



The Baseline

The Newsletter of the Alberta Geomatics Historical Society
Collecting, Preserving and Sharing the History of Land Surveying in Alberta
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Message from the President

I hope you are all enjoying this winter and were able to enjoy the many accomplishments of our Canadian athletes at the Winter Olympic Games. I am pleased to report on several important initiatives and outreach activities undertaken over the past few months.

We have been hard at work designing and finalizing a historical display case for the University of Calgary hallway. Approximately 25 artifacts will be featured in the first of four proposed cabinets. This initial cabinet, consisting exclusively of artifacts from the AGHS collection, will tell the story of the Dominion Land Survey System from its beginnings in 1871 to 1920.

Featured artifacts will include a Gunter's chain, a transit, several types of tapes and their accompanying accessories, and examples of original survey monuments. Each artifact will be accompanied by an interpretive card explaining what it is and how it was used. The display case is expected to be ready this spring.

Additional cabinets will be developed in coordination with the University as we determine the stories to be presented and the artifacts to be featured. The University also holds several historical surveying artifacts that may be incorporated into future displays. The cabinets are tentatively planned to remain on display for at least six years.

This initiative represents an excellent opportunity to showcase our Society and the instruments that played such an important role in the surveying of Alberta. It has long been our position that these artifacts should be accessible to the public, and the University provides an ideal venue, with new students passing through its halls each year.

As part of this project, we are offering both companies and individuals the opportunity to sponsor a display cabinet. This is a unique chance to show your support for Alberta's surveying history while gaining visibility among students, faculty, and visitors. If you or your company would like to be part of this initiative and showcase your commitment to education and survey history, please contact me at info@albertalandsurveyhistory.ca for more details.



Allan Main and Les Frederick manning the AGHS table at the Geomatics Exposition, University of Calgary.

The AGHS was invited by the University of Calgary's Department of Geomatics Engineering to host a table at the 28th Geomatics Exposition, organized by the Geomatics Engineering Students' Society. It was a valuable opportunity to connect with students from all four years, as well as with industry representatives participating in the Expo.

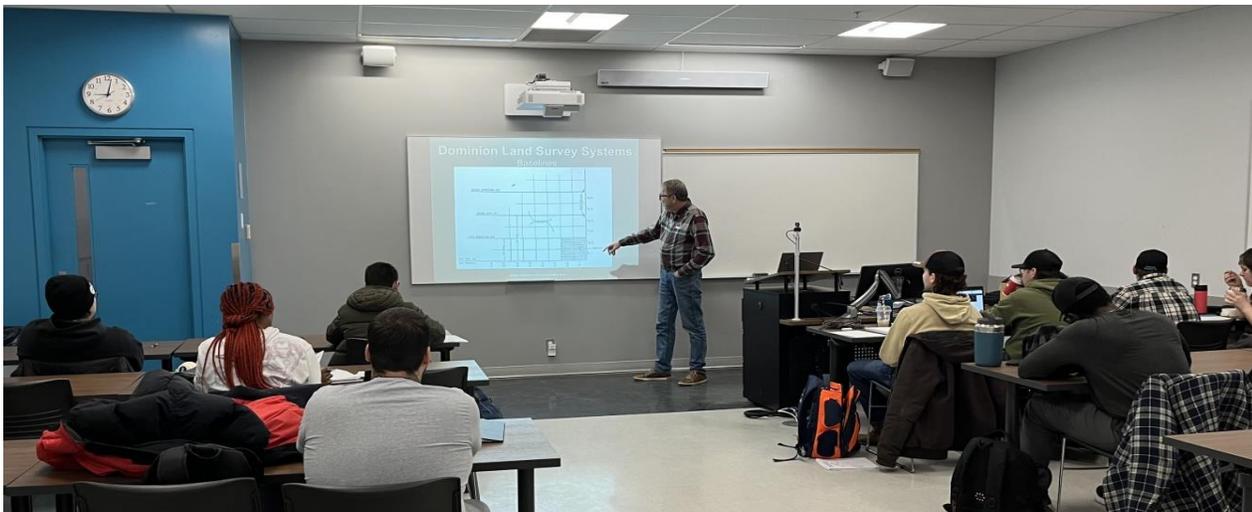
Thank you to Society members Allan Main and Kevin Jones for assisting at the table and engaging with attendees. A sincere thank you as well to the University of Calgary Department of Geomatics Engineering for the invitation and their generous support.

