Atlas GPS Tool

Mechanical Simulation Corporation provides a tool for creating and outputting routes on real roads using online services such as Google Maps. The Atlas tool is a web application hosted at https://atlas.carsim.com. To access Atlas you will need a registered Mechanical Simulation account at https://carsim.com.

Atlas will create a path by connecting two points that you will define. You can then download a file with GPS data for that path and import the data from the file into your CarSim, TruckSim or BikeSim database.

Make a GPS Path with Atlas

Use your web browser to connect with the web page https://atlas.carsim.com (Figure 1). When you first view the page, it will show some location based on how your computer is set up. You can navigate using your mouse or trackpad in the same manner you navigate any online map.

Download a Path by Clicking to Create Points

To download a file with GPS data with point-and-click actions, do the following:

1. Select a map service with the drop-down control ①. You can switch between Google Maps and HERE Maps data. If you switch, the map will change as it will be under the control of a different service.

2. Use the regular map zoom and pan controls to bring an area of interest into view.

3. Click on a point where you want to start the path. This will appear in the map as a green pin ②.

4. Click on a point where you want to finish the path. This will appear in the map as a red pin ③.
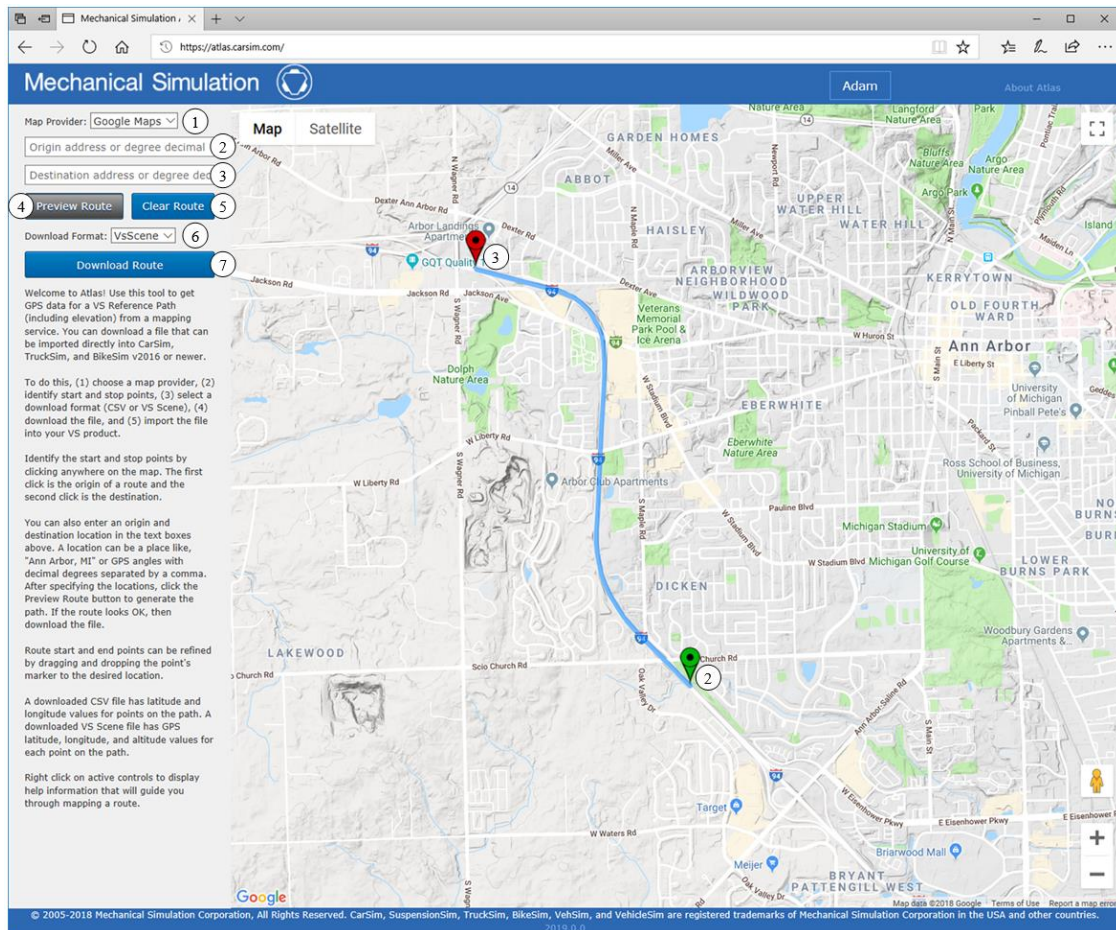
Figure 1. The Atlas web application after two points have been created.

5. If you don't like the route that the mapping service generated, the route's origin ② and destination ③ can be adjusted by dragging and dropping the point's marker to the desired location. If the route requires more than just minor adjustments, click the **Clear Route** button ⑤ and try again (go back to step 3). Otherwise continue with step 6.

