

**Saskatchewan Land Surveyors' Association
Survey Project # 1 – Restoration/Re-Establishment**

By

Brian Burridge, SLSIT

For: SLSA Board of Examiners

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1.0 Introduction

As part of the articling process for the Saskatchewan Land Surveyors' Association (SLSA), a student is required to complete one or more projects involving the principals and procedures of land surveying. These are intended to be a test for the student as they work to become a member of the Association.

This paper will deal with the re-establishment of monuments to their originally intended positions. It will give a detailed analysis of the procedures involved in the re-establishment of these monuments; from the initial stages to the production and approval of a Plan of Survey. It will also outline different circumstances encountered throughout, give details on decisions made and provide reasons for those decisions.

Specifically, this paper will deal with the position of the NE Corner of Section 19, Township 12, Range 25, W3 Meridian, and any other monuments that have been established or re-established using this position. This corner was re-established incorrectly and, with this survey, has now been re-established correctly.

2.0 Background

The position of this corner, as for all primary monuments, was originally established at the time of the initial township survey. The most recent edition (Second Edition) of the Township Plat is dated September 14th, 1915. It is noted that on this plan, the position of the NE 19-12-25 W3 is controlled by a witness monument placed a distance of 1 chain west of the actual corner. A more complete explanation of the surveys of this township will be given later in the report.

In 1974, a road survey (Registered Plan Number 74SC06569) by James Henry Hogg, SLS re-established the position of this corner, stating that the monument was lost. The plan states that he planted an iron post at this established position. To re-establish this point, Hogg found Pits 1.5 miles south, at the E ¼ 18-12-25 W3, and an iron post 1 mile north, at the NE 30-12-25 W3. His method for re-establishing all primary monuments in between was to maintain a straight line between the found monuments, and to split the total distance evenly, excluding of course the width of the road allowance along the north boundary of Section 19. There is no mention of the witness monument on this plan.

It is the purpose of this project to dispute this established position using evidence collected from the field. Previous to this survey, we were completing a separate survey and this survey required that the position of the NE 19-12-25 W3 be determined. Using Mr. Hogg's plan, the position was calculated, and it was expected that an iron post would be found. Upon navigating to the calculated point, it was discovered that the point would land in the bottom of a dry lake bed. A preliminary search was performed in the area of the calculated point, and no monument was found. Being that the calculated point was in a well established wet area, the question arose as to whether this position may have been witnessed originally. Following a review of the Township Plat mentioned above, it was realized that a witness monument had in fact been established with the original survey. Because of this, the search for a monument continued approximately 1 chain to the west. Here, the original witness monument (trench) was discovered. This discovery created more interest regarding the re-establishment procedures employed by Mr. Hogg, and is basis for this paper.

3.0 Procedures

There were four main components to this survey. These four components were:

- Work done prior to the fieldwork;
- Work done in the field;
- Work done following the fieldwork; and
- The plan approval process.

This section will explain each of these components in detail, and outline the steps taken in completing each of these parts. It will summarize each phase of the survey from start to finish.

3.1 Prior to Fieldwork

As mentioned previously, the discovery of a witness monument at the NE 19-12-25 W3 Mer initiated the process of performing this Restoration/Re-Establishment survey. Following this discovery, some office work was done to ensure that the most recent information, pertaining to the corners re-established by Mr. Hogg, was acquired. These tasks included performing the proper searches for plans that measured to these monuments, contacting landowners of the affected parcels, and obtaining original township notes for the affected sections. These tasks will be described in this section.

3.1.1 Performing Searches

Because of the possibility of subsequent plans tying to the affected corners, effective searches were essential to making certain that the Restoration/Re-Establishment

was conducted properly. These searches were of the Land Surveys Directory. A searching tool for this Directory is available through the Information Services Corporation (ISC). The best option available is through ISC's website (www.isc.ca). Here, a search for information can be performed using many different parameters. In a survey such as a Restoration/Re-Establishment survey, the most effective search to use is actually a combination of two types. The first type is by Legal Land Description (LLD). This type of search allows a person to query each desired **quarter section** individually. Its output is a list of all plans that exist within the particular quarter sections searched. The second type of search is by Corner LLD. This type of search allows a person to query specific section and quarter section **corners** individually. Its output is a list of any and all plans that connect to the queried corners. The combination of these two searches will result in individual plans being retrieved more than once. However, it allows for the inclusion of plans that make a connection to the survey's pertinent corners, but do not exist in the quarter sections searched in the first type of search (i.e. Reference Surveys). So, these two searches combined will result in every plan that may have an effect on the survey.

Following the search and the retrieval of search output, an analysis of the plans in the list is required. In order to analyze these plans, however, they need to be obtained from ISC. This can be done online as well. When the list of search output appears, each individual plan is available for download from the ISC website. Although some plans may not be specifically applicable to the particular survey being done, a person should get every plan that appears in the search output. When the plans have been retrieved, a review of each plan is necessary in order to identify which ones directly affect the survey.

After these are organized, a design, of sorts, can be created as to what must be done in the field.

