

GIS and SURVEY GRADE DATA for Urban Oil and Gas Operations

Robert L. Young

Principal Surveyor – Young and Associates and Digital Mapping Services
9601 Camp Bowie West – Fort Worth, Texas – 76116

ABSTRACT

Urbanized drilling operations has created more value for GIS professionals as the on-going changes in municipal ordinances and other regulatory agencies are applied for compliance & permitting. This involves buffering when choosing a well site and pipeline routes in populated urbanized areas. The use of high resolution aerial data, along with Survey Grade data of boundary lines, physical improvements and other hazards that create the criteria for location of facilities saves time and money.

An accurate base map of the parcel fabric is a must and this is provided by on the ground surveys. In addition, the location of buildings, and other improvements as well as natural objects like streams and rivers help the decision making process when located and buffers drawn to show the potential drillable sites for wells and the potential routes for running pipelines with the least negative impact on the environment, and also the most efficient route in terms of construction costs.

Coordination between the surveyors and the GIS professionals is a must and creates a synergy that helps perpetuate the win/win/win solutions for the Surveying and GIS professions, and of course in the end the client of both.

BACKGROUND ON OUR TWO COMPANY APPROACH

We have two companies that work together on many projects. They consist of a land surveying company and a full service GIS company. We have discovered that this combination really works, and especially for our clients as more energy companies are realizing the value that GIS can play in their many decisions. Knowing where they have been, where they are, and where they plan on going and growing. We have embraced GIS as the tool to manage our Surveying company, and thus created a great deal of value for our clients as a result of having high standards for our base map, using best practices and procedures, continuing to upgrade and enhance our database, and most of all staying on repeatable coordinate systems with ALL projects for ALL clients to continue to grow a base map that benefits many in our present time. Our goal is that our data will live on and be of value to future surveyors and GIS professionals. We

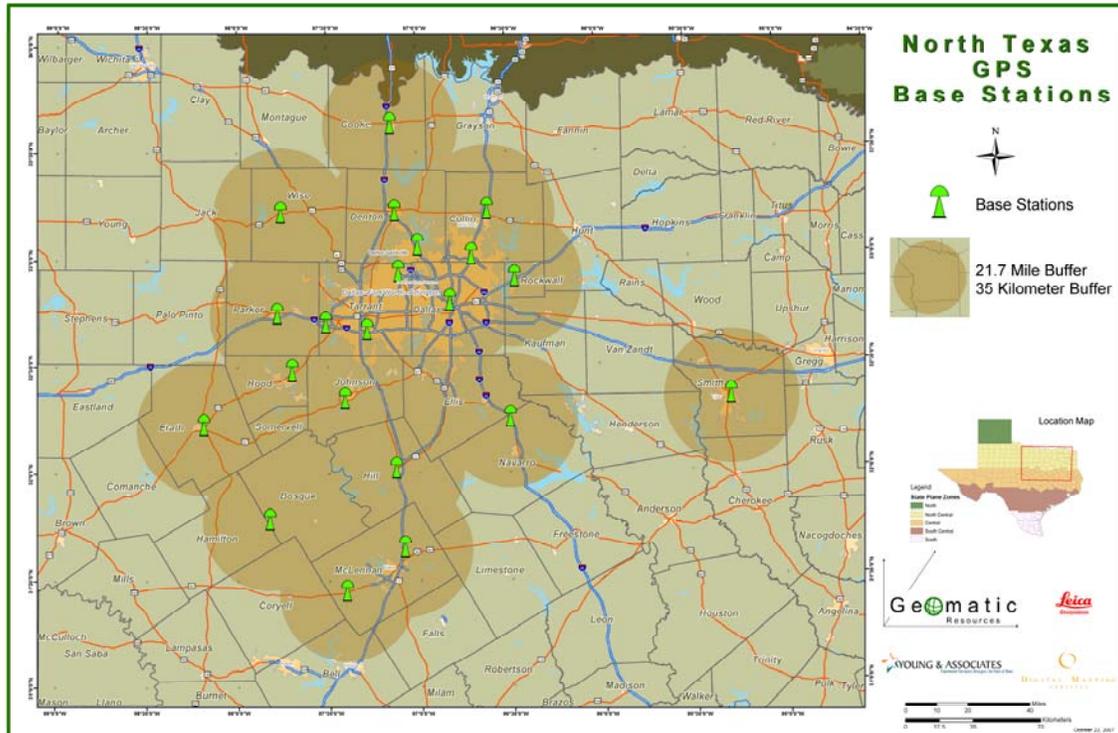
strive to keep the metadata associated with each project and data point that we collect adding value and credibility to the data we provide and share. Just in the past year, we have developed our own GIS department within the survey company based on the amount of data to manage, and especially based on the demand of the clients for better digital data from the surveyors. There has also been a greater demand for parcel mapping by our GIS company which has allowed a revenue stream from “outside our companies” for our GIS operation. It has been amazing to me to see a lot of resistance to provide digital deliverables by many of my land surveying peers, but has proven to be the best route for our two companies, as evidenced by our rapid growth, happy clients, and our mission to positively impact the surveying and mapping professions. We are proud of the job we do, and sharing data is what GIS is all about, especially when someone hires us to create a map. They get the paper maps if they want, but providing the digital deliverables to their specifications has been a real competitive advantage I never planned on, but am realizing as we grow. Please note in this paper “Our companies” will refer to the team we have of Young and Associates Surveying and Mapping, LLC and Digital Mapping Services, LLC.

