
Survey Aesthetics

This article addresses a seldom-raised subject in surveying, the appearance of our plats. Considering that a survey plat or a section of mapping is the ultimate product of surveyors it is ironic that the aspect of graphical aesthetics receives so little attention. In fact, it seems a strange indifference pervades the industry. We should consider how often the general public sees and forms opinions of surveyors through this product. It is the face that we present to the world.

Today one sees more and more surveys that while technically perfect are lacking in aesthetic touches. Surveys are very large scale maps and all maps, when masterfully executed, contain an inherent beauty. A good map will possess a composed look, as if the different items depicted were not merely added to the drawing, but placed there for effect. The elements should be laid out so that they are engaging and easy to read. But it seems the exception and not the rule to find these beautiful surveys any longer. Pick up a recent plat book and turn its pages. Some of the surveys while technically excellent are devoid of personality; drearily plain expanses of letters and lines, all the same size, weight, and font. Some look as though the draftsman believed in one way and one way only to place long strings of text or felt that the only good text was that with 5 inch long leaders. Some of the surveys look like tangles of string instead of drawn lines.

I believe that in general, the appearance of plats and surveys has declined in recent years. This is likely attributable in some measure to the proliferation of CAD programs. When drawings were made by hand, changes and improvements were expensive in time and money. This necessitated that draftsmen took pains to minimize mistakes and produce drawings that needed little refinement and rearrangement. A lot was invested in draftsmen in terms of education and training before they drew their first survey. With the onset of CAD, drafting became more accessible to people without formal training. All they had to do was make the drawing, however it looked, to be improved later by a supervisor. And eventually, the improving part of the process became minimized or left behind altogether. A CAD tech can start drafting surveys almost immediately without the months of training that would be required to learn the use of manual equipment. Also, there is less reason to learn the finer points of drafting when a tech can rough out a drawing and a supervisor can come behind and refine the drawing or mark up errors. Another problem with CAD is that it encourages techs to pay too much heed to their own convenience and too little to that of the end user. An example would be the zig-zag symbols along a power line. Think how easy they were to construct by hand. One simply drew a line with breaks along a straight edge and went back and hand drew in the zig-zags. In CAD the line can be drawn automatically by assigning a line style with zig-zags in it. But the power symbol part of the line is immovable, so if one falls on a fire hydrant for example and obscures it then some labor is required to move it. Most CAD programs require one to explode the line style, place a break in the line, and copy in the zig-zag symbol. Also prevalent in CAD drawings is a loss of individuality. It is too easy to use the default symbols and linetypes in a software than to develop your own. So, in summary, with the emergence of CAD, the often talked about scenario has occurred in which while gaining the knowledge of a new technology there has been a corresponding loss of wisdom of old skills. However, CAD does not have to be the enemy. The CAD/computer is a tool just like the T-square and technical drawing pen. It is just a much more powerful tool. Think of all of the fonts available in AutoCAD and then of all of the sizing and weighting options for the text. Think how easy it is to vary the thickness and saturation of lines by way of AutoCAD color tables. There is ample opportunity to inject personality and aesthetics into a drawing. If one invests enough time in software training I believe one can draw in CAD to the equal of any hand drawn survey and at five times the economy.

This can be a difficult subject and is often answered by: “hey, it’s right and we’re getting paid, so, who cares?” or “to each his own”. It does deal very much with issues that are subjective. Who is to say how something should be labeled or shaded or leaded? And yet, the principles of design do exist and manage to fill many textbooks. Some are based on scientific research in which experiments were conducted to determine what graphical techniques and depictions led to ease of interpretation and comprehension. Some are based on long held cartographic conventions such as using shields for symbolizing interstate numbers or stippling an area to indicate concrete. Why is there a north arrow instead of a “west fish”? No reason at all, except tradition. The engineering community usually gets some exposure to these principles in

college while attending drafting classes. Cartography students are taught well how to do these things. And graphic artists are inundated with design principles throughout their formal education. It's just that the information doesn't disseminate down to the surveying community, at least not anymore. That's lamentable because, in my opinion, every surveyor that produces surveys is a graphic artist.