For this particular project, the combination search tactic was employed. As the project ranged over six sections, a total of twenty four quarter section searches were performed. In combination with these quarter section searches, a total of thirty three specific section and quarter section corners were searched as well. An example of the search output for this project can be seen in **Appendix 'A'**.

3.1.2 Contact with Landowners

Prior to commencing any fieldwork for this project, notification was given to the landowners of the affected sections. The notification, in all cases, was either over the phone or in person and consisted of simply informing the landowners that a survey crew would be in the area. As most landowners in the area were familiar with surveyors and their practice, there were no problems to this effect.

3.1.3 Original Township Field Notes

As mentioned previously, this project originated from the discovery of an original monument witnessing the NE 19-12-25 W3 Mer. In order to correctly trace this monument through the years, it is necessary to research how the corner was put in originally. To do this, a request was submitted to the Legal Surveys Division at ISC for the original township field notes. Specifically, it was requested that any field notes concerning the corner in question were forwarded for analysis.

It is noted that there are two editions of the Township Plat for Township 12, Range 25 W3 Mer. The original survey of Section 19 was performed on August 22, 1883 by Willis Chipman, DLS. In his notes, Mr. Chipman indicates that the NE 19 is covered by a dry alkaline pond, unsuitable for posting. For this reason, Mr. Chipman erected a witness monument. The notes indicate that the NE 19 is a distance of 1 chain at a bearing of 90 degrees from the witness monument. Because Mr. Chipman's notes for the survey of the north boundary of Section 19 indicate that his course was west, it can be deduced that this witness monument was in fact on the north boundary of Section 19.

The Manual of Instructions for the Survey of Dominion Lands in place at the time of this survey was the 3rd Edition. For the situation described above, the Manual instructs the surveyor to "erect a witness mound with iron post at the nearest suitable point" to serve as the witness monument. It subsequently describes the mound as being "in form of a cone, six feet in diameter and two and a half feet high; the earth (for the mound) is taken from a circular trench fifteen inches wide". Assuming everything done in the original survey of the boundaries of Section 19 were performed according to this Manual of Instructions, the above described monument would be the one witnessing the NE 19 in 1883.

The second edition of the Township Plat for Township 12 Range 25 was issued, as mentioned previously, on September 14, 1915. Field notes for this survey were obtained as well for the purposes of this project. This survey was completed by G. C. Cowper, DLS between the dates of July 27th, 1914 and August 17th, 1914. This survey appears to have involved the traverse of a number of water bodies (including the one at NE 19-12-25 W3 Mer) within a number of townships. Also, it appears as though Mr.

Cowper visited each section and quarter section corner, and performed an inspection, if you will, of the condition of monuments at that corner. As this project is in Township 12 Range 25, these are the notes that were obtained. In these notes, Mr. Cowper indicated that the monuments in the township were in fair condition, and that about 50% of the iron posts were in place. He also notes that a re-survey of the township is not required.

Specific to the corner in question, Mr. Cowper noted that the monument at the NE 19-12-25 W3 Mer was obliterated. It is believed, however, that the only part of the monument that was obliterated was in fact the iron post and that the mound and trench remained. The main reason for this, of course, is the fact that the trench still exists to this day, and was found for this project. There are, however, other reasons for this theory as well. During Mr. Cowper's traverse of the lake/dry alkaline pond, he specifies in his notes that his 'Station No. 1' was in fact the obliterated Wit. I. P. M. In order to properly occupy this point, there would have to be enough of the monument remaining to deduce the position of the originally intended point. Also, the Township Plat issued in 1915 described the monument governing the NE 19-12-25 W3 Mer as 'Wit M. 1E'. This would indicate that the actual I.P. was no longer in existence, but the mound and trench still govern the position of the corner. A copy of the original township field notes can be found in **Appendix 'B'**.

3.2 Field Work

Following initial research on the history of the corner in question, the fieldwork for the project was commenced. The investigation of the corner turned up some good information as to the nature of previous surveys performed in the area, and therefore

aided in some of the planning for the fieldwork. There was a respectable knowledge as to which corners may be affected, and as to what monuments needed to be measured for this survey. The following section will describe the processes carried out in the field, from the initial set up of the equipment, to the actual restoration and re-establishment of the affected monuments.

3.2.1 Preliminary Field Work

Initially, before any measurements are taken, a selection of what equipment to use to make the measurements is necessary. This particular project utilized the Global Positioning System (GPS). The specific type of GPS was Real Time Kinematic (RTK). This type of GPS allows you to obtain positions of points in short periods of time. The absolute accuracies with which these positions can be obtained are in the order of +/- 2 cm. Because this project is over a large range, these accuracies are appropriate for this project. The suitable accuracy and the logistic advantage offered by the RTK GPS made this selection the best one. The RTK system used by this project was manufactured by Trimble. The particular components of this system are as follows:

- Trimble 5700 Base Station
- Trimble 5800 Rover Receiver
- Trimble TSCE Data Collector

An RTK survey uses one base station, and one or more mobile receivers (rover). The selection of a base point is a process that is dependent on what type of coordinate system is being used. If the coordinates produced from the survey are required to be connected to an earth-based coordinate system, the base point is more or less limited to points which have known coordinates within that coordinate system. If the coordinates

produced by the survey are within a local system assigned by the surveyor, the base point can be basically anywhere. For this project, a local coordinate system was assigned to the survey. In both cases, an optimum point for the base station would be a high point with good visibility. This allows for good communication between the base station and the satellite constellation, and also good radio communication between the base station and the rover receiver over large distances.

