SAINT LOUIS COUNTY PUBLIC WORKS DEPARTMENT

LAND SURVEY DIVISION/

COUNTY SURVEYOR'S OFFICE

2012 BUSINESS PLAN

James T. Foldesi, PE - Public Works Director/Highway Engineer

Thomas J. O'Malley, PLS - County Surveyor

Contents

SAINT LOUIS COUNTY PUBLIC WORKS DEPARTMENT
LAND SURVEY DIVISION/
COUNTY SURVEYOR'S OFFICE
2012 BUSINESS PLAN

James T. Foldesi, PE - Public Works Director/Highway Engineer
Thomas J. O'Malley, PLS - County Surveyor

EXECUTIVE SUMMARY

Mission: To maintain the records and landmarks of the Public Land Survey System (PLSS) while providing Land Surveying services for county government in Road and Bridge Construction, Subdivision Plat Approval, Resource Management, and Geographic Information Systems.

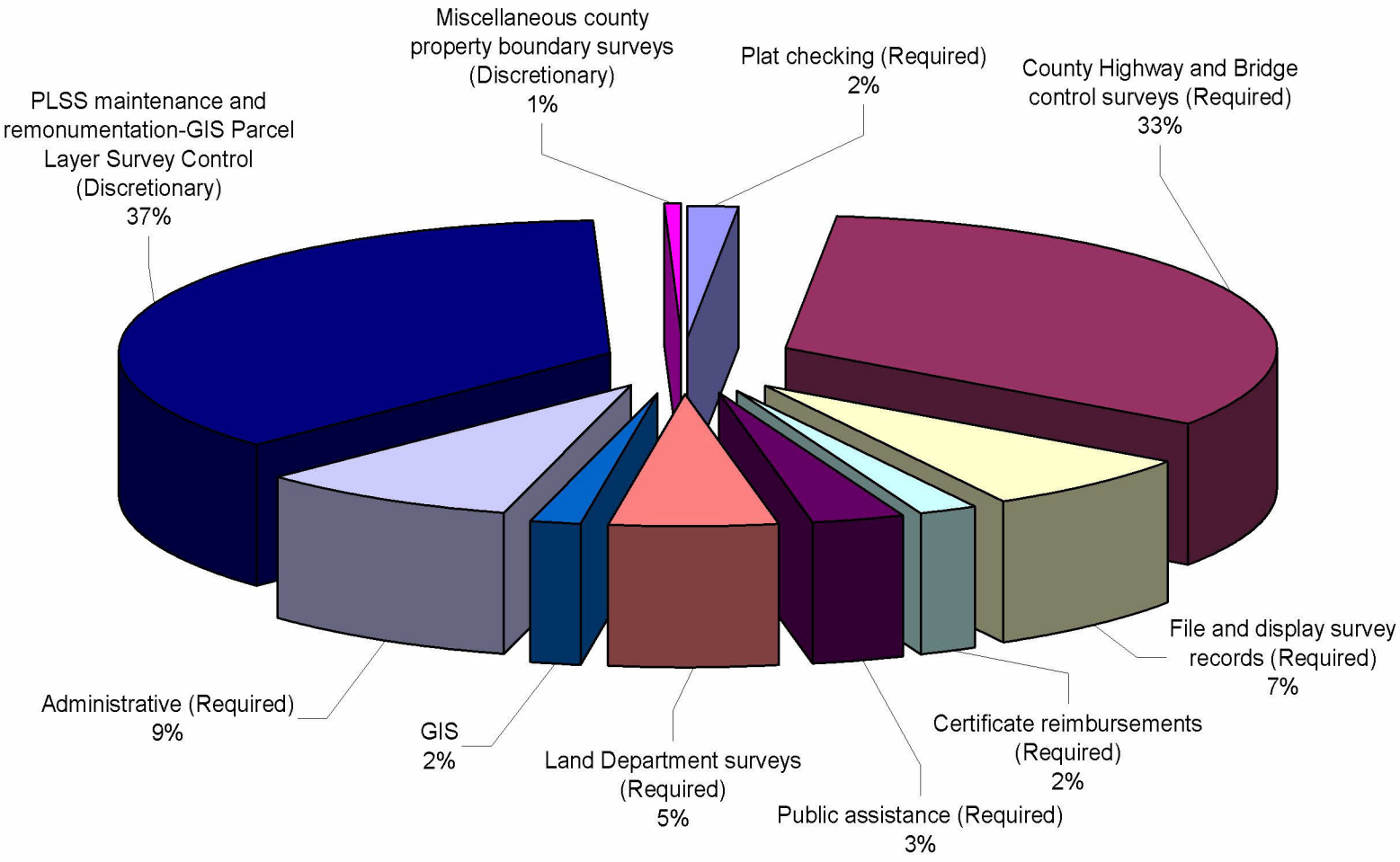
Vision:

- All Public Land Survey System corners (outside of large undevelopable areas such as the Boundary Waters Canoe Area Wilderness) will be monumented and certified with precise GPS coordinates.
- Survey control for road and bridge construction projects will be readily available for use in design and implementation, and will be replaced where disturbed by construction per MS 160 upon completion.
- Subdivision plat review as enabled by MS 389 and required by County Ordinances 34 and 60 will provide the necessary oversight to help protect public interest and welfare.
- Resource Managers will have the necessary location information to complete projects efficiently.
- The county's Geographic Information System parcel lines will be based on reliable survey control.
- Public and interested parties will have access to county-held survey records, including certificate of survey documents filed under the authority of County Ordinance 21.

Numerous vision-driven workflows are in place and producing positive outcomes, including providing survey control and other services for Public Works, providing timely feedback on subdivision plat review applications, providing users with reliable PLSS data where it is available, and managing survey records. Although we are making progress on county-wide PLSS remonumentation, our present pace puts completion on the distant horizon, and leads to a performance gap in areas where data is absent or unreliable. Resource managers, private sector partners, and GIS interests could greatly benefit from reliable county-wide PLSS data. The great need we see far outstrips our capacity, causing users to mitigate this information deficit with other, less desirable, less reliable substitutions such as calculated approximate corner positions.

To address these issues, management and administration should consider options including adding staff to the division, reallocating current resources, upgrading technology, streamlining workflows, and increased participation from our private and public sector partners.

