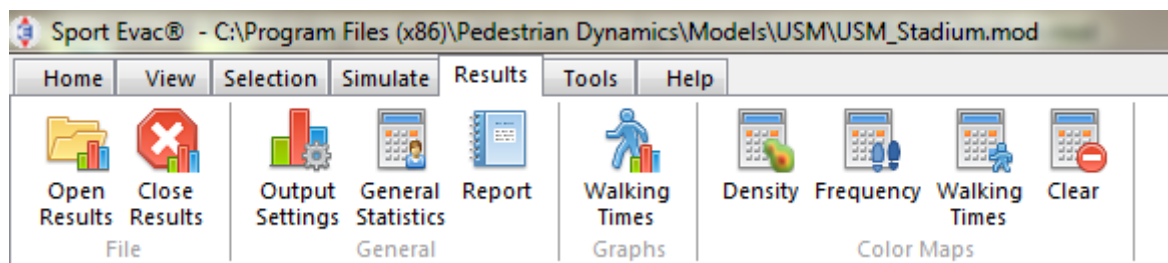
An experiment is simply a simulation whose output has been saved and can be analyzed and replayed. To start an experiment, press the “Wizard” button. Fill out the fields and then press Start.

- Name: The name of the experiment.
- Directory: Where the results will be stored.
- Description: A short description of the current experiment.
- Run length: How long the simulation should run in seconds. 1200 seconds is 20 minutes.
- Num of Reps: How many times the experiment will run. This is useful as each repetition will be different.

The simulation will then begin and be saved. You can then import that data and analyze it in the Results tab.

A screenshot of the "Experiment Wizard" dialog box. The dialog has a title bar with a close button. It contains several input fields: "Name" with the value "Experiment1", "Directory" with the value "Workdir[\\PD_Results\\]", "Description" with a text area containing "... describe new scenario ...", "Run length" with the value "1200", and "Num of Reps" with the value "1". A "Start" button is located at the bottom of the dialog.

Results



The Results tab allows the user to interact with and analyze data generated by the Experiment Wizard. From this tab, users can generate reports that contain average walking times of agents and view density maps from the simulation. This data can be printed or exported to PDF for use later.

File

- Open Results: Loads the data folder from the Experiment. Also creates a new Result Player menu.
- Close Results: Closes any open experiment results.

General

- General Statistics: Displays basic information about the experiment such as the scenario name, the run date, agent totals, number of agents per location, number of agents travelling from one location to another, and travel times.
- Report: Generates a cohesive report from various analytic tools. This is discussed more thoroughly later.

Graphs

- Walking times: Allows the user to generate graphs that show the number of agents walking along a particular route over time.

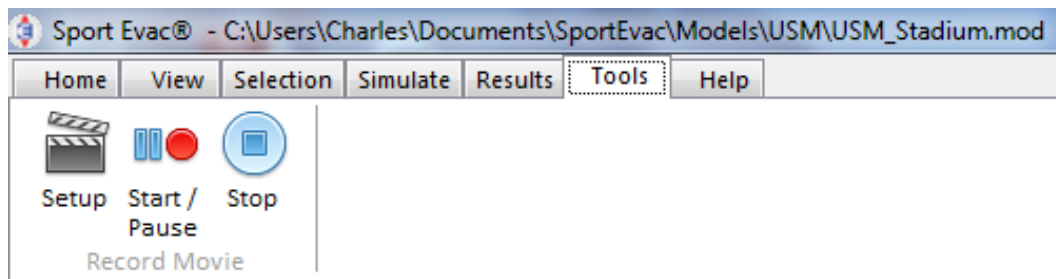
Color Maps

These place a layer on top of the model that shows various data.

- Density: Shows how tightly the agents were packed together over the course of the simulation.
- Frequency: Shows how often a particular path was taken, how many footprints walked on that spot.
- Walking Times: Shows how long it took each agent to exit the model.
- Clear: Removes any of the above layers.

Note: For more detailed information about the Results, see the "Analysis of Results" section.

Tools



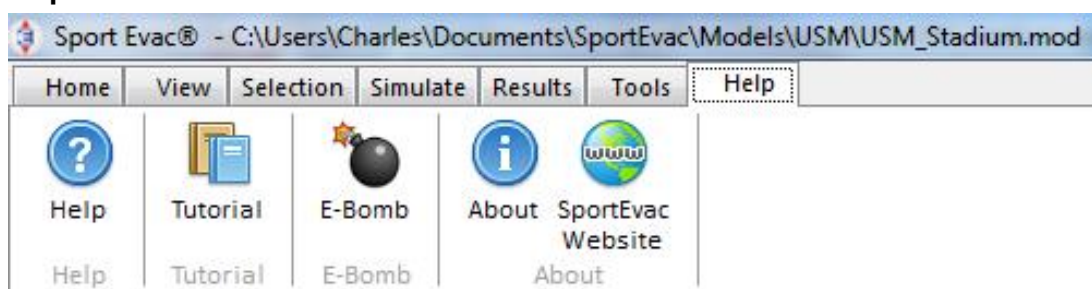
Record Movie

SportEvac allows the user to record a movie of the simulation.

- Setup – Allows the user to set the frames per second, the frame interval, and the location where the recording will be stored.
- Start/Pause – Starts and pauses the recording. When recording, the top of the window will turn red. When paused, it will turn a light blue.
- Stop – Stops the recording and stores the film.

Note: If there was a simulation running when the recording is stopped, the simulation will also be stopped. Continue it by pressing Run in the View menu.

Help

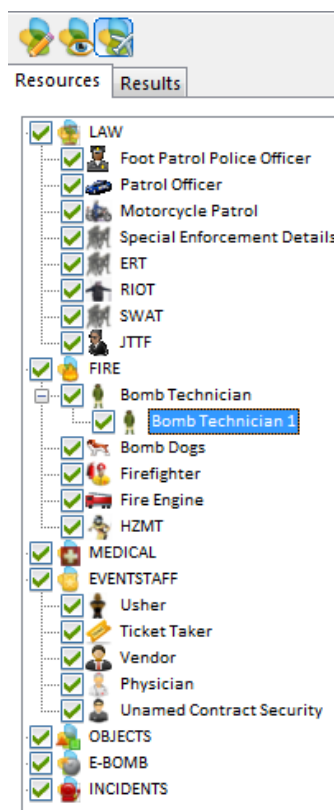


The Help tab contains useful documentation and links about SportEvac.

