Surveying the Boundaries of the Fond du Lac Reservation: Part 2
Bradshaw’s Survey

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Minnesota Society of Professional Surveyors
an affiliate of NATIONAL SOCIETY OF PROFESSIONAL SURVEYORS
AMERICAN CONGRESS ON SURVEYING AND MAPPING

MINNESOTA SURVEYOR

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Minnesota Surveyor Upcoming Deadlines

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It continues to amaze me how much the weather affects our business! Sometimes I feel I can accurately predict the type of day I will have based on the weather during my commute to the office. Likewise, I feel if I were trapped inside my office I could tell you what type of weather we were experiencing based on how the day was going!

In the Midwest, we typically have a handful of days per year where we consider the weather to be perfect. We spend the remaining 360 days discussing how each day could be better. I once thought it was difficult to carry on a conversation with people in southern California. Come to find out, there really isn’t much for them to discuss. The forecast is sunshine with consistent temperatures over the next 30 days, so what would anyone in that area have to talk about? Wishful thinking, or fairness in my mind, tells me that a late spring should warrant an extended fall.

During mid-May, I traveled across the Midwest and Eastern United States looking at various colleges with my oldest son. It was upsetting to me that I could count on one hand the total number of fields that were planted over a 3,500-mile journey. I sometimes express my concern with our delayed construction, but I can’t imagine the decisions some crop farmers face with this shortened growing season.

The Board of Directors has been busy trying to find ways that we can add value back into our membership and stabilize our budget into the future. One big hurdle that we have struggled with over the last couple of years is having limited resources with a very tight budget. We set a goal early this year to stabilize our budget wherever possible. Raising revenue through membership rates was not viewed as an option to the Board, so we are taking a closer look at our overall structure along with our major expenses.

We have mutually agreed with Ewald Consulting to terminate our Executive Director contract with them. This will take effect August 31. We greatly appreciate and thank Ewald Consulting for the services they have provided to MSPS for over 15 years.

We have issued an RFP for executive management services and formed a selection committee to manage this RFP process. Ultimately, this committee will make recommendations to the Board of Directors. The selection committee consists of me, Marcus Hampton as our current Treasurer, Julie Groetsch as our current Secretary, Chad Conner as a Director, and Connie Villari as a member. We have a transition plan that is continuously being updated, and it will be a tremendous amount of work as we go through this process. We plan to have a contract in place with a new executive director by the end of July.

Our May membership report looks strong at 582 compared to 589 last October. I would like to remind everyone to please consider inviting a friend, colleague, coworker, and/or competitor to your next chapter meeting. We are much stronger with numbers, and I would not be in this position if my mentors did not encourage me to get involved!

It was great to see many of you at the “Wisconsin Refresher” spring seminar, presented again this year by Douglas R. Crane on Thursday, April 25. The board looks forward to having our 2020 spring seminar in St. Cloud with hopes of bringing our membership, the land surveying program, and students together.

I look forward to those four to five perfect days of perfect weather yet to come this year, and I remain hopeful that we will have that extended summer/ fall we all deserve!
Dear MSPS Members,

We can tell it’s the busy season for Surveyors. Our customer services team is getting lots of calls from the public looking for Land Surveyor referrals. Our residential surveyor directory is proving to be a popular tool. If your firm wants to be listed, be sure to update your profile or give us a call, and we can help.

The Board of Directors is working hard on finding ways to increase the value to membership and manage costs. If you are interested in becoming more engaged in the work of MSPS, please consider volunteering for a committee. Volunteering is a great way to give back to your profession and maximize the value of your membership investment. If you believe that Professional Surveyors play an important role in protecting the public, you can make a positive difference by helping MSPS provide better service to its members. Your active participation will help to influence the quality of the services provided and ensure that MSPS is positioned to advance the profession. For example, this edition of the Minnesota Surveyor has more articles and exciting content directly as a result of MSPS Board Member Virginia Winberg’s willingness to help recruit a few people to submit an article.

On behalf of the MSPS staff team, we are grateful for the opportunity to be part of MSPS success over the past several years. We wish you great success in your future endeavors.

Best regards,
Lee Helgen, Executive Director

From the Staff Editor

Laurie Pumper, CAE

I’ve worked with the Minnesota Society of Professional Surveyors on publications since 2006. I’ve had a hand in every magazine since the Summer 2006 issue, and also worked on a few book projects.

It has been a pleasure working with all the authors and other volunteers over the years. Special thanks to several people:

- Dave Zenk, who has been a great resource over the years in his role as editor of the magazine.
- Rod Squires, who has been a regular contributor to the magazine since before I started working with MSPS, and who authored A Striking Triumph of Geometry over Physical Geography: Vignettes of the Public Land Surveys.
- John Freemyer, who was a regular contributor to the magazine as an author and trusted proofreader, and who spearheaded a revision and re-issue of the book Fant, Freeman & Madson on Writing Land Descriptions.

I have learned a great deal about Land Surveying over the years, but value the work of MSPS’s dedicated volunteers even more.
Greetings,

Of all of the things that the NSPS does, I would argue the most critical is the Government Affairs efforts. These are wide ranging to say the least, so I thought it may be helpful to mention just a few items that may be of interest.

State Legislation

As a new service to its members and affiliate state societies, NSPS is implementing a program to track state legislation in every state legislature in the United States. Using online technology known as GovHawk, NSPS’s government affairs consultants, John M. Palatiello & Associates, Inc., will provide reports to NSPS and its state society member organizations twice monthly when most of the state legislatures are in session, and monthly when activity slows down. The report will include a state-by-state summary of each bill, the sponsor, bill number, status, and a link to the text. The service will provide valuable information for the membership and individual state societies, either as a backstop for those states that already use some service or have it provided by a lobbyist, or would be the only such service for those states that do not currently have a system for tracking their state legislature.

Department of Agriculture

Farm Bill
The Agriculture Improvement Act of 2018 (Public Law 115-334) includes Section 12511, which authorizes a task force composed of not more than 15 voting members who shall be selected by the Chairman of the Commission, in consultation with the Secretary; and include representatives with relevant expertise in broadband network data collection, geospatial analysis, and coverage mapping. NSPS is calling this Task Force the “TMAC of Rural Broadband Infrastructure Deployment.” While the FCC is the lead on creating the task force, it must collaborate with USDA. NSPS will author a joint letter requesting one member of NSPS be among the 15 task force members. NSPS worked closely with the bill sponsors to add an individual with expertise in “geospatial analysis” to serve on the task force.

Department of Commerce

BLUE GLOBE Act
Senate bill S. 933 would advance data collection of the Great Lakes, oceans, bays, estuaries, and coasts. The Bolstering Long-Term Understanding and Exploration of the Great Lakes, Oceans, Bays, and Estuaries Act, or the BLUE GLOBE Act, would accelerate technology innovation, grow the marine workforce, and develop a better understanding of the blue economy.

Department of Education

Workforce Development
JMP&A has gathered information, provided to Curt Sumner, on Department of Defense activities to assist military personnel with their transition to civilian life and employment upon their discharge from military service. This includes numerous men and women who have surveying and mapping experience in the military that could be immediately employed in the firms of NSPS members.

Department of Homeland Security

FEMA/NFIP Reform/IMAGES Act
In November 2018, NSPS joined 25 other organizations in cosigning a letter authored by the Flood Map Coalition which was sent to key contacts in both OMB and FEMA. The letter urged Mick Mulvaney, Director of the Office of Management and Budget (OMB), “to maintain appropriated funding of at least the FY 2018 level ($262.5 million) for FEMA’s Flood Hazard Mapping and Risk Analysis Program.”

Department of the Interior

3DEP
NSPS has endorsed the USGS 3DEP program to provide consistent elevation data (primarily through LiDAR collection) for the United States, and has been a leader in efforts to assure the program is fully funded at $146 million per year. Efforts are
underway to also include provisions as part of both the FEMA/NFIP Flood Map Reform bill and Infrastructure bill. NSPS has also organized and mobilized other organizations that support 3DEP, such as the National Association of Realtors, who made a similar request of Congress.

Public Lands Bill
S. 47, the new comprehensive public lands bill, was enacted into Public Law 116-9 on March 12. Section 1120 includes the Red River gradient boundary survey. Section 1114 includes the use of mapping, spatial data and UAS operations as part of wildfire technology modernization.

Department of Transportation

Infrastructure
On February 6, NSPS joined a coalition of organizations in a letter “urging Congress to take up and pass a bipartisan infrastructure bill that will improve the safety, reliability and efficiency of our nation’s infrastructure.” The letter goes on to state, “...we urge Republicans and Democrats to unite to develop and pass a bipartisan infrastructure bill that addresses these key priorities: Significantly increases direct federal investments in a broad range of infrastructure sectors” and “Encourages active participation among all levels of government and between public and private sectors without shifting federal responsibilities because no single partner can deliver a well-functioning, national U.S. infrastructure network driven by a long-term vision and funding stability.”

Federal Communications Commission (FCC)

Ligado/LightSquared
In 2016, LightSquared rebranded with a new name, Ligado Networks LLC. Ligado has petitioned the FCC to repurpose satellite frequencies near GPS to also support terrestrial telecom services, effectively transferring its license for space-based broadcasting to powerful terrestrially-based broadcast towers. Ligado’s custom networks would provide services for industrial operations such as power grids and connectivity for drones and driverless cars, in addition to consumer broadband services. The nation’s leading GPS experts voted unanimously in August 2018 to oppose allowing Ligado Networks to use spectrum neighboring the GPS band for terrestrial communications. The National Space-Based Positioning, Navigation, and Timing Advisory Board urged opposition to the proposal, saying that even if the transmission power was lowered to just under 10 watts, it “will create totally unacceptable interference for a great number of GPS users in the United States.”

NSPS was able to convince the Coalition of Geospatial Organizations (COGO) to author a December 2018 letter to oppose the Ligado application pending before the FCC. NSPS has been asked to submit a separate letter to the FCC requesting the rejection of the Ligado application. On March 18, NSPS Executive Director Curt Sumner urged the Federal Communications Commission (FCC) Chairman Ajit Pai to reject a spectrum application by Ligado Networks (formerly LightSquared).

Office of Management and Budget (OMB) & General Services Agency (GSA) & SBA

Brooks Act/COFPAES/CIPC
Through the Construction Industry Procurement Coalition (CIPC), NSPS is working on introduction of a comprehensive construction procurement reform bill that will call for the prohibition of reverse auctions for A/E services, including for surveying and mapping.

Please visit the Reports section of the NSPS website for more information on these and all of the other Government Affairs efforts that NSPS is involved with.
Prologue

In the last article, I reproduced the letters written by the three individuals involved in surveying the Fond du Lac Indian Reservation boundary; the Commissioner of the General Land Office, the Surveyor General of Minnesota, and the deputy hired to carry out the fieldwork.1 As I wrote, “It speaks to the difficulties of working in a little known area and, surprise, working for the government.”2 Here, I describe the deputy’s work on the boundary.

Introduction

In the treaty signed on Sept. 30, 1854, by representatives of the United States and the Chippewa Indians of Lake Superior and the Mississippi, the western boundary of the cession was described as,

Beginning at a point, where the east branch of Snake River crosses the southern boundary-line of the Chippewa country, running thence up the said branch to its source, thence nearly north, in a straight line, to the mouth of East Savannah River, thence up the St. Louis River to the mouth of East Swan River, thence up the East Swan River to its source, thence in a straight line to the most westerly bend of Vermillion River, and thence down the Vermillion River to its mouth.3 (Fig. 1)

Introducing a new artifact on the cultural landscape of the Minnesota Territory, the Indian reservation, the United States agreed “to set apart and withhold from sale” several tracts in the ceded area for the various bands who were signatories to the treaty, the boundaries of which would be defined “by actual survey.”4 One tract of land, reserved for the Fond du Lac band, was described by a line, “Beginning at an island in the St. Louis River, above Knife Portage, called by the Indians Paw-paw-sco-me-me-tig, running thence west to the boundary line heretofore described, thence north along said boundary line to the mouth of Savannah River, thence down the St. Louis River, to the place of beginning.”5

This boundary line consisted of three segments: a northern and eastern boundary comprising the St. Louis River, a western boundary from the source of the Snake River “thence nearly north, in a straight line, to the mouth of East Savannah River,” and a southern boundary comprising a line run due west from an island in the St. Louis River to meet the western boundary. Unusually, the reservation was to include 100,000 acres and the treaty stated that “if said tract shall contain less than one hundred thousand acres, a strip of land shall be added on the south side thereof, large enough to equal such deficiency.”6

Clearly, the western boundary of the cession, a portion of which would serve as the western boundary of the reservation, needed to be established first. On March 4, 1858, Thomas A Hendricks, the Commissioner of the General Land Office, authorized the Surveyor General of Minnesota, Charles Emerson, to contract with a deputy to go to the source of the East branch of Snake River and, from there, run a straight random line to the mouth of East Savannah river — a tributary of St. Louis River. Aware that the cession boundary was longer than the necessary reservation boundary, the Commissioner stated that the cession boundary “should be surveyed and marked only to the extent of the western boundary of the Reservation and no further” meaning that the deputy would only correct his random line back “under such point of compass as would strike the source of Snake river if continued to that point” but he would stop at the point where his boundary lines would encompass 100,000 acres.7
On April 1, 1858, Emerson awarded Peter E. Bradshaw a contract to establish the boundary lines of the Reservation and gave him lengthy instructions that prompted a flurry of letters between the two, as previously described. It’s useful to reiterate some of the instructions given Bradshaw. Emerson wrote, “The western boundary of the above reservation is a part of the line of ceded territory ... which therefore must be first ascertained.”