In establishing a local coordinate system, the base station is set up over a random point in an optimum location as described above. Following the set up, the base point begins to communicate with the satellites and, with this communication, triangulates its absolute position on the Earth based on the GPS's coordinate system (WGS84). This position, however, is only accurate to roughly +/- 10 metres. After turning on the base station, the rover receiver can be turned on, and begin to solve for its position. The absolute position of the rover is triangulated similar to that of the base station. Although the absolute positions of the base station and the rover are quite inaccurate, their position relative to each other remains constant. To assign a local coordinate system to the survey, the rover receiver must occupy a point, and fix a coordinate for that position. Internally, the GPS assumes the meridian through this point as north. In fixing this position, the position of the base point becomes fixed as well, as their position relative to each other is constant, and each subsequent measurement is a coordinate in this system based on its distance relative to the fixed coordinate assigned. For this project, the fixed coordinate was assigned to Inertial Survey System (ISS) Control Monument Number 84V056. The coordinate value assigned was N: 0.000 m, E: 0.000 m and ELEV: 738.820 m.

3.2.2 Obtaining Measurements

Following the initial set up of the equipment and the establishment of a local coordinate system, the measurement of affected monuments commenced. To begin, the problem area was revisited and connected to the established coordinate system. At this point, the trench was measured to verify its dimensions, and a standard iron post (marked XIX, XII, XXV WIT 1 E) was planted at the centre of the trench. To re-establish the NE 19, a visit was made to the N 19 to search for a monument there. As the original position of the trench was on the line between the N 19 and the NE 19, this position was needed to re-establish the NE 19. The original township field notes indicate that simply a mound was placed as the monument at the N 19. This is echoed by the second edition of the Township Plat. As well, no subsequent survey plans had ever measured this corner. With the search, no evidence of the existence of this previous monument was found. It was concluded then, that this position was to be re-established as it had been originally surveyed. To do this, an iron post was found at the NE 24-12-25 W3 Mer. This monument was connected to the post planted at the centre of the trench, and the line formed was produced out another 20.117 metres (from the trench) to establish the NE 19. The N 19 was re-established on the line between the established point NE 19 and the iron post found at the NE 24. To establish the actual point, 20.117 metres was subtracted from the total distance between the two NE corners (for the road allowance along the west boundary of Section 19), and an iron post, marked $\frac{1}{4}$ was planted at the midpoint of the resulting line.

As mentioned previously, Mr. Hogg's plan notes re-establishing a monument at the actual NE 19-12-25 W3. Because of this, another visit was made to this corner, and a

significant dig was performed in the lake bed to see if anything would turn up. This search resulted, once again, in no evidence of a monument ever being there. Photos of the NE 19-12-25 W3 can be seen below.



Figure 3.1 – Trench found at the NE 19-12-25 W3



Figure 3.2 – Location of the NE 19-12-25 W3; Facing South

An iron post found at NE 30-12-25 W3 Mer and an iron post found at E 18-12-25 W3 Mer were connected to the survey so as to compare the established point at NE 19-12-25-W3 Mer using the witness trench, with the point that Mr. Hogg established. The difference between these two established points was actually within the standard of accuracy put forth by the Land Surveys Act 2000. However, with the witness trench governing the position of NE 19-12-25 W3 Mer, Mr. Hogg's method of re-establishing the monuments for the primary monuments between the NE 30-12-25 W3 Mer and the E 18-12-25 W3 Mer was not the proper method to use.

This project re-established these points using a different method. Using the witness monument, the position of the NE 19 was established. The position of the E $\frac{1}{4}$ 30

was established on a straight line between the NE 19 and the iron post found at the NE 30, maintaining even half mile distances. The positions of the E ¼ 19, and NE 18 were established in the same manner, but using a line between the NE 19, and an iron post found at the E ¼ 18. It should be mentioned that each of these positions were also calculated using Mr. Hogg's plan, and the differences (between calculated points) were satisfactory as well. However, when the monuments were observed at these positions, it was found that they were incorrectly placed. As noted on the plan, some of these monuments were as much as 0.400m from their originally intended position.

At each of the calculated points (E 30, E 19 and NE 18) a significant search was done to see if any evidence of the original township monument still existed. It should be noted that the monuments marking the E 30 and E 19 are shown on the Second Edition of the Township Plat as simply a mound. At each of these quarter section corners, no evidence of a mound was discovered. At the NE 18, the Second Edition of the Township Plat shows that the monument was an iron post in a mound. As an iron post was originally planted at this corner, a thorough dig and scrape was performed at the calculated point to determine if the original IP hole was still in existence. This was not the case as no rust was found. At this point, it was determined that each of these corners were to be re-established using the method described above. For each of these corners, the monuments planted by Mr. Hogg were found, and those monuments were moved to the correctly established positions.

