

## KEY ELEMENTS TO “THE CAVE MAP”

**Cave Name:** I generally use a sans serif font like Arial Bold or Helvetica Bold for the cave name and a smaller version of that font and less bold for the cave room and passage names.

**Obvious Entrance or Connection with the Rest of the Cave:** You want to be able to easily locate the entrance without having it dominate the map. I use a sans serif font with a size somewhere in between the size of the title and the size of passage names.

**North Arrow:** This arrow should point to true north and should include a subordinate magnetic north arrow. Don't go too overboard with your arrow to the point that it distracts from the map or looks better than the map. Be creative.

**Bar Scale:** Avoid ratio scales, such as 1:600, or written scales, such as 1" = 50', because if the map is reduced or expanded, then this scale will be inaccurate. Bar scales are usually better. Be creative.

**Plan, Profile, Cross-Sections:** Which of these dominates the map is up to you, but should be based on the nature of the cave. With vertical caves you probably want to focus most on the profile view. An extended profile is a stretched version of the cave following the line of survey. A projected profile is a view of the cave as though you were looking at it in real life. Which one you used is up to you. Plan views should be used on all cave maps but should be more dominant on maps of horizontal caves. Cross-Sections help you understand the nature of the cave and should be included on all cave maps where possible. Sometimes cross sections can be used in conjunction with the plan view on a Vertical Cave map. The more complex a cave gets the more creative you have to be at combining these three elements to make sense of the cave. And that's what it's all about making the cave make sense on paper. Be creative.

**Date:** This date should be the date or time period when the cave was surveyed.

**Cartographer or Survey Group:** This will help any researcher know who they can contact about the creation of the map and the methods of survey, as well as the history of the cave.

## KEY ELEMENTS TO “A GOOD CAVE MAP”

**Balance and Layout:** Does the cave map appear well balanced to the eye, or are there areas that have too much or too little detail in them that are distracting?

**Drafting Technical Quality:** How technically correct is the drafting? Are the line widths (walls, symbols, labels) consistent? Are the symbols drawn well? Are the outside walls of the cave obvious, or do they blend in with the detail? Is there a True and Magnetic North Arrow?

**Detail Thoroughness:** Is there enough detail to understand the cave without being confusing? Is there too much detail? Is the detail consistent throughout the entire map? Would a caver be able to use the map to navigate through the cave?

**Vertical Control:** Is a vertical scale included with the Profile View? How well does the Profile View match the Plan View? Do you include a precise zero datum point? Could someone who has never been to the cave before look at the map and understand the behavior of its passages (how big or tight they are, how deep or shallow, whether this is a fault controlled cave or a river controlled cave or a hydrothermally controlled cave)

**Lettering:** Is the lettering even and consistent? Is it too small or too big? Is it all evenly spaced, both horizontally and vertically? Is the lettering easy to read? I would recommend using no more than 3 different fonts; one for the title, one for the passage names and legend, and one for the stats, names, and historical information.

### ADDITIONAL FACTORS:

In reality there are no hard rules for making cave maps, unless you are trying to win an award at the NSS salon. Be creative in what you put on your cave map and how you decided to work the layout. Some additional tools or elements that you can use on your map include:

**Location:** You should at least include the state and county. If the cave location is not sensitive you could include a topo map showing the location, a satellite photo, 3D GIS views, GPS coordinates and whatever else you might imagine up. The sole difference between sport and science is good documentation.

**Cross Sections:** These are extremely important if you want to show the relationships of the various cave passages to each other. Cross-Sections can either be drawn next to the cave passage or away from the passage and then flagged with letters or numbers. Cross-Sections lines should be arrowed to show the direction of view, they should show the horizontal and vertical relationships of adjacent passages. They should be consistent and should not be confused with passage lines or detail. They should not be squeezed in too close to the cave passage (this can sometimes make the cross-section look like it's part of the plan or profile view), nor should they be placed too far from that passage (this makes reading the map more difficult).