You will therefore make due search for the East branch of the Snake River and following up same to its source. You will from their run a random line as near as may be to the mouth of East Savannah River which empties into the St. Louis River, and find the course of a corrected line from the mouth of said river to the source of the East branch of Snake river from which you started your random line.

Then, he was to meander the right bank of the St. Louis River downstream to an island above Knife portage and called by the Indians “Paw-Paw-sco-me-me-tiq,” at which point he was to, establish a stone monument (if suitable stone can be readily obtained) or otherwise of durable wood not less than 12 inches square sunk four feet below the ground and rising three feet out with pyramidal head and squared and marked in its north and west sides as follows “S.E. cor. F-du-Lac R.”

Then he was to run west from the southeast corner of the reservation setting marked monuments every mile until he intersected the western boundary of the reservation — his corrected line from the mouth of East Savannah River. At that point he was to, ascertain the distance from said Island to your corrected line, from the mouth of East Savannah River, and with these boundaries ascertain the area contain therein and if the same amounts to 100,000 acres or more you will proceed to establish the boundary line as hereinafter directed, but should the contents fall short of 100,000 acres you will change the south boundary of the Reserve by carrying it further South, until you have obtained a sufficient amount of land to make up the required 100,000 acres.

Then he was to “establish a similar monument to that directed for the South East corner of the Reserve, marking the same ‘S.W. cor. F. du Lac R.’ on the side thereof.”

Finally, he was to retrace the western boundary, running northward on his corrected line, establishing similar monuments at every mile from the last mentioned corner as posted for the South boundary and marking and blazing the line in a like manner until you arrive at the mouth of the Savannah River on the St. Louis, there establishing the North corner of the reserve, in the same way as described for the South East and South West corners respectively.

The Surveyor General directed Bradshaw to “take full and complete notes” of his survey, which he was to “return to this office accompanied with a correct Journal of each day’s proceedings and also with a diagram of the same on a scale of 40 chains to an inch.”

Thus, there are two sources of information for the actual survey, both of which are included in the BLM General Land Office Records database. R0015 is
the “Journal kept during the surveys of the exterior boundary lines of the Chippewa Indian Reservation situated on the St Louis River Minnesota,” and R0019 is the field notebook in which Bradshaw recorded what he did. (Figs. 2 & 3)

On June 3, Bradshaw left Twin Lakes “for the source of Snake River via the Military Road went 11 miles camped men have packs from 65-110 lbs. rain through the day.” The next day he travelled 16 miles and, the following day, 9 miles on the Military Road and then west 7 miles on the Mille Lac trail. He noted building a raft to traverse the Kettle River after which “good hardwood timber” covered the land surface. The next day, a Sunday, was spent in camp and then the party walked 14 miles, camping at a point Bradshaw “supposed to be the source of Snake River.” He sent the packers back to Fon-du-Lac for provisions and “took two men and what provisions they could carry and started Snake River down to the first known point, i.e. “Chengwatanna,” which they reached, after six days travel, on June 13, seemingly 85 miles downriver. At the settlement he purchased provisions and the next day went north 25 miles on the Military Road, leaving it at the Kettle River Bridge to travel northwest 14 miles, and camped on the Mille Lacs Trail. Continuing westward on the Trail for 8 miles he found “a large open swamp about 2 miles in diam.” in which he “found the 1st running water of Snake River.” He stated that he was “perfectly satisfied” that the large open swamp was the true source of the east branch Snake River and began his random line.

There are two title pages for his field notebook. The first is apparently signed by Bradshaw. (Fig. 4)

Bradshaw’s Survey

On June 1, the deputy wrote that he and his crew had left Superior and gone to Twin Lakes, where he camped to begin his survey. The following day he stated, “all hands went over to Fon-du-Lac and packed provisions over to Twin Lakes.” The deputy, chainmen, axemen, and flagman swore the preliminary oaths, which were notarized by a notary public at Twin Lakes, two days later. The next two weeks were spent trying to find the source of the east branch of the Snake River, where he was to start his survey. A brief review of his search is appropriate because it illustrates the difficulty of surveying in an area about which little was known.
The second, probably a copy, is shown in Figure 5.31

Before describing in detail the actual survey, let me give an overview. He first ran a random line, North 110 East — “an open Tamarac swamp” — toward the mouth of the Savannah River intersecting the River 42 miles 24 chains from where he started, west of the mouth of the Savannah River.33 He then went to the mouth of the river and set a corner post and from there ran a line west 1 mile 39 chains to where his random line ended.34 Then he ran south to establish the western boundary of the reservation 13 miles 9.8 chains.35 Returning northward to the Savannah River to what he mistakenly called the NE corner of the Reservation, he meandered down the St. Louis River “to the S.E. cor. post of Chippewa Reservation situated on the right bank of the St. Louis River” noting 296 points.36 He then ran westward to intersect his corrected western boundary line, establishing the reservation’s southern boundary.37

**The Survey in Detail**

Bradshaw first ran a random line, later described as North 11° East — see below — between June 18 and July 21, from the source of the Snake River toward the mouth of the Savannah River, along which he noted the distance of various topographical and ecological features and the compass variation, as instructed by the Surveyor General. (Fig. 6) On July 5, at 19 miles and 16.83 chains, he intersected the 5th correction line run by Milton Nye 2.52 chains west of the ¼ post in section 32 T.48N R.21W.38 He crossed the Prairie River at 34 miles and 3.50 chains on July 16, reaching the Savannah River at 41 miles 47 chains.39 On July 22, he ran a line 1 mile 39 chains from the mouth of the river west to the line he had just completed, where he set a post for what he incorrectly called the NE corner post on the east bank of the Savannah River at its mouth.40 He finished this portion of his notes, writing,

This is a Random line. The country passed over is mostly Tamarac & Spruce swamps. What hard land there is generally 1st rate, consisting mostly of small islands or narrow ridges, I think a continuous swamp extends from near the correction line to the St. Louis River at the mouth of the Savannah. This line crosses the easterly line of said swamp. In some places the swamp extends 2-5 miles west. The land about the sources of the Snake River is generally 1st rate timber, oak, maple, elm, ash, ironwood, basswood, birch, poplar. Course of this random line - North 11° East.41

**Date** | **Comments**
--- | ---
June 17 | Ran 10 miles, intersecting the principal fork of the Snake River.
18 | Ran 3 miles, afternoon cloudy, “tremendous hot.”
19 | Ran 2½ miles, cloudy 1/3 sun very hot country flat. Swampy.
20 | Sunday in camp intensively hot.
21 | Ran 1¾ miles, very little sun, cloudy through the day, very hot.
<table>
<thead>
<tr>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>Ran 2 ¼ miles, very little sun, cloudy through the day, country flat &amp; swampy, very little hard wood.</td>
</tr>
<tr>
<td>23</td>
<td>Ran 7 ½ chains early in the morning, no sun through the day.</td>
</tr>
<tr>
<td>24</td>
<td>No line run. No sun.</td>
</tr>
<tr>
<td>25</td>
<td>Rain all morning no sun, no line run. Sent 2 packers to the mouth of the Savannah River for provisions across the country.</td>
</tr>
<tr>
<td>26</td>
<td>No line run. No sun.</td>
</tr>
<tr>
<td>27</td>
<td>Ran 1 mile in the morning, afternoon cloudy, no sun, sent 2 men to the correction line for provisions and 3 to Twin Lakes for same, leaving only 2 men in camp, nothing to eat.</td>
</tr>
<tr>
<td>28</td>
<td>Fair day, no men in camp to run line.</td>
</tr>
<tr>
<td>29</td>
<td>2 men came in with some provisions from the correction line, cloudy, no line run.</td>
</tr>
<tr>
<td>30</td>
<td>No sun until noon then ran 1 mile (words illegible) and had to camp.</td>
</tr>
<tr>
<td>July 1</td>
<td>No sun. No line run.</td>
</tr>
<tr>
<td>2</td>
<td>No sun. No line run.</td>
</tr>
<tr>
<td>3</td>
<td>Ran 3 ¼ miles, country generally level, 3 packers in from Twin Lakes with provisions.</td>
</tr>
<tr>
<td>4</td>
<td>Sunday, no work today. 2 packers in from Savannah River this eve. Had they been out 2 days more (word illegible) only have had a meal for themselves.</td>
</tr>
<tr>
<td>5</td>
<td>Ran 3 ½ miles at 4 (word illegible) was taken sick and had to camp, tremendous hot.</td>
</tr>
<tr>
<td>6</td>
<td>Was not well enough to work this am, at noon clouded up afternoon no sun, no line, sent 3 packers to Knife Portage St. Louis River for provisions.</td>
</tr>
<tr>
<td>7</td>
<td>Rain all day, no line.</td>
</tr>
<tr>
<td>8</td>
<td>Cloudy all day, no line.</td>
</tr>
<tr>
<td>9</td>
<td>Rain hard ½ day cloudy other ½ no line.</td>
</tr>
<tr>
<td>10</td>
<td>Rain most all day, no line, no sun.</td>
</tr>
<tr>
<td>11</td>
<td>Ran 2 ¼ miles cloudy and only occasionally sun.</td>
</tr>
<tr>
<td>12</td>
<td>Sunday 3 packers in from Knife Portage country all afloat.</td>
</tr>
<tr>
<td>13</td>
<td>Ran 3 miles, cloudy much of the day, country poor.</td>
</tr>
<tr>
<td>14</td>
<td>Ran 2½ miles, only occasional sun, country very flat swamps stony (word illegible).</td>
</tr>
<tr>
<td>15</td>
<td>Cloudy all day, rain afternoon, no line, sent 2 packers to the Savannah River for provisions.</td>
</tr>
<tr>
<td>16</td>
<td>Ran 4½ miles, much of the afternoon cloudy. Country very flat (word illegible) and 1st rate.</td>
</tr>
<tr>
<td>17</td>
<td>Ran 3 miles, cloudy much of the day, crossing swamp east side, extends about 6 miles west. 2 packers in at night from the Savannah River.</td>
</tr>
<tr>
<td>18</td>
<td>Fair day, no line, Sunday.</td>
</tr>
<tr>
<td>19</td>
<td>Rain all day, no line.</td>
</tr>
<tr>
<td>20</td>
<td>No sun until 3 pm then ran 1½ miles, sent 2 packers to Savannah River for provisions.</td>
</tr>
<tr>
<td>21</td>
<td>Ran 3 ½ miles and stopped line, afternoon cloudy, went down to mouth of the Savannah River and camped.</td>
</tr>
<tr>
<td>22</td>
<td>Morning ran from the mouth of the Savannah River due west 1½ miles and intersected line from the source of Snake River, cloudy through the day, discharged 2 packers having no further use for them. Set NE cor. post to Reservation.</td>
</tr>
<tr>
<td>23</td>
<td>It being cloudy, set all hands to work packing from the mouth of the Savannah River south and cached them about 6 miles.</td>
</tr>
<tr>
<td>24</td>
<td>Men came in from the cache at noon, afternoon rain, no line.</td>
</tr>
<tr>
<td>25</td>
<td>Rain throughout the day, no sun, no line.</td>
</tr>
<tr>
<td>26</td>
<td>Cloudy, no sun, no line.</td>
</tr>
</tbody>
</table>

*Figure 6. Bradshaw's Journal. Running the random western boundary line.*

---

**Figure 6. Bradshaw’s Journal. Running the random western boundary line.**

---
The Surveyor General had instructed Bradshaw to correct this random line and establish corner monuments after he had established the other boundaries. However, on July 27, after a five-day hiatus, he began to correct his random line, writing, “Commence line at N.E. cor. post of Reservation at the mouth of Savannah River East bank. From here mouth of Floodwood River bears N 150W dist. 15.00 chs. 2.00 chs. wide from the West. At the mouth of Floodwood St. Louis River bears N 300E. St Louis River 8 chs. wide.”43 He wrote, “Course of corrected line of West boundary S 130 W.”44 He ran the line 13 miles, 9 chains and 80 links, setting posts and noting bearing trees, as instructed, and on August 8, noted, “At this point, which is the end of this line, the south boundary line of the reservation due west from an island above Knife Portage intersects.”45 The deputy’s journal of this portion of the surveys is shown in Figure 7.

