PC-TRAVEL 3

Software Suite

Travel Time and Delay Analysis Software

Quick Start Manual

Ridge Engineering Technologies, Inc. Software License Agreement

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Technical Support

If you have any questions about the use of PC-Travel, please call the following number:

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Monday – Friday 8:00 AM to 5:00 PM Eastern time

via e-mail at:

support@pc-travel.com

For more information on our products, the latest news in product development, and to download software updates, visit our web site at:

www.pc-travel.com

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Quick Overview (if you really hate manuals)

All files can be downloaded from the Downloads page at www.pc-travel.com

First get GPS2LT3 ready to collect travel time data:

1. Download and install GPS2LT3 on your laptop.

2. Download and install the appropriate USB device driver on your laptop.

3. Find the virtual serial port assigned to the USB port in Device Manager (Ports section)

4. Run GPS2LT3 and enter the COM port number found in step 3.

5. Enter your serial number into the GPS2LT3 software.

Next get PC-Travel 3 ready to process the field data you collect:

6. Download and install PC-Travel 3 on your desktop.

7. Download and install TatukGIS Viewer on your desktop.

8. Download the maps for the county or counties where your data collection will occur.

9. Create a new folder for the map files under the Maps folder of PC-Travel 3.

10. Unzip the map files you downloaded to this new folder.

11. Run TatukGIS Viewer and process the shapefiles into a TatukGIS project.

12. Save the map project as PCT.ppkgp.

13. Enter your serial number into the PC-Travel 3 software.

Introduction to PC-Travel

Welcome to PC-Travel 3, a Ridge Engineering software program designed to process travel time and delay data. Travel time and delay analysis is a complicated subject and we have not tried to oversimplify it at the expense of the experienced user who wants to get as much from the analysis as possible; yet we have tried to make the software easy to use, even for the occasional user.

Computer Requirements
- Windows 7 or newer
- Screen resolution of 1280 x 800 or better.

Software Updates
Updated versions of Ridge Engineering software are released periodically and are posted on the PC-Travel sup- port site. Licensed owners of PC-Travel can download updates to the program to make sure they always have the latest version of the software. To download the latest version of PC-Travel, go to **www.pc-travel.com** and then select *Downloads* from the list of option

Definitions

Before any discussion of travel time data collection and analysis can begin, you must have a careful understanding of the terms we use and how we use them. This section defines the words used in the program.

Run   *A single collection of travel time data.*
For example, when data is collected along an arterial, the user drives to the begin- ning of the arterial under study, starts data collection, proceeds along the arterial to the end of the study area, and then stops data collection. He has just completed one run. If he turns around and collects data in the other direction, it is another run. All runs are stored as separate files in the program.

Study   *A collection of runs*
When the user collects data, he is making data runs, and when he gets back to the office, he collects those runs into studies. The difference is important because runs can be collected into different studies. For example, a user may make a number of runs at an arterial during one or two days. Back in the office he may create a study with just the morning runs. He may also create a study with all of the runs, which of course use some of the morning runs.

There is one critical rule for studies:
All of the runs in a study must start at the same place, end at the same place, and follow the same route.

Study Group   *A folder where related runs and studies are stored.*
This term is specific to the program. Since studies must be created from runs that start in the same place, end in the same place, and go in the same direction, it makes sense to store all runs that fit those criteria in one place on your computer, along with any studies that are created from those runs.

You typically create Study Groups when you first read the run data collected in the field. Since you usually collect at least two sets of runs, one in one direction and another in the opposite direction, you usually will create two Study Groups when you process the field data.

Node   *The boundary between two segments of a run.*
Every run has a starting node, which is where you start collecting data on a fixed- route study, an ending node, which is where you stop collecting data, and several segment nodes in between.

Primary Run   *A run that contains node data.*
Most studies have statistics for the entire run plus statistics for segments along the route, separated by nodes.

Secondary Run   *A run where node information is not stored*.

Before and After   *A way to categorize a group of runs so that two different groups of runs can be compared.*

The terms Before and After are used liberally in the program and these mean only that the data is summarized into two separate groups so the statistics of each group can be compared. If all of one set of runs are made under the same conditions, they may all be defined as *before* runs. Later, identical runs made under different conditions (after an arterial has been re-timed, for example) may be defined as *after* runs. The program lets you define runs as either before or after and then automatically calculates statistics for the before runs as a group, the after runs as a group, and changes in the various statistics from before to after.

Normal Speed   *Ideal speed at which the traffic should travel on an arterial.*

The Normal Speed is used in two places in the program. It is used to find Total Delay statistics for runs and studies *(see Total Delay, below)*. It also is plotted on the Time/ Space Diagrams to show perfect progression. You set the Normal Speed on the Study Summary screen. As with most ideals, real traffic rarely measures up to the ideal, but it is useful as a guide.

Travel Time   *The elapsed time to travel between two points, in seconds.*

This is probably the most fundamental of the reported statistics. All run travel times are measured and reported to the nearest second. Study travel times, which are averages of the run travel times, are reported in tenths of second (technically speaking, the tenths of second are not significant in studies with less than about 5 runs, but that is rarely of concern in the vast majority of practical traffic evaluation situations).