Land Survey Division - Breakdown of Duties 2011



PROGRAM GOALS

Each subpart of our Vision Statement, found in the Executive Summary, has at least one associated Program Goal. Detail and perspective are added to aid in understanding and, for division staff, implementation and execution of the vision.

Program Goal – Corner Certificates: *All Public Land Survey System corners (outside of large undevelopable areas such as the Boundary Waters Canoe Area Wilderness) will be monumented and certified with precise GPS coordinates.*

"Certificate of Location of Government Corner" documents are formal records describing the current status and documented histories of the individual landmarks which were first established by the U.S. Government Survey, a.k.a. the Public Land Survey (PLS) a.k.a. the General Land Office (GLO) survey. The landmarks, or Government Corners, are commonly known as section corners, quarter corners and meander corners. Along with the official Government Survey Plats they form the legal basis for the land boundary system in Saint Louis County. The documents give legal credibility to present day monuments by linking them to the original corners established and by providing a physical description of the monument. Additionally, they usually provide precise GPS coordinates of the corner. The Certificates also promote efficiency of use by expediting corner recovery and verification for county personnel, private sector stakeholders, and landowners.

The Land Survey Division started it's "Certificate of Location of Government Corner" program in approximately 1986, and presently generates and records between 200 and 300 certificates each year. Some of these are re-certifications. An additional 100 to 200 corner certificates are recorded each year by other surveyors, such as the US Forest Service, the Minnesota Department of Natural Resources and surveyors in private practice. At the present pace (about 400 corners per year) and excluding the BWCAW and Voyageurs National Park, it will take 45 to 60 years to complete remonumentation in the county. This timeframe includes corner maintenance activities which are necessary over time.

Since a corner certificate designates a reliable corner, and reliable corners are needed for Road and Bridge Construction, Subdivision Plat Approval, Resource Management, and Geographic Information Systems, as well as the myriad of private sector land development projects, certificates driven by and generated for one purpose will benefit other programs and users at the same time. For example, where a Public Works project results in newly certified corners in a particular area, GIS control data can then be improved and, with a few more inputs, parcel lines can subsequently be more accurately displayed.

Approximately 27,000 corners were originally established between 1856 and 1906. They were generally first marked with wooden posts. This number includes section corners, quarter corners, and meander corners. Approximately 3,000 – 4,000 of these corners are located in the Boundary Waters Canoe Area Wilderness and Voyageurs National Park. We currently have about 8,000 certified corner documents. Some corners have been certified twice. This occurs when a monument or

the references are disturbed or in some cases, when twenty or thirty years have passed since the prior record was made.

We have about 5,000 PLS corners in our Survey Control Points database which are certified corners with precise (generally within 5 cm) GPS coordinates. This is our current standard. The certificate provides the legal basis and support for the corner and the precise coordinates are generally suitable for future boundary survey and engineering work as well as forestry purposes and GIS parcel layer refinements. They can also be used to restore corners if the monument and reference ties are obliterated.

"Certificate of Location of Government Corner" documents are now being prepared in conformance with MS 381.12 and MS 160.15. These documents are certified by a licensed surveyor and include a "Statement of Evidence" which is an abstract listing prior survey records in chronological order. They are brought into the public record by the County Recorder's Office and are given a document number.

Program Goal – Public Works Construction Projects: *Survey control for road and bridge construction projects will be readily available for use in design and implementation, and will be replaced where disturbed by construction per MS 160 upon completion.*

Public Works Department is charged with the management of nearly 3000 miles of County State Aid Highways, County Roads, and Unorganized Township Roads (imagine driving from Virginia, Minnesota to San Antonio, Texas *and back again*) and approximately 600 bridges. MS 160 requires that "Whenever the construction, reconstruction, or maintenance of a public street or highway causes the destruction or obliteration of a known section or quarter-section corner marker or monument, the road authority having jurisdiction over the highway or street shall provide for the permanent marking of the corners and place reference or witness monuments so that the corners can be readily located." Further required is that the corner must, subsequent to construction and within one year, be certified by a licensed land surveyor.

During the past 120 years, the County Surveyor's Office has worked in conjunction with Public Works, both as a separate department and then in recent decades as one of it's divisions, to provide road and bridge project survey control in the design and implementation stages, and then to remonument corners upon completion. Predictably, technology and procedures have changed much over the years. However, services provided have remained relatively stable. Future prospects look to be much the same, therefore Land Survey program goals for Public Works services will be based on expected continued need in the areas of road and bridge construction, and occasional boundary surveys for Public Works real estate holdings. Efficiencies gained in sharing office space, heavy equipment, equipment maintenance, technology, personnel expertise, and ease of communication will continue to be exploited.

Key Objectives:

- Identify road and bridge project areas (minimum of six months in advance of construction) based upon Public Works business needs.
- Assess level of current PLSS survey control and need for additional survey control for design work. If necessary, prioritize work so that needed control is available when design functions require it.

- Fully research all known survey records and compile them into a preliminary "Statement of Evidence." Use this information to prepare field search for corner evidence.
- Execute field search and additional fieldwork as necessary. This may include excavation by hand or with a backhoe.
- Analyze collected record and field evidence, determine correct corner location.
- Upon completion of construction, place durable monuments and accessories at accepted corner locations.
- Complete and record a "Certificate of Location of Government Corner" document for each monumented corner.
- Complete a project drawing showing relationship of corners to one another, and include supporting evidence such as occupation lines. File this in County Surveyor's Office records for use by private sector Land Surveyors and members of the public. This final drawing supplements certificate documents, and is readily added to the county's GIS for expanded use.
- Track costs and revenues using Maximo software.

Program Goal – Public Works Right of Way Plats: *Review and approve Right of Way plats as determined by the business needs of Public Works Department.*

Occasionally, Public Works identifies a business need to acquire Right of Way corridors from landowners for the construction or improvement of county jurisdiction roads. MS 160.085 provides that "In order to facilitate the acquisition of right-of-way required for highways, state and county road authorities may file for record in the office of the county recorder or registrar of titles in the county in which right-of-way is to be acquired, such orders or resolutions, as required by law, in the form of maps or plats showing right-of-way by course distance, bearing and arc length, and other rights or interests in land to be acquired as the road authority determines necessary. Said map or plat shall show by outline all tracts or parcels of land affected by the proposed acquisition."