- Help: [Pedestrian Dynamic's Help](#).
- Tutorial: [Pedestrian Dynamic's Tutorial](#).
- E-Bomb: Launches the Electronic Bomb Card program in a separate window.
- About: Pop-up with useful information about the installation of SportEvac
- SportEvac Website: [Launches browser window to http://www.sportevac.com/](http://www.sportevac.com/) which redirects to <http://www.stadiumsimulation.com>

3D Resources

The Resources panel allows the user the option to add individual resources, fly-to the resource from anywhere in SportEvac, and edit the resource's attributes.





Adding Resources

Available resources are separated into groups such as “Fire” and “E-Bomb”. Pressing the “+” next to the type of group will cause more specific resource types to appear. To add the resource to the model, simply select the specific resource and drag it onto the 3D window.

When adding a resource, a 3D representation of the resource is placed into the model. An icon will also be added to the map view.

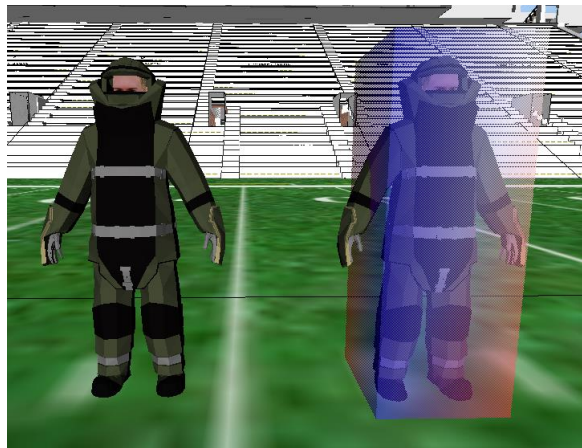
Note: It is not possible to add generic resource types to the model.

Viewing/“Flying-to” Resources

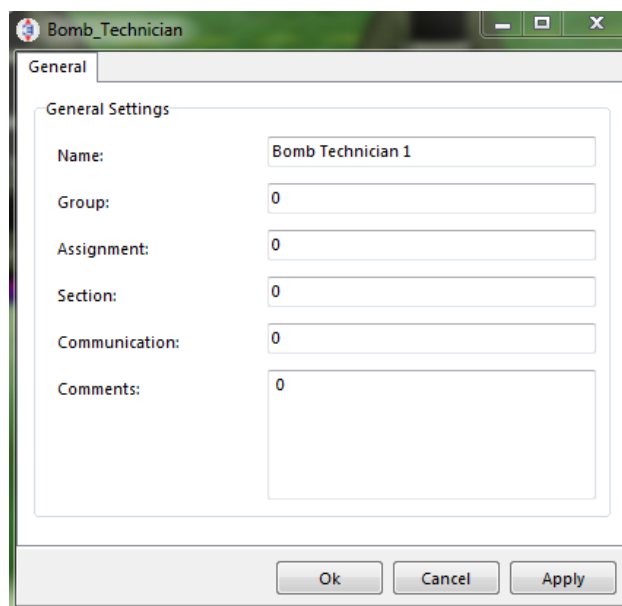
SportEvac 2 allows a user to quickly find and view placed resources. Begin by selecting the resource in the resource list. Next, press the  “Fly-to” button. The camera will then “fly” you to the placed resource. If you wish to immediately view it, you may instead push the  “View” button.


Editing Placed Resources

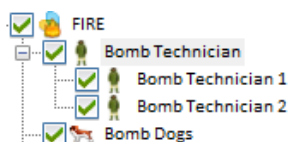
To edit a resource’s attributes, such as name, group, assignment, section, etc., first select the object. You can do this by clicking on the resource which will then become highlighted. An example of an unselected (left) and selected (right) Bomb Technician is shown below.



Then double-click on the resource. The resource attributes window will now appear. After making the changes you want, press “Ok”.



You can also edit resources from the resource menu itself. After adding resources, you'll see another "+" appear next to the specific resource types. By clicking the "+", you'll be able to see a list of all that have been added of that type. You can then select the added resource and press the  "Edit" button.



Moving Resources

To move a resource, first select the item by clicking on it in the model. To move the object along its X-Y axis, hold the "Ctrl" key down while dragging the item. Release both mouse and key when finished. To move the object vertically, repeat the above but also hold the "Shift" key.

Removing Resources

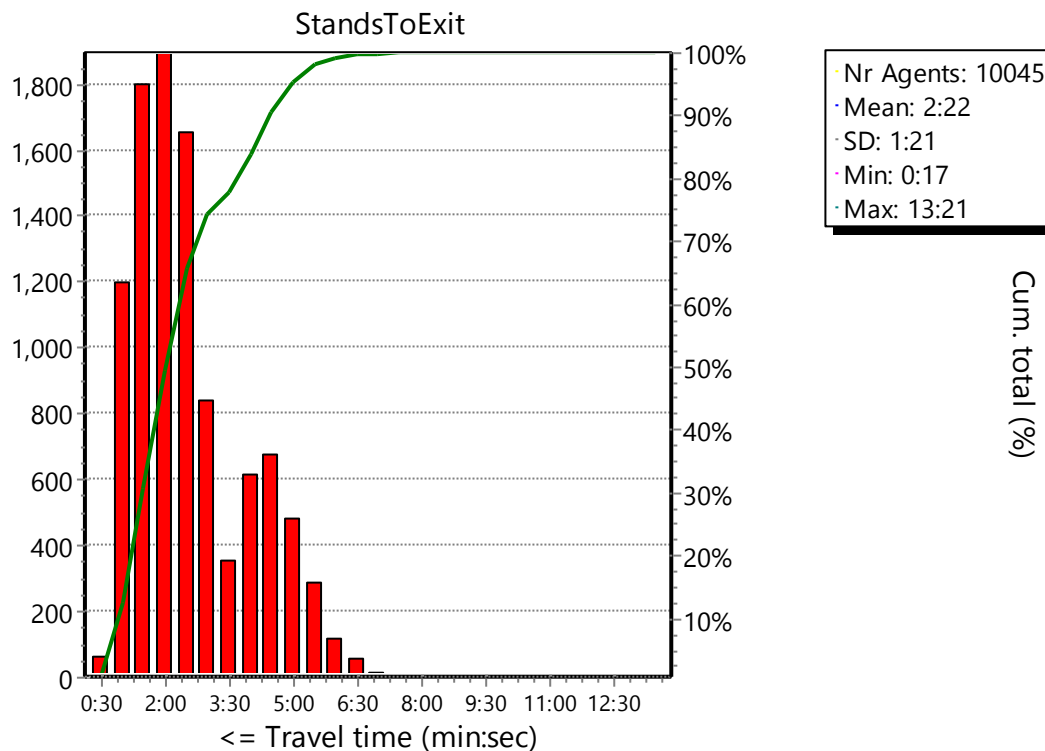
To remove a resource from the model, first select the resource you wish to remove. You may do this from either the model or the resource list. Then, press the Delete key on your keyboard.