GIS and SURVEY GRADE GPS – ROCKS !

The availability of Survey Grade GPS Data

The densification of Survey Grade Reference networks all over our country, especially in urban areas, which produce the availability for anyone to obtain REAL TIME Survey Grade GPS data is one of the many ingredients that create the present day solutions to the challenges that the oil and gas producers have when performing exploration in urban areas. Our companies have experienced this in many ways by working in the Barnett Shale in the North Texas area. In the past, it has been very normal for the production of oil and gas to be done “out in the country” where there were still many challenges getting the products out of the ground and to the market place, but not nearly to the extent as in cities like the Dallas-Fort Worth, also known as the metroplex.

Please note the map below that shows the present configuration of these GPS reference stations which utilize the existing Cell Phone Networks to broadcast data for the many Survey Grade GPS rovers that are used in this market, not only for oil and gas, but all types of Surveying and Mapping operations.



As you can see above, the most populated and developed areas are very adequately covered with this GPS network. There are other networks in place that cover the same area, so no matter what brand of GPS you have, there is a Survey Grade Solution available, and the geo-reference data is no longer “too expensive” or “too hard” to obtain for the clients. This not only allows for getting survey points, but creating digital deliverables in any format desired by the client, like shp files, and geodatabases. This has propagated more base maps that are “Survey Grade” as the data and metadata is shared with the clients.

Rich GIS Base Map

The GIS component is greatly enhanced with many rich data sources like current high resolution aerial data, the value added data of all of the survey work performed each day being projected to the same datum and projection, in this case State Plane Coordinates, which creates a more detailed base map each day as the survey crews add more data to the parcel fabric, as well as showing the location of man made and natural objects which can be referred to as hazards or obstacles when planning a well pad or pipeline route in this type of developed terrain.

Our survey company uses Arcview to manage the work we do, track our progress, plan our projects, and benefits all parties involved, especially our clients as we provide data that can fit right into their base maps to help them manage their specific operations. It truly creates a "win – win" deal for us and the clients.