6. Select a format for the file you will download ⑥. There are two choices: VS Scene (recommended) and CSV:

   a. The CSV (comma-separated variables) is a text file that can be loaded into Excel and other spreadsheet programs. It contains only latitude and longitude value.

   b. The VS Scene file is a text file that uses JSON (JavaScript Object Notation), an open standard data-interchange format (see json.org). It contains more data, including GPS altitude.

7. Click the button **Download Route** ⑦. A file will be written in the default download location for your web browser.

Download a Path Using GPS Coordinates

To download a file from known GPS coordinates:

1. Select the map service (Google Maps or HERE Maps) ①.

2. Set the **origin location** of a route ②. This can be latitude and longitude, written as two degree decimal numbers separated by a comma. For example, `42.15604, -83.67504` is valid text which can be entered as the origin of a route. It is also possible to provide just the name of city or the detailed address of a specific location, e.g., `755 Phoenix, 48108`.

3. Enter the **destination** of the route ③. The allowable input format is the same as for the origin location.

4. Click the **Preview Route** button ④. This will draw and center the map on the calculated route.

5. Select a format for the file you will download ⑥.

6. Click the button **Download Route** ⑦. A file will be written in the default download location for your web browser.

Altitude Data

Google and HERE mapping services can return varying results for elevation when generating `vsscene` files. From Google maps API documentation: "Elevation values are expressed relative to local mean sea level (LMSL)." From HERE maps API documentation "If there are no elevation data available for given shape point, elevation will be interpolated from surrounding points." The elevation estimates from HERE may be significantly different from Google. Combining routes from different mapping services will likely result in disjointed roads due to location and elevation.

Import Atlas Data into a Scene: External Import Dataset

The purpose of the **Scene: External Import** screen is to import data from Atlas, ADAS RP, and VS Scene Builder into the global X-Y-Z coordinate system of the VS Math Models (Figure 2).

To import the GPS data, the browser automatically converts the coordinates from latitude and longitude angles to global X and Y coordinates. The calculations involve the GPS latitude and longitude of a point that is the origin of the X-Y coordinate system. (These are parameters in the math models: `GPS_REF_LAT` and `GPS_REF_LONG`). The reference point should be in the vicinity of the path; otherwise, the X and Y coordinate will be very large and can be inconvenient when viewing plots.

The easiest way to set the reference point is by checking the box **Set References** ④. Do this before importing the Atlas file.

To import the Atlas dataset, click on the **Import New Scene File** ② and choose the Atlas file you downloaded. This works for both `vsscene` and `csv` files. The name of the imported file is shown for reference ①.

If the reference box is checked ④ when you import, the fields for the GPS reference will be filled in ⑤ and the imported path will appear in the plot area ⑩.
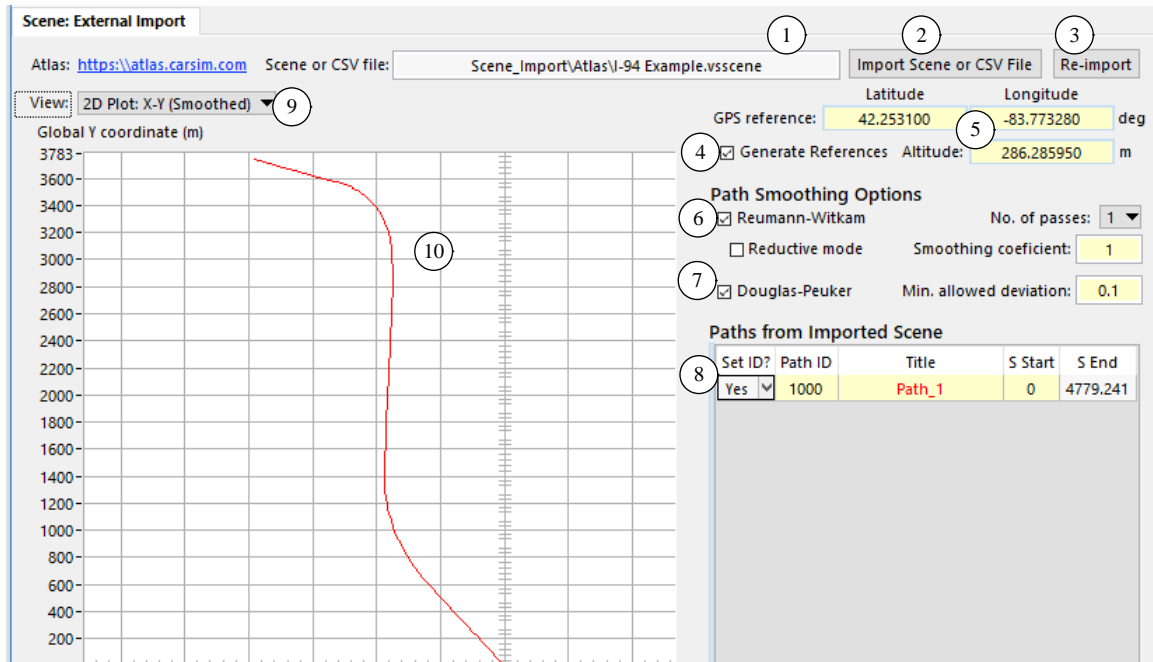
Figure 2. Import Atlas data into a Scene: External Import dataset.