Because these monuments were incorrectly placed, any monuments that had intersected boundaries controlled by these monuments, since the time of the original road survey, were incorrectly placed as well. In this survey, there were three pipeline right-of-way surveys (Registered Plan Nos. 94SC06225, 94SC06747, and 95SC03252) that

intersected the affected boundaries. To ensure that the intersection monument was in fact at the intersection of the two lines, the nearest monument on either side of a section boundary was observed, and the point where the two lines intersected was established. In each case, the original intersection monuments were found, and those monuments were moved to the established intersection points.

There were three other pipeline rights-of-way (Registered Plan Nos. 94SC06746, 02SC08550 and 101839338) that had measurements (distances and angles) affected by the movement of these monuments. For these cases, sufficient monumentation was connected to the survey so as to amend these measurements properly. A more in-depth discussion of the process for changing measurements on each of the aforementioned plans will appear later in this report.

The last primary monument to be affected by this re-establishment was that at the N ¼ 20-12-25 W3 Mer. Mr. Hogg's plan showed that the monument planted at the time of the original township survey was lost. He, therefore, re-established this position and planted a monument at this position with his plan. With the position of the NE 19 changing, it was concluded, that a connection to the N 20 was needed to ensure that it was in fact in the right position. When this point was visited, the preliminary search resulted in no evidence of Mr. Hogg's monument being found. It should be noted that this point fell inside corrals, and therefore may have been disturbed with the construction of the corrals. Nonetheless, a significant dig was once again performed in attempt to find a rust hole left by the monument placed by Mr. Hogg. Once again, however, no rust was found. A photo of the N 20-12-25 W3 can be seen below.



Figure 3.3 – Location of the N 20-12-25 W3; Facing South

At this point, it was concluded that the position of the N 20 had to be re-established. Because Mr. Hogg's plan re-established this position, and it was the most recent determination of that position, his plan was to be used to re-establish the position once again.

To do this, the position of the NE 20-12-25 W3 M needed to be determined. Mr. Hogg indicates, at the time of his plan, that he found evidence at this corner, and planted an iron post at that position. This corner was visited and it was found that, with the construction of the ditches for the high grade road, any evidence (including the monument) that had defined this corner was destroyed. A photo of the NE 20-12-25 W3 can be seen below.



Figure 3.4 – Location of the NE 20-12-25 W3; Facing West

So, the position of the NE 20 had to be re-established. This was done by observing road monuments along Mr. Hogg's plan. Specifically, the monuments marked 'R8' and 'R9' were observed. The reason for this was that Mr. Hogg shows an angular tie between the line formed by 'R8' and 'R9' and the north boundary of Section 20. Using this angle, and the distance shown between the monument marked 'R8' and the iron post that Mr. Hogg planted at the NE 20, the position of the NE 20 was established. Only a point was established at this position. No monument was planted here. Photos of the NE 20 can be seen below.

With the establishment of the NE 20, the N 20 could be re-established as well. To establish this point, a line was formed between the established point at the NE 20 and the

established point at the NE 19. The position of the N 20 was established on this line. To establish the exact point, 20.117 metres were subtracted (for the width of the road allowance along the west boundary of Section 20) from the total length of this line. At the midpoint of the remaining length, a monument marked '¼' was planted to mark the position of the N 20. This completed the fieldwork portion of this survey. A copy of the field notes for this project can be found in **Appendix 'C'**.

3.3 After Field Work

On completion of the fieldwork, the information gathered was transferred to the office for the post-fieldwork processes. For the purposes of this report, these processes will be broken down into 3 main tasks. They are the verification of fieldwork, or calculations, the preparation of a Plan of Survey and the identification/preparation of applications for plan corrections (Change Orders). These three steps will be explained in this section.

3.3.1 Verification of Field Work

Following the fieldwork portion of the project, the information gathered was brought into the office to be analyzed. As mentioned before, the data was collected using GPS. Because of this, the first thing done was to transfer the data collected from the GPS to a computer. As the information in GPS is collected and stored within a data collector, the file downloaded to the computer is in a form compatible only with that particular data collector. In order to put this file in a form compatible with the software in which the

calculating would be done, it had to be entered into GPS data processing software. For this case, the software used was Trimble Geomatics Office (TGO). With this software, the data collector file was imported. The software then enabled this file to be converted to a file type that was compatible with the calculating software used for the project. This calculating software was AutoCAD 2007. This, however, was not the only purpose served by TGO. It also offered an element of quality control to the function of the equipment. This works by showing the obtained measurements in a graphical format. Each measurement taken by the RTK system is stored as a vector originating at the base station and ending at the occupied point. These vectors are what are displayed on the screen in TGO. With this dataset, TGO can produce a report which ‘red flags’ any observations that were outside the tolerances set within the software. This allows the user to see, graphically and in table form, the specifics on each observation made. For this case, all observations made were satisfactory, and no ‘red flags’ were produced upon the import of the data collector file. A points report was created with TGO. This points report sorted the points within the data collector, and produced a table showing values for the following:

- Point Name
- Northing, Easting, and Elevation (within the assigned coordinate system)
- A description of the observed point

This points report can be seen in **Appendix ‘C’**.