Analysis of Results

In this section, we'll detail how to use the analysis tools found in the Results tab.

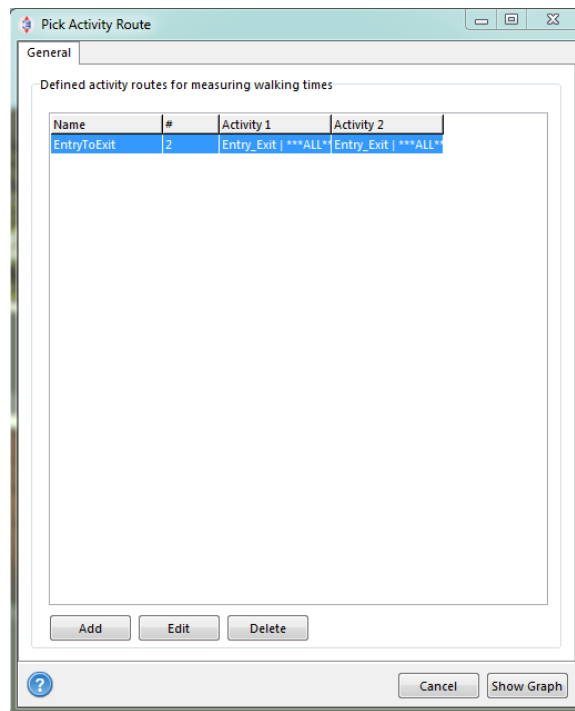
Note: To use any of these tools, you must first run an experiment and then load the results into SportEvac. See the appropriate sections earlier for more information.

Walking times



Walking times displays a graph of the time it took for agents to leave one location and go to another. Above, we see how long it took all agents to leave their seats in the stands and exit. This can be drilled down to a specific stand to the any exit or any stand to a particular exit or any combination therein.

When you first open the dialog, you'll see a window like the one below.



You'll see that there's a predefined route already added. If you click "Show Graph" at the bottom of the window, you'll see an empty graph. We'll explain why shortly.

By clicking on the "Edit" button, you'll bring up a dialog to edit the route's settings. You'll see a place for a name, the interval length, and the max number of intervals for this particular graph. You can edit or leave the defaults as is, but depending on the activities you're analyzing choosing a better name might be wise.

The meat of this window is the next section where you can add and edit the routes. There are eight different types of activity locations built into SportEvac, but only two are currently utilized: "Entry_Exit" and "Stands". These are the only two activities worth using.

If we skip down the Resulting Activity list, we'll see two activities already placed. You can think of these as a list of activities that the agent will do in order over the course of the simulation. In this case, we're looking for agents that enter and then exit. However, there is no scenario that calls for the agents to enter and then exit; they either enter and go to their seats or leave their seats and exit. For this reason, the empty graph is shown as there are no agents that match this set of activities.

In order to get some actual graphs generated, we'll need to set the list to one that will match some of the agents. If you have an entering scenario's results loaded (i.e., INGRESS), select the bottom of the two. If you have an exiting scenario's results loaded (EGRESS, EVACUATION, or FIREPARTIAL), select the top. Now, select "Stands" from the above activity type list. When you do so, the next two dropdowns change.

Add/Edit Activity Route

Select Activity type: Stands

Select Activity group: ***ALL***

Resulting Activity (ID;Type; Group;Name):

Use arrival time:

Resulting Activity list:

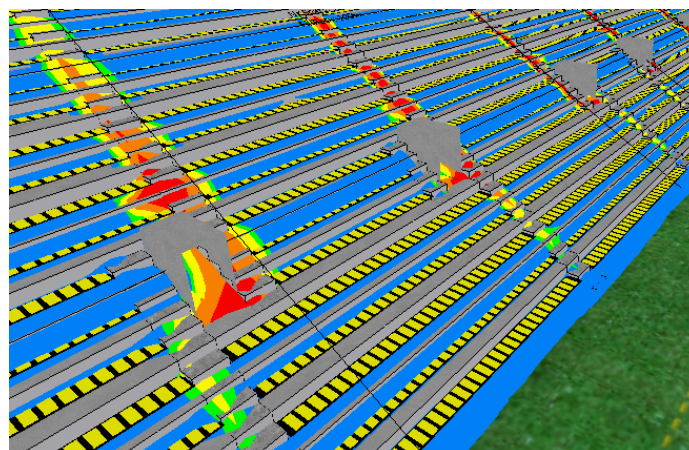
ID	Type	Group	Name	ArrivalT
-	Entry_Exit	***ALL***	***All of this Type & 0	0
-	Entry_Exit	***ALL***	***All of this Type & 0	0

Buttons: Add, Update, Delete, Insert

You can either select a particular group or keep "***ALL***" selected. In the next one, you're able to select a particular stand or all as well. After making your choices, click the "Update" button to the right. Then click "Apply" at the bottom.

The graph has now been added, and you can view it by pressing "Show Graph". To add more graphs, click the "Add" button and follow the above steps. You can add an unlimited amount of graphs.


Color Maps

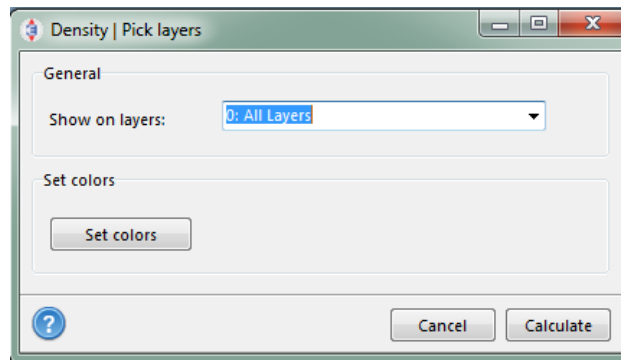


Depending on the map selected, color maps can be used to visualize agent traffic. Density maps can be used to see how compressed agents are while frequency maps display how much a path is used.

Note: Unless the user is wishing to look at the stadium as a whole, it's advantageous to analyze one layer at a time.