The document commonly created, approved, and recorded by Public Works for these purposes is known as a Right of Way Plat. The plat itself does not serve to transfer title or rights, but aids in the process by substantially simplifying the legal land description of the real estate involved in the transaction. Public Works design personnel typically draft the plat in conjunction with a Public Works Right of Way agent. Upon preliminary completion, the draft document is submitted to the County Surveyor's Office for review.

Key Objectives:

- Ensure that any PLSS monuments used for survey control are certified.
- Ensure that the plat geometry meets expected mathematical precision by checking closure of polygons, lengths of lines, curve data, and stationing
- Ensure that certified horizontal survey control is employed by checking coordinates of corners, along with bearings and distances to project alignment.
- Ensure that the new parcel polygons align with underlying legal descriptions as shown on the plat.
- Ensure that parcel numbers are not duplicated on the plat, and that omitted numbers are designated as such.
- Ensure that the plat shows sufficient information so that the parcels created can be located on the ground.
- Track costs and revenues using Maximo software.

Program Goal – Public Works Boundary Surveys: *Provide boundary survey services to Public Works Department as determined by it's business needs.*

Public Works holds numerous parcels of real estate throughout the county, commonly used for gravel pits and toolhouse structures. Occasionally, the department identifies a business need to acquire a boundary survey for one these holdings. Land Survey Division has provided these services to various departments including Public Works during the past 100 years, and expects to continue to do so on an occasional basis. Boundary surveys will be expedited when necessary, but can be better worked into busy schedules given several months lead time.

Key Objectives:

- Minimize county liability by using certified survey control.
- Minimize county liability by following the industry "standard of care."
- Where applicable, certify survey control, thereby facilitating related program goals.
- Track costs and revenues using Maximo software.

Program Goal – Subdivision Plat Review: *Subdivision plat review as enabled by MS 389 and required by County Ordinances 34 and 60 will provide the necessary oversight to help protect public interest and welfare.*

The County Surveyor is charged with the review and approval all new Subdivision, Registered Land Survey, and Common Interest Community plats prior to recording. Although the County Surveyor's Office has been involved in the subdivision of lands for a very long time, formal plat approval requiring the signature of the County Surveyor or Deputy dates to 1987.

Historically, recorded plats throughout Minnesota have varied in quality and conformance with statutory requirements. A circa 1970 study of platting in Minnesota, made by the Minnesota Land Surveyors Association, found that "a large number of plats of record were substandard. Many were not in 'substantial agreement' with the law."[1] The county ordinance and review procedure can help protect public interest and welfare in this specialized area where general public knowledge and abilities are very limited.

The County Board's fee schedule provides for collection of fee revenue from the land developer creating the plat in exchange for review services. The current two-tier fee structure allows a $100 discount when plats are submitted in both paper and electronic format. By receiving the final plat electronically, county personnel are able to add the platted parcel lines from the drawing into the county's GIS, thereby removing a workflow step and improving efficiency.

Altogether, anywhere from 20 to 45 plats are typically approved and signed on an annual basis.

---

[1] Fant and Maher, Platting in Minnesota, Department of Civil Engineering, University of Minnesota, Minneapolis, MN, 1970, p. 1

Key Objectives:

- Ensure that any PLSS monuments used for survey control are certified.
- Ensure that certified horizontal survey control is employed by checking coordinates of corners, along with bearings and distances to project exterior.
- Ensure that the plat geometry meets prescribed mathematical closure standards by checking closure of lots, blocks, exterior boundaries, buildings, units, elements, tracts, section subdivisions, lengths of lines, and curve data
- Ensure that applicable state statutes are properly applied.
- Ensure that the described property matches platted image.
- In the absence of a field check, assess plausibility of the boundary survey.
- Minimize county liability by following internal guidelines for review.
- Track costs and revenues using Maximo software.

Program Goal – Department of Land and Minerals Boundary Surveys:
Provide boundary survey services to Department of Land and Minerals as determined by its business needs.

Department of Land and Minerals administers resource management services for the nearly 900,000 acres of State of Minnesota Tax Forfeit parcels located throughout the county. In August of 2011 Land Survey Division began to provide surveying services for identifying trespass incidents and parcels being offered for sale. Currently the Department of Land and Minerals is reimbursing Public Works for one FTE (Deputy County Surveyor) which is about 8% of our total staff.

Occasionally, the department identifies a business need to acquire a boundary survey for one of its parcels. Examples include situations where trespass is suspected, where unique factors trigger a boundary survey prior to disposal, or where an easement description is needed to allow access across tax forfeit lands. Land Survey Division has provided these services to various departments during the past 100 years on an occasional basis, but the new partnership with Department of Land and Minerals will require them on a much more regular basis. Boundary surveys will be expedited when necessary, but can be better worked into busy schedules given several months lead time.

In addition, the department has been moving forward with a plan to sell current lakeshore lease lots. DLM personnel estimate that it may take up to 5 years to complete the process and that each lot will need to be surveyed before the sale can be completed. The extent to which the Land Survey Division will be involved with these surveys is not yet clear. Whether we are asked to complete/manage the boundary surveys, certify nearby PLSS monumentation, or review subdivision plats, it is apparent that a significant amount of resources will need to be dedicated to facilitating the sales process.

Key Objectives:

- Meet the boundary survey needs of the Department of Land and Minerals by following the industry "standard of care."
- Minimize county liability by using certified horizontal survey control.
- Minimize county liability by following the industry "standard of care."
- Work with the Department of Land and Minerals to facilitate the sale of lakeshore lease lots.

- Where applicable, certify survey control, thereby facilitating related program goals.
- Track costs and revenues using Maximo software.

Program Goal – Department of Land and Minerals Resource Management:
Provide Department of Land and Minerals resource managers location information to complete projects efficiently.

Department of Land and Minerals administers resource management services for the nearly 900,000 acres of State of Minnesota Tax Forfeit parcels located throughout the county. In August of 2011 Land Survey Division began to provide surveying services for general forestry purposes. We anticipate that, in addition to the needs of established forest management practices, mineral production will begin to demand more attention as the potential for mining on tax forfeit lands is explored. Currently, the Department of Land and Minerals is funding one FTE (Deputy County Surveyor) in Public Works which is about 8% of our total staff time. Through this new cooperative arrangement with the Land and Minerals Department, it has become evident to us that there is a very great need for reliable survey control in areas being harvested for timber, and the potential need for additional survey data in order to manage tax forfeit mineral interests.