The file now was then exported from TGO and saved in a form compatible with AutoCAD 2007 (a .dxf file). The next step was then another verification of the quality of the observed points. This was done in AutoCAD. This, however, was a different type of check than the one performed in TGO. The check in TGO was one of the absolute

positions of the points observed, and the quality of these positions. The check done using AutoCAD was a more thorough one, and involved the points positions relative to previous observations by our firm, and previous observations on earlier plans. As the area in which this survey took place is a frequently surveyed area, the local coordinate system was established in the field to match the coordinate system established in our firm's AutoCAD file. When the .dxf file was imported into AutoCAD, it was able to be inserted so as to have its '0, 0' point at the same point as was on file. This eliminates any rotating or scaling of the coordinate system that exists in the data collector, and therefore eliminates one source of error. With this as well, a person is able to compare positions of monuments that have been observed previously against the new file.

Following this check, points can be joined and closures calculated graphically in AutoCAD. Although closures to other plans were calculated in the field, the checks done within AutoCAD allowed for a more complete check to each section affected by the survey. It has to be remembered that in the field the office is the cab of a truck, and sometimes things can be overlooked, or not investigated to their full extent. Basically, the resources in the field are not as extensive as those in the office, and therefore, checks can be limited to what resources are there. So, the office check is one of necessity, as the final product of these checks will be a legal Plan of Survey.

In AutoCAD, as mentioned previously, the observed points were linked graphically. This process was basically a 'connect the dots' process, as GPS was used. The product of these calculations was a graphical shell, more or less, of the Plan of Survey. Following the calculations, the area of interest was copied out of the calculations

file, and was used to begin drafting the plan. A capture of the AutoCAD calculations file can be found in **Appendix 'D'**.

3.3.2 Preparing the Restoration/Re-establishment Plan

Following the numbers checks, the drafting and submission process began. The drafting process was one that basically involved the identification and labeling of information that was pertinent to the survey. There are many things that are required to be shown on a Restoration/Re-Establishment Plan of Survey. In drafting the plan, each of these things is to be shown so as to graphically depict clearly the processes used to survey the area on the ground. Because the nature of a Restoration/Re-Establishment plan is one that usually involves the moving of monuments, clearly depicting the ground survey can be somewhat of a challenge. This is because, in most cases, the distances over which monuments are moved cannot be seen at the same scale as the plan is drawn. For these situations, a detail (at an appropriate, larger scale) is used to clarify the methods used over these smaller distances. A detail is required to match the plan proper identically, so as to provide enough common information between the two that a person using the plan can move between the two freely within the same calculation. In the case of this project, six details were needed at different points to make clear the plan's intent.

Specific to this project, the following issues were to be addressed at the drafting stage, a checklist of sorts:

- **Including a title block explaining the nature of the plan, the location of the plan, the range of time over which the survey was performed and the scale of the plan.**
- **Including a legend referencing and explaining any symbols show on the plan and stating the units of measurement used on the plan.**

- **Including a north arrow to give the plan orientation.**
- **Identifying which monuments were found in the survey, and labeling them appropriately.**
- **Identifying which monuments were planted in the survey, and labeling them appropriately.**
- **Identifying which primary monuments were lost and re-established during the survey.**
- **Clearly showing the methods employed for re-establishing these monuments.**
- **Identifying any monuments that were found and moved to corrected positions in the survey.**
- **Clearly showing the methods for performing these corrections (i.e. where they were found, and the distance and direction of the move).**
- **For every monument found or planted during the survey, identifying the state of the monument as it was found or planted (i.e. marker post or not, if not the reason why.)**
- **For every monument found or planted during the survey, identifying the markings on the monument (i.e. what was stamped on an iron post).**
- **For every monument found or planted during the survey, showing sufficient measurements (angles and distances) to the monument so as to enable the re-establishment of its position should the monument be subsequently lost.**
- **Accurately depicting and labeling all legal survey plans within each quarter section shown on the plan (i.e. showing the plan number and width of a pipeline right of way survey).**
- **Ensuring that all details shown are accurate.**

There are minimum text size requirements employed by ISC in a document titled 'General Requirements for the Preparation of Plans'. For this project, this document was used as a reference for these technical drafting issues.

3.3.3 Identifying Plan Corrections (Change Orders)

As mentioned earlier in the report, there were previously registered plans that had measurements that were affected by the movement of monuments during this survey. Because the distance between monuments, and angles between surveyed boundaries had changed on the ground, these measurements needed to be changed on the plans that measured them originally, along with plans that may have observed the monuments during later surveys.