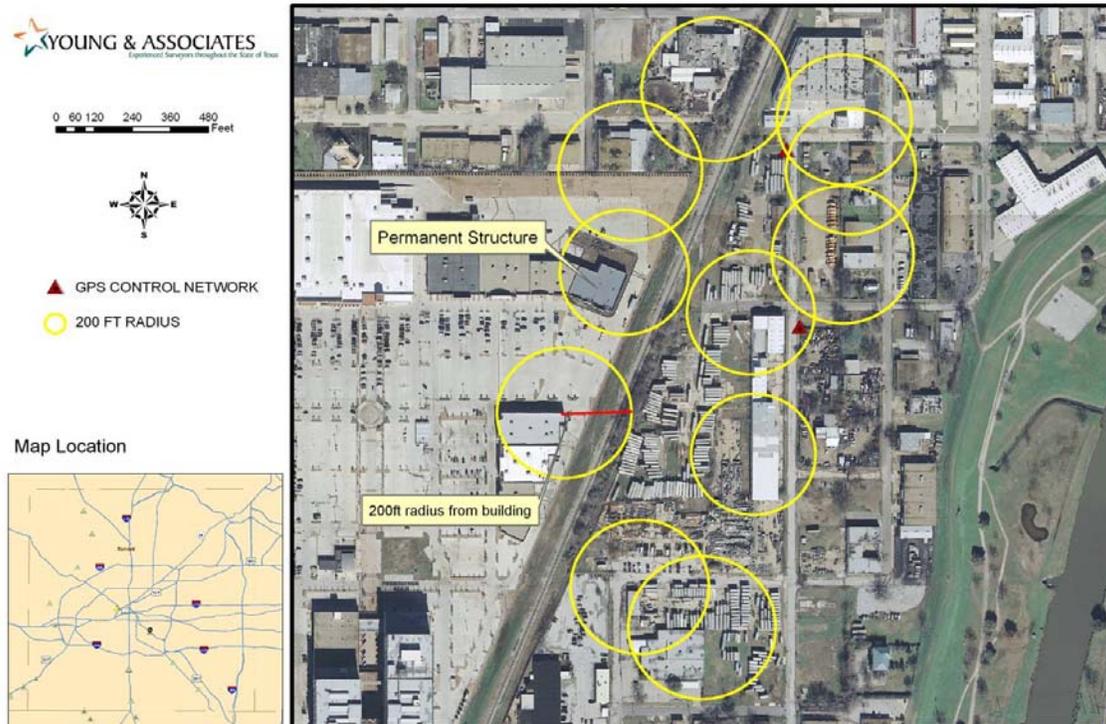
The "culture data" that comes with the GIS software is great to start with, but we continue to add parcel data, survey data, and many sources of free data, and other data that can be purchased from private and public agencies to add more value and functionality to our base map.

We have found that the majority of our clients are data poor and many do not have accurate base maps of the areas they have under lease, or areas they are developing. This creates an opportunity for our GIS company to help, as well as our survey company to be a source of verifying, or in some cases, helping to create a better quality base map for our clients. Inaccurate base maps just cause problems, frustrations, and cost many folks money as these maps are the source of many crucial decisions.

Buffers easily created in GIS drive decisions

When we are asked to find the best drill pad locations or pipeline routes for a client in an urban area, the utilization of buffers in the GIS is a major tool. Looks very simple and it is so, especially when you have really good data to work with. The regulations and ordinances from the local and state agencies creates the guidelines for what to use when picking a pad site. It usually involves distances from buildings, other facilities like water-waste water or other utilities, creeks, lakes, rivers, roads, and many other objects that once accurately located on the earth and base map, can be used as points to create buffers. This really gets to the possibilities of construction and exploration opportunities by creating a visual that leaves only the legal drill sites, or pipeline routes allowing higher quality decisions in a timely manner. When you know the facts and can rely on them, the oil and gas exploration teams can plan their work and production schedules much more efficiently. A good example is this map showing available drill pad locations after an on the ground survey and using the buffer tool. Barnett Shale drill site, Fort Worth, Texas.

7th Street Project Urban Drilling Site



SYNERGISM

Surveying and GIS are very compatible

We have discovered that most of the challenges between the professions are based on a lack of understanding of each other, and when you add a lack of communication, you have a greater potential for friction. Enough of the negatives as all of us have our stories about how things can and have gone wrong in the past, based on our personal experiences, or handed to us by other's who want to emphasize how bad things can be when you attempt to mix these two professions.