Number of Stops   *A stop is defined as a one-second interval where he speed is less than X MPH for one second when the speed was greater than X MPH in the previous second.*

X is normally 5 MPH but can be set to any speed you want. This speed is called the Stop Speed and is set on the Study Summary screen. Each time the vehicle slows down and crosses the Stop Speed boundary, a stop is counted. The vehicle must speed up faster than the threshold before another stop can be counted.

Average Speed   *The total distance covered divided by the elapsed time.*

The program calculates the average speed for each section *(node to node distance)* and also separately calculates a total average speed for the entire route.

Total Delay   *Difference between actual travel time and ideal travel time.*

Actual travel time is calculated from the data. The ideal travel time is based on the Normal Speed setting on the Study Summary screen.

Time <= X MPH   *Total time the vehicle spent at or below the given speed.*

The program gives you three speed categories, which you can set for different purposes. You can measure stopped delay (time vehicle is stopped) by setting Category 1 to 0 MPH. You can measure queue delay by setting Category 2 to 7 MPH. The third category might be set to 30 MPH to show how much time vehicles spent in car following mode rather than free flow (assuming free flow speed is 40 or 45 MPH).

How to Install, Run, & License PC-Travel

Installation Procedure

Download the installation program from the PC-Travel.com support site at www.pc-travel.com. Unzip the file you downloaded to a convenient folder and run the Setup.exe file. This is a standard installation program so you should be familiar with how it works.

Note: You will need to have administrative rights to install the software since the installation program installs system files and writes to the registry. You may need to involve your IT people to help with the installation.

How to Run PC-Travel 3
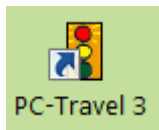
The installer created a shortcut on your desktop as shown here.

Double-click the icon to run PC-Travel 3.

How To Enter Your Serial Number
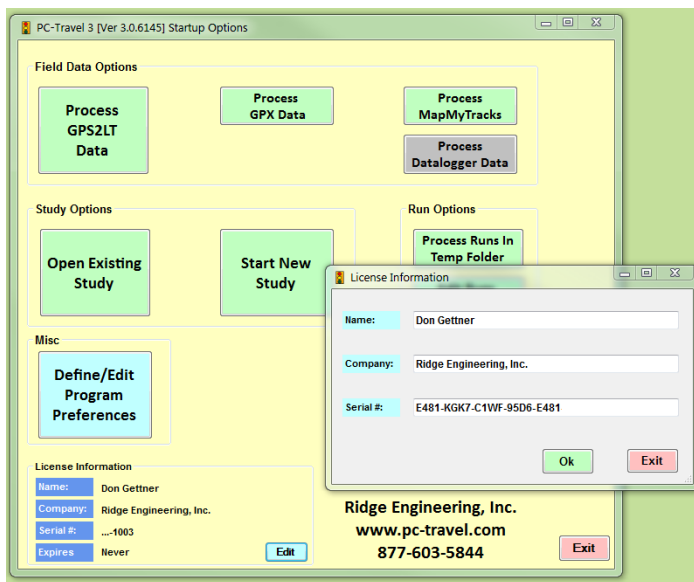
Run PC-Travel 3.

This brings up the Startup Options screen.

Click on the Edit button in the lower left corner of the screen. This brings up the screen shown here

Enter your Name, Company or Organization, and serial number. Make sure you enter the dashes "-" as well; they are part of the serial number.

Use the same serial number for PC-Travel and GPS2LT3.

Click **Ok**. The Registration window should disappear. If there was a problem with the serial number, which is usually just a typo error, the software will show an error message.

The software is now licensed and ready for use.

How To Install GPS to Laptop (GPS2LT3)

The GPS Travel Time software allows you to collect travel time data using a GPS receiver and either a laptop computer or tablet.

The basic idea is simple. The GPS receiver outputs data every second. Some of this data includes the speed of the vehicle, which is measured to a surprisingly high degree of accuracy (better than 1 MPH). The laptop or netbook reads the data from the GPS receiver and stores the speed information, plus other information that you input.

The PC-Travel software then can read and process these files into travel time studies.

GPS Technology and Receivers

In case you are new to GPS technology, what follows is a brief introduction to the subject. Each GPS receiver is a glorified radio antenna that picks up signals put out by the network of dedicated GPS satellites. Once the receiver gets a signal from three or four satellites, it can compute your position *(latitude and longitude)* anywhere on the planet. Using a little math, the receiver can figure out how fast you are moving by monitoring your changes in position.

There are dozens of GPS receivers available, in many different price ranges and features.
In general, the best GPS receivers to use with GPS Travel Time do not have dedicated display screens.

For our purposes, they just aren't necessary. Since the laptop you are running GPS2LT3 on acts as your display, you don't need one on your GPS unit. If you've already got a GPS receiver with a display and it's supported by GPS Travel Time, that's fine. However, if you're shopping for a GPS unit for the specific purpose of taking travel time data, save yourself some money and opt for something like the simple black receiver shown here. Visit www.pc-travel.com for more information on GPS receivers.

The most important part of the GPS Travel Time set up is the placement of the GPS antenna. In order for the GPS receiver to function properly, it must have a fairly clear view of the sky. This makes GPS reception more difficult in places with numerous tall buildings or dense foliage, and nearly impossible in tunnels.