**Type of Survey:** While most North American cave surveyors choose not to use survey grades, the map should be noted as to its type (e.g., Topofil, Brunton and pace, or Suunto and fiberglass tape). In addition, loop closure accuracy may also be included. You can include it if you want to. I usually don't.

**Legend:** As many cave map users are not cavers, it is often a very good idea to include a legend with the cave map. Feel free to make up your own symbols, as long as you include a legend so the viewer knows what they mean.

**Length and Depth of the Cave:** I think this is pretty important, since that is one of the key things most cavers want to know about a cave. The length of the cave is the surveyed or horizontal length. The depth of

the cave is the difference between the elevations of the highest and lowest station or point in the cave. These may or may not be at an entrance.

**Passage endings:** Those passages which became too small for human passage, but look to continue, or are too high, or otherwise beyond the abilities or time of the surveyors, should be shown as continuing. It is also helpful to describe what the cave is doing or what the lead is like, whether there is air, whether it obviously opens up, whether the passage is blocked by delicate formations, etc. These notes are made to aid in future exploration. Don't mark a passage as a lead if it is not humanly possible, ie too tight and doesn't seem to have any chance of opening up.

**Personnel:** It is always a nice touch to say who helped map the cave. Credit may be given to the project leaders, the people who reduced the data, and the cartographers. A thank you can also be given to the landowner or the appropriate government agency.

**Survey Stations:** Survey stations should not be shown on the final map, unless the map will be used for future geological, biological, or paleontological work.

**State or Province Speleological Survey Code Numbers** can be displayed on the map. These may be placed in the title block, or they may be displayed in an unobtrusive manner elsewhere on the map.

**Notes:** Unobtrusive notes on the geology, biology, history, or whatever can be included on the map if the cartographer so wishes.

**Photographs and Illustrations:** An unobtrusive artistic drawing of the cave entrance or some feature in or around the cave can be included if the cartographer so wishes. These can enhance the map a great deal or they can detract from the map. It's up to you to decide if it helps the map or not.

**Borders:** All maps should include a border.

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## THE CAVE MAP VISUAL HIERARCHY

When you look at a good cave map your attention should be drawn to certain elements before others. You must decide what are the most important elements of your map and then design it so that the viewer can easily find those elements in the right order. For example, if I want my cave to be noticed first, but my passage names are too big and bright red, people will get distracted by my passage names and have a more difficult time noticing the cave. So as you are designing the cave map keep your own visual hierarchy in mind. Here is mine:

- 1) **The cave.** The first thing I want people to notice is that they are looking at a cave map so I donate plenty of good space to the cave illustration.
- 2) **The title.** The second thing I want is for people to know which cave they are looking at and where it is so I make the title big enough to stick out by not so big it dominates the cave map.
- 3) **The view.** The third thing I want people to know is whether they are looking at the Plan or Profile view of the cave so I make the “Plan View” and “Profile View” headings obvious but not bigger than the title.
- 4) **The entrance.** The fourth thing I want people to know is where the entrance is to the cave, so I make the “Entrance” heading big enough to locate easily, but not so big it become distracting.
- 5) **The scale and direction.** The fifth thing I want people to see is the size of the cave and the direction it is facing, so I put these in a place that is easy to find, but not too obtrusive.
- 6) **The detail.** Once people have quickly decided where they are in relation to the cave I want them move in closer and start exploring the cave passages, and understand what the cave is doing, so I make the detail clean and simple to read.
- 7) **The names.** As they start to explore I want them to discover the names of different passages, so I make the names big enough to easily read and big enough to stand out.
- 8) **Who and What was involved.** Finally when they have finished exploring the cave I want them to be able to sit back and read about who explored the cave, what leads are doing, and what was involved, so I make this font the smallest, but still easy enough to read and not cluttery so that it distracts from the viewing experience.