



Gravestone Project Instructions

Graveyard Data Level

Step 1 : Identifying marble gravestones

The markers for graves in graveyards (or cemeteries) can be made of a huge range of materials. Some are as simple as a piece of wood and some are as ornate as a carved statue. In most parts of the world stone is the most common material used to mark graves. For this project you need to be able to identify gravestones that are made of marble.

Marble gravestones are quite easy to identify, as they are normally white in color. In some locations the marble is light to dark grey, and even red has been seen. However, for this project it is the white marble headstones that you need to find.

Other than marble, gravestones have been made out of granite, slate, sandstone and any local stone that could be carved. None of these stones can be used in this study, but it can be interesting to see what has been used in each graveyard.

Lead Lettering

Black or grey lettering on marble gravestones is a good sign that lead has been used to fill the letters. On new gravestones the lettering will be flush with the marble. On older gravestones the lead will stick out of the marble. Sometimes the lead completely falls out leaving the remains of the carved letters along with small holes in the marble where the lead once was. Sometimes black paint has been used inside the carved letters to make the letters stand out. These will be easy to identify as the letters are below the surface of the marble. Also, the letters do not have the small holes drilled into them to help hold the lead.

From a brief web study and our own research, it seems that lead lettering was commonly used in the UK, Australia and parts of New Zealand. Also, in some countries brass letters are added to gravestones. These letters sit on (not flush with) with the marble surface and

therefore can't be used. So don't be disappointed if you don't find these marble-lead types of gravestone, as you can take measurements on marble gravestones without lead lettering.

Step 2 : Visiting graveyards and searching for marble headstones

Visiting graveyards in your local area or while you are traveling will be easy. Almost every town and village will have at least one. Most are open to the public during the day. Many have restrictions on entry at night (dusk to dawn) because of vandalism. Please make sure that you follow the local regulations, laws and customs when visiting the graveyard such as opening hours etc. Some graveyards occur in historic sites, parks and national parks. You may need to seek permission from the land manager before you collect data from these sites. It is also very important to realize that graves are sacred places for many in the community and therefore you must take particular care not to walk on, disturb or damage a grave or gravestone in any way. Gathering data for this project can be done without walking on graves. Do so from the side of the grave and be careful not to mark or damage the gravestone in any way.

In this project you will need to collect quite an amount of information. To help you we have developed a Gravestones Project Datasheet that you can print off and take with you. Just fill in the data on site and then you can use the sheet to complete your EarthTrek log when you return to a computer. (Steps 3 or 6) If you have a digital camera, you can also upload images when you log the graveyard of each gravestone you measure and a general one of the graveyard.

The first task is to find the name of the graveyard. There may be a sign, or the name may be recorded on a map. You may need to ask a local official (town hall, police, library, museum). If it is associated with the church/house of worship, use the name of that place. Having the correct name is important, but not essential. Many old graveyard names have been lost or never recorded.

If the graveyard is very large (i.e. more than the size of a couple of football fields or a few hectares) then it is most probably divided up into sections. Each section is normally marked, often by religion or denomination. In this case you can treat each section like a separate graveyard, just remember to name the section as well as the graveyard in your log.

The second task is to go to the approximate center of the graveyard (or section) and record the latitude and longitude. This is the central location data for the graveyard and you will be asked the log this for each graveyard you visit. Write down the time you do this as well. You will need this for your log.

Your third task in visiting is to firstly walk through the graveyard and see if you can find any marble gravestones. Some graveyards will be full of these gravestones - others will not contain even one. It is very important that we know which graveyards do and don't

have the marble gravestones. If the graveyard has no marble gravestones, you can now go to Step 3 and EarthTrekLog your data.

If the graveyard has marble gravestones, then you can either just go to step 3 and EarthTrekLog the graveyard, or continue to collect data at five different gravestones.

Step 3 : EarthTrekLog your graveyard data

If you are not going to record marble gravestone data because either the graveyard does not contain marble gravestones or you do not have a micrometer to use for the next data collecting level, you can EarthTrekLog the graveyard data. Log onto EarthTrek and then select the Gravestone Project. Click on the Log Data button and complete the online form.

Gravestone Data Level

In this level of the project there are two ways to take measurements. The first can only be done on marble gravestones that have lead lettering (Steps 4a and 5a). The second way can be done on almost all marble headstones (Steps 4b and 5b). Read carefully all the notes for what you need to do for each type of marble gravestone. Remember that whichever method you use you will need to log the data (Step 6).

Marble-Lead gravestone method

Step 4a : Locating five marble-lead gravestones

If you are in a graveyard that has marble-lead gravestones then selecting which five marble-lead gravestones to collect the data for a graveyard may be a challenge, especially if you are in a large graveyard with many hundreds to pick from. Remember that we are trying to get a good representation of the gravestones and so we need to consider four things.

Different ages

The first thing is to select gravestones that are of different ages. Most gravestones are erected about one year after the person died and was buried. You will find that often more than one person was buried in the same grave, so look for the youngest date of death. So if two people were buried in the same grave and the stone has two death dates of 1879 and 1911, then it's the 1911 date you will record. This is because the stone was most probably re-carved with the new date, new lead placed into the letters and re-polished flat, essentially resetting the weathering clock for the gravestone. You should try and get two that are some of the oldest gravestones you can find. You should then find one gravestone that is one of the youngest you can find. And finally find two gravestones that are somewhere in between the oldest and the youngest.