Education and outreach continue to be an important focus for the Society. In February, I delivered a presentation to first and second year Geomatics students at SAIT on the history of the Dominion Land Survey and the importance of original monumentation. The presentation introduced students to the early development of the DLS and highlighted the hardships endured by the surveyors who laid out so many townships across Alberta. Historical photographs helped bring those challenges to life.

The importance of original monumentation as governing evidence was emphasized, supported by real-life examples. Students were also introduced to the AGHS and the work our Society does to preserve and promote the history of surveying in Alberta. I would like to thank the instructors at SAIT for providing the opportunity to speak. It is important that students understand the path their chosen profession has taken.

We remain hopeful that a survey artifact display at SAIT can still become a reality. After nearly a year of discussions, the initiative was paused last fall; however, we will continue working toward making this happen.

The following week, the same presentation was delivered to first-year students at NAIT. This marks the second consecutive year we have had this opportunity, and we appreciate the continued interest.



Les Frederick presenting to the students at NAIT

We have scheduled the third Annual General Meeting of the AGHS for **Wednesday, March 25, 2026, online via Microsoft Teams**. During the meeting, members will elect the Board of Directors and discuss and vote on the proposed AGHS Sustainability Fund Policy.

The proposed Sustainability Fund is designed to provide long-term financial stability for the AGHS. Our Society relies mainly on memberships, sponsorships, and donations. These sources fluctuate from year to year. Establishing this fund will allow us to gradually build a financial reserve that will protect the Society against financial uncertainty. It is not simply about setting aside money. It is about strengthening the Society's future. Over time, the fund will generate investment income and provide a stable foundation to support and advance the Society's mission.

I hope to see you online at the AGM and strongly encourage you to attend and participate. Your vote in the election of the Board of Directors, as well as your comments on the Sustainability Fund Policy and other matters, are important. The strength of the AGHS depends on its members, and your support will help ensure that the AGHS remains able to fulfill its mission for many years to come.

Les Frederick

Names from the Past: Flavio Gioia, Man or Myth?

I suspect that very few readers will recognize the name Flavio Gioia, yet nearly everyone knows the instrument he is credited with popularizing, one that transformed the world of navigation. But who exactly was Flavio Gioia? When and where did he live? How did the name of a man connected to such a world-changing instrument disappear into history?

The answer lies in the story of the compass, a seemingly simple device that changed how men explored the seas, mapped distant lands, and measured the world around them. The compass allowed travelers to determine direction with confidence and became an indispensable instrument for explorers, sailors, and surveyors alike. In this article, I will delve into the origins of the compass, its adoption for navigation, the contributions of Flavio Gioia, and its small role in the history of land surveying in Alberta.

The earliest records of an instrument resembling a compass can be traced back to ancient China. As early as the 1st century AD, the Chinese understood the properties of lodestone and its mysterious ability to attract metals. In 1044, a Chinese text described how a thin leaf made of iron in the shape of a fish would, when suspended or floated on water, consistently orient itself along a north-south axis. At this time, the “compass” was used for the orientation of temples, tombs, and buildings. The term “feng shui” reflects this attention to directional alignment, which was believed to influence harmony and fortune.

At this time, the Chinese were not very involved in maritime trade, so the use of the compass as a navigational aid was probably very limited. However, by the 11th century AD, they had begun adopting the compass for practical navigation. The directions they used were based on the wind, and these directions were marked on a card (the wind rose). Mariners discovered that a floating magnetic needle provided a stable reference point even when landmarks were not visible. This allowed them to travel longer distances, expand their trade routes, and navigate unfamiliar waters.

Moving westward through the Silk Road and across busy sea routes, the secret of the compass eventually reached the Arab world and, by the 12th century, found its way into Europe. Once European sailors saw what it could do, they quickly recognized its value as a navigational aid.

Before the compass, mariners had to rely on familiar coastlines and the positions of the stars and the sun. These methods worked well enough on clear days or near home waters, but they could be very unreliable once clouds rolled in or ships ventured far from land.