Since the inside of your car doesn't provide an ideal view of the sky, it is best to have a GPS receiver with an external antenna. This antenna may be the entire receiver, as in the case of the GlobalSat BU-353 S4, or it may plug into the GPS device which would then feed the data to your laptop. Either way, you don't want to be driving around holding your GPS receiver out the window so you don't lose your signal. Most of the external antennas are magnetic, which is very handy when popping it on and off of a car's roof, but a suction cup anchor or fixed mounting bracket would also do the job. Route the cable through a window into your car.

To physically connect with GPS Travel Time, your GPS receiver must have some means to send data to your lap-top. Usually the easiest means to achieve this connection is through a USB port.

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The specific information output by GPS receivers will vary from unit to unit. However, there is one standard output format that is supported by nearly every receiver. This format is called NMEA. NMEA outputs are divided into sentences and these sentences are transmitted as ASCII text characters. Often, there are ways to adjust which sentences your receiver transmits. A GPS receiver may default to output its sentences every second, every two seconds, or sometimes every 5 seconds. This time interval may also be changed on most units. PC-Travel requires that your receiver output sentences at one second intervals. If you aren't sure if your receiver outputs data in the proper format, visit www.pc-travel.com or give us a call

Installation

Download the GPS2LT3 install file from the **Download** page of the support site at www.pc-travel.com. Unzip the file you download to a convenient, empty folder and then double click on the Setup.exe file to run the installer. This is a standard installation program so you should be familiar with how it works.

Note: You will need to have administrative rights to install the software since the installation program installs system files and writes to the registry. You may need to involve your IT people to help with the installation.

How To Install a USB Serial Driver

The GPS receiver 'talks' to the laptop or tablet via a device driver installed on the laptop. This device driver creates what is called a 'virtual serial port'. GPS2LT3 then connects to the virtual serial port to read the data from the GPS receiver.

Most GPS receivers come with a CD that has a USB Driver on it and these usually work ok. Follow the directions that came with the GPS receiver to install the device driver.

Plug the GPS receiver into a USB port. You should hear a distinctive 'boing' sound that says the computer recognizes that a USB device has been connected. Now you need to determine which 'virtual serial port' number has been assigned to the USB connector you used.

The procedure is a little different if you have Windows 7, 8 or 10, but the result is the same. In all cases you want to find the Device Manager screen and then check the COM port number assigned.

Here is the procedure for Windows 7:
1- Click on the Windows Start icon in the lower left corner of the screen.
2- Click on Devices and Printers on the right side of the pop up window.
3- You get a list of Devices and Printers. At the bottom is a section for Unspecified. Look for a device that has USB and/or Serial Port in the name. Remember the number.

In Windows 8 or 10 use the **Search** feature (bottom left corner of the desktop screen) to search for Device Manager, then look in the Ports section to find the Comm port number.

Each USB port on your laptop will have a different number and will stay the same from session to session. Pick a port, find the number assigned to it, and continue to use that port in the future.

Once you know the COM Port number, you can enter it in GPS2LT3.

Run GPS2LT3. This brings up the first screen shown in the figure below.
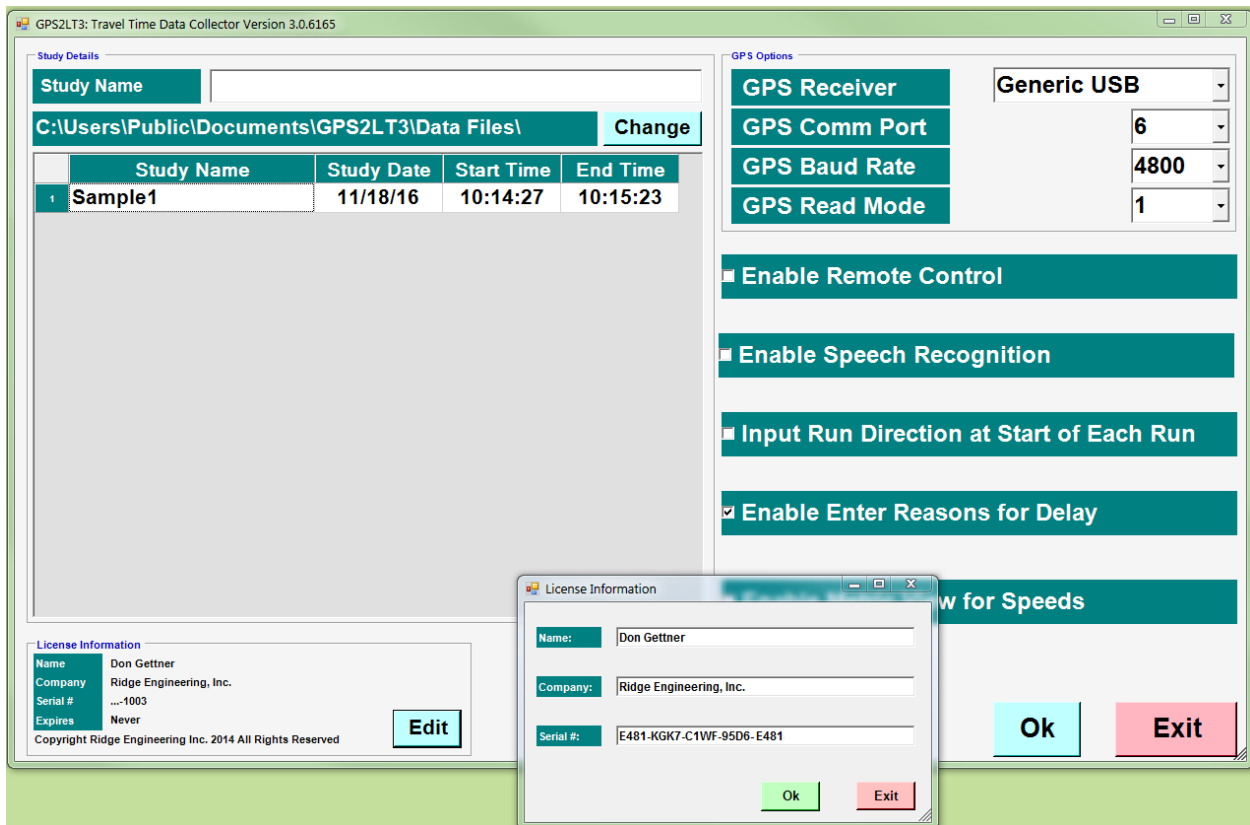
Enter the COMMnumber in the **Comm Port** box. In the example shown here the Comm Port is 6.
Set the **GPS Receiver** to Generic USB and the **Baud Rate** to 4800 unless you have been told to use other settings. Now GPS2LT3 knows how to listen to the GPS receiver.