See the **Help** document for the screen (press the F5 key) for information about smoothing the data and possibly removed data points.

In addition to the X-Y plot ⑩, you can view an elevation profile plot (Z vs S) or a table of the imported coordinates. Choose between these viewing options with the drop-down control ⑨.

At any time, you can re-import the file using the **Re-Import** button ③. This is handy if you edit the table of X-Y-Z coordinates and want to quickly revert to the original data.

Import 2D CSV Files into Path: X-Y Datasets

Three screens in the VS Browser can import CSV data files with GPS coordinates:

1. Path: X-Y Coordinates (Figure 3)

2. Path: X-Y Coordinates for Segment

3. Path: X-Y Coordinate (Legacy)

These screens have a hyperlink to the Atlas tool and a button **Import GPS Coordinates** ①.

These screens can automatically convert the GPS coordinates from latitude and longitude angles to global X and Y coordinates. The calculations involve the GPS latitude and longitude of a point that is the origin of the X-Y coordinate system. (These are parameter in the math models: `GPS_REF_LAT` and `GPS_REF_LONG`). The reference point should be in the vicinity of the path; otherwise, the X and Y coordinate will be very large and can be inconvenient for view plots.

The easiest way to set the reference point is by checking the box **Set reference from import file** ⑥. Do this before importing the CSV file from Atlas.
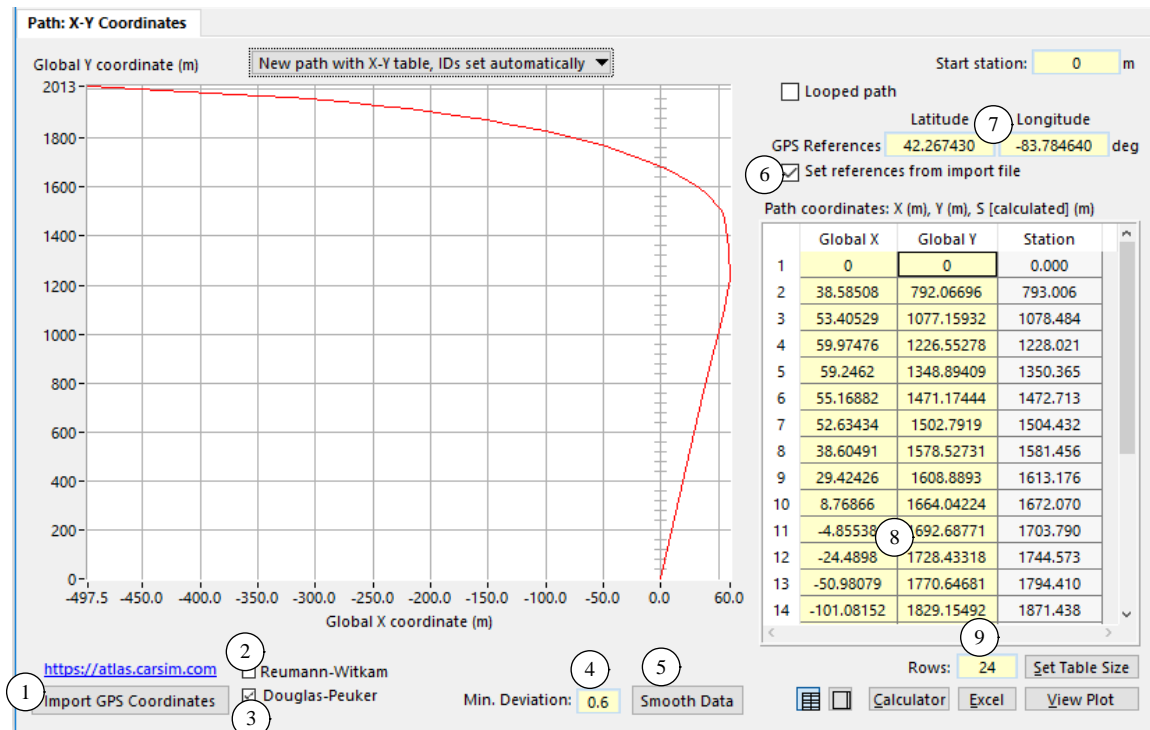
Figure 3. Import GPS data from a CSV file into a VS Dataset.

