

Quintana Roo Cave Mapping Project

By Peter Sprouse

Introduction

The goal of this project is to produce detailed, accurate cave maps of dry caves in Quintana Roo using methods that can facilitate integration of maps between various groups. This can involve resurveying, but our goal should always be to make ours the last survey that will ever be needed.

Surveying methods

Record only the instrument and tape readings in your data. Don't write down LRUD distances, as we don't utilize them. Concentrate instead on sketching to scale and orientation. Use of a protractor and ruler is imperative, the ASS protractor/ruler is perfect for our use. Sketching scale is 1/8"=1m, which in our standard large survey books means that the rectangles on the right page are 1 by 2m.

List your station names completely (ie "AB123"), and on a single line. Split line data can produce errors in interpretation. Instrument backsight readings are optional, but helpful. Use a slash to indicate foresight/backsight (171/351), or use an extra line to record backsights, using the column below the foresights.

Sketch complete floor detail, there is a symbol for everything so there is no excuse for blank space between passage walls. Blacken in the interior of columns in your sketch so that they can be distinguished easily. I recommend not bothering with drawing any floor detail outside the dripline in the collapses, ultimately I'd like to utilize imagery for that. Do try to sketch the outline, or depression contour, of the sinkhole collapses. Sketch cross sections in addition to the plan view, and profiles of main passages and entrance passages. Our caves are mazy, try to survey areas thoroughly as you go through them rather than doing just one survey line that leaves it to someone else to clean up. Don't shoot past any junctions, place a station at each one.

Number and mark all stations on the rock with marker and labeled flagging, and try to place them on the wall, ceiling, or big boulders. Stations on the floor will get trampled. Rather than picking a station prefix randomly, get one from the Walls data manager; these caves are now extensive enough that inadvertent duplication of prefixes is becoming a problem. Examine the line plot and working map of your assigned area. Give it to a team member and have them locate all existing stations nearby so that you can be ready for tie-ins. Don't resurvey any passages, always tie in to the nearest station! If you have the personnel, assign one person to just recon for tie-ins and plan the route for the team.

Creating the map in Adobe Illustrator

The goal here is for multiple people to be able to work on cave maps in Illustrator that can be readily integrated into regional cave maps. Key elements are

common symbols that can be dropped into the map, a common scale (1:500), standard line widths, and a standard layer structure set up for Walls round-tripping. Walls round-tripping will enable the walls and floor detail of the map to move with the newly adjusted baseline as loops are added, caves are connected, and GPS locations refined.

Your map section

I will set up the Illustrator file of the cave you are to draft, with the proper layers for round-tripping. Later, we can combine it with other maps to create an overall area cave map as needed. Your file will have the line plot in it, and a layer for scanned notes or pencil drafts as desired. The scale of the drawing is set at 1:500, meaning if you were to print it out at full size then 1 cm = 5 m.

Drawing on layers

It is critical to place your drawing elements on the appropriate layers in order to be compatible with round-tripping back to Walls. The main layers you will draw on are the w2d Walls (for the passage walls) and w2d Detail (for floor detail) layers. Note that there are two sub-layers under each of these, to hold two categories of objects, those that will be merely moved to follow the baseline (the sym sub-layer), and those that will move and also be morphed (shp sub-layer). In the symbols sub-layers you would put things like sand, bedrock floor symbols, text for passage names and the like that you don't want distorted when things move. In the shape sub-layers you want to put the items that you do want morphed: passage walls, floor and ceiling drops, lakes, etc. These tend to be the longer items on your drawing, and are the ones that are drawn to true shape, rather than represented by a symbol. In order for all our maps to be compatible, we have developed a line width standard: walls are 1 pt width, and detail is 0.5 pt. Dashed wall lines should be 4 pt dash length and 4 pt gap.

Locking layers

Be sure to lock the layers that you are not drawing on, so that you don't inadvertently affect them. It is especially important to lock the w2d Survey layer, you don't want to move the baseline inadvertently (though you can change the color if you want to). In general, you should only be modifying the layers that are shown in gray on the layers palette.