Historically, the Department of Land and Minerals has utilized a "best information available" approach to marking their harvest lines. They utilized existing certified section corners, corner card records, calculated corners, and other readily available survey data to establish harvest lines. This approach has worked in the past and they are not challenged very often by adjacent landowners. However, relatively few corners have been certified in this process.

A cooperative approach to establishing harvest boundaries will benefit the Land Survey Division, the Department of Land and Minerals and the County as a whole. The Land Survey Division will benefit by certifying corners in areas that have historically been neglected. This will add certified corners in areas that are in great need of survey control and will make future survey work more efficient and reliable. Additional certified corners will also benefit The Department of Land and Minerals by making the determination of harvest boundaries more efficient and reliable. The County will benefit by more efficient use of tax revenues.

The Land Survey Division will take a holistic approach to determining harvest boundaries. In areas where survey control is necessary and nearby, we will certify the corners used to determine harvest boundaries. In areas where the Department of Land and Minerals have identified great need for harvest boundaries, we will undertake large scale projects to meet that end.

We will also determine where it is cost and time prohibitive to determine survey control in an area. In these cases the Department of Land and Minerals will direct the course of action.

The department is also tasked with managing public interests in mining activities occurring on tax forfeit lands or where mineral rights have transferred to the public through tax forfeiture. As mines expand into tax forfeit lands, the county expects to benefit from royalties associated with mineral rights. It is crucial that the boundary lines

of the tax forfeit lands are properly determined. This need will create an as yet undetermined requirement for Land Survey Division time and resources.

Key Objectives:

- Minimize county liability by using certified survey control where possible.
- Avoid infringement upon neighboring landowner property rights.
- Where applicable, certify survey control needed to determine harvest lines and thereby facilitating related program goals.
- Provide foresters with coordinate data needed to mark harvest lines.
- Provide customized PLSS training for resource managers.
- Track costs and revenues using Maximo software.

Program Goal – Geographic Information System: *The county's Geographic Information System Cadastral Geodatabase will be based on reliable survey control.*

Development of the county's Geographic Information System (GIS) has proven to be a sizable undertaking. Accomplishments of the past two decades have accumulated and resulted in a cadastral product that is nearly through the development phase. The Planning, Research, and GIS Division of the Planning and Community Development Department is charged with facilitating and coordinating the enterprise planning, development, utilization, and integration of GIS technology, geospatial data, and infrastructure across the Saint Louis County enterprise system to improve department and overall county management and productivity. As the cadastral product matures from creation, to production, and finally to maintenance mode, administrators are adapting by shifting from a consultant-based workflow to one rooted in county departments and their staff "subject matter experts." Departments such as Public Works, Land and Minerals, 911/Sheriff, Auditor, Planning, and Records and Valuation are beginning to take on the maintenance of database layers where department needs can be met by staff personnel.

As the "subject matter experts" in spatial location data for cadastral boundaries, the role of Land Survey Division will be focused on reliable horizontal survey control for the purpose of controlling the parcel lines in the Cadastral Geodatabase. With this responsibility come significant challenges. Given the relative lack of good location data for the 27,000 or so PLSS corners that are the controlling base for the parcel lines, it is not surprising that the parcel lines in areas of sparse survey control have proven to be less than reliable for some of their intended uses. One example occurred when an errant parcel line triggered a request for a boundary survey by the Department of Land and Minerals. Upon investigation, it was found that no part of the property in question was contained within the polygon that purported to depict it on the GIS. Usually, introducing reliable survey control in these areas can significantly improve the locations of parcel lines. In this case, improvement of the local survey control was successful in helping to improve the accuracy of the parcel line locations. Continued growth of County Surveyor's Control Point Database will help provide the survey control data necessary to correct local inaccuracies and improve the overall quality of existing parcel lines, benefiting all county departments.

Additional work is needed to address several thousand discrepancies which were identified by county personnel and parcel line consultant ProWest and Associates during the initial construction of the Cadastral Geodatabase. Discrepancies will vary greatly in the amount of staff time required to correct each one. Some discrepancies will require survey work to resolve. At this time, Land Survey is planning to take a supporting role assisting Auditor personnel with this task. (Note: Many discrepancies cannot be resolved by County staff because they require action by the land owner(s)).

In large part, improvement of parcel line locations represents a major work flow driver for us. Program goals related to Public Works and Department of Land and Minerals tasks will work in conjunction with the goals set out in this area, creating efficiencies that we intend to prioritize and exploit.

Key Objectives:

- Maximize GIS Cadastral Geodatabase spatial accuracy by using reliable horizontal survey control.
- Prioritize areas of need based on division goals.
- Corners Geodatabase: Update Cadastral Geodatabase corners from County Surveyor's Control Point Database (Database to remain separate from GIS). Conduct parcel fabric adjustments based on improved corner precision.
- PLSS Lines Geodatabase: Update existing PLSS lines geodatabase based on improved corner precision.
- Sections Geodatabase: Update existing Section lines geodatabase based on improved corner precision.
- Townships Geodatabase: Update existing township geodatabase based on improved corner precision.
- Quarter Geodatabase: Update existing quarter lines geodatabase based on improved corner precision.
- Quarter-Quarter Geodatabase: Update existing quarter-quarter lines geodatabase based on improved corner precision.
- Subdivision Geodatabase: Create new subdivision exteriors as property is subdivided. Adjust existing subdivision exteriors as new survey control dictates. Auditor takes supporting role.
- Blocks Geodatabase: Create new block outlines as property is subdivided. Adjust existing block lines as improved survey control dictates. Auditor takes supporting role.
- Lots Geodatabase: Create new lot outlines as property is subdivided. Adjust existing lot lines as improved survey control dictates. Auditor takes supporting role.
- Historical Plats Geodatabase: Definition of 'Historical Plats' currently undecided.
- Lot Annotation Geodatabase: Record bearing and distance for platted lots. Auditor takes supporting role.
- Develop a workflow to address parcel line discrepancies. This will involve setting priorities and guidelines to determine if and when Land Survey becomes involved in an individual discrepancy issue. The Auditor's Office is expected to assume the lead role in this process.
- Track costs and revenues using Maximo software.