When we make things a "MUST" instead of a maybe, ought to, might, want, desire, or even a goal, then things happen. I urge all of you to make it a "MUST" when it comes to finding a way to create a better working relationship between the surveying and GIS professions. If it just starts from those of you reading this paper, then it will grow. In any areas of your life, when you make a decision to make something a MUST, it will happen. This is not based on positive thinking, but based on how our minds work in relation to challenges we give it. Why not become part of the solution instead part of the problem? If you are already open minded, then share your thoughts, and do your best to not

assume that everyone thinks the same as you. Make something good happen in your workplace or area of influence as it will create a positive wake and ripple effect that will be a force that impacts many others.

This paper is evidence that when there is a common goal and common interest, in this case providing the best data to the client in the most timely manner, true synergism can occur. This is based on desire and abilities to communicate resulting in a better understanding and higher level of trust between both professions. The clients do not care about this issue as long as they get their needs met, but I feel that it is a topic that must be addressed until such time when it is commonly accepted by surveyors and GIS professionals that we can co-exist and work together. There is more progress being made at all levels as this conference which is just one more bit of positive evidence that the parcel fabric of GIS base maps needs to be RIGHT. In the area of boundary locations, it is the role of a land surveyor to use all of the skills, knowledge, tools, and resources to help locate the boundaries of land ownership, Right of Ways, and even easements. We have experienced a high degree of excitement within our GIS folks when they continue to get really good data to work with. This is one way of breaking down walls between the professions, just share some data and ask for it to be evaluated on the content, usability, and accuracy. No matter which profession does this, it can be one way of starting a dialogue. Once the dialogue is started, then there can be exchanges of information, ideas, and finally solutions resulting in synergism.

External Forces and organizations are helping

ESRI is just one of many organizations that is focused on GIS and realizes the value of being inclusive to the Land Surveying profession. Several State Surveying organizations are beginning to create membership categories to embrace GIS professionals as the alignment of the two professions is being dictated by the market, as well as common sense. It is our experiences that the oil and gas professions expect synergism, as they are learning to ask better questions of their vendors, and create standards for their deliverables that help perpetuate the coordination and synergism between GIS and surveying. In the past the American Congress on Surveying and Mapping (ACSM) has been dominated by one group, the surveyors via National Society of Professional Surveyors (NSPS). This is changing at the national level as the Geographic Land Information Society (GLIS) is beginning to grow and evolve as it is the only national organization that embraces both GIS and surveying professions. There is movement within the societies, organizations, and educational institutions, as well as in the market place. We are driven by the demand of our clients and this is evident in the oil and gas arena as the data demands of the surveyor and the

GIS professionals are growing closer and helping to fuel this win/win/win relationship.

CONCLUSIONS

The future is very bright for anyone with an open mind in the surveying or GIS profession. The availability of very good data from reliable sources grows each day. The social environment is changing at all levels to create opportunities for those who want to make a better world. Awareness and education continues to be the foundation for better coordination, and opportunities to share information and success stories continues to increase. There is no doubt with the present day energy issues we face, that GIS will continue to be the tool that helps decision makers make better decisions. The role of the surveyor will continue to evolve to meet the needs of the market and the times we are living in, as more surveyors realize that embracing GIS is not only the right thing to do, but can create revenue, organize their operations, create a culture that will attract the "high performance people" that is really the backbone of any organization. On the other hand, GIS professionals are getting used to higher quality data, and when they see a land parcel issue that seems to be totally ambiguous and unsolvable to them actually resolved by a surveyor, there is the potential for more respect from the GIS profession towards the surveying community as a whole. This has had a lot of time to fix itself, and it is time for all of us to be more proactive in reaching out to create solutions for our professions and our clients.

Being a professional at whatever you are involved in carries with it the responsibilities to grow as an individual, be a positive role model for your profession, and to keep an open mind towards others that can work with you to create a better world. Most of the folks I meet in the GIS profession have no problem with passion about GIS as that is why they are in the business. On the other hand, surveyors have been and will be passionate about surveying, and with education, awareness, and demands by the clients and society, become as passionate about GIS as I have. My goal is to help this happen and I sincerely appreciate the opportunity to use ESRI as a platform to create this synergism and perpetuate the passion I have for the integration of GIS and Surveying.