Enter the Serial Number:

If you haven't done so already, then click on the **Edit** button which pops up a little window where you can enter the serial number. The serial number is the same for GPS2LT3 and PC-Travel 3. Be sure to include the dashes (-) since they are part of the serial number. Click Ok. If there is a problem you will see an error message (usually just a typo).

You are now ready to collect travel time data.

How To Download and Install Maps

The US Government provides Census Data free of charge. Part of this data includes TIGER files which contain geographic and cartographic data of the entire country. In March 2008 the format for these files was changed to use standard files called Shapefiles. These files are now called TIGER/Line Shapefiles and can be downloaded for free from the Internet.

This section of the manual will show you how to download the shapefiles for your area and then how to add the symbology to make the shapefiles look good on maps.

Download Shapefiles

Go **to https://www.census.gov/geo/maps-data/data/tiger-line.html** (or Google TIGER/Line Shapefiles). This site has more information than you would ever want or need to know about TIGER shapefiles.

This brings up the screen shown here:

Near the bottom of the screen you can select the Year (select the latest year), then click on the **Download** link, then select **Web Interface**.

First, select Water, under the Features section in the drop down box, then click the Submit button.
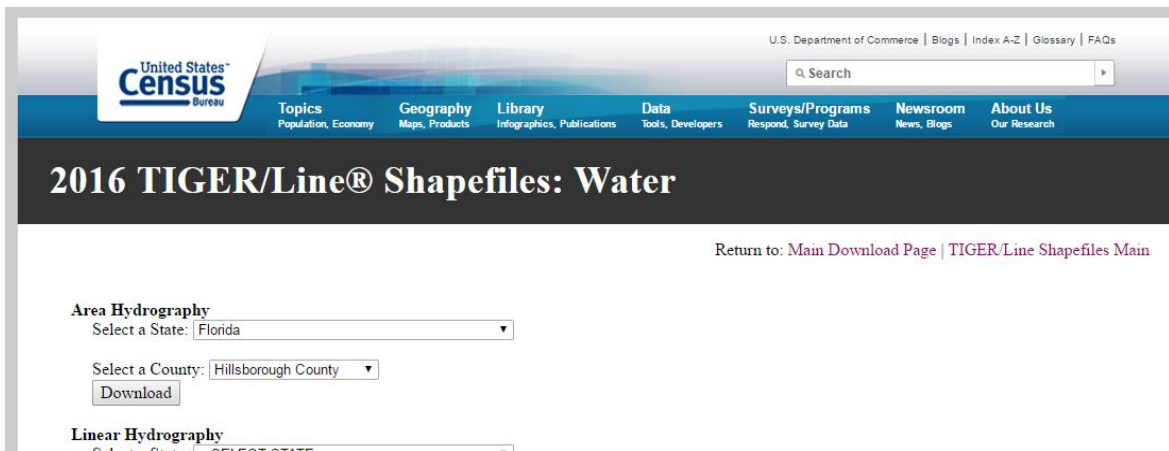
Then select your State and County (make sure you select the **Area Hydrography** section.

Click the **Download** button. The Water files for that county will be downloaded as a zip file, usually to your Downloads folder.