Density Maps

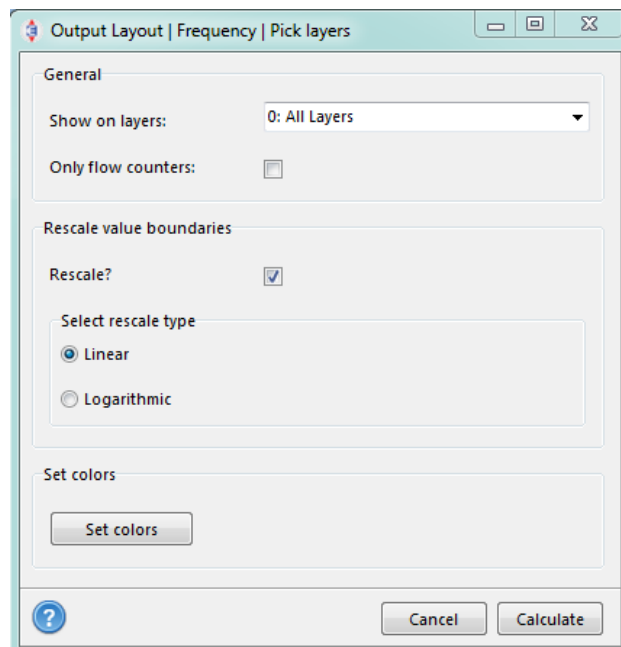
Begin by choosing the layer you wish to analyze. Using the “Layers” toolbar under the “View” menu, show only it. Remember the name of the layer. Under the “Results” toolbar, select the  “Density” button. The Density select dialog appears.



In the dropdown, select the layer you selected earlier and press “Calculate”. SportEvac will determine the density of agents and visualize it.

Frequency Maps

The steps to generate a Frequency Map are similar to those of the Density Map. With a frequency map, you can choose to rescale the values based on a linear or logarithmic scale.




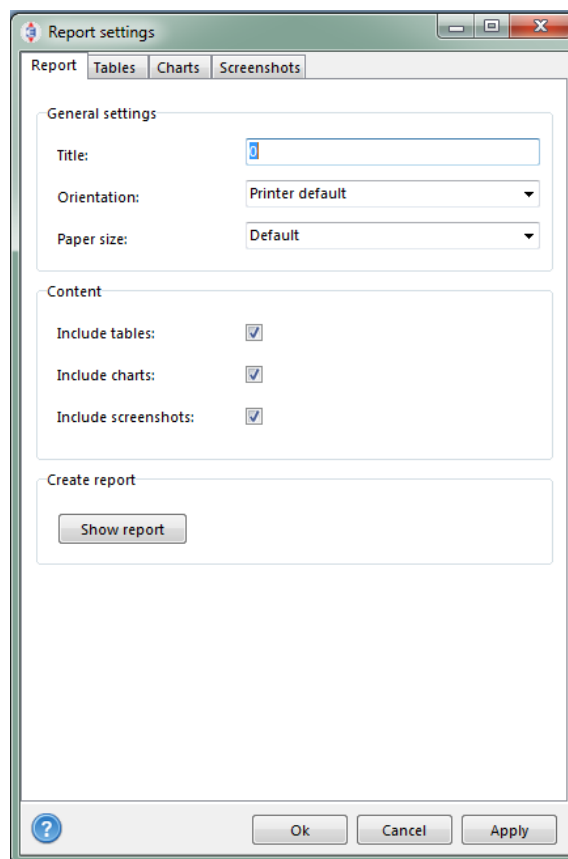
Report

Report Settings

All of the analysis tools culminate together into one cohesive document: the Report. The Report contains all of the data from “General Settings”, all the graphs created in “Walking Times”, and any screenshots you create. Of course, you can elect to include any and all of these.

Note: If you are going to include “Walking Times” graphs, create those first. Then return here.

To begin, press the  “Report” button in the “Results” menu. You’ll see the “Report Settings” dialog box appear.



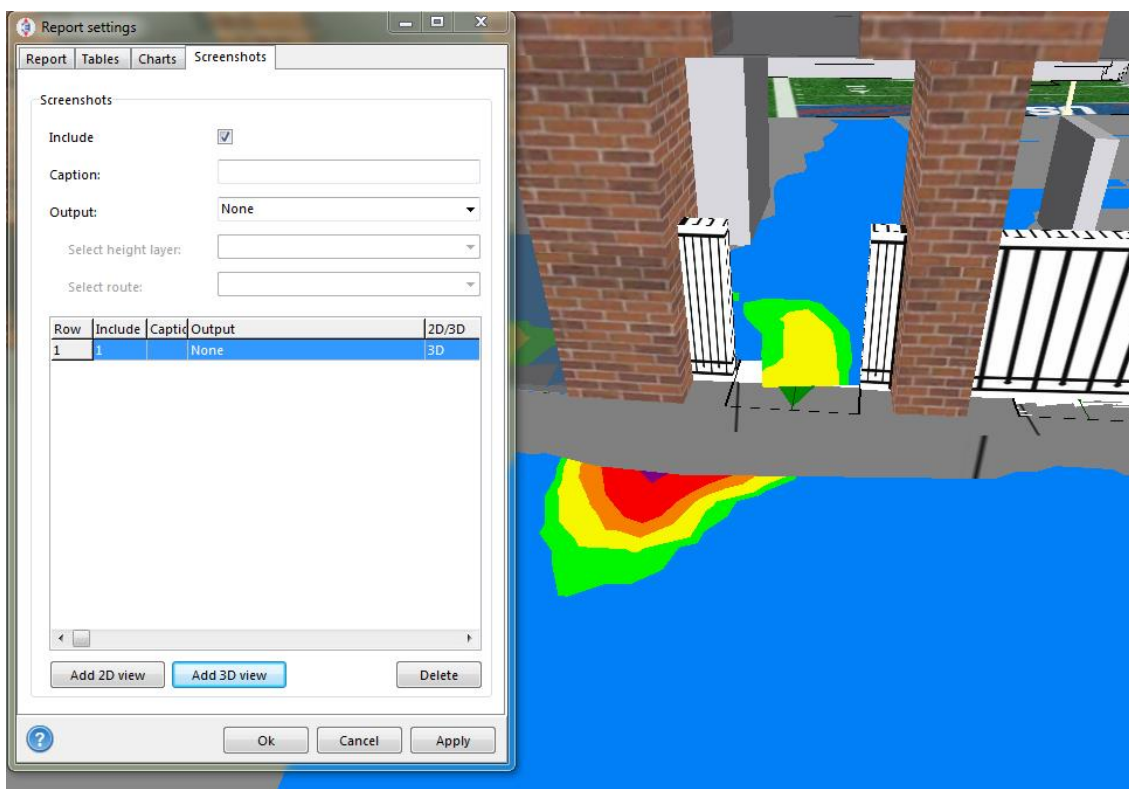
Some default settings are already set. You can change these to fit your needs. We recommend you change the Orientation to “Landscape” and set the Paper size to “Letter”.