The compass changed all of that. It provided a constant directional reference, allowing sailors to venture farther from shore with confidence year-round.

The use of the compass for navigation around the Mediterranean has been linked to a mariner by the name of Flavio Gioia and the town of Amalfi, Italy. Amalfi was, for a short time in the 12th and 13th centuries, a maritime power; however, with its many naval battles, the outbreak of bubonic plague, and an earthquake in 1343 that destroyed the harbour, the town declined and never recovered.

The mariners of Amalfi had been using a needle floating in water as a compass. Around 1300, it is said that Flavio Gioia improved the design of the compass for use on ships. Instead of a floating needle, he mounted a magnetized needle on a pivot so it could spin freely, enclosed it in a round box to protect it from the wind, and divided the wind rose into 360 degrees. These innovations made compass readings more reliable even in rough seas. Gioia had transformed the floating needle compass into a version more indicative of a modern compass. This was a huge leap forward in the advancement of navigation and mapmaking.

But who was Flavio Gioia, and is this story of him improving the compass factual? Although he is sometimes credited with inventing the compass, this claim is not supported by historical evidence. The compass had been in use in



Statue of Flavia Gioia on the Amalfi Harbour

Europe for centuries before his time. The claim that he improved the compass cannot be historically confirmed. As a matter of fact, it cannot be proven that Flavio Gioia even existed. There are no records from this time that clearly mention a mariner named Flavio Gioia inventing or modifying the compass. His name does not appear in surviving civic documents from Amalfi, nor in technical treatises of the period. In fact, it has been suggested that the story of Gioia may have originated in the sixteenth century as a way of attributing a celebrated invention to an Italian figure.

Although there is no solid evidence that Flavio Gioia ever existed as a real person, his name may represent someone who became connected to a series of improvements made by many skilled workers over time. The compass did not develop in a single step. It developed gradually through a series of improvements made over many centuries. Craftsmen improved the pivot mechanism, enclosed the needle in a protective box, and used detailed wind rose cards marked with directions and degrees. These small but significant improvements greatly contributed to the instrument's reliability, allowing explorers to navigate previously uncharted waters and establish new trade routes.

Although at this time the compass was considered a mariner's navigational tool, it would also play a role in the evolution of land surveying. A compass and a chain could be used to measure direction and distance for property boundaries and to create small-scale local maps. The surveyor's compass, also known as the circumferentor, emerged as a specialized instrument designed for land measurement rather than navigation. It was typically mounted on a staff or tripod, and it featured a magnetic needle aligned with graduated degree markings. This allowed surveyors to measure bearings (angles relative to magnetic north) with reasonable precision.

A fundamental principle of a compass is that the compass needle points toward magnetic north and not true geographic north. The angle between them is known as magnetic declination and varies depending on location and time. In the 17th and 18th centuries, surveyors relied almost entirely on compasses for surveys. By the middle of the 19th century, however, improved instruments and more accurate methods of sun and star observations allowed surveyors to determine true north. The magnetic declination at that point could then be readily determined. Early surveyors would account for these corrections when using compasses for mapping, and many identified the declination value on their maps. Understanding declination was important because, without accounting for it, bearings could be off by several degrees. This would result in significant errors, especially over long distances.



**Surveyors Compass or
Circumferentor
ALSA 2011.01.01
donated by Ronald A. Burwash**

The Dominion Land Survey in Canada, from its inception in 1871, distinguished between magnetic and astronomical north. This distinction has been referenced since the first edition of the *Manual of Instructions for the Survey of Dominion Lands* was published in 1871. On page 10 it states: “The land surveys of Manitoba and the North-West Territory, are to be astronomical – that is to say, performed independently of the magnetic needle.”

The seventh edition of the manual, published in 1910, addresses the use of the compass in more detail. Section 62 states: “The surveys of Dominion lands are astronomical, that is to say, the direction of the lines are referred to the astronomical meridian. The use of the magnetic needle for running such lines, or the limits of townships, sections or lots, or for establishing the boundaries of property of any kind, or for ascertaining the courses of traverses in subdivision surveys, is not allowed, but it may be used as a check against errors, for sketching and for work of a like character.”

