

GIS Technology

In Support of Right of Way Acquisition

BY RICHARD WALTRIP, PLS

Those of us in the engineering and surveying professions who have been involved with right of way acquisition projects over the last several years have seen some remarkable changes with regard to electronic data and tools. The types of electronic land-based data available today include assessor's maps, flood maps, soils maps, ownership databases, orthophotography, land use maps, census and economic maps, zoning maps, wetland maps, and the list goes on. Every few months, new electronic data and data sources become available. The quality of the data is improving and it's getting easier to utilize it on our projects. One can only imagine how things might be in the not-too-distant future.

Web-based Geographic Information System (GIS) platforms are becoming more common and more robust. The satellite imaging tool Google Earth is a good example of these new developments in GIS mapping technology, and it gives us a glimpse of where things are headed. As these electronic maps and datasets become more highly developed, spatially accurate and available, a service such

as Google Earth might include many of them in their list of available themes. This tool reflects the needs and wants of our society for access to this type of spatial data.

Not only has the data world changed, but our electronic tools continue to advance in their capabilities. Computer-Aided Design (CAD) platforms are evolving away from line/layer production tools to more intelligent, object-oriented design tools. GIS is better able to integrate CAD products with a decreasing amount of data conversion, and the misconception that GIS somehow diminishes the accuracy of spatial data is fading. Other routine (yet important) tools are spreadsheets, databases and word processing programs. Integration and interoperability are the keywords with regard to all of these important tools.

Right of way projects, especially the larger ones, involve the collection and utilization of large amounts of data. The data comes from a variety of sources and includes survey data, deeds, plans, aerial photos, graphics and other types of land-based data. Analysis and design data is produced during the implementation of a design project. Eventually,

as-built data is produced from the construction process. The project data will be in a variety of formats, including CAD, spreadsheets, databases and hard copy form. The promise of GIS is to be a tool capable of integrating these types of data into a single project repository that supports all aspects of the project.

Current GIS Utilization

GIS has been utilized for right of way environmental studies for some time. This aspect of the right of way process is a natural fit for GIS, as the technology has grown out of the environmental domain. Transportation planning, alternative analysis, visualizations, as well as public involvement displays and activities are other areas that GIS technology is being increasingly utilized.

A step involved with concept development and environmental studies is the development of a dataset of existing conditions through the collection and compilation of the existing land-based data discussed earlier. This existing conditions dataset is a necessary component to virtually all aspects of a project. Not only is it used on concept, planning, and environmental aspects, it is also used for design, acquisition and construction. GIS is proving itself to be an excellent tool to compile and manage all project data.

Through this type of utilization, GIS is becoming a routine tool to support environmental and planning tasks. It's being used increasingly for engineering analysis. It would seem to be an excellent tool to support acquisition activities as well. The remainder of this article will explore possible applications of GIS in the right of way acquisition process.