Many of the tabs here do not require editing as they’re either generated automatically or created elsewhere; you can safely ignore the “Tables” and “Charts” tabs. Instead, we’ll begin in the Screenshots tab.

Screenshots

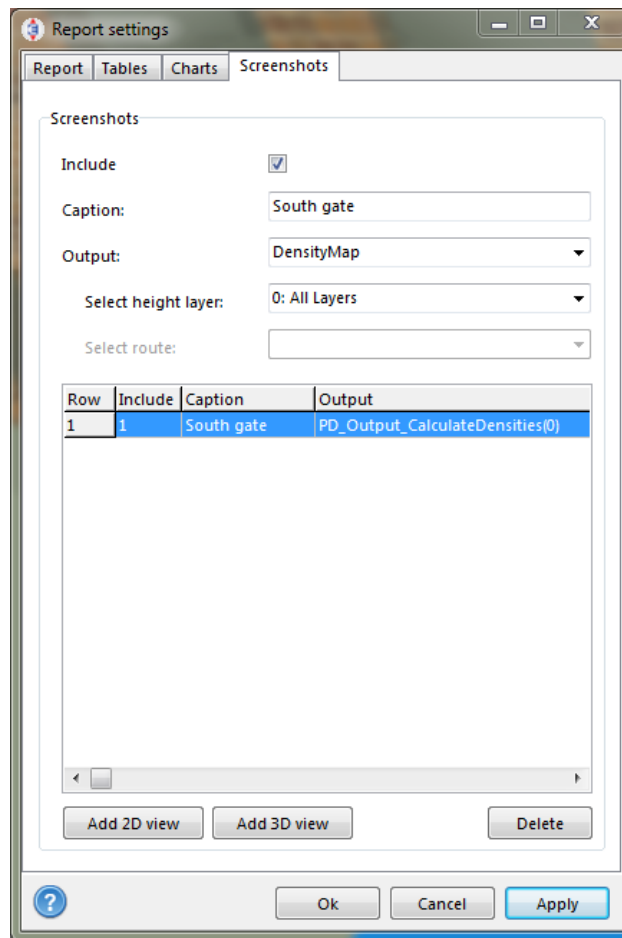
First make sure that all layers are shown. See the “View” section under the “Menu Ribbon” of this manual. Next, generate a color map with the layers set to “O: All Layers”. Now position the 2D or 3D view to the location you wish to take a screenshot of. After doing so, reopen the “Report settings” dialog box by clicking “Report” on the “Results” menu and navigate to the “Screenshots” tab.

Depending on the type of view you have open, click either “Add 2D view” or “Add 3D view”. A new row will appear in the list and a few options above will become available for editing.



Note: Because this is a 3D view, we selected the “Add 3D view” button. If we had clicked the “Add 2D view” button, we would get an error saying “No 2D layout open or selected.”

We’ll now add a caption and select “DensityMap” for the “Output:” box because that’s the kind of color map we generated. Where it says “Select height layer”, we’ll select “O: All Layers”. Click “Apply” at the bottom of the window.



We can continue adding as many screenshots as we like this way.

Generating the Report

Once we are ready to generate the report, we make sure the “Report” tab is selected then press the “Show report” button. A series of windows and progress bars will appear before the final report window is displayed. From here, you can view, save, and print the generated report.

Note: Pressing “Ok” or “Apply” on the “Report settings” window will not generate a report but rather save these settings to be used later.

Map Tools

Users can pan back and forth using the hand icon located on the Map Viewer Toolbar and zoom in and out of different map views using the + and - icons. Additionally, users can zoom in and out by using the mouse scroll wheel.



The forward and backward buttons will return to and from different views of the Map Viewer.

Feature Information Tool: This tool provides detailed information about specific map features. Below is an example of such information.

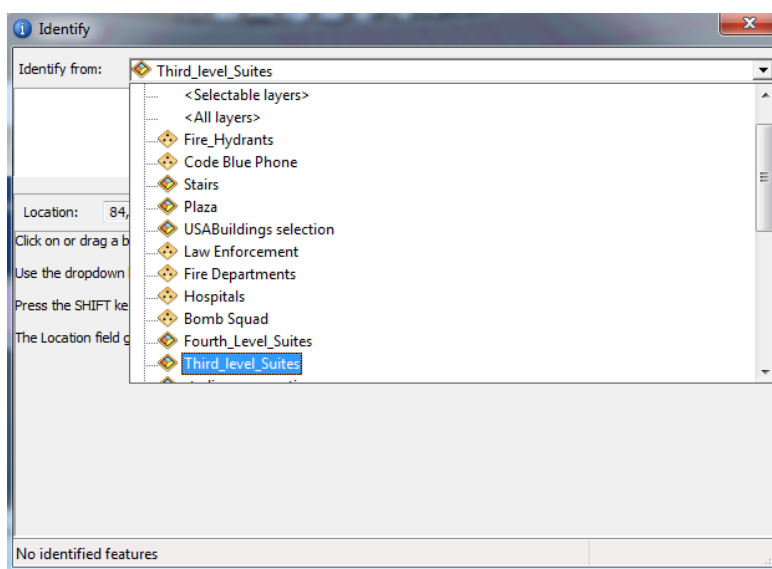
Latitude : 31.3294467926025, Longitude : -89.3319778442383	
stadium usa sections	OBJECTID 87
stadium outline	Id 0
USABuildings Stadium Perimeter	Section HH
one_mile_buffer	Shape Length 68.3673456649986
	Shape Area 291.103347473701
	Floor




Map screen Identify Tool: The Identify tool allows the user to identify features on the map and get detailed information about buildings, roads and other map features.

Note: Remember to choose the group you want to identify. The map will select the topmost layer if a group is not selected.