Having these five gravestones spread in ages can provide some other important information like changes to the rate of weathering over time.

Upright (vertical) gravestones

The second thing is to only select gravestones that are completely vertical. Some gravestones are installed at an angle, or have moved so they are at an angle. To get data that we can compare, we need measurements from only vertical gravestones.

Facing direction

The third thing is to pick gravestones that face in different directions. This is because the orientation of the gravestone to the dominant rain direction and the drying effects of the sun can also affect the weathering of the marble, so you should try and get measurements from gravestones that face in different directions. Some graveyards have all their stones facing in the same direction. But many have them facing in directions related to the changes of slope in the ground. What ever is the case, you will need to work out the direction (in this case a compass bearing from 0 to 359 degrees) and record this for each stone.

To get this direction, set your GPS into compass mode. Place the GPS against the face of the gravestone that has the lettering and then move the GPS away from the gravestone at 90 degrees to the face. The GPS will show you the direction the stone is facing.

No restoration

The fourth thing to take into consideration is to make sure that the gravestone has not been restored. Sometimes families pay to have gravestones taken away and have new lead lettering and re-polished then replaced on site. These may be hard to recognize, but expect that they will appear to be in much better condition than other gravestones of the same age. If you are in doubt, then pick a different gravestone.

No lichens or mold

The final consideration is that the gravestone has to be relatively clean and free of mold or lichens. These 'plants' can get under the lead and lift it out giving bad data. Mold/lichens may only affect one part of the gravestone lettering, and so measurements could be taken from those letters away from mold/lichens. Alternatively, choose another gravestone if you can.

5a : Collecting five measurements at each gravestone

Measuring the distance from the front of the lead lettering to the marble needs to be done carefully with a micrometer. Rather than just taking one measurement per gravestone, we will take five measurements. This helps to average out any problems due to lead moving for other reasons.

To take a measurement, place the base of the micrometer against the lead so that the spine of the micrometer when pushed out will reach the marble. Make sure that the base

is flat on the lead and not at an angle. Slowly push the spine out so it touches the marble then take the reading. For more help, see the section on "How to read a micrometer".

For almost all cases, the reading should be less than a few millimeters.

Record the information on the Gravestones Project Datasheet. Move the micrometer to another lead letter on a different part of the gravestone and repeat. Do this three more times so you end up with five readings for the one gravestone.

Remember to show respect to the grave while you are doing your measurements. Stand to the side of the gravestone rather than directly on top of the grave. If you can't take a measurement from the side, then find another gravestone.

To help us tie the two methods of measurement together, we would like you to measure the oldest gravestone you did using this method by also using the method below for the oldest marble-lead gravestone.

Marble gravestone (no lead letters) method

Step 4b : Locating five marble gravestones

If you are in a graveyard that has marble gravestones without lead lettering, then selecting which five marble gravestones to collect the data for a graveyard may also be a challenge. We are going to assume that when most gravestones are made that the front and back of the gravestone are parallel to each other. Sometimes, although rarely, gravestones are made where the front of the stone is at an angle to the back. We can't use these stones for this study.

Remember that we are trying to get a good representation of the gravestones and so we need to consider four things.

Different ages

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We also notice that in some graveyards there are marble gravestones without a death date recorded on them at all. You will not be able to use these gravestones in this project.

You should try and get two that are some of the oldest gravestones you can find. You should then find one gravestone that is one of the youngest you can find. And finally find two gravestones that are somewhere in between the oldest and the youngest.

Having these five gravestones spread in ages can provide some other important information like changes to the rate of weathering over time.

Upright (vertical) gravestones

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No restoration

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Step 5b : Collecting five measurements at each gravestone

To measure the weathering on these marble gravestones we are going to take five measurements using the micrometer calipers. We are going to take two measurements at the base of the stone. These need to be 20 mm (7/8 inch) from ground level, one on either side of the gravestone. You should record your thickness measurements 35 to 40 mm (1.4 inch) in from the side of the stone (this is about as far as a standard set of calipers can reach). We are also going to take two measurements on the side of the stone at 500 mm (20 inches) from ground level on either side. These also need to be measured 35 mm to 40 mm in from the side of the stone. If the gravestone is not tall enough to take the measurement at 500 mm above ground level, or if it is not possible to get all of these measurements because of the way the stone is placed, or if it is broken, you will have to select another gravestone.

To take a measurement, open the caliper ends of the micrometer wider than the thickness of the stone. Place them around the stone and then slide them in so that they touch the front and back of the stone. While the calipers are still touching the stone, read the scale on the micrometer and record the data. For more help, see the section on "How to read a micrometer".

For this project we need measurements taken with two decimal places i.e. X.XX or XX.XX or XXX.XX.

Record the information on the Gravestones Project Datasheet along with the date on the stone, the family name etc.

Remember to show respect to the grave while you are doing your measurements. Stand to the side of the gravestone rather than directly on top of the grave. If you can't take a measurement from the side, then find another gravestone.

Step 6 : EarthTrek Log your data

Log onto EarthTrek and then select the Gravestone Project. Click on the Log Data button and complete the online form using the data you collected on the Graveyard data sheet. You will need to complete both the graveyard data and the gravestone data.

If you have measured gravestones using the thickness method, make sure you recorded the data online in EXACTLY the same fields as on the data sheet.