It is also interesting that Appendix C of the seventh edition of the Manual states, “Although the compass is not allowed for establishing lines of Dominion Land Surveys, it is employed for other purposes, and a knowledge of the direction of the magnetic meridian or of the magnetic declination is useful.” It then gives directions for how to observe and record these observations.

With the advance of modern survey technology, the compass has gradually lost its significance. The ability to measure accurate angles and distances, along with satellite-based positioning, has resulted in the diminished use of the compass. That does not mean that modern surveyors can forget about the compass. They must still understand compass bearings, magnetic declination, and historical surveying methods in order to interpret old surveys and resolve discrepancies.

The invention and use of the compass as a navigational tool cannot be underestimated. Its use led to the discovery of new lands and new trading routes. Its transition to a land-based survey instrument provided early surveyors with a consistent directional reference for their surveys and maps. While modern technology has surpassed it in precision, the compass remains foundational to the history of surveying.

Whether or not Flavio Gioia ever existed, the instrument associated with his name helped shape navigation and land surveying for centuries.

Sources:

Amir D Aczel, *The Riddle of the Compass, The Invention That Changed the World* (New York: Harcourt, 2001)



**T. G. Co Ltd Mk III, 1940 Military Compass
SHF 2018.01.09
donated by the estate of Ed Scovill**

How Much Does Magnetic North Move?

Throughout the 20th century, the magnetic north pole was moving approximately 10-15 kilometers northwest across the Canadian arctic. However, this all changed in the 1990s. Since then, the magnetic north pole has been moving towards Siberia about 50-60 kilometers per year. It has slowed somewhat in recent years, but still moves faster than its historical average.

Presently in Alberta, magnetic north lies **approximately 13.5° EAST** of true north. This means when your compass points to magnetic north, you must rotate it about 13.5° to the **WEST** to align it with true north.

Les Frederick

Recently, when doing presentations with students at NAIT and SAIT and conversing with several of them after about how the historical surveys were performed, a question that invariably comes up is: "So just how good were those original surveys?"

When I was working in the field, surveying in the northern parts of Alberta (pre-satellite surveys), there were many times I had to locate original township monuments that hadn't been seen in over 100 years. I was always amazed at how accurate those old surveys were, given the equipment used and the conditions the survey parties were working in. After cutting line through bush and locating the original monument, a distance of a few feet or less from the "actual calculated position" was not uncommon.

This accuracy had much to do with inspection surveys that were performed by Dominion Land Surveyors. I found the following article very interesting and still pertinent even after 120 years.

From the Past: Report of the Department of the Interior, for the fiscal period from 1st July, 1906, to 31st March, 1907.

"During the past few years, a very marked improvement has taken place in the execution of the surveys of Dominion lands. Whereas the direction and lengths of the lines in the old surveys were often much in error, the reports of the inspectors show that the lines examined in the present day contracts are straight, that their direction is correct, that the chainage is good and that the corners are well marked. This change has been brought about by the use of improved instruments which not only enable the surveyor to run more perfect lines but permit of more accurate and more frequent observations, also by the introduction of the astronomical field tables and by the organization of a more careful and systematic method of inspection."

"In addition to the subdivision of new territory, the department is constantly being called upon to retrace and restore old lines. In surveys made twenty or thirty years ago, it is often found that the posts and mounds have entirely disappeared. Formerly, no mounds or pits were made in the woods, the corners being marked simply by wooden posts and bearing trees; these marks have frequently been destroyed by forest fires. When the lands are taken up, the new settlers naturally wish the corners to be properly marked so that they may know the limits of their lands. A number of survey parties are constantly engaged upon this work."

"The correction of errors in old surveys is an important part of the surveyors' duties. The surveys of Dominion lands have not always been made with the same care and precision as they now are. Townships were subdivided by contract as at present, but the system of inspection was neither as thorough nor as systematic, and bad surveys occasionally escaped detection. Generally, several settlers are interested in any correction. Those who benefit by the change are in favour of it, while those who lose by it wish the old survey to stand. It is very difficult to settle such cases satisfactorily to all parties."

Les Frederick

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