He then returned to the “northeast” corner and meandered the right bank of the St. Louis River downstream to a white cedar post that marked the southeast corner of the Chippewa Reservation “situated on the right bank of the St. Louis River and opposite the middle of an Island called in the Treaty of Septr 30th 1854, Paw-paw-sco-me-me-tig …” 47 (Fig. 8) Interestingly, he next ran a line due south from that point 4 miles 2 chains to the north exterior of T.48 & T.49 north, the 5th Correction line that had already been run.48

Before running the southern boundary, Bradshaw spent some time completing administrative work that included responding to the Surveyor General’s demand for some communication from him and calculating the area enclosed by his lines, which was apparently necessary before he set a post for the SE corner of the Reservation. (Fig. 9)
<table>
<thead>
<tr>
<th>17</th>
<th>Morning cloudy. Having run 1¼ miles found I was (illegible) with the many declinations, went back &amp; corrected. Made 1½ miles.</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Ran 2½ miles, cloudy but little sun.</td>
</tr>
<tr>
<td>19</td>
<td>Ran 4½ miles cloudy most of the morning.</td>
</tr>
<tr>
<td>20</td>
<td>Ran 4½ miles cloudy part of the day</td>
</tr>
<tr>
<td>21</td>
<td>Ran 4½ miles cloudy part of the day</td>
</tr>
<tr>
<td>22</td>
<td>Ran 2¼ miles and stopped line at noon opposite the middle of island mentioned in treaty of Sept. 30, 1854 and called Paw-paw-sco-me-me-tig. Afternoon ran line south to north line of surveys between T.48 &amp; 49 distance 4 miles 2 chs.</td>
</tr>
<tr>
<td>23</td>
<td>Received letter (from Superior by messenger) from Chs. L. Emerson Survey Genl., wrote &amp; sent back answer, calculating area of reservation 52</td>
</tr>
<tr>
<td>24</td>
<td>Discharged 1 packer having no further use for him. Calculating area, cloudy.</td>
</tr>
<tr>
<td>25</td>
<td>Calculating area, cloudy, no sun</td>
</tr>
<tr>
<td>26</td>
<td>Calculating area, discharged 2 packers</td>
</tr>
<tr>
<td>27</td>
<td>Calculating area, found error in the traverse table &amp; shall have to recalculate most of the work. Stormy all day</td>
</tr>
<tr>
<td>28</td>
<td>Calculating area. A fine day, say the 2nd without clouds since began survey!!</td>
</tr>
<tr>
<td>29</td>
<td>Calculating area, cloudy!</td>
</tr>
<tr>
<td>30</td>
<td>Calculating area, clear day!</td>
</tr>
<tr>
<td>31</td>
<td>Finished calculating of area. Set S.E. cor. post to Reservation 53</td>
</tr>
<tr>
<td>Aug 23</td>
<td>Fig. 8. Bradshaw’s Journal. Meandering the right bank of the St. Louis River.</td>
</tr>
<tr>
<td>3</td>
<td>Ran 1½ miles about 2 hours sun in the morning, rainy the rest of the day</td>
</tr>
<tr>
<td>4</td>
<td>Cloudy &amp; showers all day, no line run</td>
</tr>
<tr>
<td>5</td>
<td>Sunday, no sun in the morning, afternoon a little, did not run any line</td>
</tr>
<tr>
<td>6</td>
<td>No sun no line run</td>
</tr>
<tr>
<td>7</td>
<td>Ran 1 mile, no sun in the morning &amp; but little afternoon</td>
</tr>
<tr>
<td>8</td>
<td>Ran 2¼ miles mostly cedar swamp covered with fallen timber, clear day</td>
</tr>
<tr>
<td>9</td>
<td>Rain all day no line run</td>
</tr>
<tr>
<td>10</td>
<td>Ran 1¾ miles mostly swamp &amp; old windfall cloudy &amp; rainy most of the day very little sun</td>
</tr>
<tr>
<td>11</td>
<td>Ran 2½ miles but little sun</td>
</tr>
<tr>
<td>12</td>
<td>Ran 3 miles, fair day, hard going mostly swamp</td>
</tr>
<tr>
<td>13</td>
<td>Ran 1¼ miles very little sun cloudy through the day with rain</td>
</tr>
<tr>
<td>14</td>
<td>Ran 1¾ miles no sun in the morning afternoon but little also rain</td>
</tr>
<tr>
<td>15</td>
<td>Ran 2¼ miles but little sun</td>
</tr>
<tr>
<td>16</td>
<td>Ran 2 miles and finished survey at 3 ½ pm no sun in the morning</td>
</tr>
<tr>
<td>Sept 1</td>
<td>Started &amp; ran due west on south boundary of Reservation 1½ miles had sun but an hour or so in the morning, afternoon rain</td>
</tr>
<tr>
<td>2</td>
<td>Ran 2½ miles but little sun, showers through the day</td>
</tr>
<tr>
<td>3</td>
<td>Ran 1½ miles but little sun, showers through the day</td>
</tr>
<tr>
<td>4</td>
<td>Cloudy &amp; showers all day, no line run</td>
</tr>
<tr>
<td>5</td>
<td>No sun no line run</td>
</tr>
<tr>
<td>6</td>
<td>Ran 1 mile, no sun in the morning &amp; but little afternoon</td>
</tr>
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<tr>
<td>13</td>
<td>Ran 1¾ miles no sun in the morning afternoon but little also rain</td>
</tr>
<tr>
<td>14</td>
<td>Ran 2¼ miles but little sun</td>
</tr>
<tr>
<td>15</td>
<td>Ran 2 miles and finished survey at 3 ½ pm no sun in the morning</td>
</tr>
<tr>
<td>16</td>
<td>Fig. 10. Bradshaw’s Journal. Running the southern boundary.</td>
</tr>
</tbody>
</table>

Bradshaw completed his survey on September 16 and then returned to Twin Lakes where he camped and subsequently discharged his party spending the next ten days “making up notes” and “making up plans.” (Fig. 11)

<table>
<thead>
<tr>
<th>Sept 17</th>
<th>Went east towards Knife Portage 16 miles &amp; camped</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>Went 15 miles towards Twin Lakes &amp; camped</td>
</tr>
<tr>
<td>19</td>
<td>Party got into Twin Lakes</td>
</tr>
<tr>
<td>20</td>
<td>Making up accounts discharged party</td>
</tr>
<tr>
<td>21</td>
<td>Not at work</td>
</tr>
</tbody>
</table>

From September 2 to 16, Bradshaw ran due west from the southeast corner of the reservation to the southwest corner, establishing the southern boundary. He ended his survey 22 miles, 72 chains, and 3 links from the SE corner of the reservation, and wrote, “Intersect west boundary of the Reservation 9.80 chains S.13°W 13 mile from N.E. cor.” where he established a white cedar post and noted “End of survey.” (Fig. 10)
Then the deputy showed his calculations of the acreage included in the Reservation boundary lines that ran 69.72 miles — 125,000 acres — considerably more than the 100,000 required by the treaty provisions.

He made the following observations at the end of his field notebook,

The land passed over while making this survey (after leaving the East & West Correction line between T.47 & 48) and going thence Northwardly on Random line as well as on both of the Boundary lines is mostly swamp land unfit for cultivation; the hard land where it exists is generally small Islands or narrow ridges from 1 to 5 feet above the swamps. From my knowledge attained of the reservation I think the land generally poor & swampy. There are a no. of lakes in the Reservation.

The final affidavits of his assistants, two chainmen and two axmen, were notarized on Sept. 25 and the affidavit of the deputy was notarized September 29.

Conclusion

Bradshaw completed his survey, although not without difficulty and not quite as instructed. There are several unanswered questions about his work; for example, it is not clear whether he actually marked any of the corner posts he set.

In his annual report dated Oct. 11, 1858, Surveyor General Emerson stated:

A deputy was despatched (sic) in May last, in accordance with your instructions of March 4, to proceed to the survey of the boundaries of the Indian reservation on the St. Louis river, (reserved under treaty with the Chippewas of Lake Superior and the Mississippi to the “Fond du Lac” band,) but owing to unforeseen difficulties he was unable to take the field as soon as expected, and from the peculiar character of the survey necessarily consuming much time in the search of his starting point, (being the source of a small stream,) and requiring a preliminary survey of many miles to establish the position of its western boundary, before he could commence the actual survey of the reserve itself, has delayed the completion and return of the notes much longer than I anticipated. I have, however, recently received information that the work is completed and that the deputy might shortly be expected to deliver his notes, in person, at this office, when they will be immediately examined and platted, and if found correct a map and transcript thereof will be transmitted without delay to your office. The establishment of this reserve will enable me at once to connect the public surveys with its southern boundary.

But there would be more work to be done before the rectangular survey lines could be closed against that particular boundary. And this will be the subject of the next article.

End Notes

1 The surveys of the Indian reservation boundaries comprise a distinct class of surveys. See Minnesota Secretary of State, Land Survey Field Notes p.7. In the Bureau of Land Management (BLM) General Land Office Records database <Minnesota>, hereafter “BLM GLO”, all of the field notebooks for these surveys are designated with the prefix “R”.


3 10 Stat.1109 Article 1. The treaty was proclaimed by President Franklin Pierce on Jan. 29, 1855. The “southern boundary-line of the Chippewa country” was a line defined as the northern limit of the area ceded by the Ojibwe in 1837, described in the treaty dated July, 29, 1837, as, “Beginning at the junction of the Crow Wing and Mississippi rivers,
between twenty and thirty miles above where the Mississippi is crossed by the forty-sixth parallel of north latitude, and running thence to the north point of Lake St. Croix, one of the sources of the St. Croix River.” 7 Stat. 536.

4 10 Stat.1109 Article 3.

5 Ibid. Article 2 4th.

6 Ibid.


9 Letter dated April 1, 1858. Minnesota Historical Society, U.S. Surveyor General of Minnesota. Letters Sent K, p.15-18. Bradshaw was assisted by chainmen William Hoge and Thomas Kellogg, and axemen Barney Earley and Baptiste du Faux — neither of whom could write, see BLM GLO Records <Surveys> <Minnesota> <Any Surveyor> <Bradshaw Peter>. For more on the letters between the deputy and the Surveyor General, see the reference in end note 2.

10 Letter dated April 1, 1858, end note 9. Emphasis in the original. Although he was not explicitly directed to run a corrected line, merely to “find the course of a corrected line,” Bradshaw did correct his line before meandering down the St. Louis River. He did note setting a post to establish what he called the NE corner of the reservation but clearly it was the NW corner (see below). This seems to have been the starting point for the survey of the reservation, although Emerson directed the deputy to set this corner last.

11 Ibid.

12 Ibid. Emphasis in the original. Bradshaw received no instructions on how to alter the southern boundary. This boundary was clearly altered, by whom is not yet known, as will be described in the next article on the Reservation boundary.

13 Ibid.

14 Ibid.

15 Ibid. No diagram has been seen.

16 This 26-page journal kept by the deputy as he ran the boundary lines, somewhat curiously contains the necessary notarized preliminary oaths by the deputy and his assistants dated June 3, 1858, and the deputy’s notarized final affidavits dated Oct. 4, 1858, both of which were normally included in the field notebook.

17 It is clear that Bradshaw did not precisely follow the Surveyor General’s instructions.

18 BLM GLO R0015 p.3. Bradshaw divided his journal into days without any pagination so here I use BLM database pagination. Twin Lakes is shown in section 31 on T.48N R.16W plat. It lay on the Military Road from Point Douglas to Superior, which ran through the southern tier of sections in the township.

19 Ibid.

20 Ibid. p.29-31.

21 It also helps explain the length of time Bradshaw was engaged in the actual survey.

22 BLM GLO R0015 p.4. The Military Road is depicted in various township plats.

23 The location of the Mille Lacs trail is unknown.

24 BLM GLO R0015 p.4-5.

25 Ibid. Emphasis in original.

26 Ibid. p.6-7. Emphasis in original. The Snake River is winding — but 85 miles, merely adding up the miles Bradshaw listed, seems excessive. Chengwatana was an Ojibwa village located along the lower course of the Snake River, Minnesota. The transient village became a permanent village located at the outlet of Cross Lake, on its southeastern shore, at the beginning of the lower course of the Snake River where Elam Greely, a lumberman, had built a toll dam. (Wikipedia).


28 Ibid. p.9.

29 The actual notes of the survey are contained in one slim volume, BLM GLO R0019, and are prefaced by a statement from the deputy; “The within notes were taken during the survey of the Chippewa Indian Reservation on the St. Louis River Minnesota under contract dated April 2nd 1858. Survey commenced June 18th. Finished September 16th, 1858.”

30 BLM GLO R0019 p.7. I use the BLM database pagination, not the field notebook pagination.

31 I suppose this is a later addition to the notes because of the use of “his.”

32 BLM GLO R0019 p.7.

33 Ibid. p.8-27.

34 Ibid. p.27. He must have placed a temporary marker at the end of his random line although he makes no mention of doing so.

35 Ibid. p.29-43. He did not, apparently, set any monuments along the lines, although he must have set a temporary marker at the end.

36 Ibid. p.44-63. Apparently there was a post already there.

37 Ibid. p.64-82.

38 Ibid p. 15. On July 21, 1857, Emerson had awarded a contract to Milton Nye to run the 5th correction line, the
line dividing T.48 and T.49N, from the Independent Meridian to the Mississippi River. Nye's notes are contained in BLM E159.


40 Ibid. p.29-30. The corner post obviously established the NW, not the NE, corner of the Reservation. On p.30, the “E” appears to have been written over a “W.”

41 Ibid. p.27-28.

42 **BLM GLO R0015** p.10-17.

43 **BLM GLO R0019** p.30.

44 How did he derive this course?

45 Ibid. p.43. How did he know this? Was the south boundary already established?

46 **BLM GLO R0015** p.17-19.

47 Ibid. p.63. August 22. Who established this post?

48 Just why he ran that line is unclear. It would prove fortuitous, however, because it would subsequently be used as a portion of the Reservation's eastern boundary.

49 Presumably a letter dated July 26 that I have not seen.

50 Letter dated August 12 that I have not seen.

51 **BLM GLO R0015** p.19-22.

52 Probably the letter dated August 17, sent by special messenger, in which Emerson expressed concern that he had not received any correspondence from the deputy. See my previous article referenced in end note 2, p.14.

53 According to his notes, see end note 46, there was a post at that point already.

54 **BLM GLO R0015** p.22-23.

55 **BLM GLO R0019** p.82.

56 **BLM GLO R0015** p. 23-25.

57 He discharged his party on Sept. 20, **BLM GLO R0015** p.26.

58 What does this phrase mean?

59 I do not know what this phrase means.

60 Ibid. p.26-27.

61 **BLM GLO R0019** p.83. I do not understand the calculation Bradshaw made over a six day period. Perhaps one of you can help? I’ll gladly acknowledge any contributions and buy you a beverage when next we meet.

62 **BLM GLO R0019**. p.84.