What follows are a few basic guidelines for good graphic communication. Some of these are based on scientific research. Others are based on long held cartographic conventions.

1. Balance and layout. The graphic elements of the plat should fill the area within the border or "neat line" as much as possible and be "balanced" in a way that is visually appealing to the user. This is achieved by distributing the elements harmoniously about the visual center of the work area. The visual center is not at the geometric center of the work area, surprisingly, but almost 10% above it. If you use the visual center as a fulcrum and balance the elements around it, then the desired affect will be achieved. The appearance of the survey will "feel right" to the user and thus, will be easier to read. The usual strategy to achieve this is to put on the survey the land area being depicted and place the remaining elements such as the north arrow, seal, and survey notes in the remaining empty spaces. This goes hand in hand with the drawing scale and paper size decision. Be willing to quickly abandon the "north is up" orientation when it serves you to do so.
2. Line contrast. One of the biggest hindrances to efficiently "reading" a survey or map is a lack of differentiation in line weights. This is a common problem with surveys. On a boundary survey, the property lines of the parcel in question are usually thicker than other lines in the survey, but often this is the only contrast in the whole survey, and sometimes this line is grossly over-thick. Without contrast between lines that depict different items in the survey the user has difficulty picking out those items. The idea is to set up a hierarchy of line weights with the thicker lines to be used on progressively more important items in the survey. The more difference that exists between items depicted, the greater the variation in the line weights. For example, if a difference in line weight exists between the lines used to draw a house and the lines to draw a driveway, the difference does not need to be great. However, if a leader is used to label the driveway as concrete it should be significantly different, and, in my opinion smaller because it has less importance than the driveway itself. Be consistent throughout the survey and try to limit the number of classes to five. Have no more than a 25 % increase between intervals and no less than 10% with the exception of the property line on a boundary survey which should get a double jump.
3. Text size, weight, and placement. Text placement can be a big factor in enhancing readability. The optimal setting for a text is next to the element being described at about the "2 o'clock" position. Be prepared to abandon this easily and often to minimize graphical obstructions. Except for the title use compact, rectangular text blocks of text instead of long strings. An imaginary text block outline should approximate the "golden rectangle" from classical geometry. This is basically the shape of a credit card. Just as with lines, you want to construct a hierarchy of text sizes to describe different classes of elements in the survey. The letters to describe a factory would be larger than the letters to describe a house whose letters would be larger than the letters to label a garden shed. I would suggest that larger text sizes describe the following entities in ascending order: material descriptions, object descriptions, property corners, courses and distances, title block information, and finally, the title. At some point you will need to fit in some text for which you have a set size but it won't fit in the space that you have. In this case I believe it's better to make the text smaller rather than leader it in. But only up to a point. Using leaders to connect text to the objects they describe are often necessary, but frequently are overused. I usually think of leaders as a last resort tactic. Keep it to a minimum and, most importantly, be sure that the leader line will not be confused with the other line work of the survey. This is why I almost always choose curved leaders instead of straight line leaders.
4. As to the letters themselves, two important points should be mentioned. First, using all capitalized letters

is something to be minimized. It seems to have gained a disappointing prevalence in surveying and engineering products throughout the industry. It's common to see a boundary topo plat without one lower case letter. Studies have shown that a person can read text in lower case significantly faster than capitals, and with greater comprehension. This is because a word is recognized by its' silhouette rather than by looking at each letter. Secondly, letters that are moderately serified are more easily read than sans-serif letters. Serified letters aid in word recognition and have a stately look to them. But again, sans-serif letters dominate the industry, and they do have a clean, modern look. But, it's not by chance that virtually all newspapers, books, and magazines use serified letters. Finally, it is okay to use decorative typefaces occasionally, but not overly decorative typefaces such as *Gothic Old English*, even for a few items, such as the legend and north arrow. They are difficult to read and look ridiculous.