Bringing in scans

Bring your scanned survey notes or pencil drafts into the Scans layer using the "Place" command. As you use the Place command pay attention to whether or not you are linking the file or embedding it. If you embed it, your file size will increase, but the scan will not get misplaced as can happen with a linked file.

Using brushes and swatches

For floor drops, ceiling drops, and in some cases flowstone it can speed things quite a bit to use brushes, which are transformations that you apply to a line. We have created these brushes for you, they are in the brushes palette. Important

note: after drawing your line, but before applying the brush, make sure that the line width is set to 0.5, otherwise will make the brush line width squirrely. For areas of sand or small rocks, you can use the pre-made fills found in the swatches palette. Just create a shape (polygon) and apply the fill. However, I have found that swatches can be more trouble than they are worth, and no longer use them. Round-tripping alters brushes and swatches. Brushes are converted to groups, while swatches lose their fill and become invisible. They then have to be relocated and the swatch applied to them again.

Symbols

There is a collection of pre-made symbols that you can drag over onto your drawing, such as the bedrock floor symbol, various flowstone shapes, etc. These are sized to match our common drafting scale, so that when are various maps are all joined together they will generally look uniform in style. It is best not to resize them, as the line widths will change if you do so.

Water

Lakes in the plan should be in the w2d Detail>w2d Detail shp layer, they need to be morphed since they often follow the shape of the passage walls. When a lake does follow a long section of wall, just copy that wall line and create a new version on top of the old line (ctrl C, ctrl F). Then drag that new version of the line down to the w2d Detail>w2d Detail shp layer and edit it as needed, joining it to other lines to create your pool outline. Use a 0.25 point line for the outline of pools.

Cross Sections

Place cross sections in a sublayer under the w2d Detail>w2d Detail sym layer. By placing cross sections and their trace lines in a dedicated sublayer we can turn them on and off as needed for different types of map displays.

Text

Place text that is associated with specific passages in the w2d Walls>w2d Walls sym layer, because passage names are outside the walls and need to move with them (but not change shape). Title block text can go in the w2d Legend layer. Use Myriad Pro 12 pt for entrance names, and 10 pt for passage place names and comments, using upper and lower case. Italicize comments (ie, "goes") to distinguish them from place names.

Illustrator tips

Ctrl-shft A to clear current selection

C to cut a line, or hold down eraser tool icon until cut option appears

Space bar for push tool

Ctrl F to paste in same location

Alt drag to place a copy of an object

Check out Illustrator cave map drafting videos at brandonkowallis.com

Round-tripping

Be sure to read the Walls help topic on round-tripping. After you have entered new survey data for your cave in Walls, open up the Illustrator file that you want to RT. Double click on the Scans layer and click on the box that says “template”. This will exclude your scans from being affected by round-tripping. Then save a copy of the file as a .svg file. In your Walls project, go to the branch of your tree that you want to RT. Set it up so that the line plot shows what you want to include. On the root of that branch, click on “new item”, then “other” (not “survey file” or “book”). Browse til you locate the .svg file that you exported from AI and select it.

Now you are just about ready to export from Walls. Make sure your stations, labels, and vectors are the colors that you want, and that your frame dimensions are set appropriately. Then go up to the svg button on the top row. In the resulting dialog box set the grid interval and sub-interval. Enable “adjustable output”, and also the items that you want to RT, typically grid, vectors, and labels. Then say “OK”. The Walls2D viewer will display your new svg file. Make sure it looks like you want it to (right click to zoom out), then exit the viewer. Open up the svg file in AI and under “File” select “Document Setup. Here you want to enter the frame size that you used when you exported from Walls.

Lastly, you will want to make the apparent layers created by Walls into actual layers, these will be gray instead of white. Normally you will only need to do this for the ones you intend to create thing on, namely the Legend, Walls, and Detail layers. To make this conversion see the Walls help file on round-tripping.

Improvements

This map-making project and these guidelines will evolve as we go along, please make suggestions. Feel free to add to the brush, swatch, and symbols libraries.