63 Ibid p.86. The Journal was notarized on Oct. 4, **BLM GLO R0015** p.32.

Women Surveyors Summit
Anna Rios, Texas Society of Professional Surveyors

The first Women Surveyors Summit will be held August 23-24, 2019, in Austin, Texas, at the Residence Inn/Courtyard Inn by Marriott hosted by Texas Society of Professional Surveyors (TSPS). The event was developed to help promote, support diversity, and build camaraderie among the women in the surveying profession. It was originally inspired by the Minnesota women surveyors and something that I hope will take place regularly across the country.

Brief Personal History

I was inspired to become a Registered Professional Land Surveyor (RPLS) in Texas in 2001 by working for the First Woman RPLS in Texas. Over many years, I worked to obtain my RPLS; through my involvement with TSPS at both the state and local level, I have developed a strong desire to help others pursue their passion. I first became involved with my local TSPS chapter in 2014 as Secretary/Treasurer. In November 2015, I became the Texas Representative for the National Society of Professional Surveyors Young Surveyors Network. In February 2016, as the Texas Representative, I attended the FIG/NSPS YSN North American Meeting held in conjunction with the Minnesota Society of Professional Surveyors Annual Meeting in Minneapolis. It was at this event that my inspiration for a women surveyors’ conference took place.

Role of Minnesota Women Surveyors

In Minneapolis during that 2016 event, the women surveyors of Minnesota were excited to see the young women in the young surveyor group and were very welcoming. During this event, I was introduced to every woman surveyor in attendance from Minnesota and several from Wisconsin. It was clear there was a strong bond among the group. Through visiting with these connections, I was told that each year following the MSPS Annual Meeting, the Minnesota women get together for a couple days for a weekend getaway. They even invited me to stay the weekend and attend; unfortunately, I had to get back to Austin or I would have gladly joined them for the weekend. In that moment, I knew I wanted to do something similar in Texas.

Purpose

In a profession that has been historically male and where we continue to search for ways to increase the workforce, it is imperative that our profession continue to reach out and support the many diverse backgrounds that can bring new ideas and new personnel. While attending state and local meetings are fantastic networking and educational opportunities for both men and women, sometimes it can be a bit daunting to be the only woman in a room full of men. Many women surveyors stand confidently in that room, and even so, still long for some camaraderie among other women in the profession. This is the purpose that the Women Surveyors Summit is hoping to fulfill.

Event Details

At the first Women Surveyors Summit, women surveyors from across the country are invited to attend. We will have a tour of the Texas General Land Office, including a look into their map room which holds some of the largest maps I’ve seen. We will also have two CEU courses. The first will be a 4-hour CEU course about researching at the Texas GLO records and the records available. The second is a 2-hour panel discussion among women leaders in the surveying profession about building diversity, developing and recruiting workforce, and other various topics that affect the profession. We are also hosting an evening rooftop social on Friday and an evening dinner reception on Saturday. There is an optional Austin Brewery Tour on Saturday afternoon.

Thanks to our many sponsors, the event is free for all attendees, with the exception of the optional tour. Space is limited and is expected to fill up quick! Registration is available on the TSPS.org website.
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MSPS Young Professionals Picnic
Tim Holperin, LSIT, Chair, MSPS YP Committee

Our recent Young Professionals picnic at Silverwood Park in St. Anthony was a success! It was great to hang out and enjoy some good food, surprisingly fantastic weather, and lively conversation with the younger contingent of MSPS. We even had some new faces in attendance, which is really exciting to see.

I would like to thank the others on YP Committee for helping to organize the event and for getting the word out to as many folks as possible. Special thanks go to Frontier Precision for their generous donation toward the food and to Westwood for supplying ice cold beverages.

We are making a renewed effort to boost the involvement of the surveying community's younger demographic. To help accomplish that goal, we need to get to know each other a little better. This means you can expect to see more social events hosted by the YP Committee, and hopefully we will see you there!

If you have any suggestions for future events or would like to join the YP Committee, we would like to hear from you. Feel free to contact me at timholperin@gmail.com.
TrigStar Statewide Place Winners
STATEWIDE – 12 schools and 160 students participated

First Place: Noah Gersich 100% (9:13 minutes)
Mankato West High School
Awarded $350 and Gold Medal

Second Place: Zi Hoo Yang 100% (20:21 minutes)
Fairmont High School
Awarded $250 and Silver Medal

Third Place: Timothy Cain 94% (18:32 minutes)
Mankato West High School
Awarded $200 and Bronze Medal

First Place: Mankato West High School - 877 points
Traveling Trophy - Chapter One MSPS
Teacher Steve Jones

Chapter One
One hundred eight students from six different high schools participated in the event: (1) Fairmont High School, (2) Lake Crystal Wellcome Memorial, (3) Mankato West High School, (4) New Richland-Hartland-Ellendale-Geneva NRHEG, (5) Nicollet High School, and (6) Waterville-Elysian-Morristown.

1st Place  Noah Gersich 100% (9:13 minutes)
Mankato West High School

2nd Place  Zi Hoo Yang 100% (20:21 minutes)
Fairmont High School

3rd Place  Timothy Cain 94% (18:32 minutes)
Mankato West High School

Traveling Trophy Event
Chapter Two

Bagley High School participated. Seventeen students took the exam.

1st Place  Cori Bonik  94% (44:51 minutes)
2nd Place  Emma Mattfield  88% (41:09 minutes)
3rd Place  Kylli Anderson  60% (47:29 minutes)

Traveling Trophy Event
Bagley High School  445 Points

At Breckenridge Senior High School, seven students took the exam.
1st Place  Adam Hieserich  70% (20:53 minutes)
2nd Place  Kaitlin Arnhalt  70% (41:09 minutes)
3rd Place  Olivia Eichhorn  65% (24:05 minutes)

Traveling Trophy Event
Breckenridge High School  337 points

Chapter Three - No events held

Chapter Four

Twenty-seven students from four high schools participated in the event: (1) Proctor, (2) Hermantown, (3) Duluth East and (4) Denfeld.

1st Place  Mary Johnson  94% (50:35 minutes)
           Denfeld High School
2nd Place  Keegan Chastey  88% (30:17 minutes)
           Denfeld High School

Traveling Trophy Event
1st Place  Denfeld  715 points

1st Place  Mary Johnson
           Denfeld High School
1st Place  Margaret E. Geidner
           Duluth East High School
1st Place  Zachary Cade Jaros
           Hermantown High School
1st Place  Ellie Rumbley
           Proctor High School

Chapter Five - No events held

Chapter Six - No events held

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A Retracement of the 1852 St. Louis River Survey from the Mouth of Lake Superior to the Meridian Line:
A Review of the 1852 General Land Office Survey:
Recognizing the Bad with the Good?

Anthony Lueck

On Oct. 14, 1852, U.S. Deputy Surveyor George Stuntz began a survey along the St. Louis River at Lake Superior for the northwesterly boundary line between the State of Wisconsin and the Territory of Minnesota. Stuntz ran his survey along the St. Louis River westerly to the point described by the State Congress before continuing south across land to the St. Croix River establishing a state boundary-meridian line. The Stuntz state line survey along the St. Louis River and the state boundary-meridian line are documented in his field notes of 1852. Wisconsin became the 30th State admitted to the Union in 1848. In 1846, Congress approved the Wisconsin Enabling Act, describing the State Boundary, in part: “through the centre of Lake Superior to the mouth of the St. Louis River; thence up the main channel of said river to the first rapids in the same, above the Indian Village, according to Nicollet’s map; thence due south to the main channel of the River St. Croix ....” Stuntz was under an existing contract with George Sargent, Surveyor General of Wisconsin and Iowa, to run township and range line surveys north to the shore of Lake Superior and bank of the St. Louis River. There was a considerable difference in the quality of state line survey work between that carried out along the St. Louis River and with that carried out for the state boundary-meridian line to the St. Croix river. The major difference was his method of survey. Stuntz began his survey chaining along the bank of the St. Louis River, but soon resorted to crude triangulation survey practice to complete his survey to the point of beginning for the state boundary-meridian line as described by Congress. There was a necessity to use triangulation, as Stuntz points out in his field notes on Oct. 14, 1852: “From this point to the Indian Village, a distance of some 12 miles, the Main Channel of the River winds through a Bay lined by extensive Marshes, having high precipitous Banks thickly covered with White Cedar & Spruce thickets, rendering the Meandering thereof at any other Season of the year than winter impracticable. Therefore the Meanders were continued by Triangulation.”

Oct. 20 to Nov. 10, 1852: Stuntz used traditional chaining measurement running approximately 40 miles, 75chains, 84 links south across land establishing the state boundary-meridian line from the center of the St. Louis River to the center of the St. Croix River.

In 1847, Surveyor General George Jones had awarded contracts to survey the 4th Correction Line from the Michigan Boundary to the Mississippi River. David Owens, who was engaged in Geological surveys, recommended to the Surveyor General immediate surveys be completed because of timber and mineral values, “the establishment of which is indispensable to the survey of the copper lands on the southern shore of Lake Superior, and of the country actually embracing the greater and better part of the St. Croix Valley pinery.” Also, U.S. Deputy Surveyor Henry Wiltse was to extend the 4th P.M. north to the shore of Lake Superior in Wisconsin, which he described as an extreme hardship with windfalls, steep terrain and rivers, insects, and a lack of supplies. See Vignettes of the Public Land Surveys, R. Squires, p. 37.
By 1850, Township Exteriors were already completed along the St. Croix River easterly along the 4th Correction Line to facilitate sale of lands in the valuable pine areas being logged in the State of Wisconsin and Minnesota Territory. The General Land Office (GLO) had a difficult time completing surveys and getting land ready for transaction ahead of the timber industry and eager settlers moving across the country.

In a letter dated April 13, 1852, J. Butterfield, Commissioner of Lands for the GLO in the Department of the Interior, wrote to George Sargent, Surveyor General for Wisconsin and Iowa: “The Governor of Wisconsin in a communication to the President under ... the most urgent application have been made to him of late by many of the citizens of Northwestern Wisconsin for the immediate survey of the Territory bordering on the River St. Louis and the coast of Lake Superior to the end that this portion of our state may be steadily settled. The market already afforded by the twelve thousand miners, and recent emigrants engaged in mining and the Fisheries of Lake Superior renders that important portion of our State of great relative value. ...” Further in the letter: “... The running of the meridian boundary between Wisconsin and Minnesota may probably be connected with the foregoing in the same contract under the instructions to you last year. Of this however you will be the judge. ...” (National Archives, Microcopy No. 27, Roll 14:456 General Land Office, Letters Sent to Surveyors General)

In 1846, Congress approved the Wisconsin Enabling Act, describing the State Boundary, in part: “through the centre of Lake Superior to the mouth of the St. Louis River; thence up the main channel of said river to the first rapids in the same, above the Indian Village, according to Nicollet’s map; thence due south to the main channel of the River St. Croix ... .” This is the legal description which Stuntz had to work with ready to venture his survey expertise. At the end of the survey along the St. Louis River, Stuntz began the Meridian survey for continuing the State Line south to the St. Croix River. The Stuntz meridian was independent of continuing the Range line run north between Ranges 15 and 16 West to the 4th Correction Line. U.S. Deputy Surveyor William Burt was under contract in 1856 to run such a Range line north between Ranges 15 and 16 West from the 4th Correction Line to, and crossing the St. Louis River, into the Territory of Minnesota. If you look at the Range and Section lines for the Townships on each side of the St. Louis River, you will see that they are not continuous because of the St. Louis River. Townships in Minnesota Territory were based on the 1856 Meridian line run north between Ranges 15 & 16 West from the 4th Correction line.

Stuntz ended his survey along the St. Louis River, you might say in an undefined way, either being on the edge of or in the center of the River. The last course in his meander notes along the St. Louis River is S4°40'E, a distance of 6.39 chains: “... to high precipitous bluff opposite the foot of the first rapids above the Indian Village as laid down on Nicolets Map. The White Pine across River bears S23°W [The White Pine across River was called out in the previous course] and a Yellow Pine on top of high precipitous bluff and due South of the Middle of the River at the first rapids aforesaid bears S½°W.” No monument was set to reference the point along the St. Louis River. The next course was the first course referred to as due south on the Meridian Line. S0°30'W a distance of 20.46 chains: ... to Yellow Pine 20” in diameter. The White Pine over River bears N22°W.” The Stuntz Meridian survey notes continue: “1st Mile ... top of high precipitous and marked a Yellow Pine tree 20” in diameter with 2 notches on the North side and 2 notches on the South side and in a square blaze on the East side marked the letters W.B. and in a square notch on the West side marked the letters M.B. and marked six bearing trees.” I note here that Stuntz may have been familiar with the country because in the first mile at 59.60 chains is noted a Trail to the St. Croix River bears S.W.
On April 8, 1914, D. Van Vleck, County Surveyor for Douglas County, Wisconsin, asked William Bennett, Chief Clerk of the Wisconsin Land Office, to transcribe the 1852 Survey Field Notes by Stuntz. The transcribed field notes match those of original survey notes of record in the Land Office Records. Van Vleck had retraced part of the Meridian Line for survey purposes in 1914. Van Vleck has notations in the transcribed field book at the location of the 1852 20"d. Yellow Pine Tree south of the St. Louis River: “Stump there. Letters OK. 2 BT.” He goes on to note found field evidence from the 1852 Meridian Survey at Mile Posts 1 and 2. There are field maps of the Van Vleck survey in the Douglas County Surveyor’s Office.

On June 2, 1978, Minnesota DNR Surveyor B. Eveland filed a Certificate of Survey map retracing the State Meridian Line from the St. Louis River south to Mile Posts 1 and 2. The survey confirmed finding field evidence from the 1852 Meridian Survey at Mile Posts 1 and 2. There are field maps of the Van Vleck survey in the Douglas County Surveyor’s Office.