Using the “**Identify From**” drop down menu the user can select a specific layer group (e.g. local roads) in order to view more information about that specific map feature. This may be useful for identification of critical infrastructure such as hospitals and fire stations

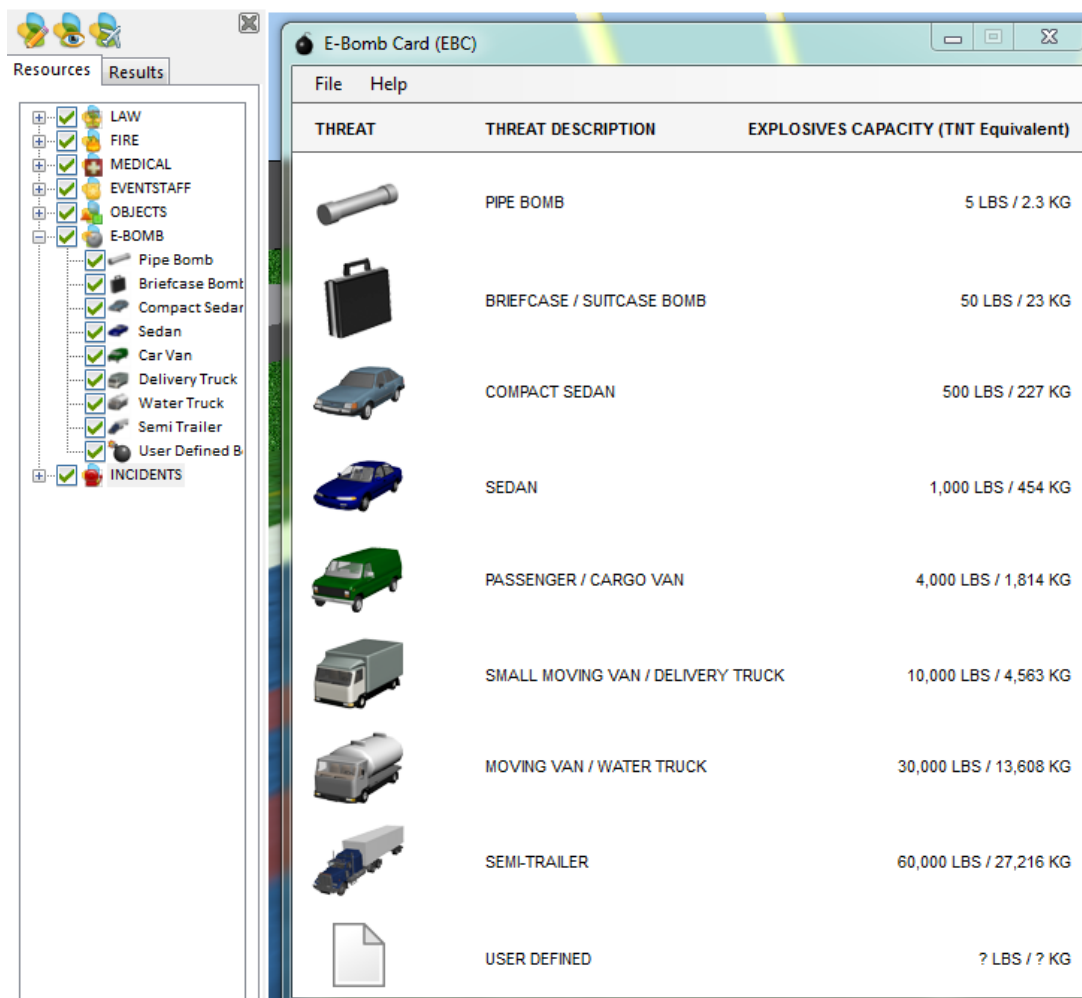


Map Measure Tool:  The Map Measure Tool, denoted by the ruler icon in the Map Viewer tool bar, gives the user the ability to measure the distance between chosen points of interest and calculate the area of a chosen building, space, property or other map feature.

Note: The **line** will measure distance and the **polygon** will measure area. Units can be displayed in either metric or English units.

ccElectronic Bomb Card

The Electronic Bomb Card (E-Bomb Card) allows for the placement of improvised explosive devices (IEDs), either predefined or user-defined, into the 3D viewer. The IED will also appear in the map viewer as an icon. This tool also displays the IED's radius of effect.

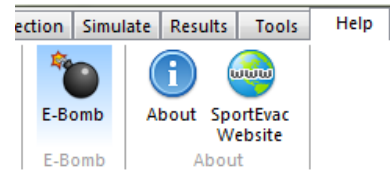


Note: The left panel displays the IED list while the right displays the E-Bomb Card.

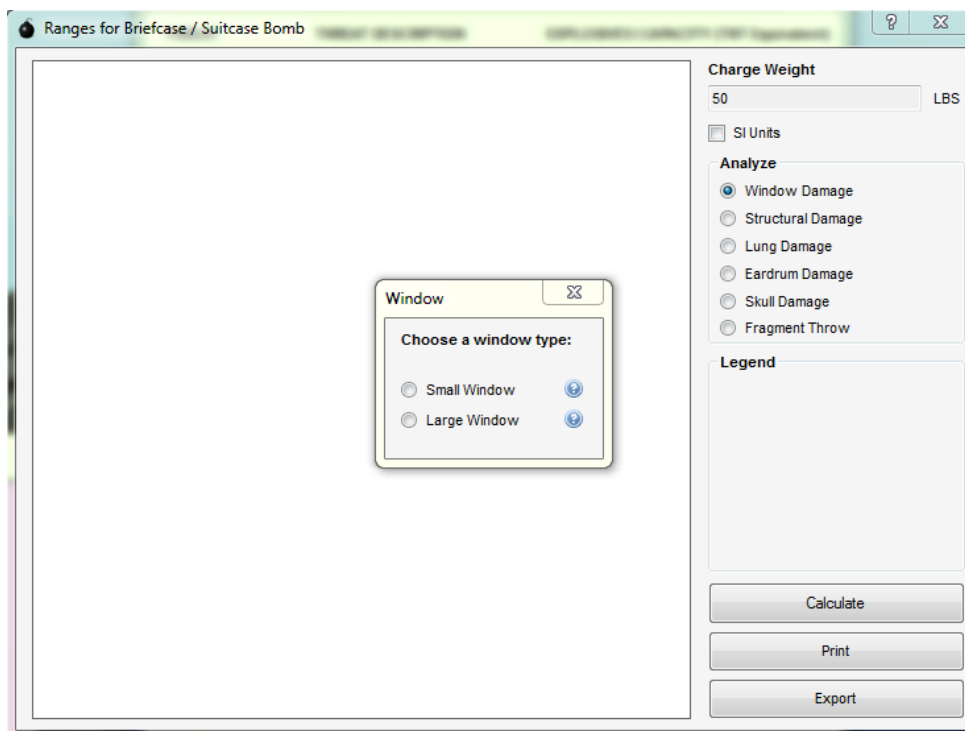
E-Bomb Card

The E-Bomb button allows the user to look at the E-Bomb card and the categories of explosive devices and areas of effect. This E-bomb menu will give the user an idea of the area of effect for typical IED delivery systems.