Program Goal – County Surveyor's Records: *Public and interested parties will have access to county-held survey records, including certificate of survey documents filed under the authority of County Ordinance 21.*

One of the original core services provided by the County Surveyor's Office, dating all the way back to statehood in 1858, is the filing and public display of its surveys. MS 389 provides that "All records of surveys are public records and must be made available by the county surveyor at all reasonable times to inspection by any person."

In addition to the hundreds of field books and innumerable additional in-house survey records, the County Surveyor has, over the years, accumulated hundreds of field books and other media from dozens of public and private sources which currently reside in Pike Lake and Virginia records libraries. Among these are the "Private Surveys" which are boundary surveys generated by the private sector Land Surveyors and filed under the authority of County Ordinance 21. Together, these records are an invaluable source of information used in the maintenance, retracement and restoration of our Public Land Survey System. They are also used as references by private sector surveyors preparing to create a new boundary survey. Our libraries are visited chiefly by members of the private sector land surveyor community, along with members of the public and other interested parties.

With this varied multitude of sources contained in several media types, retrieving records for a particular geographic location can be challenging. During the past 10 years or so, modernization of our records indexes from pen and ink into a searchable database has begun to transform the way research is conducted. Where once the researcher may have needed to search all of these many paper indexes separately, now one can search most of them at once via computer using any of the numerous data fields, most notably section, township, and range. Records research has become more powerful and efficient, and stands to improve again as the next phases are implemented. With additional inputs, the database can be accessed using GIS, providing a spatial search component. Ultimately, the various historic survey records could be imaged, and called up at will using the database index.

Key Objectives:

- Retain historic records and assure that they are properly preserved for future use.
- Store records in a way that they can be conveniently retrieved as needed.
- Index existing and new records to allow for convenient research and retrieval. Make indexes searchable online in addition to in-house.
- Imaging of all historic records is a long-term objective.

JUSTIFICATION AND BENEFITS

Part of Public Works Department: The main reason the County Surveyor's Office is in the Public Works Department is because, among all departments, Public Works has the greatest need for licensed professional land surveying services which are often required by statute and must be precise, reliable, legally accountable and have permanent value. These services include restoring PLSS corners disturbed by construction (required by MS 160.16), surveys and plats for right-of-way acquisition (MS 160.085) and boundary surveys of department lands. These services help contribute to the general maintenance of the PLS system.

The close association between our staff and the engineering staff has been very effective and the costs for our work are often recovered through State or Federal aid for highways. Additionally, as part of Public Works we have jointly promoted, built and maintained parts of the MnDOT CORS/VRS network in St. Louis County. This network provides precise real time corrections to mobile GPS units. Sharing equipment knowledge and technical expertise has also been very helpful.

Our current office and garage space located at the Pike Lake and Virginia Public Works facilities are very well suited to our work. These locations are also well suited to working with the Department of Land and Minerals.

Working with Other Departments: We perceive a tremendous need for reliable survey data relating to the Public Land Survey System (PLSS) and cadastral information in general. In addition to the well-known needs of Public Works Department, it's apparent to us that the Department of Land and Minerals has a great need for survey information for timber harvesting, trespass incidents land sales and minerals management. Also, it's apparent that there are many discrepancies (currently about 6000 identified) in the present GIS Cadastral Geodatabase. Many of these result from ambiguities in deeds which can only be resolved by the affected land owners. But many others exist due to inadequate PLSS cadastral data. Solutions to these cannot be found until the need for adequate survey control is met.

Since 2003 a substantial portion of our work has been focused on survey control for the GIS cadastral geodatabase. Several township scale PLSS remonumentation projects have been completed for this purpose. Most of this work has been done in areas dominated by private land holdings where property tax revenue is generated, as opposed to the many townships comprising mostly state or federal parcels. In the future we expect to focus some time on requests from the Land and Minerals Department, based on the business needs of that group.

It bears repeating that all data users benefit from better data independent of the original reason for the work. For example, in townships where numerous county jurisdiction roads exist, PLSS control is likely to be relatively reliable due to the many road construction projects occurring through the decades. Where reliable survey control existed prior to creation of the GIS parcel lines, spatial accuracy of those lines tends to be much better than in areas lacking such infrastructure. Going forward, improvements in PLSS control gained from road work can be used to update parcel lines originally

drawn without the benefit of good location data. Township scale GIS projects can benefit Public Works and Department of Land and Minerals in a similar manner.

Protecting the Public Interest: History reminds us that uncontrolled land development can become detrimental to communities over time, and poorly planned or executed subdivisions of land can pose immediate and lurking threats to the rights of unsuspecting consumers. Federal, State and local governments have created several layers of consumer protections in response to poor practices of the past and today's changing needs. US Army Corps of Engineers, Minnesota's Departments of Natural Resources and Transportation, County and Municipal Planning Departments, along with the county's Auditor, Attorney, Recorder, and Examiner of Titles Offices, among others, play a role in regulating this process so that it occurs in a way that benefits but also protects the public.

Process involvement by the County Surveyor's Office introduces important aspects of consumer protection which would otherwise be absent. Without our review, when would an independent licensed Land Surveyor, knowledgeable in the subject matter, review plats for compliance with state statute and local ordinance? Would there be oversight by an expert in the field to ensure that the plat geometry is valid? Who would protect the PLSS, the critical infrastructure used to determine property boundaries, by ensuring that any PLSS monuments used for survey control are perpetuated and certified? Would consumers have confidence in the plat documents that help define their rights as landowners?

In some localities, particularly where the County Surveyor's review is non-existent or inadequate, private parties sometimes exchange services or pay for peer review to help lower their liability. Due to the voluntary nature of these transactions, their inherent potential conflicts of interest, and the lack of a true public advocate, we feel that private party peer review is beneficial but would not adequately protect public interest in Saint Louis County if solely relied upon for that purpose.

Restoring the PLSS: Although plat review is one way the County Surveyor's Office protects the public interest, it is not the only one. Maintenance and remonumentation of the PLSS, one of our key vision and program goals, is crucial to protecting the real property rights of landowners. Since the PLSS is the basic infrastructure for defining and locating land boundaries, landowners have a critical interest in it's maintenance and upkeep.