This story is about retracing the 1852 Stuntz survey along the St. Louis River to the Meridian Line. The St. Louis River was part of the State Line Survey completed under his contract with Surveyor General Sargent. There was a difference in the quality of survey work along the St. Louis River to the Meridian Line; as compared to the Meridian Line survey run between the St. Louis River to the St. Croix River. The Meridian Line survey was well measured. The St. Louis River survey, in contrast, had many significant computed distance errors in the record. And if you try to follow or retrace this survey it may leave you with an ill feeling. I wondered why there was not a map of record from the GLO displaying this survey work along the St. Louis River.

An easy answer is that Stuntz and Surveyor General Sargent knew that Township Exterior and Subdivision Surveys were soon be contracted to the shoreline.
of Lake Superior and the St. Louis River. These surveys would compensate for any errors in the 1852 state boundary line survey along the St. Louis River. Also, the GLO Commissioner urged expediency in the Township surveys to follow. The Oregon Survey Manual stated that “State Lines” should fall on “Range Lines” which was dismissed here to expedite the State Line and the Township Subdivision surveys north to Lake Superior and the St. Louis River. In 1853, a year after Stuntz ran the state line survey along the St. Louis River to the State Meridian Line, he was standing on the south bank of the St. Louis River between Ranges 14 and 15 West and stated: “There is an Island that lies about 1 mile north in the River. I do not know if this Island is in Wisconsin or Minnesota.” The GLO had not extended the surveys north of the 4th Correction Line into Minnesota Territory. Also, in 1852 the islands in the St. Louis River were not being surveyed for the State of Wisconsin or Minnesota Territory. In 1856, Warner Lewis, the new Surveyor General of Minnesota had U.S. Deputy Surveyor William Burt run a Meridian Line north from the St. Croix River between Ranges 15 and 16 West. With the Township and State Line surveys of Wisconsin and Iowa nearly completed, a General Land Office was opened in Minnesota Territory. The 1856 Burt survey contract ran a meridian line between Ranges 15 and 16 West north to and across of the St. Louis River and established a 6th and 7th Correction Line east to Lake Superior, including the survey of selected Township Exteriors and Subdivisions by the Deputy Surveyor to accommodate preemptive settlements.

October 14, 1852: U.S. Deputy Surveyor Stuntz commenced his work for the State Line at the Meander Corner on the West Bank of St. Louis River in Township 49 North between Ranges 13 and 14 West. In his opening notes, he gives bearings to the mouth of the St. Louis River and to the northeast extremity of the St. Louis Bay from the township meander corner between Ranges 13 and 14 West. He then begins his survey running northwest along a narrow sand beach N39°W 14.50 chains. He continues northwest, chaining several courses of survey to the extremity of point from which both points at mouth of river bear S53°E. The field notes do not show or identify any monuments which may have been set at the 1852 survey angle points. From the angle points, bearings are given for a number of reference objects identified on the opposite side of the river in the territory of Minnesota.

Note: I used the 1861 Meade Topographical map for verification of courses and calls made in the 1852 river survey. The 1861 Harbor and River survey was well surveyed by the Corps of Engineers and drawn to scale. There have been numerous changes in the St. Louis River basin since this survey. The 1861 Meade map helped to identify and show the 1852 Stuntz survey line along the St. Louis River and the possible locations of some survey errors. I placed the township and section lines of the GLO survey for reference as an overlay on the 1861 Meade map. The GLO lines should be viewed as representative & approximate. The purpose of this story is to retrace the 1852 State Line survey along the St. Louis River, and not that of the adjacent Township Subdivisions & Islands which were completed between 1853 & 1894.

The first several survey courses of the 1852 survey fit well with that as mapped on the 1861 topographical map, including those bearings to the objects relative to Minnesota Point, Rice’s Point, and the mouth of the St. Louis River at Lake Superior. Stuntz notes, “From this point to the Indian Village, a distance of some 12 miles, the Main Channel of the River winds through a Bay lined by extensive marshes, having high precipitous banks, thickly covered with White Cedar & Spruce thickets, rendering the meandering thereof at any other season of the year than winter.
impracticable. Therefore the Meanders were continued by triangulation.”

The next courses for the State Line meanders on the Right Bank of the St. Louis River were by triangulation as George Stuntz had noted. Monuments were not set or shown in the field notes. His reference objects were mainly some noticeable feature such as a dead Pine Snag or a Yellow Pine on an Island. From these calls, a Land Surveyor could make a premise that there will be a degree of inaccuracy in the field survey to be reckoned with. And such was the case with the survey along the river using the crude triangulation methods. To make the survey record more confusing, the distances computed by trigonometry to reference bearing objects had considerable errors. And more misleading was that the bearings taken to reference objects seemed to be reliable by forcing mathematical closures and distances in the field notes. But how could a person dismiss or analyze this part of the 1852 Survey along the St. Louis River without some kind of factual basis? (The 1852 St. Louis River survey was disregarded after Township Subdivisions along the river.)

Figure 6 shows the location of the 1852 state line running southwest from Connors Point. Along state line courses labeled “-8-, -9-, -10-,” there is a problem with the Stuntz record. The 1852 field notes show a closed triangle, with bearings and computed distances along the south line of course (line) -9-. A number of survey and measurement errors occur at this point, for example, that disrupt the validity of the survey by triangulation. 1. At the angle point of courses -8- and -9- Stuntz gives a bearing and distance to a reference object on Rice’s Point. An error along line -8- or the reference bearing are possible. 2. The closed triangle in the survey record along line -9- with bearings northerly to a reference object across the river. The northerly point of the triangle falls considerably short of the river bank. If the length of line -9- is changed to fit near control points “U & V” on the 1861 map it may fit better to 1852 field call locations. Then the triangulation reference bearing from angle point -8- and -9- will hit at the shoreline based on the reference bearing from angle point -10- and -11-. The angle point -10- and -11-, control point “2” on the 1861 map, fits well to the 1852 field notes and river topography. But there is a large, significant distance error in the 1852 field record for line -10-. The 1852 Stuntz-computed line distances are short, as well as reference object distances, to the actual river. Collectively state line courses (lines) -8-, -9-, -10-in the field notes approximate total distance is 19,359.8’. From the 1861 Meade map comparing feature calls from the 1852 survey notes a total distance is 23,067.5’. The collective line error in the 1852 state line triangulation record being short 3707.6’. The 1852 distances computed to reference objects on the northerly shoreline also run short to the distances along lines that go to presumed locations based on field calls and control points on the 1861 Meade map. State line course -11- is only 91.7’ near main channel.

The reference object calls and courses in the 1852 survey could be made relative to the 1861 Meade map. The bearings seemed to be fairly reliable, but most distances had considerable errors. This could be verified with the calls to the right or left bank of the river and calls to objects which were outstanding topographical features, such as a spruce on edge of bluff. The 1852 survey bearings followed roughly the course of the river. Remember that Stuntz noted there were many bays along the river — such as Pokegama Bay, which he skirted across the “mouth of the bay” for the 1852 survey of the St. Louis River. Multiple bearings to reference objects from various angle points could be made to fit based on the topography of the river, and not the distances given between angle points in the field survey notes.
Along this part of the 1852 state line survey on the St. Louis River the triangulation courses for lines -19- and -20- are very long. The 1852 state line skirts straight over land masses in both states in the Township surveys that is now gone and part of the river. The shorter 1852 state line courses along lines -12- through -18- fit marginally well across Pokegama Bay and along the course of the river south of the Big Island. In the 1852 field notes, Stuntz references a couple post and flag monuments along the shoreline. After course (line) -18- a baseline was established for his survey reference. The NE point of Spirit Island had a reference object he measured to from a number of positions. It is labeled point “20” on the 1861 Meade Map. It is near the COE monument 140A. The 1852 State Line survey bearings and distances of record were used for lines -18- through -22- for this part of the river and laid in to fit with the 1861 Meade survey map.

Further adjustments were made for State Line courses -23- through -26- distances to fit better to calls made in the 1852 field notes with the 1861 Meade topography map.

When the 1852 survey notes of record would not close from the point of beginning at the Meander Corner near the mouth of the St. Louis River to the state boundary-meridian line at the Rapids, a mess ensued open to many interpretations by any party reviewing the 1852 survey record. I had wondered if the original field book had not been altered when transcribed.

A note of interest between the 1852 Stuntz survey along the St. Louis River and the 1861 Meade Topographical Harbor survey made by the Lake Survey crew of the Corps of Topographical Engineers under Hearding is that many “angle or control points” numbered on the 1861 Topographical Map correspond with the “angle points” derived from courses and bearings in the 1852 Stuntz state line survey along the St. Louis River.

The solid line on the 1861 Meade Topographical Map detail in Figure 8 is the location of the 1852 State Line along the St. Louis River. Note how Stuntz could not stay on one side of the St. Louis River with the numerous bays and marshes. The small numbers are the depths of the river and bays as sounded in the 1861 Meade survey. Stuntz had multiple bearings from various State Line angle points end up near the same reference object — which they should! But this is only possible by changing the distances along the 1852 State Line courses. The 1852 State Line survey calls are verified by the topography shown on the 1861 Meade map; for
example, the “1852 Dead Pine on Point of Bluff.” Further note, the number “30” by the “1852 Dead Pine on Point of Bluff.” This number is an 1861 Meade Map control point reference shown on the 1861 map near the 1852 State Line survey location. Other examples of control point numbers on the 1861 Meade map with the 1852 State Line survey are at the 1852 “Fir on Right Bank” being number “27”, and “Spruce on Bluff”. The “Spruce on Bluff” is near the 1921 State Line monument COE163. The 1861 control point references correspond with the 1852 survey angle points throughout the survey along the St. Louis River.

The Township and Section lines on each side of the St. Louis River in the State of Wisconsin and Minnesota do not line up because an Independent Meridian was run north between Ranges 15 and 16 West from the 4th correction line into Minnesota Territory in 1856. The 1852 State Line Meridian location was based on a description from Congress and not the General Land Office Township and Range lines.

This 1861 Meade map is near the settlement at Fond du Lac and the end of the 1852 River Survey at the Rapids near the high bluff proceeding south along the 1852 State Boundary Meridian Line. On State Line course (line) -26- I held with the 1852 bearing and distance of record and placed the line as best fit on the 1861 map. State Line course (line) -27- is the course that intersects with the line that came south on the La Pointe Treaty line from the Fur Trading Post at Fond du Lac. A distance of 488’+/- was added to state line course (line) -27-. From the angle point of this line the foundation of the 1852 house call was found. This helped to verify the Stuntz calls of record. Also, an adjustment of 200’+/- north was allotted for in the State Line survey at this location to fit calls to the House and Fur Post. State Line courses (lines) -28- through -32- were laid out with 1852 bearings and distances of record. These lines fit well with 1852 field survey creek calls and a historic development point. An adjustment or gap of 422’+/- was made between state line courses (lines) -32- and -33-. This was because I ran the 1852 State Line survey back along the River from the 20°d. Yellow Pine marked on the State Line.

The State Line survey run north 20.46 chains from the 1852 Yellow Pine reference fit well with the 1921 State Line survey where monuments of record were found on each side of the St. Louis River. The 1852 state line survey record bearings and distances fit well along the St. Louis River running the survey in this direction until reaching the angle point at State Line courses (lines) -33- and -34-. In running out state line course (line) -33- by record bearing and distance there was a gap of 422’+/- bearing S0°30’W, the same bearing as the State Meridian line, to connect with the state line course (line) -32- by record bearing and distance from the adjustment in survey made at the Trading Post-Treaty Line location.

In 1852 state line courses (lines) -23- through -25- the straight line inverse distance of the lines was S79°23’37”W and a distance of 8210.16’. With the said lines made to fit the river topography with modified distances, the straight line inverse distance of the lines was S74°46’36”W and a distance of 8601.57’. The 1852 survey distance being approximately 391’+/- short of the distance along the modified lines with the topographic map. State Line course -26- was held to the record bearing and distance to the modified location. State Line course -27- was extended 478’+/- northwesterly for the Trading Post-Treaty Line calls. The 1852 State Line survey fell about 900’+/- short from State Line course -13- to State Line course -33-.
I was confounded by the 1852 Stuntz survey along the St. Louis River. I wanted to make it work out, and make it work out well! But such was not to be the case; let's be thankful for the later Township Subdivision work through the additional Deputy Surveyor Township Subdivision contracts. The Stuntz St. Louis River survey preceded and led to the Point of Beginning for the continuation of the State Boundary-Meridian Line survey for the boundary between the State of Wisconsin with Territory of Minnesota. The 1852 Survey was even called upon for discussion in the 1921 U.S. Supreme Court boundary dispute between Minnesota and Wisconsin in an attempt by Minnesota to state that “the Big Island” in the St. Louis river was originally in the State of Minnesota.

What field or additional evidence could be found to verify the 1852 St. Louis river state line survey record? The initial “Meander Corner” in Township 49 North between Ranges 13 and 14 West is reconstructed from City Plats. The 1852 mouth of the St. Louis River as it enters Lake Superior could be verified by the 1861 Meade Map, but the location of the river mouth today has changed with dredging and improvement of the shipping canal. This is also noticeable when laying out the meander lines of the GLO surveys along Wisconsin and Minnesota points. Stuntz did not call out any islands in his 1852 survey along the St. Louis. In fact, his initial state line survey did run on the south side of “the Big Island.” But by 1853, the Surveyor General and Stuntz placed “the Big Island” in the State of Wisconsin.

Stuntz called out a couple trading posts and houses in his triangulation survey. There was a trading post on Minnesota Point at a different location than the trading post that Stuntz set up a year later for his private business. Immigrants and settlers were rapidly moving in to the area needing supplies and opening other ventures.