5. Use legends intelligently. If there is an element on the survey such as a power pole, then it should be in the legend. But, then, you wouldn't want to label it as a power pole in the drawing. That is the point of the legend. But rather than having everything in the legend you may just want to label some items, especially the seldom used, such as a decorative fountain or a ham radio antenna. Also, give some thought to what symbols you use to represent something. Make it easy for the reader to arrive at comprehension. Obviously having the symbol as some approximation of what the object would look like from a bird's-eye view is one example of this. Another might be to add a couple of letters to a symbol such as putting "RW" next to a small box to represent a right-of-way marker. Note that there are a few aspects of the survey so foundational they don't need to be described in the legend. Some examples would be the property lines of the subject property, woodlines, and edges of buildings. It is actually a violation of statutes regulating the profession to do this in some states, but I don't think it should be.

Following are some miscellaneous graphicacy issues:

1. On a topo map use tick marks pointing inward to indicate a closed depression contour.
2. Speaking of topo maps, place a spot elevation at the summits and sag points. Spots should proliferate on the relatively flat areas and be used sparsely if at all in areas of high relief. They shouldn't fit there anyway with contours so close together.
3. When connecting power poles with power lines trim the power line back to the edge of the pole. Don't continue it into the center of the pole. This destroys the illusion of the pole symbol being the pole. The same goes for pipes running to catch basins and manholes.
4. Place curve data to the inside of a curve when possible.
5. It's always good to show short hatched lines on the inside edge of buildings. It really aids in "seeing" the building structure. They should be of slightly less weight than the edge of the building. One way to achieve this is to create an offset structure two to four feet inside the building, fill the narrow space between the lines with a diagonal hatch, and then place the interior building offset on a hidden layer.
6. All other things being equal, it is better to show a textured or shaded fill for concrete and asphalt as opposed to labeling only. Some care should be taken in this decision, however, because fills always increase production time considerably.
7. It's best to use double dashed lines for pipes. The double lines lend to the illusion of the pipe and the dashed lines to signify it is underground.

8. When it is impossible to place text without obstructing something, one option available is masking, where a small area fitting the text and extending slightly beyond is removed for clarity. One can also practice selective masking in which some items are removed and others are deemed too important and are left intact.

Most importantly, the survey should demonstrate an overall organization, a sense of being designed. Think of the neat line of the survey as the frame of a picture. Arrange the elements of the drawing in ways that are aesthetically satisfying; in a way that allows the user to navigate through the survey better and faster. Adhere to the line weight and text size hierarchy when it serves you, abandon it when it doesn't. There will be empty spots on any survey but they should not predominate in one area. Take full advantage of all of the automation that a CAD software offers, but realize that you can override the process and utilize some artistic freedom when necessary.

In submitting surveys for recording or for certain clients you will encounter standards. I will almost guarantee you the following things. The standards were not written by surveyors. The standards do not make aesthetically pleasing surveys. And often the standards will not even make sense. In one government jurisdiction I am familiar with the line style and weight for a property line and an easement line are identical! Imagine two adjoining lots with a drainage easement running back from the street on the edge of one of the lots. The result if one followed the mandated standards would be what looks like three property lines and no one could tell which property had the easement! When you encounter something like this your choice of action should be clear. Fight! We as surveyors should be the experts as to how a survey should look. And, at the very least we should be consulted for input when formulating standards. Many people are intimidated by standards and feel as though they are beyond reproach. To do anything other than submit to them would be an unpatriotic act of defiance that would waste company resources and after all they represent the distilled wisdom of the finest minds in the land development industry. Personal experience tells me that when drafting standards are in place they were usually arbitrarily arrived at and represent a head CADD techs' personal preference. No one can really explain why the title of a survey must be written with text size #14 and colored magenta but "the guy that wrote the book of standards" for the county in question "assured everyone that this was the best way and things wouldn't work any other way. No, you can't discuss it with him, he only worked here for two years and that was five years ago." You get the idea. We are the surveyors. WE SET THE STANDARDS.

This article does not promote style over substance. The first order of business of a survey is function through accuracy. I merely submit that aesthetics are an integral part of function. I propose that when the accuracy and precision of a survey are achieved you are not finished. You have a rough diamond that needs and deserves polishing. Forgetting the artistic touches of surveying is ultimately bad for the bottom line and for the profession. Take as long as necessary to create the optimal mapping you want. This is the legacy that you will leave behind.

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