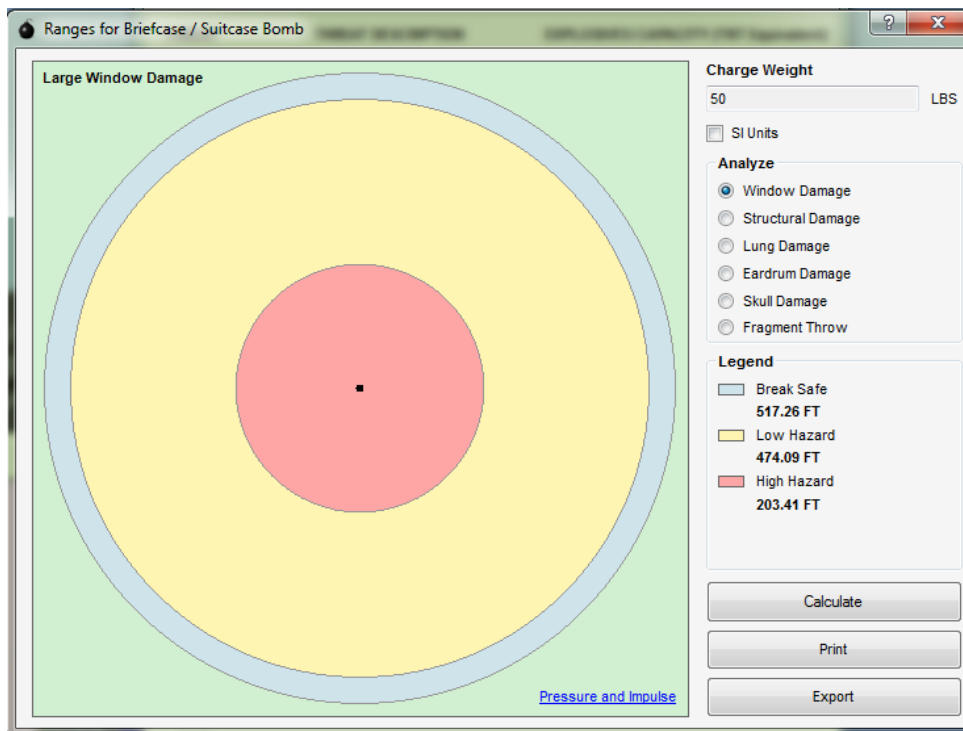
To open the E-Bomb Card, navigate to the Help menu and press the E-Bomb button. Next, select the type of bomb you'll wish to review. Each option shows what type of bomb you'll be viewing and TNT weight equivalent.



From here, you'll be able to see the charge weight and select what damage area you'll like to view by simply clicking on the damage type. For some, you'll need to clarify further, e.g. when choosing "Window Damage", you'll need to specify whether you wish to view the damage to "Small" or "Large" windows.



After choosing one, you'll see the resultant area of effect. From here you can Print it out in PDF format or Export the raw data to XML.



Note: If a specific bomb type is chosen, the charge weight is uneditable. To analyze an area of effect for a specific charge weight, choose the “USER DEFINED” option and add your weight.

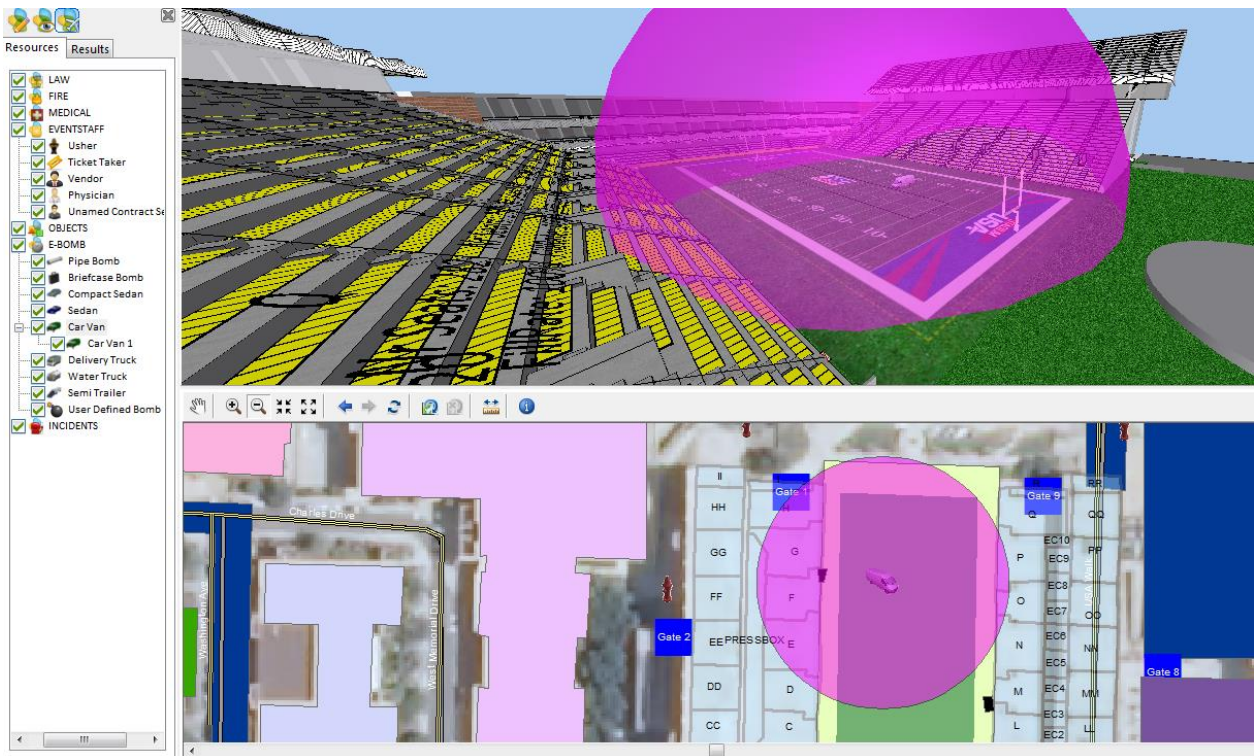
Adding IEDs to the Model

Placing an IED is similar to adding a resource and can also be found in the Resources menu. Begin by selecting the type of bomb and then drag it onto the model. A 3D representation will appear and an icon will be shown in the map viewer.