Toward the westerly end of his survey along the St. Louis River, Stuntz called out the “Treaty Line” (from Treaty of La Pointe) being due south of the trading company post at Fond du Lac in Minnesota Territory. At the same reference point, he called out and triangulated (took bearings) to two other house structures on the south side of the river in the State of Wisconsin. In 2018, I was able to locate one of the two house structure foundations.

Also, the location of the fur company post from a 2015 Archeological Report completed at Fond du Lac.
Another structure of permanence is the State Highway 23 Bridge and approximate location with the 1852 Survey. Even though it has been replaced a number of times, it is near the location of the 1852 field survey call N55°30'W a distance of 2 chains. The 1856 Military Road crossed the St. Louis River by ferry to the preemptive settlement at Fond du Lac.

From Fond du Lac, I believe that Stuntz continued his survey along the river bank by chaining and with only one triangulation reference object across the river in Minnesota Territory being at the end of his St. Louis river survey before heading south and establishing the state meridian line to the St. Croix River. But his survey north of Fond du Lac still seemed to lack the care we would hope to see in an original GLO survey. Distance differences in the 1852 Stuntz state line meanders along the river were evident when comparing with the meander line by U.S. Deputy Surveyor William Daugherty in his Township 48 North Range 15 West Subdivision from 1860.

Stuntz’s course S4°40'E a distance of 6.39 chains to a high precipitous bluff the foot of the first rapids above the Indian Village as laid down on Nicolets Map leaves me in question of his more exact location. Was he along the edge of the River at the toe of the bluff or already on or near the top of the bluff. Stuntz does not set a post monument at this location, but he establishes two references: A previously referenced White Pine bears S23°W across the St. Louis River and a Yellow Pine on top of high precipitous and bears south of the middle of the river at the first rapids aforesaid bears S½°W. From the bank of the St. Louis River, Stuntz begins his “1st Mile” of the State Line Border Meridian south to the St. Croix River. On a bearing of S0°30’W and at a distance 20.46 chains, Stuntz calls out a 20”d. Yellow Pine.
At the 20”d. Yellow Pine, Stuntz states that the White Pine over river bears N22°W. He places two notches on each side of the Yellow Pine north and south. On the east side, in a square blaze he scribes “W.B.” for the Wisconsin boundary and on the west side in a square blaze he scribes “M.B.” for the Minnesota boundary. He establishes additional tree references for the 20” Yellow Pine State Line Monument before continuing south on the State Meridian Line.

In 1914, Douglas County Surveyor Van Vleck retraced parts of the State Line from the 1852 Stuntz survey. He located the Yellow Pine as a stump in his survey. In 1978, the Minnesota DNR recovered a deteriorated stump for the 1852 Yellow Pine line tree. To summarize, the 1852 State Line survey along the St. Louis River will not get you to this point based on the Stuntz field survey notes. His survey along the St. Louis River was superseded by the later Township subdivisions in Wisconsin and Minnesota. Because his survey notes are of record along the St. Louis River, they deserve to be explained for a better understanding of the early GLO surveys and methods.

I believe Stuntz intended to provide a good survey of the St. Louis River, at least along the southerly shoreline; but that was not the case when retracing his field notes of record along the St. Louis River to the state boundary-meridian line. I do not think Stuntz knew of the errors in his survey along the St. Louis River as written in the field notes of record.

At the end of his survey on Nov. 10, 1852, Stuntz wrote a “General Description and Report” of his work and description of the land traversed. The survey report is interesting to read in lieu of the measurements along the St. Louis River. His report gives a good description of the St. Louis River to Lake Superior and a historical insight into what Stuntz witnessed in his field work. He was not alone. Stuntz begins his Survey Report:

“That portion of the Boundary line defined by the St. Louis River from its mouth as high up as the first rapids above the Indian Village being peculiar and different from the other portion. I will describe first the mouth or entrance as it is called by the Voyageurs of the River, is about ¼ of a mile wide, formed by a narrow sand bar projecting from the north shore of the Lake about 7 miles. This bar is uniform in its course and does not vary more than from 40 to 160 rods in width. The bar on the east side of the River is like the one on the west side, but is only about 1½ miles in length. During this summer the water in the channel over the bar was about 7½ feet. The channel is crooked making an entrance to the Bay within during the heavy NE storms extremely dangerous. Once inside the Bar however vessels are safe. The River widens into a Bay about 8 miles long and 1¼ miles wide. The shores are mostly
clay banks with narrow sandy beach for 6 miles up the Bay; there the sandy beach disappears and small bays extend from the main body in numerous inlets varying in length from 5 to 160 chains. At the distance of 19 miles up the River is situated the Indian Village of Fond du Lac on the north side of the River containing 50 or 60 cabins and lodges, and 3 or 4 good houses, and 2 trading houses, and a Mission Building. On the Wisconsin side opposite this village several families of French and Indians live in half civilized manner, hunting and fishing being their only occupation. On the Wisconsin side of this Bay to the Rapids the country is hilly and thickly covered with Timber, mostly of small growth, the most valuable kind of which are White Cedar, Spruce, and White Pine. The North side (of River) is bounded by a range of mountains that raise 800 to 1000 feet above the Lake within from 1 to 3 miles from the beach. This range extends parallel to the Lake shore as far East as Pigeon River and bears N55°E. From the best information I could gather and from specimens I saw, I am inclined to believe this to be the best mineral range upon Lake Superior. Specimens of native silver and copper have been found in several places though no mines have been opened or worked."

Stuntz then comments on his decision for a State Boundary-Meridian Line:

“In discharging the responsible duty of establishing the Boundary of a State, I was not a little embarrassed by the vague and indefinite lettering of the law fixing the starting point, but was fortunately relieved upon arriving at the rapids designated. To find that the River ran nearly due North and that the point to commence measurement was the only one to be overcome. The measurement was commenced near the foot of the rapids which are some ten chains in length, and the line passed from that point up the stream crossing the principal reef in the centre of the River, and from thence to the top of a high precipitous bluff 20.46 chains South of the starting point. ...”

The errors in the 1852 field notes along the St. Louis River were too numerous to retrace to be able to map the 1852 survey with any reliable accuracy. The 1852 survey by triangulation methods was too loose in procedures to reliably and consistently compute distances along the St. Louis River. An overall survey error along the 1852 state line St. Louis River may be surmised as 4600′+- short E-W, and 600′+- short N-S. Survey bearings for the route courses fit roughly to river courses, in segments, when distances were modified. Topographical features and river edges as called out in the 1852 field notes could be approximately located when applied with the 1861 Meade topographical survey map.

The GLO has many surveys and methods of survey that may not have always yielded desirable results. Recognizing and identifying with problems in a U.S. Deputy Surveyor’s work goes against the premise that the GLO records are always correct. In this situation, there were later Township subdivisions to follow and supersede the 1852 survey, along with field notes and plats approved by the Surveyor General. There also was a plat for the State Boundary-Meridian Line and mile posts reestablished from later surveyors. This allowed the errors in the 1852 state line survey along the St. Louis River to be contained and partially identified.

Figure 13. George Stuntz and Crew on the St. Louis River.
Triangulation survey methods can lead to distance errors difficult to analyze. As surveyors we have probably seen where a distance across a lake along a section line has been computed incorrectly using triangulation methods (i.e. bad bearings to flags or bearings along baselines or computations). More general and lax are the meanders along lake, swamp, and river boundaries with GLO surveys. With the 1852 State Line survey along the St. Louis River, we take the good with the bad. Stuntz's final survey report is interesting and insightful to the nature of the St. Louis river and the occupants of 1852. He properly establishes the State Boundary-Meridian Line between Wisconsin and Minnesota as described by the 1846 Congress for the State Boundary, in part: “through the centre of Lake Superior to the mouth of the St. Louis River; thence up the main channel of said river to the first rapids in the same, above the Indian Village, according to Nicollet's map; thence due south to the main channel of the River St. Croix ...”

Figure 14. Oneota Cemetery overlooking the St. Louis River in Duluth, Minn.

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Surveying Merit Badge training with the Boy Scouts

With the goal of becoming an Eagle Scout, area Boy Scouts hiked to the north end of the St. Cloud Technical and Community College’s (SCTCC) Campus on Tuesday, April 16 to complete the tasks to earn their Surveying Merit Badge.

Instructors Dan Kvaal and Sean Clark from the Land Surveying/Civil Engineering program at SCTCC worked with the Central Minnesota Boy Scouts to set up a training date so they could earn their Surveying Merit Badge. The badge is one of many needed to become an Eagle Scout.

This is the fourth year that the Land Surveying/Civil Engineering program at SCTCC has partnered with the Boy Scouts organization to provide the training, which takes in the evening, on their own time. Several college students from the LSCE program also volunteered their time to work with the Boy Scouts, showing them how to turn angles with the instruments and how to accurately measure distances. Back in the classroom, instructors and college students help each Boy Scout with leveling and error calculations, which are required to obtain their Surveying Merit Badge.

The training provided is a great opportunity for Boy Scouts to get a taste of actual surveying, an outdoors oriented career, which can be very fun and rewarding. The LSCE program has all the necessary equipment to complete the surveying tasks and classroom space to perform the calculations. SCTCC Instructors feel that this is a perfect community outreach project and an opportunity for our college students to help the younger Boy Scouts.

Because the training took place from 4 to 8:30 p.m., an evening meal of pizza and pop was provided for the Boy Scouts and college volunteers. A few parents also attended the merit badge training and expressed their appreciation for all of the volunteers who helped out at the event. Each Boy Scout also received a certificate of achievement from SCTCC for completing the Surveying Merit Badge training.
In the last 20+ years, the surveying industry has seen rapid change — including advances in technology and the continual pressure to complete work in less time to realize a ROI. Deliverables have changed, requiring more detail and more data. Collectively, this has driven an increase in liability (as if surveyors didn’t have enough already). We have a cycle where increases in data capturing and dissemination capabilities give birth to more detailed requirements, which in turn drive newer and faster technologies, resulting in a runaway train of responsibility for the surveyor.

Given this, is it any wonder that surveyors don’t have time or desire to pick up CAD? Our addiction to increasing efficiency promotes a single workflow from field work to final deliverables, yet many surveyors find CAD a burden, or at least don’t have the time or background to become proficient. This article will aim to bring clarity to these challenges and how to overcome them. This topic spans a broad set of workflows and technologies, so the focus will be on AutoCAD Civil 3D and the processing of imported survey data. We’ll cover best processes in backend set-up, as well as strategies for getting teams up to speed in short order.

Understanding the Challenges

Survey teams face a number of primary challenges in both learning and effectively implementing Civil 3D. In no particular order, they include:

- **Civil 3D is a design tool first, survey second:** About 75% of the toolsets in Civil 3D are for engineers, the rest for surveyors. The result is a daunting myriad of tools that surveyors must wade through. Since engineers are the primary product customers, their requested enhancements to the application typically receive higher priority. The result is typically a “stick with what I know” approach, preventing users from exploring newer toolsets that might be better suited. The solution is to provide pre-determined and documented workflows to survey teams so they don’t have to take the time to figure it out on their own.

- **Surveyors aren’t computer people:** Often what attracts people to the surveying industry is the opposite of what interests computer geeks. As a result, surveyors come to Civil 3D with less exposure to computers and understanding how they “think”. The result is a slower learning curve — and with less interest in computer technologies in the first place, a greater likelihood of giving up on Civil 3D. The solution is to openly acknowledge this and provide the proper training. This doesn’t mean sending surveyors to a general Civil 3D training class, but rather figuring out behind the scenes exactly how your organization will use Civil 3D, then teach the production staff. This takes detailed work, but the ROI can be quick and substantial.

- **Utilization rules all:** While keeping surveying staff highly billable makes short-term financial sense, it doesn’t leave much room for individual skills development. In many cases, projects charge the client by the hour. Every hour spent paying that employee a salary, but not billing the client for it, feels like a loss. Instead of focusing on selling hours, organizations should push for lump sum projects, then work on their internal CAD processes and technologies to become more efficient to increase profit. If lump sum isn’t an option, then work to raise your billing multiplier.

- **Civil 3D is worthless out of the box:** Especially for survey workflows, Civil 3D requires substantial efforts to set it up for your organization’s standards and processes. For example, most organizations use a unique survey code list. This is the foundation for a major part of the set up in Civil 3D for survey. Plugging this data in properly in the first place and maintaining it as things change over time takes substantial resources. Coupled with previous challenges, the result is often a half-configured setup of Civil 3D, leaving surveyors to fend for themselves and just “make things work”. This wastes time and only adds fuel to the flame of why surveyors don’t like Civil 3D in the first place. The solution is to have a small team explore, configure, and test Civil 3D to suit your organization’s needs, then train staff with documented and/or recorded workflows that have been vetted behind the scenes ahead of time.
Making Civil 3D Purr

Proper configuration is one of the biggest hurdles in getting survey teams to efficiently use and embrace Civil 3D. This configuration involves a number of steps. Following is an outline with references to specific solutions and strategies. This work should be done by a small team prior to rolling out new standards and processes to production staff. Whether you’re starting from scratch or going through an overhaul, follow this process. If the expertise isn’t in house, hire a consultant, but don’t skip these critical steps.

1. Nail down drafting and CAD standards. These are plugged into a Civil 3D setup, so must defined.
   a. Fonts, Linetypes, Hatch patterns, Blocks.
      i. Use the CIM Manager Suite from CTCSoftware.com to save time editing Linetypes and Blocks.
   b. Titleblocks, sheet sizes, logos, etc.
   c. Info shown on a given sheet (tables, labels, what info?).