In order to correctly identify which plans needed amendments, a thorough analysis of the final draft of the plan had to be done. With the graphical representation of the survey completed, it made it a little easier to identify the plans that crossed boundaries changed by the survey. However, in order to identify plans that had simply tied to an affected monument, and not crossed an affected boundary, each plan identified in the drawing had to be analyzed. As mentioned previously, six survey plans total were identified as needing to be amended. Sketches of the affected portions of the plans were then generated.

Prior to moving forward with amendments to plans, permission had to be obtained from each land surveyor whose plan(s) was affected. However, if the land surveyor whose plan was affected was no longer an active member of the SLSA, no permission was required. Although there were six plans to be amended with this survey, only two of them were performed by an active member of the SLSA. Because both of these plans were performed by the same land surveyor, the contact required was minimal, and permission to move forward with the amendments was obtained. Although not active, the

four other plans affected by the survey were all done by the same land surveyor as well. On each of these plans, the survey company who this surveyor worked for was shown. This company was contacted, as a courtesy, to notify them of these changes. It should also be noted that the amendments to these plans did not result from blunders by the surveyors of them, but from the incorrect re-establishment of the specific primary monuments by Mr. Hogg.

3.4 Plan Approval Process

After completion of the field work, the calculations, the drafting, and the identification of plan corrections, the survey was ready to be submitted to ISC for plan approval and filing. For this survey, two types of submissions were required for examination; one for the actual Plan of Survey and one for each of the change orders. This section will discuss each of these submissions.

3.4.1 Submission of Plan of Survey

In order for a Plan of Survey to be approved and filed in the Land Surveys Directory, it must be submitted to ISC for examination. The submissions for examination are call packets. There are three ways in which a packet may be submitted to ISC. Two of these are by regular mail and one is by electronic mail (e-mail). For the regular mail submissions, a surveyor can send either paper copies of the documents required, or a disk with the required documents saved on it. The e-mail submissions allow the surveyor to

attach the required documents to the message as files. The most efficient way to submit, for the purposes of this survey, was to submit the information using e-mail.

The packet consists of documents required by ISC. The number of pages in a packet can vary from survey to survey. The first three pages are standard forms provided by ISC:

- The **Plan Processing Packet Cover Page** is always the first page in the packet. It is a unique (bar code) form on which the surveyor identifies themselves and indicates the number of pages in the packet. It also supplies ISC with a client reference number.
- The **Plan Processing Request** is always the second page in the packet. It is a form on which the surveyor identifies themselves once again, indicates the number of plans and support documents that are submitted for examination and indicates the type of plan that is to be examined.
- The **Begin Attachment Sheet** is always the third page in the packet. It is basically a separator between the ISC forms and the rest of the packet.

All of these sheets can be downloaded from the ISC website. The rest of the packet consists of the surveyors own documents. For this project, the fourth page in the packet was a cover letter, addressed to the Controller of Surveys, indicating the type of plan and that it was being submitted for examination. The fifth page was the signed Saskatchewan Land Surveyor's Affidavit, where the surveyor certifies the work and indicates the dates of the survey from the first day of fieldwork to the last day of fieldwork. Page six was a surveyor's report in which the surveyor discusses anything through the course of the survey that may have been considered as unusual as well as the survey's agreement with previous plans. And finally, the seventh page was a copy of the finished Plan of Survey. A copy of this packet can be found in **Appendix 'E'**.

To make the initial submission is as simple as sending a message to packets@isc.ca and attaching all of the aforementioned documents. Following the initial

submission of the plan, an automatic response is generated by ISC acknowledging that the request for examination is on file in their data base. A copy of this acknowledgement can be found in **Appendix 'F'**.

This acknowledgement, however, is not the examination of the plan. After the ISC plan examiner examines the plan, they will respond in one of two ways. The first way is in the case that the plan has satisfactorily met the requirements for compliance with the Land Surveys Act and Regulations. For this case, the examiner will send (via e-mail) a 'Request Approval Notice' stating that the plan has been examined, assigned a number and approved by the Controller of Surveys. The other response is one where the plan has not met the requirements, and corrections are to be made to it. For this case, the response is called a 'Memorandum'. The memorandum will state that the plan has been reviewed, assigned a number, and it will list the corrections that need to be made to the plan. These corrections could be anything from a drafting error to a discrepancy with a previous plan. Upon receiving the memorandum, the surveyor will make the specified corrections and resubmit the plan, in the manner set forth previously but including a response to the memorandum, for approval. This cycle will continue until the Controller of Surveys approves the plan, and the request approval notice is obtained.

For this project, the first response from the plan examiner was unfortunately a memorandum. When the memorandum was received, it listed three errors in particular that were to be amended. An interesting note specific to this project was that two separate memorandums were received after the first submission. This was because the examiner at ISC must have realized a fourth error after the first memorandum was sent, and therefore

had to send this notice on a separate sheet. Copies of these memoranda, and the responses to them can be found in **Appendix ‘G’**.

Following these memoranda, the plan was reviewed again and the specified corrections were made. After the re-submission, the request approval notice was received and the plan was filed in the Land Surveys Directory as Plan Number 101905635. The Request approval Notice, and the Plan of Survey can be found in **Appendix ‘H’**.