Now go back the previous screen where you selected the Water feature, but this time select the Roads feature from the drop down list then click on the **Submit** button, as shown here:
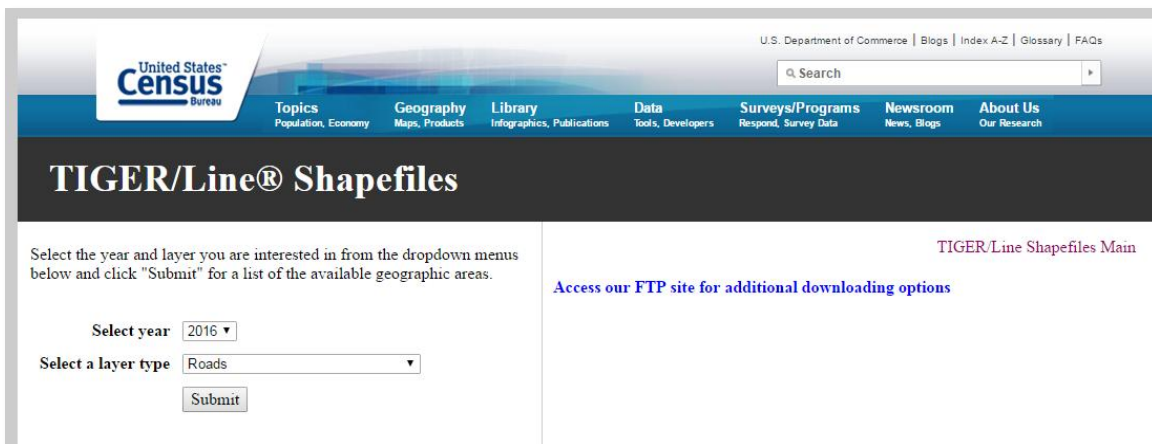
Then select your State and County again like you did before:

Click the **Download** button. The files for the Roads for your county will be downloaded to your computer as a zip file, usually to your Downloads folder.

You now should have two zip files in your Downloads folder (or wherever you had them downloaded).

You now want to make a folder for the files you downloaded.

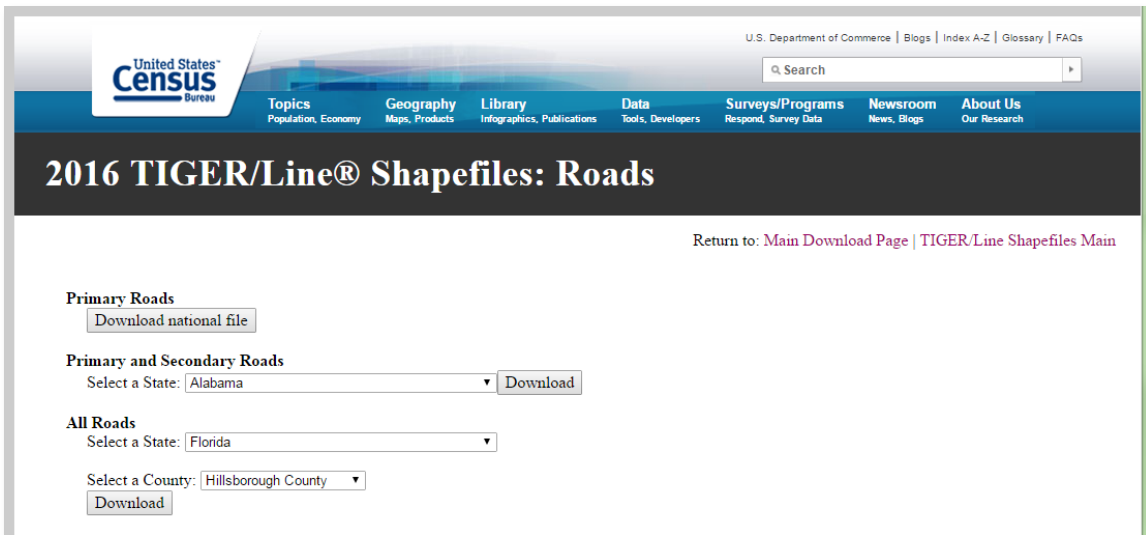When PC-Travel 3 is installed, among other things, it creates a folder called PC-Travel 3 in the Libraries section of your computer. This is where the program stores files it needs. It also creates several folders under the PC-Travel 3 folder which can be used to store your run and study files (you also may choose to store them on a remote server, but initially the software assumes you will use local folders). One of these folders is called Maps and is used to store the map files used by the software.

In Windows Explorer, navigate to the Maps folder under the PC-Travel 3 folder and create a new folder with the name of the county you downloaded in the previous steps.
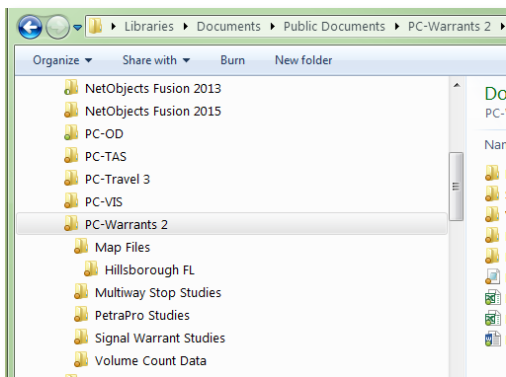
In the example shown here, we created a folder called Hillsborough FL which is where our offices are located.

Your screen should look similar.

Now copy the two zip files from your Downloads folder to this new folder you just created.

Unzip the files into that folder and then delete the two .zip files; you don't need them again.

You should have a bunch of files that looks somewhat like the image to the left here. There are two sets of shapefiles in the folder. The shapefiles have a very specific naming convention.