2. Be comfortable with Survey Databases, Surfaces and Annotation.
   a. You can’t build Styles and settings for tools you don’t understand.
   b. See Brian’s Autodesk University classes for deep dives on this.

3. Update Survey code list.
   a. With Civil 3D functionality now in mind, revise your code list in Excel. A unique code is needed for only one of three reasons:
      i. You want a unique symbol or linetype for the feature.
      ii. You want on/off Layer control for that feature alone.
      iii. You want a unique color for the feature.
   b. Titleblocks, sheet sizes, logos, etc.
   c. Info shown on a given sheet (tables, labels, what info?).

4. Create a custom template.
   a. Start with acad.dwt and add Styles, Layers, etc., as necessary. This will be a Survey-only template, so name it something like “C3D 20XX - Survey.dwt”.
   b. Never do testing or object creation in this template, but instead in a junk drawing.
   c. Don’t put Layouts and title blocks in this drawing. Create a separate Sheet Template with preconfigured Layouts and Page Setups that are inserted into drawings as necessary.

5. Template Building Philosophies.
   a. Generally speaking, use Layers to turn objects on/off, use Styles to change appearance.
   b. Set Style component layers to 0 as default and do property overrides in the Style if unique Layer control is needed for that feature through xrefs.

   a. If nothing is in place, use NCS; otherwise use your current system if working well. Either way, account for smart Layer Filtering through consistent suffixes/prefixes when defining your standard.
   b. Use the CIM Manager Suite from CTCSoftware.com to export an Excel Layers template and build your initial Layer set there. Use the tool to reimport and sync those Layers to the template. Don’t worry about defining every layer at this point.
7. Build your Description Key Set using the **CIM Manager Suite** from [CTCSoftware.com](https://www.ctcsoftware.com) to automatically import and sync your Description Key Set from Excel, saving lots of time.
   a. Utilize similar styles and layers as much as possible.

8. Create Point Groups.
   a. These are to change overall appearance of groups or all points at once.
   b. Utilize Point Group overrides to trump Desc key Set settings and to group Surface points.

9. Create Linework Code Set (you should be able to stick mostly with out-of-box).

10. Create Figure Prefix Database using the **CIM Manager Suite** from [CTCSoftware.com](https://www.ctcsoftware.com).
    a. Export a Figure Prefix Excel Template from the toolset, then plug in the appropriate linework survey codes and settings.
    b. Sync back to your Figure DB.

11. Create Surface Styles.
    a. Understand surface creation and editing, and Data Shortcuts.
    b. Understand Breaklines Supplementing factors’ influence on surfaces.
    c. Create Styles for just existing Surfaces.

12. Create Annotation and Label Styles.
    a. Decide on standard ways of labeling lines, curves and areas. These label types have a tendency to grow out of control, resulting in confusion for the end user.
    b. Aim to minimize the number of labels needed (bearing, bearing and distance, etc.).

13. Set up an AutoCAD profile.
    a. Decide where survey support files will be stored (template, figure database, etc.).
    b. Determine how you will deploy this custom setup. It should be a one-click solution for users. See Brian’s Autodesk University classes for deep dives on this and consider an all-local setup.

14. Test, Test, Test...
    a. The more, the better. The more complete the setup is by the time the first real project takes place, the more successful you’ll be.

**Making Surveyors Purr**

It’s true. Surveyors will purr when Civil 3D works well! This can only happen if the work has been done with configuration and process development. Once complete, processes should be documented and/or made available in training videos. Hands-on training is great, but if the timing isn’t right it will be a waste. That’s why on-demand resources are critical.

Following is the general workflow within Civil 3D for processing survey data. Take this and build on it to suit your specific needs.

1. Export point file from data collector.
2. Create the project in Civil 3D.
   a. Set the Survey Database and Data Shortcuts Working Folders.
   b. Create new drawing from Survey Template.
   c. Create Survey Database, taking note of unit and coordinate system settings.
   d. Import Survey Data into the Survey Database. You must use Survey Databases to utilize Automatic Linework, which is the single most powerful survey-related functionality in Civil 3D. To not use it is missing crucial part of why you purchased Civil 3D.
3. Analyze and edit points and linework via this “Editing Hierarchy”.
   a. Survey Points Editing.
      i. Use Layer Isolate/Unisolate to step
through each feature type in drawing. (Your Layering standard should support this functionality.)

ii. Strive to make all edits using this method instead of Figure Edits, allowing “Process Linework” option at any time. Note that Processing Linework after Figure edits will create duplicate Survey Figures. Use Survey Sweeper in the CIM Project Suite from CTCSoftware.com to fix this.

iii. Adjust Point Group Hierarchy to turn off/on labels on key point types (trees, structures, etc.).

iv. Points with User Defined Properties.
   1. For Storm Structures, for example, enter measure-downs and descriptions in Survey Point Properties.

b. Survey Figure Editing.
   i. Only move to this phase when Survey Point editing is complete.
   ii. Edit Figures in two ways:
      1. Edit Survey Figure Properties.
      2. Screen edits through Contextual Ribbon or Grip Edits.
         a. Always make sure to “Update Survey Data From Drawing” after.
   iii. Add attribute data for Pipes, or other Survey Figures to be labeled.
   iv. Creating Survey Figures manually.
      1. Toolspace > Survey Tab > right-click on Figures.

4. Create Surface
   a. Update Point Groups
   b. Add “Surface Data” Point Group to existing Surface.
   c. Create Breaklines from Survey tab, and adjust Breakline Parameters if necessary (default 25’ distance; 0.2 mid-ordinate).
   d. Create Breakline Figures Interactively as necessary when linework codes are not in place.

5. Edit Surface.
   a. Global Edits.
      i. Remove points from “Surface Data” Point Group as necessary.
      ii. Add Boundaries (Outer and/or Hide).
      i. Delete Lines.
      ii. Swap Edges.

6. Prep for design Team.
   a. Set Point Group Hierarchy and/or Layer Filters appropriately.
      ii. Create Data Shortcut (right-click Data Shortcuts tree in Prospector).

Conclusion

While all this seems like a lot of work, let’s consider the result when we don’t put in the effort:

- Without streamlined workflows and staff support, surveyors are forced to fend for themselves in an overly complex application. This can double or even triple the time spent on work.
- When forced to fend for themselves, surveyors will resist using Civil 3D, or at least the newer toolsets within. This creates a roadblock for synergy and efficiency gains found in teams understanding both field and office processes and technologies.
- If at least some initial configuration efforts aren’t put forth, organizations can never get out of the slump of wanting to sell hours of inefficient teams. Make the investment in your processes and teams to give yourself some breathing room for innovation and larger profits.

Acknowledge and embrace our ever-changing industry and the technology within. No single organization can slow it down, and to refuse to meet it head-on will only serve to hurt your organization in the long term. Whether it’s losing talented staff to more progressive organizations, or losing work in our competitive industry, the threat is there. Be bold and jump in!

About the Author

Brian Levendowski, PE, is the Civil Product Manager for CTC Software, spending his time developing custom applications for Civil 3D, AutoCAD and the Infrastructure industry. His background includes 10 years in production as a Civil Engineer and land survey technician, and 10 years as a CAD consultant specializing in implementing Civil 3D and AutoCAD for civil and survey organizations. Speaking regularly at national and regional conferences, he is a known expert in AutoCAD and Civil 3D.
An honest look at the role of UAS in the Surveying Profession
Jay Haskamp, Technical Team Manager at Frontier Precision, Inc.

Working for a measurement technology vendor for the last 11 years has given me an interesting look at the surveying industry. I constantly see how manufacturers market their products to users, trying to catch their attention. I get to see how our competition and our manufacturers’ competition market themselves, as everyone continues to try and gain that edge. In the end, your goal and ours is to be successful and make a profit for our businesses. Having spent six years working various roles in the surveying industry before my time at Frontier Precision has given me the perspective that I measure my own success by trying my best to be honest and helpful to the customers I deal with — even if that means giving them the answer they didn’t want to hear. After all, if you are not successful, I am not successful. So, when we all see the constant barrage of marketing and solutions with UAS, as well as everyone with a drone seeming to think they can now survey, I felt that I needed to do some research to understand how UAS is affecting the surveying industry, how people feel about it, what future it holds, and its impact on the survey profession. To do this, I reached out to several friends and colleagues who are surveyors and have worked in the industry with UAS. I asked them all the same questions in hopes to get a well-rounded view of what the surveying industry’s thoughts are on this technology.

The first question I wanted to explore was just how surveyors felt about UAS being used in the industry. One gentleman I spoke with was Neil Robicheau, a PLS in Alaska. Neil stated he was “excited that UAS is at the surveyor’s disposal” but also said he is a bit disappointed that it is being adopted so slowly. Neil feels that UAS gives us the ability to bridge the gap for more affordable aerial data (such as orthophotos and LiDAR) by having the ability to turn around data sets the next day. Kelly Ness, a Minnesota PLS, also agreed that from what he has seen, the adoption rate has been fairly slow.

Another surveyor I consulted with was Matthew Kumpula, a PLS from Washington. Matthew shared some of Neil’s excitement, saying, “UAS is a platform to access the world in ways we never could before, aiding us in measuring, mapping and modeling the built and natural world.” Matthew expressed that surveyors can make better decisions when they have the ability to choose and pair the best survey tools together for a project.

I also spoke with Bob Green, a Colorado PLS. I really enjoyed Bob’s perspective on this technology as he is a third-generation surveyor and has witnessed several new technologies that have dramatically impacted the profession. Bob admits that up until about a year ago, he was a skeptic. He stated that in the past he had partnered with photogrammetrists hundreds of times providing them ground control, even prior to GPS. Bob states, “the thought of a drone meeting or exceeding traditional aerial methodology, to me was preposterous!” Last year after Bob set reference panels for an RTK enabled drone, he was amazed at the accuracy of the results, and stated that they only improved when constraining to the coordinate values from their RTK. Because of this, Bob has had a change of heart when it comes to the uses and opportunities with UAS.

To be honest, all these answers were about what I expected. I would agree with Bob that about a year ago, I was skeptical myself. I continue to be amazed at the pace of progress for the technology, whether it is in positioning methods from RTK, PPK and IMUs to the quality of sensors being produced and put up in the air. But I guess the big question for me is who should be harnessing this technology, and how can it be applied to our daily workflows to produce better, more cost-effective deliverables for both the engineering professional and the consumer?

So, the next thing I tackled was thoughts on whether Part 107 commercial UAS operators are having a negative impact on the surveying profession. This was the one topic that I feel everyone seemed to agree upon. Most of us have seen instances where someone has posted online that they purchased a consumer-grade drone, some sort of processing software and have flown a site with no ground control, then posted their processing report claiming how accurate their survey was. I follow several social media groups that are dedicated to UAS. Some of the things I see make me just shake my head at times. The issue at hand, in my opinion,
seems to be that drones have become very accessible both with cost and ease of use. Almost anyone can push the buttons and create some sort of product, but many cannot understand how to accurately set ground control, adjust data, report statistics, and so on. As Matthew stated, “Regardless of their specialization, the geospatial professional understands the means, methods, sensor science, math, error propagation and how reliable a solution can be using these tools.” This is where I see the real potential of the surveying profession stepping in to set some sort of policy or standards for UAS mapping. We have already witnessed a number of operators in other states being reprimanded or fined by the local board of registration for advertising services that fall under the definition of Land Surveying. As Neil stated, “The greatest damage being done isn’t the bad data, it’s the fact that the UAS technology will be seen as technically unreliable and unprofessional.” This echoes what Kelly told me, that he “feels there is going to be a graying of the area between hobby mapping, professional mapping and surveying. It will be hard for the public at large to know what they are getting.”

I often think back to the presentation Bryn Fosburgh, VP at Trimble, Inc., gave a few years back at the MSPS annual meeting. Bryn discussed a lot of the technologies and practices that are creeping their way into the surveying profession, like contractors staking their own roads, UAS, etc. Bryn’s overall message seemed to be that this stuff isn’t going away. Take GIS for an example. When GIS came to be, the surveying industry at the time didn’t see it being what it is today. He pondered why the boat was missed with GIS. But now, looking at UAS and other practices, he would say that even if someone else is collecting the data, Surveyors should still be needed to interpret, verify and manage that data. If we’re trying to deal with something that needs to be spatially accurate, who better than a Surveyor to do it! I feel that eventually the fly-by-night outfits (no pun intended) will be weeded out, and there will be an end to folks, as Bob stated, “providing poor quality TINs, contouring the top of hay, etc.” But he goes to say that surveyors will need to step up to fill that gap.

As I thought more about this, I wondered what the group felt about how UAS measured up to conventional survey methods. I think we can all agree that it isn’t quite there yet, but there were some interesting takes on the subject. Bob and Kelly felt similarly that for the foreseeable future, UAS should only be used to supplement traditional survey and geospatial workflows. However, surveyors need to continue to educate themselves on these emerging technologies. Neil agreed, saying, “there are situations where locating a feature using traditional methods is just as ambiguous and random as selecting a pixel from a photo. But traditional methods are still the best way to validate your UAS data.” Matthew made a good point regarding comparing UAS to traditional manned aerial methods, “what has changed is the level of resolution in the data we are acquiring due to the close proximity of the sensors to the earth. This has given the expectation of higher accuracy, which may or may not be true depending on the application.”

Matthew also brought up a good point in this part of the discussion that applies to traditional surveying, but I think more so applies to UAS. With the advent of technology and new algorithms, we often have “forgotten or taken for granted things like vector processing, GNSS, time and the science of light that generally affects all things in the realm of measurement. Processes, computing and artificial intelligence can greatly aid in these things but will always require a professional to apply reason and ask, ‘is this true?’.”