The Right of Way Acquisition Process

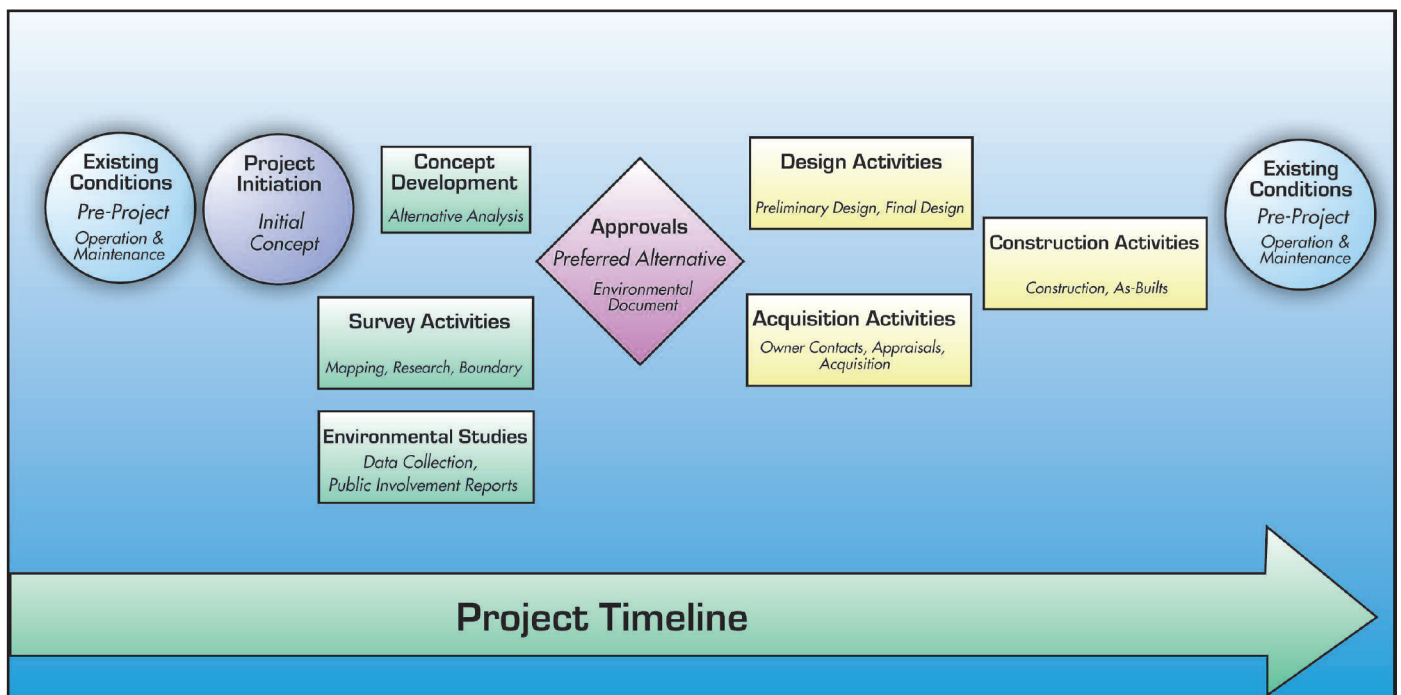
For a transportation project, the right of way acquisition process starts during the design stage. For some projects, acquisition may start during preliminary design, while on others, it may start during the final design stage. In either case, the process is both interactive and iterative. Since the acquisition process occurs concurrent to much of the design process, coordination and exchange of critical information between the acquisition team and the design team is vital.