After enduring a period of great neglect leading to widespread deterioration and disrepair, the state of the PLSS in Saint Louis County is slowly but surely recovering. County efforts using modern methods of evidence gathering teamed with staff expertise and new technology have created an environment where the system can be steadily restored according to the guidelines provided by US code, state statute and case law. The end goal is to provide a stable system of landmarks that can be relied upon and defended in court by land surveyors, land owners, and real estate attorneys, among others. Users benefit when property lines can be known with confidence. Our public and private sector partners and colleagues are also contributing to this effort.

If we can continue to make progress and eventually meet our program goals, the benefits will be reaped by the many users of the PLSS, and the many users of systems built on or reliant on the PLSS. For example, when control monuments are easily found and verified, a boundary survey can be completed in a timely manner. When a boundary survey can be completed, a land development project can have spatial certainty, a key component. When business needs of county departments trigger the need for precise location data, those needs can be quickly met, eliminating or reducing delays to important projects. When partnering agencies need spatial control data, our spatial control data is available for their use.

Program Benefits:

- Land ownership and other land use rights are heavily dependent on the PLSS. Maintaining accurate and reliable monuments and records of the system promotes effective and efficient use of land for many purposes.
- A robust PLSS promotes more accurate and reliable land records systems for both public and private interests.
- Private Sector land developments require reliable spatial control. A well-maintained PLSS can help foster development opportunities.
- Existing certified corners can help streamline the plat approval process.
- Landowners often need to know where their property boundaries are. Knowledgeable landowners can use the PLSS to help guide them.
- Dollar costs for private sector boundary surveys can exceed the landowner's ability or willingness to pay especially where survey control is insufficient. Certified PLSS corners can help reduce costs for landowners and promote opportunities for businesses.
- Boundary disputes between neighboring landowners can and do occur. Survey control is a necessary tool in accurately locating boundaries and helping to resolve disputes using civil processes.
- Landowners benefit when surveyors agree on the location of property lines. Open access to the many sources of survey records fosters agreement among surveyors. Our survey records library and indexes can help promote stability and agreement in the locations of property lines.
- Many County Departments, including Public Works, Planning, Land and Minerals, Environmental Services, Auditor, 911 Dispatch and Records and Valuation, often need reliable spatial data to provide services. For example, Public Works projects can be designed and implemented more efficiently, GIS parcel lines can be shown more accurately, and tax forfeit trespass investigations conducted more readily where PLSS corners are certified.
- Restoring disturbed PLSS monuments is a simpler, more efficient process when the corners have already been certified.
- Natural resources require reliable spatial data for effective management. With a robust PLSS and convenient records delivery, public and private sector resource managers can locate project boundaries more efficiently.

Consequences of Complacency:

- Where reliable PLSS data is absent, some users will substitute less reliable data which will introduce unknown future risks and costs. Some of those costs will be borne by second parties. Some of the risks may be assumed directly by county personnel for the county.
- County projects may be delayed, including those involving resource management.
- Private sector land development projects may suffer delays or increased costs. Sometimes these costs are prohibitive to project completion.
- Where PLSS control is deficient, costs of boundary surveys can exceed the landowner's ability or willingness to pay. Private sector business interests can suffer.
- Where neighboring property owners find themselves in a boundary dispute, insufficient PLSS survey control can sometimes take away one of the tools landowners use to resolve these disputes, potentially making lasting solutions more difficult to achieve. Experience in these disputes over the years tells us that people do suffer stress and anguish when solutions are not easily found.
- Substitution of less effective legal land descriptions for development projects or even simple land splits due to the lack of reliable PLSS control can mitigate present delays, but can later resurface, compounded by the passage of time.
- A poorly maintained PLSS is more costly to maintain.

REQUIREMENTS AND COSTS

Land Survey Division Staff and Equipment:

- 3 Supervisors who are licensed surveyors
  - 1 County Surveyor
  - 2 Deputy County Surveyors

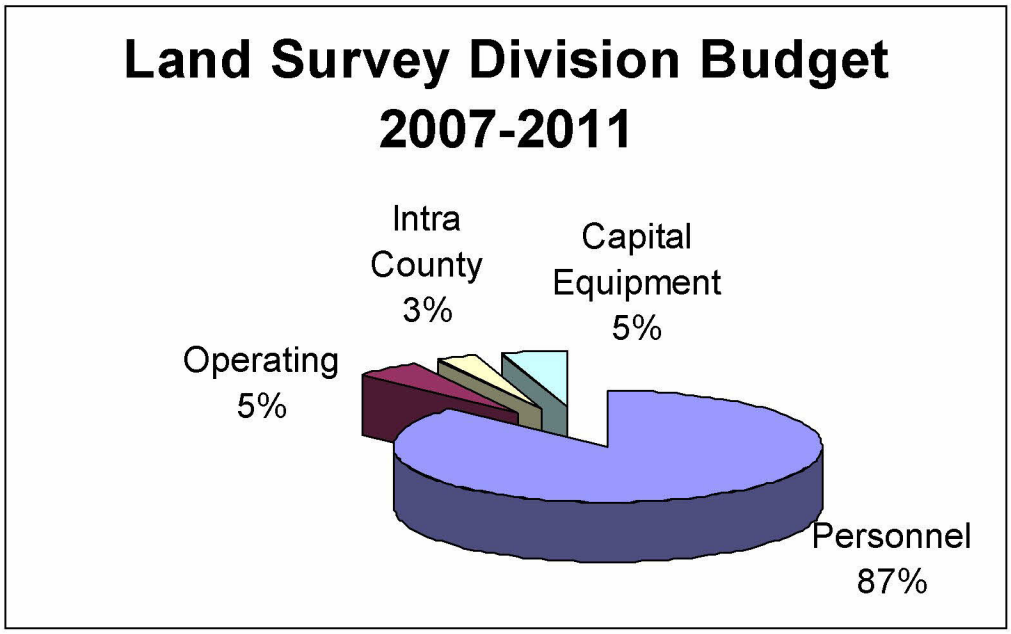
- 12 Survey Technicians
  - 6 in Pike Lake
  - 6 in Virginia

- Office space
  - 15 staff members and PC work stations
  - two survey records collections

- Vehicles and garage space
  - 6 Survey trucks (van, pickup, or suburban)
  - 1 Sedan
  - 8 ATVs
  - 4 snowmobiles
  - two boats

- High precision survey equipment for 5 survey crews

Land Survey Division Budget:



The Land Survey Division is part of the Public Works Department and part of County Budget Fund 200. The majority of our funding comes from the General Property Tax Levy. A portion of our funding comes from reimbursements for State and Federal Aid for Highways and another portion comes from the Land and Minerals Department which is currently funding one of our Deputy County Surveyor positions. We also receive fees for services such as Subdivision Plat Checking. Possible future funding sources may include revenue from mineral rights royalties and/or the Recorder's Technology Fund.