As with most things in life, a price is attached for the services of ISC. There are different fees attached to their examination and approval services for different types of plans. Fortunately, in the case of this project, the fees for the examination of a Restoration/Re-Establishment Plan are free. However, for any paper, e-mail or fax submission there is a \$10 fee per request. This fee is a one time fee charged with the initial submission, and is not required to be paid on each re-submission. Therefore, for this plan, the total fee for ISC services was \$10.

3.4.2 Submission of Plan Corrections

The submission for plan corrections is similar in many ways to the submission of a Plan of Survey; however it is different in ways as well. Following the identification of what change orders are required, a packet must be prepared for submission to ISC as well. The first three pages of this packet were the same forms as described earlier. The only difference occurred when indicating which type of examination was required, as the process for filing a change order is different than that for approving a Plan of Survey. The packet’s fourth page was once again a cover letter in the same form as described above.

The fifth page was an 'Application for Plan Correction Change Order' on which the following information was indicated:

- **The plan number of the affected plan.**
- **The location of the affected area (Section(s), Township(s), Range(s) and Meridian).**
- **A statement that no adjoining owners would be affected by the changes.**
- **A list requesting that the particulars of what needs to be changed (actual numbers) are changed.**

The sixth and final page was the sketch of the affected area. The change order packets for this project can be seen in **Appendix 'J'**.

A change order is different in that the surveyor is not in fact submitting a new plan for examination, but a support document. In plan submissions, support documents are considered to be anything that is not the ISC forms or the actual plan. When the change order is submitted, it is given a 'Support Document Number' this is sent back to the surveyor with the acknowledgement. The acknowledgements for the support documents in this project can be seen in **Appendix 'K'**.

Following the examination by ISC, there are, once again, two scenarios. These are the same as with a plan. If the examiner has issues with a particular application, they will send a response outlining these issues. This, however, is not in the same form as that for a plan submission. For a change order, this is called a 'Notice of Filing'. If the examiner is satisfied with the accuracy of the request(s) made, the Controller's office will both create the change order, and amend the affected plan. This is done by assigning a new unique packet number and request number to the file. The surveyor who submitted the original request will receive a second acknowledgement, identified by these new unique numbers, indicating the support document number assigned earlier, along with a new 'Change

Order Number'. The final piece of correspondence issued by Controller's office is the 'Request Approval Notice'. This indicates that everything has been approved and amended, and it assigns a plan number to the request. Along with the request approval notice, the Controller's Office will send a copy of the amended plan for the surveyor's records.

For this project, all but one change order application was approved with the first submission. The application for Registered Plan Number 95SC03252 had a notice of filing returned inquiring about some information that could potentially have been changed. However, the case was that this information was not changing enough to warrant a change order. This Notice of Filing can be seen in **Appendix 'L'**.

It should be noted that along with this specific inquiry were two other general inquiries. The second was actually an omission on our part. Plan Number 101839338 was not included in the initial submission. It actually includes a tie distance that was affected by the survey and missed in the initial check for affected plans. Because of this, a packet was made for this particular change order and submitted for processing at ISC. This application moved through the process laid out earlier quite smoothly. This packet can also be seen in **Appendix 'J'**.

The third inquiry was with respect to fees for change orders. As two of the plans corrected were done by a land surveyor still practicing in Saskatchewan, there was a fee attached to amending those plans. The inquiry was as to who would pay these fees. The examiner was informed that all fees would be paid by our firm. No charges exist for changes to plans by surveyors who are no longer practicing in Saskatchewan for whatever reason. For this project, the six change orders submitted were done so with

separate packets. The second group of acknowledgements received from ISC described the charges attached to each change order submission. A mistake was made here, by ISC, in that charges were attached to plans done by surveyors who had since retired. This mistake was caught by the examiner after the **second** error. There were in fact **two** plans to which charges were supposed to be attached, so it was decided that instead of charging for these plans, no charges would be attached and the fees would be the same in the end. A copy of the second group of acknowledgements can be found in **Appendix ‘M’**.

As each of the six change orders were submitted as a separate packet, the \$10 fee per request resulted in a \$60 charge. The fees for a change order are \$120 per change order plus another \$10 each for the submission. The two change orders with fees resulted therefore in a charge of \$260. Therefore, the total fee for these change orders was \$360. Another note that should be made with regards to correspondence with ISC is a comment that was actually included in one of the memoranda for the Plan of Survey. Here, the examiner noted that contact was to be made with any active surveyor whose plans were affected. Although contact had been made, copies of the correspondence were not included in the initial submission to ISC. For that reason, copies of the correspondence were included in both the re-submission of the Plan of Survey and with the new change order that was submitted after the first submission. This correspondence can be seen in **Appendix ‘P’**.

After addressing each of these issues, all of the six change orders were approved, and the request approval notice was received along with copies of each of the six amended plans. Copies of the request approval notices for the change orders along with copies of the amended plans can be found in **Appendix ‘N’**.