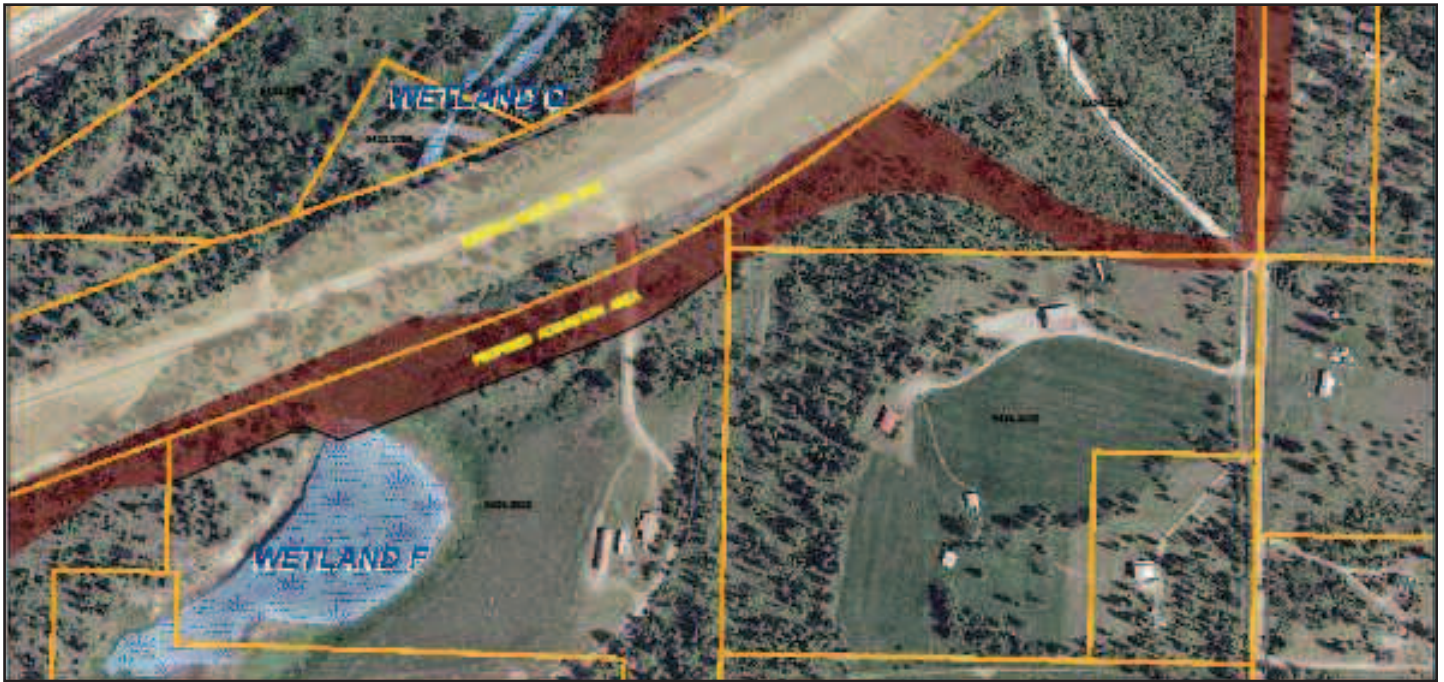
Other considerations such as project timelines and funding deadlines may determine the required pace of acquisition activities. If these deadlines are missed, construction can be delayed until the next round of funding becomes available for the project. Coordination and timely exchange of critical information is especially important on fast-track projects.

The typical steps in a right of way project involving acquisition are illustrated below.

At the point in the project where acquisition activities are initiated, the public participation process has passed, the environmental document has been approved, a surveyed base map has been developed and the alignment and major design elements have been decided upon. The acquisition team starts contacting the affected property owners with a letter of intent and the process starts.

Over the following weeks and months, the acquisition agent meets with the property owners and coordinates with the public agency, as well as





the design team. The process is supported by the production of preliminary plans or exhibit maps. Often the proposed right of way is staked, so it can be seen on the ground. Legal descriptions are proposed and written. Appraisals occur and are reviewed. Affected property owners negotiate the proposed impacts to their property. Details regarding discussions with property owners and subsequent agreements are documented.

The acquisition team has a critical need to have access to project data such as zoning and land use information, assessor's maps, ownership information, title reports, existing right of way information, existing permitted and non-permitted access points, the location of encroachments into the existing right of way, topography, flood plain limits, water well and utility locations. It may be helpful to know properties that have been in specific families for long periods of time and other special aspects within the project area. If a visualization presentation has been produced, it can be made available to the acquisition team. Currency of information is always important, but it is especially critical on fast-track projects in which acquisition activities are occurring concurrent to design activities. All of this data can be compiled and organized in a GIS database, and made readily available to the acquisition team in graphical and non-graphical formats.

The ease with which negotiations proceed depends a great deal on the groundwork laid during the public involvement process. Affected property owners should be involved in the discussions about concepts and alternatives and informed about the decision process. If this is done properly, acquisition will be facilitated because the affected property owners are knowledgeable about the project. If GIS is used properly in the public involvement phase and incorporated into the

design process, consistency between public involvement displays and design plan exhibits is easier to achieve. This is especially true if the acquisition team is involved in the public meetings. And if the affected owners see consistency in the materials they are presented with, misunderstandings and surprises can be minimized. Ultimately, the process will go more smoothly.