The Division budget currently makes up approximately 1.7% of the Public Works Department budget and is approximately 0.3% of the total County budget.

Additional Staffing Requirements: Beyond the immediate need for continued services in our traditional program areas, the staff necessary to meet these emerging responsibilities in providing services for Department of Land and Minerals and Planning will depend on the perceived importance of improving the spatial accuracy of the parcel lines and the reliability/credibility of the associated data. We think that adding three new FTEs is an appropriate long term expectation for doing this additional work. Adding one FTE each year in 2012, 2013 and 2014 is a realistic time frame. This would allow us to continue our traditional work with our current staff. Potential future funding sources may include revenue from mineral rights royalties, severed mineral collected taxes, increase in yearly levy, increase in fees, and/or the Recorder's Technology Fund.

Current areas of strength are in the traditional surveying disciplines and customer service; areas of need are specific GIS skills. These needed skills could be attained through training and development of current staff, or augmented through the recruitment process.

Partnerships: In addition to the capabilities of the division, private sector entities play a role in accomplishment of our goals. Currently, our budget allows us to administer a reimbursement program where 35-50 corner certificates may be subsidized annually at a rate of $150 to $200 each depending on content and according to our written policy. The current reimbursement rate is based only on the estimated time to draft the formal certificate document and does not cover the actual cost of researching and monumenting or verifying the corner. The cost for this work is generally borne by the private surveyor's client. With administrative support, expansion of this program could potentially play a role in reducing the amount of time needed to complete our remonumentation work. Increases in this budget allocation could mean increases in corner certificate production as a whole, therefore shortening our program timelines.

This option should be viewed as part of the overall strategy, but not the whole strategy. Two factors beyond our control limit its potential: The first is the voluntary nature of participation of our private sector partners. During periods of high real estate activity, the program has not been utilized to its full extent, so increasing budget allowances alone would have zero effect. The second factor is the limited ability of private sector entities to fully explore corner evidence especially where conditions require use of excavation equipment in public roads, or where costs are greater than the client's ability or willingness to pay. As part of Public Works, Land Survey Division has unique access to department assets and resources which facilitates thorough evidence gathering in these situations. We feel that the County Surveyor's Office alone has the authority, resources, and expertise to best remonument the most challenging corners.

Technology Plan: Today's changing environment requires us to adapt to new trends and technologies in the field of Land Surveying to meet the future professional surveying needs of county departments and taxpayers. The division's technology plan focuses on office and field computer software, computer hardware, and telecommunications. Our goal is to use technology to help us deliver services more efficiently at a lower cost. The purchasing of hardware (PCs, GPS equipment) is coordinated with IT and the Purchasing Department to ensure the timely deployment of these assets. PCs are replaced on a 4-6 year timeframe. Survey grade GPS equipment has become a vital tool in the execution of our field activities. Migration from equipment reliant on laser and optics-based survey measurement to types utilizing the available global satellite networks has been a significant capital outlay but has proven to markedly increase productivity and capabilities. Recent partnerships with MnDOT have yielded very good results, with county contributions to the statewide Virtual Reference Station (VRS) network coming in the form of network GPS receivers and facilities space. The network uses stationary "base stations" to create local corrections that are delivered via cell phone to the end user. Numerous public and private sector entities are regularly using the system and are enjoying its benefits of reliability, convenience, and increased productivity. GPS equipment is replaced on a variable schedule based on need, with 5-10 years as an expected service life.

Survey records management is an ongoing challenge. Static, historic resources along with growing, modern files all need to be indexed and available for viewing by the public and other interested parties. We currently have hard copy files and manage different electronic documents in different systems depending on the document and its use. Imaging of our paper documents should be considered as the ultimate solution to our

document resource management challenges. With the combination of scanned images, well-indexed files, and GIS, a system could be developed that would be spatially based, available on and off site, and immensely useful to county staff and private parties. Currently, we have the index nearly completed, but imaging presents a formidable challenge due to volume and cost.

The software currently used to produce road and bridge plans and survey worksheets is being replaced. EaglePoint design software announced in late 2009 that they are discontinuing their support in 2011 and being absorbed by another company. After an extensive evaluation, we selected Carlson Software as the replacement and are currently in the process of installing the software. AutoCad drafting software will continue to be the drafting component. We continue to evaluate new products and major releases of existing, competing products to make sure we are using the most cost effective solutions for our operations. GIS continues to be a major technology player in our Department. Division databases are tied to the GIS wherever possible. We are an integral player in the county-wide parcel layer. We continue to look for new ways to display and manage data in this medium, as we have seen the power of being able to view data spatially, helping us reach our own program goals while knowing our contributions to the system are helping others do the same.

Space and Facilities Plan: The Division's Space and Facilities Plan is centered on the expectation that the County Surveyor's Office will continue to operate as a division of Public Works. Current office and garage space, provided by Public Works, is adequate and well suited to current program requirements in both Pike Lake and Virginia. Potential growth in future years will need to be accommodated as necessary.

Equipment Plan: Survey vehicles (sedans, pickups, vans) are normally scheduled for replacement at 100,000 miles or 10 years old. ATVs and snowmobiles are budgeted as needed, with expected service life of at least 10 years.

IMPLEMENTATION PLAN

Setting Priorities: Whenever need outstrips resources, setting priorities is usually step one in attempting to achieve the broadest positive outcomes. Since the need for reliable survey control comes from multiple program partners and greatly exceeds the division's capacity, priorities must be in place to help manage the allocation of resources. The following groups encompass our current and expected near term activities, and will help guide allocation decisions.