After receiving all the great feedback, I will focus on standards and accuracies a bit. I wanted to see how the group felt about how they apply to UAS. What interests me the most is who should make these standards? Are there any currently? Are they acceptable? I was particularly interested in what they thought about the ASPRS (American Society for Photogrammetry and Remote Sensing) mapping standards. Neil thought that he didn’t “believe there are solid accuracy standards for UAS to follow. The ASPRS standards do set a bar, but I don’t think they translate well to UAS. It’s disappointing that this doesn’t seem to be a topic of urgency.” Bob believes that each state should consider this and regulate minimum standards and reporting confidence levels. Kelly had similar views. mentioning that he thinks the state of Florida got it right with the PSM (Professional Surveyor and Mapper). This means that in Florida, mapping falls under the licensing board, and therefore can be regulated.

Matthew’s take on standards was, “accuracy is always up to the owner or agency for the project or contract requirements unless it comes to things that involve real property rights. Then, statutory
standards may apply.” I tend to agree with Matthew’s thoughts that ASPRS standards are statistically robust and repeatable, but they aren’t always practical in the real world. As Matthew states, “there is a difference in certifying a dataset versus applying the best practices to that dataset for reporting.” Hopefully we will soon see, in the forthcoming revision by the ASPRS, some additional clarification applied to how we report on structure from motion derived deliverables.

Following along these lines, I asked everyone’s thoughts on how some manufacturers advertise their UAS solutions as “survey grade” or “no need for ground control.” I personally see this a lot on the supplier end of things. I typically cringe a bit when I see this. When someone tells me this, my first question is always, “compared to what?” How do you know it is survey grade or how accurate it is if you do not have ground control to validate? Also, if you have ground targets, how were they measured and to what level of accuracy? Neil made a statement that I really agreed with, saying, “No need for ground control is absolutely damaging, since people are taking this statement as no need for any ground survey.” Neil is correct, in my opinion. Often, I get a message from someone who performed a drone flight and couldn’t understand why things did not line up when they used their $1,500 drone from Amazon, with no correction source and no ground control. I’ve witnessed some of these folks not understanding why they cannot turn a base station on and get a centimeter accurate position, not understanding that a GPS base is operating autonomously unless you provide it reference coordinates. Along these lines, Kelly’s answer was short and to the point, simply pointing me to his article in XYHT that states, “Survey grade? Only if you’re hiring a Surveyor.”

Most in the group, however, agreed that it can be done to some extent. UAS surveys can be “survey grade.” But this always must be done with some sort of ground control and/or check points to validate everything. We all agree that these types of claims likely will not stop, and crazier claims will likely be thrown out there as well. Bob likened it to when distance meters and RTK first came out. To check against the EDM values, they “compared distances to a steel chain, tension handle and low hung thermometer. After multiple tests, we began to trust EDM.” The same goes with RTK. This was the first solution that wasn’t a direct measurement. In full transparency, when I got into this industry, RTK was already in full swing, but I have heard countless stories from my managers and mentors about how hard it was at first to prove RTK to people. They would talk about the countless demos where they would put a quarter on the ground, measure it with RTK, walk away, and then make the system take them right back to the same spot. Like Bob said, “we qualified multiple RTK surveys with EDM until we trusted it and never looked back. The same will happen with drone technology.”

As I talked with these folks and asked my questions, I really enjoyed the wealth of information and opinions. I feel it is comparable to how most folks in the industry feel. My last question to the group was if they thought UAS is a useful tool for today’s Surveyors. Matthew said it definitely is, saying, “this is one of, if not the most, disruptive technologies in our lifetime so far, requiring us to progress as a profession.” Bob and Neil would both agree. As Neil stated, “Absolutely! There are several uses, but this single more important use would be as a value-added service in a fierce marketplace. There is only so much that a vector drawing can articulate; a picture is worth a thousand words.” Kelly stated, “Yes, for some applications. It’s not a replacement for any tool and will likely never replace any surveying tools. But for certain workflows, the advantages cannot be ignored.” I tend to agree with the group, as I have witnessed many of our customers take UAS and transform their work to a whole new level — whether it is more detail, faster field time, cost savings or safety for their field personnel. I agree with Bob’s statement, “Yes! It’s a game changer.” Bob’s hypothesis is within three years, if you don’t have UAS in some capacity, you’ll be out of business. He’s already seeing it happen out west. He feels that within five years, every survey truck will have some sort of UAS onboard.

So, to summarize, we must ask ourselves, “What is our takeaway from this?” For me, it is a few things. First, I feel that technology will not slow down for you or me. In order to be relevant, we need to embrace it and learn to trust it. But that does not mean to blindly accept it. We must do our due diligence to vet these technologies, validate their accuracies (or inaccuracies) and decide if this is a viable tool for the type of work we are involved with. Second, be informed. Do your research and talk with folks involved with UAS. Don’t rush out and buy the first thing you see. Make sure it is the right
solution for you. Third, partner with the right people. You may not have the time, manpower or the ability to dive fully into UAS. That doesn’t mean that you can’t do it. There are several qualified and reputable people out there you can reach out to. Last, beware of imposters; look out for the folks who bought a drone for photography, real estate, etc., and now think that they can survey. There are many of them out there, and I feel they can do a lot of damage in a short period of time. Only work with pilots, partners and vendors you can trust to have your best interest in mind. There is certainly still a long way to go with this technology, and there are a lot of opinions. But the reality is, UAS is here to stay.

Writing this has been a great experience. I got some information from folks I know and trust. I also got to see how my thoughts and feelings compared to theirs. This has definitely made me rethink a few things in how I approach UAS, how I validate its uses and accuracies, and how I apply them to different situations. Bob and I have some neat ideas and things to work on moving forward for testing and reporting UAS accuracies and consistency. And it has been fun reconnecting with Matthew; we went to college together back in the early 2000s. Matt reminded me of a statement one of our mentors in college gave us that I feel is a good way to close this: “It is now up to you to elevate our profession.”
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13605 1st Ave N Ste 100
Plymouth, MN 55441
P: (763) 412-4000 | F: (763) 383-1089
http://www.ae-mn.com

Cornerstone Land Surveying, Inc.
Dan Thurmes
1970 Northwestern Avenue, Suite 200
Stillwater, MN 55082
P: (507) 387-6651

E.G. Rud & Sons Inc
Jason Rud
6776 Lake Drive NE, Suite 110
Lino Lakes, MN 55014
P: (651) 361-8200 | F: (651) 361-8701
http://www.egrud.com

Sathre-Bergquist Inc.
Stephanie Grotbo
150 S. Broadway Ave
Wayzata, MN 55391
P: (952) 476-6000 | F: (952) 476-0104
http://www.sathre.com

Houston Engineering Inc
Curtis Skarphol
1401 21st Ave. N.
Fargo, ND 58102
P: (701) 237-5065 | F: (701) 237-5101
http://www.houstoneng.com

James R. Hill Inc
Marcus Hampton
2500 W Cty Rd 42 Ste 120
Burnsville, MN 55337
P: (952) 890-6044 | F: (952) 890-6244
http://www.jrhinc.com/
Firm Member Directory

Northern Engineering & Consulting, Inc.
Terry Freeman
111 South 6th Street, PO Box 292
Walker, MN 56484
P: (218) 547-1296
https://www.neciusa.com

Otto Associates
Paul Otto
9 West Division St
Buffalo, MN 55313
P: (763) 682-4727 | F: (763) 682-3522
http://www.ottoassociates.com

Rehder & Associates, Inc.
Christine Larson
3440 Federal Drive
Eagan, MN 55122
P: (651) 452-5051 | F: (651) 452-9797
http://www.rehder.com

Stonemark Land Surveying Inc
Patrick Trottier
30206 Rasmussen Rd Ste #1
Pequot Lakes, MN 56472
P: (218) 568-4940 | F: (218) 568-5404
http://www.stonemarksurvey.com

The Gregory Group, Inc dba Demarc
Gregory Prasch
7601 73rd Ave N
Brooklyn Park, MN 55428
P: (763) 560-3093 | F: (763) 560-3522
http://www.lotsurveys.com

Wenck Associates, Inc.
Chris Ambourn
1802 Wooddale Drive
Woodbury, MN 55359
P: (651) 485-9876
Sustaining Members

The Minnesota Society of Professional Surveyors appreciates the continued participation and encourages your support for the following Sustaining Members of MSPS:

Fred Meyer Technology Services
Fred Meyer
14558 Joppa Ave S
Savage, MN 55378
P: (952) 381-4404

Frontier Precision, Inc.
Steve Richter
10900 73rd Ave N Ste 120
Maple Grove, MN 55369
P: (763) 496-1366 | F: (763) 898-3997
http://www.frontierprecision.com

Harrison Marker Co.
Ellen Johnson
PO Box 66
Anoka, MN 55303
P: (763) 421-1445
http://www.harrisonmarker.com

Leica Geosystems Inc
Chris Rotegard
4107 158th St. W.
Rosemount, MN 55068
P: (651) 385-6067 | F: (651) 200-2008
http://www.leica-geosystems.us

RDO Integrated Controls
Dan Stong
9201 East Bloomington FWY, Suite JJ
Bloomington, MN 55420
P: (952) 948-1604 | F: (952) 948-1606
http://www.rdoic.com

Berntsen International, Inc.
Kari Campbell
PO Box 8670
Madison, WI 53708
P: (877) 265-2296 | F: (608) 249-9794
http://www.berntsen.com

Martinez Geospatial, Inc.
Steve Martinez
2915 Waters Road
Eagan, MN 55121
P: (651) 686-8424 | F: (651) 686-8389
http://www.mtzgeo.com

Quantum Spatial, Inc.
Miles Strain
18391 Smith Court
Elk River, MN 55330
P: (763) 442-3398
http://www.quantumspatial.com
The Minnesota Land Surveyors Foundation is accepting donations to the Blethen Memorial Scholarship in memory of long-time MSPS member Peter W. Blethen.

Peter was a graduate of the University of Colorado, Boulder; he was a dedicated employee of Bolton & Menk, Inc., for more than 31 years until his retirement in 2014. Peter passed away in January 2016 following a courageous battle with cancer. He was a Registered Land Surveyor in both Minnesota and Iowa. Peter worked very hard in advancing survey technology within Bolton & Menk as well as in the surveying industry. In addition to his MSPS membership, Peter served in multiple capacities within the society — including as chapter secretary, chapter vice president, chapter president, MSPS board member, secretary and president. Peter was recognized as MSPS Surveyor of the Year in 2006 for his contributions to the land surveying profession in Minnesota.

Throughout Peter’s career, he supported the work of the MLS Foundation. He believed there was no better way to promote the surveying profession than to support surveying students in their education. In 2002, he was the first owner of the prestigious MSPS Traveling Bearing Tree Trophy.

Further demonstrating his strong belief in surveying education, Peter served on the South Central College Civil Engineering Technology Advisory Committee and on the MnDOT Survey Technical Workshop Committee.

The Foundation is working with Peter’s family to determine the criteria for the Blethen Memorial Scholarship. In the meantime, we encourage members to make a donation to the scholarship fund.

Yes, I wish to donate to the Peter W. Blethen Memorial Scholarship

Donor Information:
Name: __________________________________________________________________________________
Address: ________________________________________________________________________________
City: _______________________________________________  State: __________   Zip: _______________
Email Address: ___________________________________________________________________________

Send checks and/or correspondence to:

MLS Foundation
c/o Dennis J. Purcell, PLS
1399 Wood Duck Trail
Shakopee, MN 55379-9430
dpurcell20@hotmail.com

Make checks payable to: MLS Foundation

Please note that your donation is for the Blethen Memorial Scholarship.

The Minnesota Land Surveyors Foundation is a 501(c)3 nonprofit corporation. A tax deduction receipt will be provided to each donor.
ATTENDEE INFORMATION

Name: ___________________________ Employer: ___________________________
Work Address: ___________________________
City: ___________________________ State: _______ Zip: ___________________________
Telephone: ___________________________ Fax: ___________________________
E-mail: ___________________________

Special Meal Requirements: ☐ Vegetarian ☐ Gluten-free ☐ Other (please specify): _________________

REGISTRATION FEE

Thursday and Friday Seminars: ☐ $90 x ___ = $ ____
Golf (18 holes w/cart): $62 x ___ = $ ____
Zip Line Course (2.5 hrs): $75 x ___ = $ ____

Registration Includes:
Wednesday Social, Thursday Continental Breakfast,
Thursday Night Cruise, Friday Breakfast Buffet

TOTAL: $ _______

Please list the names of additional guests:
__________________________________________________________________________________________________

PAYMENT INFORMATION If paying by credit card, mail or call Pat or Cindy at 218.568.4940.

☐ Check (payable to MSPS Chapter 2) ☐ Visa ☐ MasterCard

Cardholder Name (print)_______________________________________________________________

Credit Card # __________________________________________ Exp. Date __________________

Security Code _________________________________

Phone ___________________________ Cardholder Signature ___________________________

Billing Address (☐ same as above) __________________________________________________________________

City __________________________________________ State _______ Zip ___________________________

 HOW TO REGISTER Registration forms to be mailed or faxed to:

MSPS Chapter 2
  c/o Stonemark Land Surveying
  30206 Rasmussen Road, Suite 1
  Pequot Lakes, MN 56472

PCI Compliance: In order to protect your privacy, please do not email your credit card information.

Cancellation Policy: N/A
Audio/Video Policy: N/A

 Lodging

MSPS Chapter 2 room block has been created for nights of Aug 14 and 15, 2019.
Guests can now make reservations online (preferred) at www.breezypointresort.com
and use 270387 as group ID, or call Breezy Point Resort directly at (800) 432-3777 and
mention MSPS Chapter 2 room block.