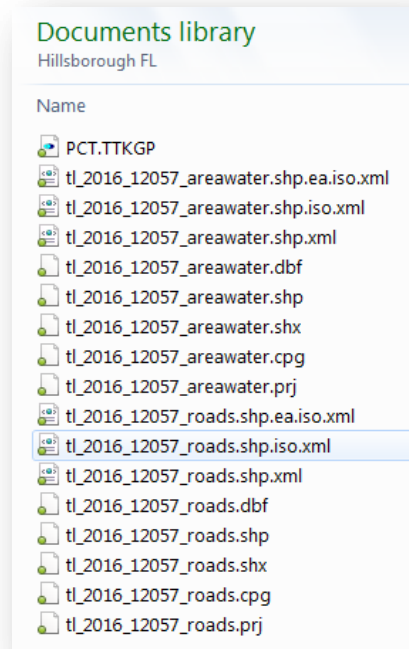Your files of course will be a little different but they should have a similar looking naming convention.

You are now ready to create the map file project so that you can map your studies.

Download and Install *TatukGIS Viewer*

The GIS engine used in PC-Travel 3 to display shapefiles is made by a European company called TatukGIS. This software integrates into Visual Basic .NET, which is the software used to write PC-Travel 3. TatukGIS allows programs written in Visual Basic .NET to display maps, interact with the maps, print the maps, and a host of other map related operations. TatukGIS supports shapefiles, which makes it easy to use, since we can get the shapefiles for free from the US Census Bureau.

TatukGIS makes a program called **TatukGIS Viewer** which is free for anyone to download and use. Among its many features is the ability to add *symbology* to shapefiles. What this means is you can use the software to decide how different features look when displayed on maps. We will use TatukGIS Viewer to edit the shapefiles downloaded from the Census Bureau so that they look good on the Map screen in PC-Travel 3.

You can download the TatukGIS Viewer install program from the **www.pc-travel .com** support site. Look on the **Downloads** page.

The installation is a standard Windows type install. Run the installer program and follow the directions. Normally there is no reason not to accept all of the default values. For convenience you should install TatukGIS Viewer on the same computer where you have PC-Travel 3.

Once you have installed TatukGIS Viewer you can follow the procedure in the next section to edit the shapefiles.

Edit Shapefile Properties In TatukGIS Viewer

Note: These directions assume you have followed the procedures in the previous section and have the shape- files in the folder you created, under the Maps folder. There also should be two .ini files in the Maps folder that were installed when you installed PC-Travel 3: TigerRoads.ini and TigerAreaWater.ini.

Run **TatukGIS Viewer**. You will see a screen similar to the figure here.
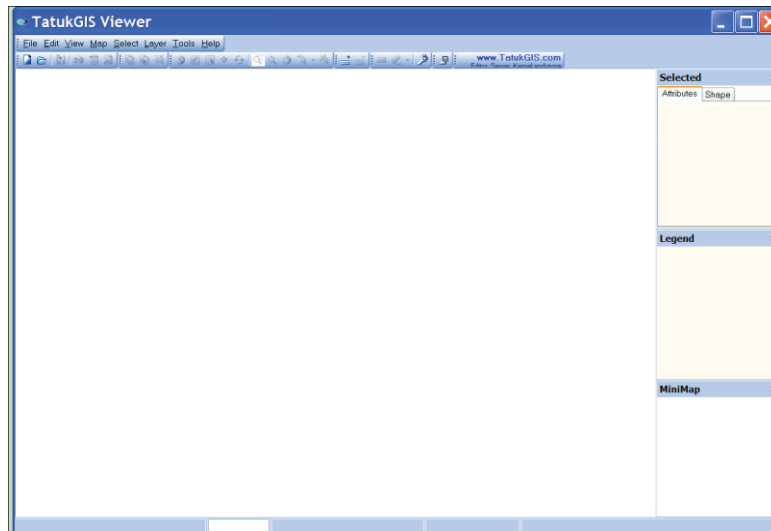
Note: If a map is displayed then click on File:New Project to clear the screen. If the Legend panel is not visible then click View:Panels:Legend.

Each shapefile is loaded as a separate layer to the map. Each layer will be added to the project and then the properties for that layer will be loaded from a prepared .ini file. The order you load the layers is important so follow the sequence shown.

1. Click on **Layer:Add** in the menu at the top of the screen.
2. Navigate to the **C:\Program Files\PC-Travel 3\Maps\YourCountyName** folder.
3. Select *x-areawater.shp* where *x* is the prefix of the files in your folder.
4. Click **Open**. This usually brings up lots of grey areas. These are all of the water areas in the county.
5. Click on **Layer:Load layer properties** in the menu.
6. Navigate to the **Maps** folder and select *TigerAreaWater.ini* from the list. The areas turn a light blue.

7. Click on **Layer:Add** in the menu at the top of the screen.
8. Navigate to the **C:\Program Files\PC-Travel 3\Maps** folder.
9. Select *x-roads.shp* where *x* is the prefix of the files in your folder.
10. Click **Open**. This brings up lots of thin, black lines.
11. ***Click on the new layer name (x-edges) in the Legend box on the right side of the screen.***

12. Click on **Layer:Load layer properties** in the menu.
13. Go to the **Maps** folder and select *TigerRoads.ini*. The lines look more like roads.

Note: Step 11 is highlighted because it is the step that is most often missed. You have to select the layer you want to edit before you load an .ini file.

Note: You can repeat this process with additional counties if you so studies in more than one county. Your map can contain as many counties as you need. Download the shapefiles for each county to one folder as explained on page 14 and repeat steps 1-13 from page 17 for each set of files. However, if you create a map with too many roads, the map will take longer to display when you use the software, although with modern computers this is a minor detail. The alternative is to have several map projects for different areas that you can select from when you run PC-Travel 3. This is a little complicated so call us and we can explain it better.

