Hewlett-Packard Distance Meter set up on bank of Thames River

Co-ordinate Control Survey

by James D. Nisbet, O.L.S.

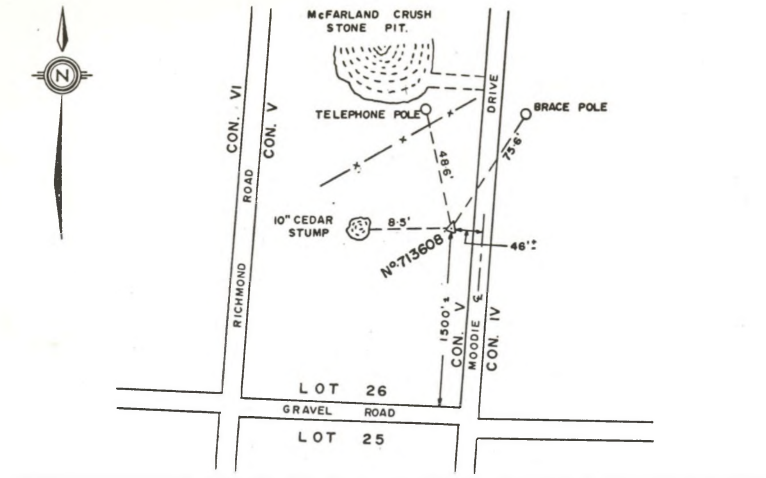
In June 1970, our firm received instructions from the Department of Lands and Forests to undertake certain control survey work along the shores of lakes Erie and St. Clair. This work was undertaken as part of a program to establish a grid system for land identification to provide for the better administration of oil and gas resources under lakes Erie and St. Clair by the Department of Mines and Northern Affairs. Our particular task was to perform field surveys to provide the co-ordinate values, on the Ontario Co-ordinate System, of monuments which had been established at the intersection of the lake shore with each of ten township boundaries.

In eight of the ten cases the centre line of road allowance had been projected to the top of bank at the lake and monumented by the local surveyors; namely H. H. Todgham, O.L.S., William Setterington, O.L.S., and Hans Koester, O.L.S. The remaining two boundary lines were rivers. Monuments were placed at suitable convenient locations.

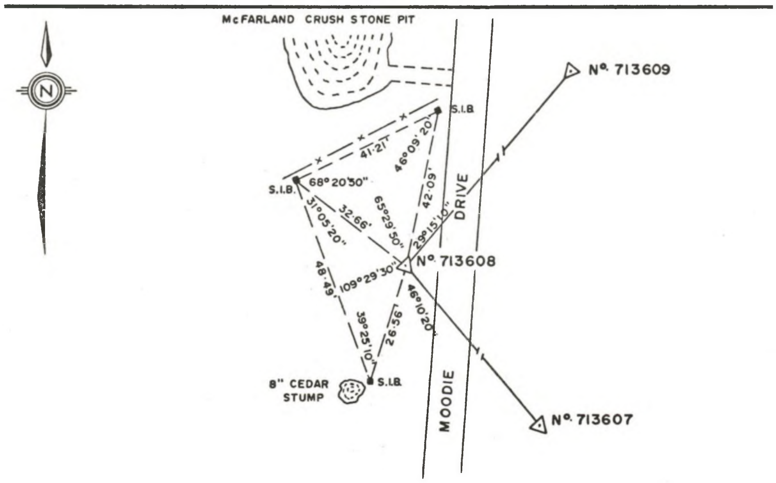
Initially, maps were provided indicating the location of co-ordinate monuments in the area of the respective proposed new co-ordinate points, which for simplicity I shall hereafter refer to as town line points. These previously located monuments had been established by the Ontario Department of Highways now the Department of Transportation and Communications, Geodetic Survey of Canada, Canadian Hydrographic Service, and the Department of National Defence of Canada. The oldest monuments had been located as early as 1919 and the newest had been located as late as 1970.

Our work began in mid June and the field results and computations were delivered to the department on September 15, 1971. The working crew consisted of an Ontario Land Surveyor, party chief, instrument man, and chain man.

A reconnaissance survey of the entire project was completed in three days by the two senior crew members so as to



LOCATION PLAN



REFERENCE PLAN

acquaint ourselves with the locale and find the existing co-ordinate monumentation, with the use of location sketches which were also provided. This task proved more formidable than would have seemed to have been necessary.

The location sketches provided poor ties, some of which were difficult to interpret, and some of which were incorrect. As a result some time was lost trying to find these monuments. Ultimately we found about seventy-five percent of them and satisfied ourselves that the remaining twenty-five percent had been obliterated.

In the course of our search we found further co-ordinate monuments in the area of our town line points and requested location and information on additional co-ordinate points further afield where needed.

Generally speaking we tied into two co-ordinated monuments and by traversing checked into two others in the course of forcing the values to our town line points. We adjusted the error in the traverse by the compass rule method.

Each town line point was the angle of a continuing traverse and not left as a hanging line.

The allowable tolerance in the traverse was to be one in ten thousand. The minimum length of traverse turned out to be some six thousand feet and the maximum length was seventeen miles.

The maximum error on the shortest traverse using conventional chain measuring methods was one in eighteen thousand. In the longer traverses using Hewlett-Packard distance meter for measurements up to nine thousand feet, and Tellurometer for distances in excess of nine thousand feet, we obtained traverse closures of up to one in three hundred thousand, with the average being one in seventy thousand. (See picture of Hewlett-Packard)

A Wild T-2 was used to measure all interior angles. No special consideration was given to avoiding heat waves unless they were extreme in which case the angle was measured later. Four sets of eight readings were taken at each angle using the zero quadrant twice, the one hundred and twenty degree quadrant once and the two hundred and forty degree quadrant once. If an angle varied by more than three seconds from the average, it was re-measured. In the latter part of the survey some trouble was experienced with fog especially in the early morning and in the area of the Bradley Marsh, but this problem was not significant.

Inasmuch as we were continuously sighting across country over tall corn and marsh we devised a mini tower for the T-2 and the distance meter. We attached two inch by four inch by eight feet wood extensions to the legs of the tripod with "C" clamps and erected a safe way scaffolding around it for the instrument man to stand on. A setting of this kind could be erected easily in fifteen minutes or less. (See picture of mini tower)

One day the instrument man was commenting that the flag he was sighting on the picket seemed to be hanging in an unusual way. In jest I asked him if it had a maple leaf on it, and we were both most surprised to discover that it had. Needless to say we sought out the proper back sight.

We set some two hundred and fifty bars in all, with four bars at each traverse point, except at found monuments where three only were placed. Each angle and side in the resulting figure at each traverse point was measured so that any missing monument in the figure can be restored if obliterated. In addition to the three reference bars, three location ties were also set. (See sketch of typical location and reference notes)

This extension of control survey might be considered one of the first steps toward establishing the incoming system of holding title to land in this Province.

WILD T-2 mounted on 2" x 4" x 8' legs with operator on Safeway scaffolding.
Location: Bradley Marsh, Chatham, Ontario.