After checking the box, click the button **Import GPS Coordinates** and select the .csv file that was downloaded. The fields for GPS reference will be filled in ⑦ and the table of X-Y coordinates will be populated ⑧.

See the **Help** document for the screen (press the F5 key) for information about smoothing the data. After the GPS data are imported and used to calculate X-Y coordinates, there is just one chance to smooth them by clicking the **Smooth Data** button⑤. When you do so, the number of rows in the table ⑨ will typically decrease as some points are removed. To try again with different smoothing settings (②, ③, ④), you must import again and then smooth again with the different settings.

Editors for CSV and VS Scene Files

The GPS coordinates in the files imported to datasets in the **Scene: External Import** library are immediately converted to X, Y, and Z coordinates using the reference point. The original GPS values are no needed by the VS Solver (multibody programs that work in global X-Y-Z coordinates and path S-L coordinates). However, both kinds of export files are written in standard formats and can be easily viewed with external tools.

Viewing CSV Files

CSV is simply a text file with a table, where the elements of each row are separated by commas (hence the name, Comma-Separated Variables). The file can be viewed with a text editor, spreadsheet programs such as Excel, and other software tools. For example, Figure 4 shows a CSV file as viewed in two tools: Microsoft Excel (on the left) and the ConTEXT text editor (on the right).
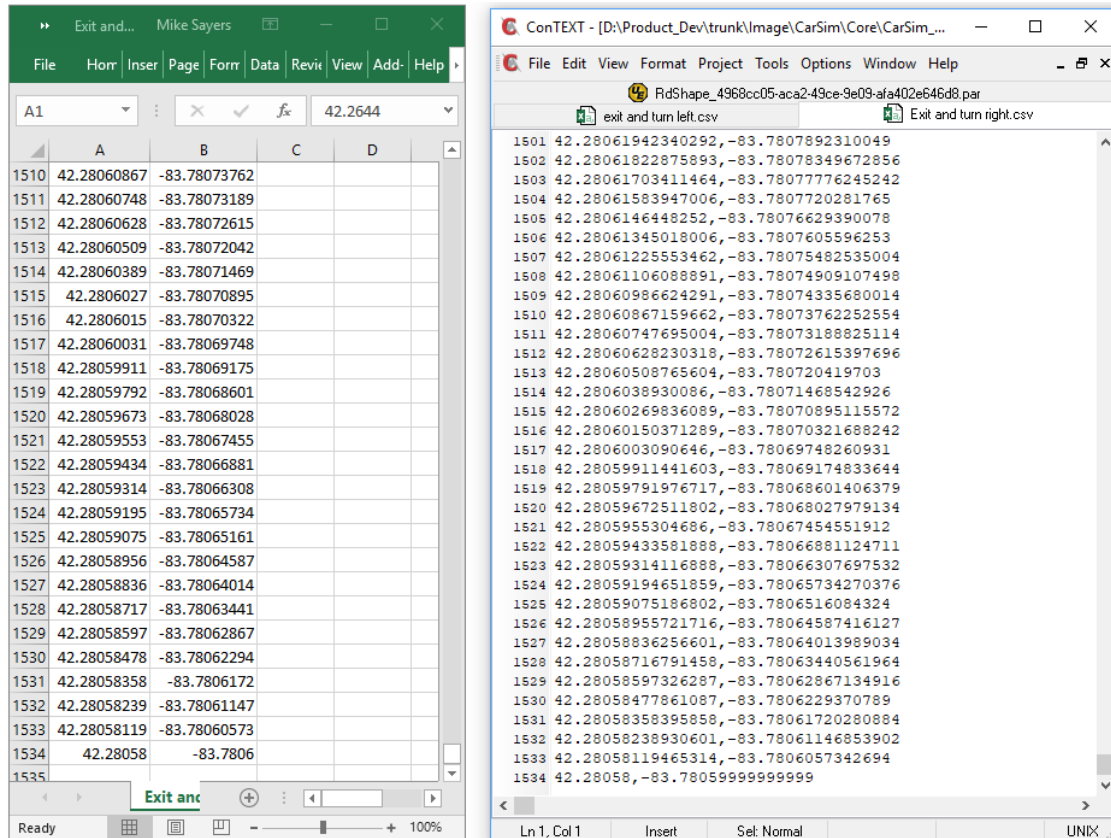
Figure 4. CSV file as viewed in Excel and in the ConTEXT text editor.

Viewing VS Scene Files

VS Scene files are text file that use JSON (JavaScript Object Notation), an open standard data-interchange format (see json.org). There are many JSON editors. For example, https://jsoneditoronline.org is a free online tool. View the JSON file by dragging it into the window (Figure 5).

Figure 5. Online editor for JSON files such as VS Scene downloads.