You now should have a map that looks somewhat like the following
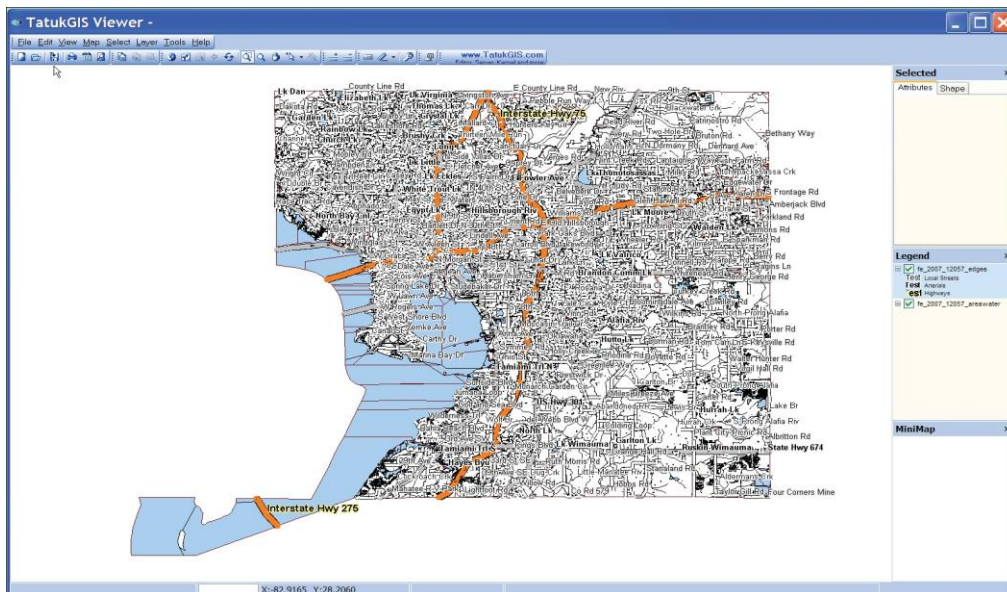
We now have the map looking like a decent map, although it may look a cluttered. We will take care of that next.

Load Map Units

The next step is to set the map units so that the software understands how distances are calculated in the layers that are used in the map.
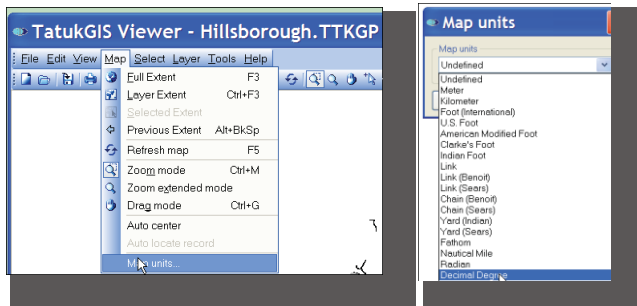
Click on Map in the menu at the top of the screen. Click on Map Units from the drop down box.

Click on the down arrow and select **Decimal Degree** from the long list of options, then click **Ok**.

You probably noticed that the screen greatly simplified so that all you can see are the major highways on the map. This is because there are settings in the project to decide when to show certain road types on the map. In this case the local roads are only shown when you are zoomed in fairly close. This cuts down on the clutter.

Pick Background Color

The maps look a little better if the background color isn't white; you get a little contrast with the roads and text. It is easy to set the background color.
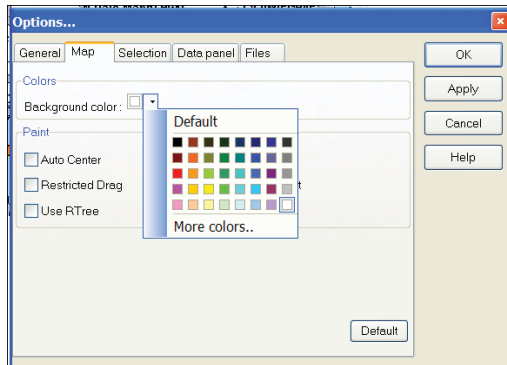
Click on **Tools** on the menu at the top of the screen.

Click on **Options** from the drop down list.
Click on the **Map** tab.
Click on the down arrow in the **Colors** section.
This brings up a screen shown here. You can pick one of the colors shown but most people like a very soft background color. One option is a very light green background. To set this:
Click on the Light Green square on the bottom row so it is highlighted, then click on the **More Colors** button.
Click on the **Define Custom Colors** button.
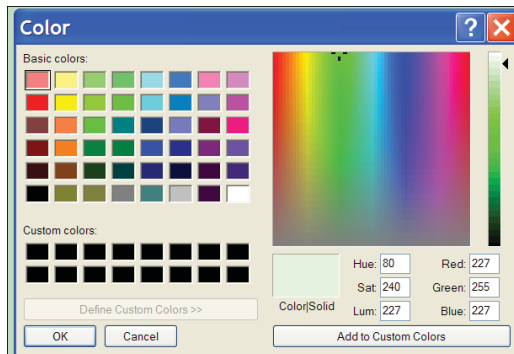
You will see a screen like this. On the far right is a graduated color scale that starts at white at the top and progresses down to black at the bottom. The little triangle shows the currently selected color. Click on the arrow and drag it up one or two spots so that the arrow is just below the white section.