4.0 Discussion

As mentioned earlier in this report, a surveyor's report is submitted with a plan of survey discussing any unusual circumstances encountered through the course of the survey. It also discusses the survey's agreement with previous surveys in the area. This portion of the report will take on a very similar approach to that of the actual survey report submitted to ISC. In fact, many of the same issues will be discussed as they were the pertinent issues affecting the survey.

There were some unusual circumstances encountered during the course of this survey. As mentioned earlier, the survey by Mr. Hogg re-established the position of the NE 18-12-25 W3M. His plan stated that the original monument was lost, and that no monument was planted at this position. The reason for no monument was that the corner fell under water. During the course of this survey, an iron post was in fact found at the NE 18. As well, there was no indication of any water body existing; previously or presently. It was in fact on a high point. Since the time of the original road survey, three separate plans have measured to this corner (Registered Plans 92SC00496, 94SC06747, and 95SC03252), and in each case have shown an iron post **found** at this position.

In addition, the original road survey re-established the position of the NE 19-12-25 W3M, and notes that an iron post was planted at that time. Mentioned earlier, as the basis for this survey, it was noted that the position of this corner was governed by the trench found. It was also mentioned that this corner fell directly in a well established slough that holds water for a good portion of the year, and that a significant dig was performed to no avail. A survey performed after the road survey (Registered Plan No.

94SC6225) showed an iron post found at the NE 19, but does not provide a measurement directly to it. If this iron post was in fact found in 1994, it has been lost since.

These things indicate the possibility that the descriptions given to the corners in question were transposed on the original road plan. As the NE 19 was found in a well established wet area, it was concluded that Mr. Hogg **did not** in fact place a monument at this corner during his survey because it was under water. As the NE 18 had a monument found marking its position on three separate occasions prior to this survey, as well as during this survey, and that the physical location of the NE 18 was on a well established high point, it was concluded that a monument **was** in fact placed there during the road survey by Mr. Hogg. This elevation change is displayed in the photo.



Figure 4.1 – Near the NE 18-12-25 W3; Facing North

To add to this confusion, the iron post found at the NE 18-12-25 W3M was in fact marked '1/4'. This was obviously the incorrect marking for the position it intended to

mark. During the survey, this marking was corrected to read XVIII, XII, XXV on the monument. The monument was then placed at its re-established position. Following this discovery, all other monuments' (concerning this particular survey) markings were read to ensure no other mistakes of this nature existed and that was in fact the case.

Minus the disagreement with Mr. Hogg's plan, agreement was obtained in every case with the pipeline right of way surveys done succeeding Mr. Hogg's plan. The methods used for correcting the intersection pins affected resulted in satisfactory numbers with regards to closing with the specific plan being changed.

The only major discrepancy, in terms of agreeing with other plans was with the distance on Registered Plan Number 74SC06569 between the monuments marked 'R8' and 'R7'. Mr. Hogg measures this distance as 1834.84 feet (559.259 metres). This survey measured this distance as 558.307 metres, a discrepancy of -0.952 metres. This was addressed in the first memorandum received from the Controller's Office. This was investigated following the memorandum, and it was found that a mistake must have been made in the original measurement of the distance. The intention of the original plan was to maintain a straight line, through each road monument, from the north end of the road to the south end of the road. The observations during this survey agreed with this intent. As well, the monument marked 'R8' was originally intended to be on the north boundary of Section 20-12-25 W3, and was found during this survey to be within tolerance even though the boundary had changed. These are the reasons for the conclusion that the original distance was amiss.

A note that should be made with this project is with respect to the fees for Change Orders discussed earlier. As mentioned, these fees apply only to surveyors who are still

practicing within the association. Both of the corrected plans that were surveyed by a practicing member were done correctly, and the changes to it were as a result of errors committed by a person who is no longer practicing. It is this issue that is one of unfairness. The realization of this error came as a result of an abundance of information collected by our firm within the area of the survey. The subsequent plans that had intersected these boundaries did not need all of this information for their production, so the surveyors obtained only the information pertinent to their plans; a normal circumstance. It is the opinion of this report that surveyors who have completed surveys in the correct manner should not be penalized in the form of a fee to change their plan when they have not in fact committed an error. If the original error was committed by a person who has since retired, and subsequent plans have been contaminated as a result of this error, no fee should be attached to the resolution of the original error or to fixing any plans that were affected because of it.

5.0 Conclusions

By moving through the processes set out for the restoration/re-establishment survey, this project has corrected a previously committed error and filed a plan to echo those corrections. It has also made any changes to plans that had measurements affected by the corrections.

This survey was one that encompassed a wide variety of survey tasks. This report has explained the processes involved in the survey including pre-field tasks, field procedures, calculations, drafting, approval and filing of a Plan of Survey. Though this

specific process has dealt with a Restoration/Re-Establishment Plan of Survey, many of the tasks involved were ones that could be used in most surveys.

For a land surveyor in training, this project has provided the tools for use when encountering a situation where the re-establishment of monuments is necessary, and has offered a substantial base for future surveys of the same nature.