Much of the data used and produced in this part of the project is electronic. If it is electronic, then it can be easily compiled in a GIS database. Spreadsheets, word documents, digital photos and other electronic products can be placed in the proper electronic project subdirectory, allowing the GIS database to perform analysis and produce reports based on the latest data. Then the data is readily available for review and use by all team members. If a web-based GIS is utilized, it can allow the data to be input and utilized by project team members from any location with web access. In fact, a web-based GIS will provide an acquisition agent with access to a number of project information products, such as maps, plans, charts, graphics and other visualizations. With only a laptop and internet connection, the agent can present this information to an affected owner while sitting at their kitchen table.

At the end of acquisition process, agreements are documented and property is conveyed. This information is incorporated into construction and right of way plans. The new right of way plans and deeds become the new documents for a new "existing" right of way. GIS is a great tool to compile this information and to be a repository for the plans, deeds and document records. If done properly, future surveys of the right of way will be easier. Records will be found more easily and will become more readily available to surveyors. Encroachments can be minimized.

The Data Model

The key to broad and successful utilization of GIS is the architecture of a project data model with GIS (and all project tools) in mind. The earlier in the project that this occurs, the stronger the contribution by the project GIS. This should involve several key team members from both the consultant and agency teams. All disciplines involved in the project should be represented. Ideally, this group will include senior level team members with strong experience on right of way acquisition projects and knowledge about GIS. Since much of the data is spatial data, participation and oversight by land survey staff is necessary.

The GIS staff selected to participate in this group would preferably include those with transportation project experience, a strength in transportation data modeling and application development expertise. The group, as a whole, would need to be able to think from a data model perspective, know what kind of data will be collected and how it will be utilized, as well as have a familiarity with the right of way acquisition project process. It is not necessary that each of the team members be strong in all aspects cited above, but it is vital that the team collectively possess these strengths.

This group will be tasked with outlining the process that will define the project from beginning to end. This outline will include timelines, milestones, critical decision points and special aspects of the project. Further, the team will determine the types of analyses to be performed, the required information products (plans, maps, graphics, matrices, tables, reports, etc.), and the questions to be asked of the data. This effort will shape the architecture of the data model. It will determine how the project GIS can be utilized on the project and will be directly related to its successful application.

There are a few additional things to note. This data modeling approach is similar to the approach used for the development of an agency GIS, but is not often utilized this comprehensively on a transportation project GIS. As stated earlier, GIS has been applied most successfully and extensively on environmental projects, including the environmental aspect of transportation projects and for transportation planning. It appears to have been applied only on a limited basis to support acquisition and design. Assembling the ideal team to develop the project GIS may be challenging. This being said, I firmly believe that there are firms that can put together the proper team and develop a successful project GIS. I also believe that, over time, GIS utilization for right of way acquisition projects will become common practice. And, if a successful utilization of a project GIS occurs, the implications for other uses are significant and include construction and post-construction management of the highway.

“ ...coordination and exchange of critical information between the acquisition team and the design team is vital.”

The Big Picture

It should be apparent that the development of a strong data model and project GIS can benefit many aspects of a right of way project. Looking beyond the project, if the data model is well developed to support acquisition activities and acquisition documents are compiled in accordance with the model, the project GIS can likely be incorporated into an agency GIS for subsequent right of way and real estate management activities. Access management, permit management and property management can be facilitated. Right of way retracement surveys will be easier to perform. These ongoing business functions will benefit by thinking about the big picture during the project stage.

Why not apply similar thinking to how it can benefit the design process (including intelligent highway design), construction management and life cycle management? As the operational phase of a highway is often much longer than a design and construction phase, operation and maintenance may be the most significant aspect of the Department of Transportation mission. This must be conducted in a way that facilitates an effective and safe flow of traffic and provides for the effective use of capital resources. If GIS is utilized on design, can the products be rolled into an intelligent traffic system? If GIS is utilized on design and for construction management, can the project GIS be used to support asset management and capital programs? And ultimately, can a properly developed project GIS be utilized to provide support for all life cycle management activities? That is the subject of a future article. ●