Click on the **Add to Custom Colors** button then click on **Ok**. This brings you back to the previous screen.

Click on the **Apply** button and the background of the map should change to the new color.

Feel free to experiment to get the color you like. Some people like a light yellow or a light grey. It is up to you.

Save Project File

The next step is to save this project so that PC-Travel 3 can use it.
Click on **File:Save Project As...** in the menu at the top of the screen.
Navigate back to the folder with your shapefiles (very important).
Enter *PCT* in the **File Name** text box, then click **Save**.
This creates a PCT.ttkgp project file in the Maps\YourCountyName folder. PC-Travel 3 looks in this folder for the shape files and for the project file.

When you are done you should have the shape files in your folder now and only the .ini files in the Maps folder. Congratulations you have successfully created maps of your area and formatted them to use in PC-Travel 3.

Misc Notes:

Many users like to create a separate folder for each county or collection of counties that are part of the same map project. This is particularly true for consultants who might have clients in many different parts of one or more states. In this case first create a folder with the name of the county or counties under the Maps folder. Unzip the map files you download from the Internet to this new folder and then follow the directions above. Make sure you save the map project file PCT.ttkgp in the same folder as the shapefiles. Don't save the map project file in another folder and then move it to the new folder. This doesn't work.

The procedure shown here is only one way to get to the same result. If you know a better way, please let us know so we can share the information.

The way the map looks is completely adjustable. If you would like to learn how TatukGIS Viewer works and come up with different symbology for the features, then please feel free to experiment. If you come up with some looks you like, let us know and we will share them with others on the **www.pc-travel.com** website.

If you do make changes then make sure you save both the .ini for the layer you edit, and the project file. Just make sure you save your project as PCT.ttkgp so that PC-Travel can use it.

How To Learn About PC-Travel: Web Tutorials

Now that you have installed the software and map project files, what next? In the 'old days' there would be another hundred pages to this manual that would explain how to run the software using text and pictures. But that isn't the best way to learn. The best way is to have someone who knows the software show you how the software works. That is what happens on the web tutorials.

Go to **www.pc-travel.com**. Click on the *Tutorials* link on the left side of the screen. This will bring up the list of available tutorials as shown in the screen shot below. This list will be expanded as new tutorials are added.

If you are new to PC-Travel then certainly watch the first few tutorials. The first two **Introduction to ...** will give you a complete 'walkthrough' of the software so you can see the entire process. (Note: this screenshot doesn't show the **Introduction to GPS2LT3** tutorial which was added after this manual was written).

If the section of this manual on creating map projects (pages 13-19) was confusing you can watch the **How To Create a Map Project with US Census Bureau Data** tutorial which shows the entire process from start to finish.

If you have a topic for a future tutorial that you think would help other users, let us know.

Field Worksheet

It is a good idea to take notes when you collect data in the field so that if there are any questions about the data when it is processed in the office there is a written record to check.

We created a simple form you can use. Feel free to come up with a version of your own.

The important section is the Runs section. If anything unusual happens during a run, such as congestion that is caused by an accident or a stalled vehicle, anything that isn't really representative of the traffic during that time, then mark it down on the form.

With version 2 of PC-Travel most users don't mark nodes in the field so there isn't any place on this form to write down the node names. If you still like to mark nodes in the field, or if you don't use GPS receivers to collect the data, then you can write the node names on the far right side of the form.

It isn't critical to get the starting time exactly right. Plus or minus a minute or so is fine. The time can be used in case there is some confusion about which direction a particular run was going. With GPS data and editing the data on a map, even this isn't really needed since it is easy to tell the direction of a particular run from the data points that are plotted on the map.

The main use of the form is for unusual events, ones that might explain data that seems odd when you are look- ing at it back in the office (office weeks or months after collecting the data). Keep that in mind.

On Page 23 is a form with some sample notes to give you an idea what to do. On Page 24 is a blank, full size form you can copy to use for your own studies.

Fill out the top section before you start the runs. Use one sheet for each study.

You could put a rough sketch of the route on the back of the worksheet, especially to show temporary things like work zones.

PC-Travel Field Worksheet

Location:	56ᵗʰ ST		Date:	5-11-2011
Operator:	DON			

Runs:

#	Dir	Time	Comments
1	NB	9:49	
2	SB	9:58	
3	NB	10:05	
4	SB	10:13	
5	NB	10:20	
6	SB	10:28	LIGHT RAIN
7	NB	10:35	"
8	SB	10:42	"
9			
10			
11			
12			
13			
14			
15			

Put the direction and starting time at the beginning of each run.

Add any comments at the end of each run.

Notes:

LIGHT RAIN FOR LAST 3 RUNS. DIDN'T SEEM TO AFFECT DRIVERS.

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Remember: The point of the worksheet is to record what happens during the runs so the information can be entered properly and easily into the software back in the office. Also focus on items that might effect the interpretation of the data---odd traffic patterns, weather considerations, accidents, work zones, etc. Ask yourself, "What do I want to remember about these runs 6 months from now?"

PC-Travel Field Worksheet

Location: _____ _Date:_ _____

Operator: _____

Runs:

#	Dir	Time	Comments
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			

Notes:

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