Enabling and Editing IEDs

After placing, you must then enable it by giving it some parameters. Do this by selecting, then double-clicking the placed IED. The IED’s settings dialog will appear. Here you’ll be able to name the bomb, set the type of damage you wish to be displayed, the charge weight of the bomb, and how you would to visually see the results. You’ll notice that some defaults have been filled in. You can either edit them to your liking or simply press “Ok”. After doing so, the effects of the bomb are shown in the 3D model and in the map viewer.

You’re also able to set where you would like to see the area of effect: nowhere, only 2D, only 3D, or both. In addition, the user is also able to set the transparency of that area, i.e. how easy it is to see through the radius. The defaults should be fine for most users.



Note: For the purposes of this example, the type of damage being shown is for skull damage.

Moving, Viewing, Removing IEDs

To move, fly-to, or remove IEDs, please follow the instructions from the 3D Resources section.

Simulations

A simulation is a scripted movement of a crowd of people (i.e. agents) based on a pre-defined scenario.

In order to execute any of the pre-installed Stadium USA simulations, first select the “Simulate” tab. At the “Scenario Selection” dropdown box select one of the following scenarios:

- INGRESS – Standard beginning of game ingress
- EGRESS – Standard end of game egress
- EVACUATION – Immediate evacuation of stadium
- FILLSTADIUM – Not really sure...
- FIREPARTIAL – Fire partial evacuation

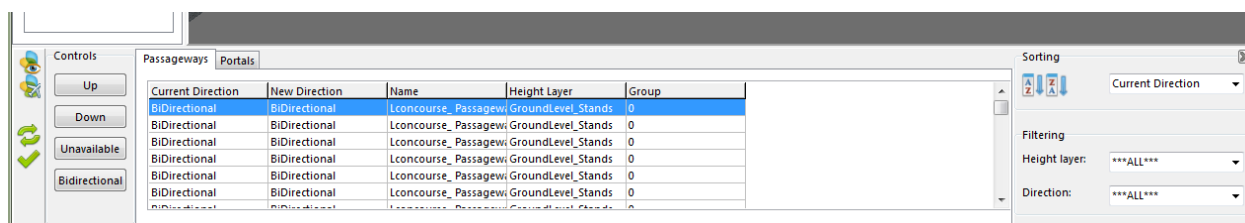
After selected a simulation, press the Run button.

Note: If no scenario is selected, SportEvac will run an Ingress simulation.


At any point during the simulation, you may Reset, Stop, or Step through the scenario or edit the run speed. You’re also able to add resources and IEDs during the simulation without stopping.

Using the Control Panel

The Control Panel is the largest innovation in SportEvac. Here, a user can open and close passageways and portals in real time. This will allow the user to better understand the effects of the decisions they make.



Within the Control Panel there is a list of each passageway and portal in the model. Their current direction, their new set direction, name, layer, and (if applicable) what group of passageways they belong to. The user can sort via all of these attributes. Also, these can be filtered out to only display those on a certain layer or set to a certain direction.


To use the Control Panel, simply find and select the passageway/portal you wish to edit. You can also select groups by selecting one, holding the mouse button down, and dragging to highlight each one you wish to edit. Then push the button representing the new direction and hit the  checkbox.

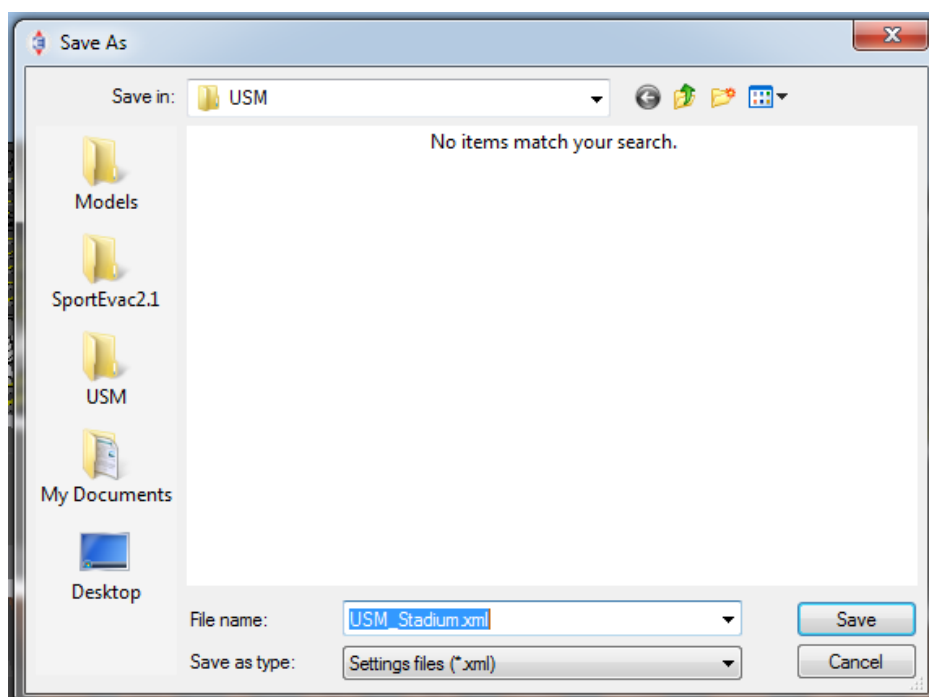
If the simulation is running when you’re doing this, expect it to pause while it updates. This pause may last 4-5 seconds before continuing. The agents will then begin to adjust themselves according to your changes, e.g. if a door they were going to walk through is now closed, they’ll find another route to their destination.



Settings


SportEvac allows the user to store various data in an external xml file that can easily be reloaded. This allows the user to have various situations that will impact how the simulation is run. The following types of data are able to be stored and retrieved:

- Passageway and Portal directions
- Placed resources including their attributes such as name, group assignment, etc.
- Placed IEDs
- The fill rates from the Visitor Settings menu

To do this, simply make the changes you wish. Then press the  “Save Settings” button. If you haven’t already loaded a settings file, you may be prompted to specify the location and name of your new settings file.



After doing so, you can make more changes and then press the  “Save Settings” button again to save those changes to that same file. To save it to a different file, press the  “Save Settings As” button.

Now at any time you wish to load those changes, you can press the  “Load Settings” button and load those changes again.