- Group A: Statutory and/or County Ordinance obligations. These are plat reviews and Public Works road and bridge projects along with survey records management and display. Customer service/public assistance generally falls into this category, and includes certificate reimbursement applications. General administrative needs fall into this group as well since they are vital to the function of the division.

- Group B: Services funded by other departments. Currently, Department of Land and Minerals is funding one FTE. Although this work is top priority for that individual, allocation of other division resources to this activity must be managed according to overall division needs.
- Group C: Discretionary PLSS maintenance and remonumentation, where decisions can be driven by needs such as GIS improvement, landowner hardship, or miscellaneous requests from internal or external entities. We currently allow about one third of our available time and resources to these tasks, and expect the same in the near term. Miscellaneous boundary surveys for county departments such as Public Works fall into this category as well.

With our current staff and workload, we are reliably meeting our obligations in Group A. In Group B, which is new to us in summer, 2011, we are attempting to come to a balance by working out routines and workflows. This group will need it's own set of priorities and goals, as it is clear that the resources allocated (one FTE) will not meet the great need for survey data in Land and Minerals. In Group C we find our greatest growth potential. Added resources could advance program goals especially in upgrading survey control for the county's GIS.

It bears repeating that our varied resources can be spread among the groups so that projects in each group are progressing at all times. Furthermore, activities in one group likely contribute to the program goals of another. For example, road project survey control may contribute to overall PLSS maintenance and remonumentation *and* GIS improvement all at the same time. Our greatest efficiencies are achieved when multiple program goals are wrapped into one project. We attempt to focus on such projects to exploit opportunities and to achieve these efficiencies.

Adapting to Changing Demands: As new demands require new skills from current staff, training will need to be a major component of development. Examples of training required: Carlson Drafting and ArcGIS. Sufficient expertise exists to accomplish this in-house, but efforts must be made so that programs are catered to Land Survey staff needs. Once these needs are fully understood, coordination with Engineering, Planning, and Training and Development can proceed.

Exploring New Options: Options for shortening our remonumentation timelines should be considered. This can be addressed in a number of ways:

The most direct way is to increase the number of FTEs in the Land Survey Division. (This would be in addition to the three FTEs described above in "REQUIREMENTS AND COSTS"). With the addition of one Deputy County Surveyor and six survey technicians focused exclusively on PLSS corners, an additional 200 - 250 PLS corners could be completed each year.

The immediate focus of this expanded effort would be in areas of high interest such as; areas with many parcels, areas of known mineral interest and areas of priority for county forest harvesting.

This option would involve associated overhead costs for office support, work stations, survey equipment, survey vehicles and garage space.

In Groups B and C above (in "Setting Priorities"), some opportunity exists to increase capacity through contracting with private sector entities. The mechanisms are in place that would allow increased participation in our existing reimbursement program, should administration deem this a worthy option. However, based upon feedback we have received from private surveyors, the reimbursement amounts per corner may need to be increased to make this option viable. By increasing the annual program budget (currently $7,000) and/or by increasing the fee paid for each corner (currently $150-$200) participation in this program could be significantly strengthened resulting in more robust contributions by private sector partners. For instance, by increasing the annual budget to $30,000 and the reimbursement fee to $400 per corner, remonumentation contributions driven by this program could increase from 35 to 75 corners per year. Success is dependent on voluntary participation by the private sector surveyors and does involve internal Division costs for administration and review of applications.

A thus-far-unexplored option would be to define projects and open them for bid from outside entities. This method has recently been used by others including the US Forest Service and Beltrami County. Further study is needed to investigate the full benefits, costs, and consequences of this option. Based on recent US Forest Service contracts, a $100,000 annual budget for contract survey work would produce about 40 certified PLS corners.

Augmenting capacity through partnerships can be productive but can, at the same time, consume needed staff time on contract administration and quality assurance activities. Benefits must be carefully weighed against costs before any new programs are implemented.

By incorporating all of the 'New Options' described, about 300 to 350 additional PLSS corners could be certified each year. Adding these to the current pace of about 300 to 400 corners per year would give us an annual total of about 700 corners. Over a twenty year period, this would amount to about 14,000 corners. Adding to the 8,000 corners currently certified gives a total of 22,000 corners which is approximately 95% of all the corners lying outside the BWCAW and Voyageurs National Park.

Reallocating Resources: Roughly two-thirds of division staff time is dedicated to non-discretionary activities comprised by statutory obligations, administrative demands, and funded obligations to other departments. Redirection of these resources is not recommended at this time. The remaining one-third can and should be directed toward the accomplishment of division goals as prioritized according to this plan.

MEASURING SUCCESS

Land Survey Division's lone Key Performance Indicator (KPI) measures production of corner certificates in terms of number signed per year. This serves as an important goal for division staff and is a fair measure of general progress toward overall program success. We have met our goal of 210 each year since 2006 and expect to continue to do so in the future, even with increased demands in new areas.

Activities that do not directly result in the creation of corner certificates can be improperly perceived as threats to success since the lone KPI measures only the one facet of our production. We should generally discourage these assertions where those activities are valuable and contribute to the program goals previously outlined. Additional quantifiable goals could be established to capture success outside of our traditional certificate measure. However, any new categories should be limited in number and each should be limited in volume so that focus on our most important charge is not diffused.

Maximo cost accounting software is beginning to show us details about our resource allocation that had not been readily available before. For example, we can easily view a report of time billed to each individual project, plat review, or boundary survey. In a broader sense, we can use Maximo to get an idea of how much of our time is applied to each program goal. Using this accounting data is a secondary method that can and should be applied to future decisions regarding asset allocation (See the pie chart on p. 2, which was derived using data from Maximo). Data should be evaluated on a regular basis as a check on resource allocation specific to program goals.

Evaluation of any remonumentation completed through partnerships with the private sector should consider both the funds paid and division administrative costs associated with and unique to these programs. Administrative costs may be captured by Maximo, with the value of the data in part determined by the quality of time reporting.

Comparison of future yearly KPI results to our existing long-term baseline levels should be valid and should provide useful perspective on progress toward accelerated PLSS remonumentation. Increases in yearly KPI values gained through enhanced service levels can be extrapolated to help predict and adjust timelines for completion, allowing for wise allocation of resources.

Saint Louis County Surveyor's Office

Timeline of Services