Saskatchewan Land Surveyors' Association
Survey Project # 2 – New Road/Maintenance/Surface Consolidation

By

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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 actually deal with three different types of surveys in the same area. The first type of survey is one for a new road. The second type of survey is one used for the maintenance of a previously surveyed road. The third is surface consolidation where areas that were divided before will be consolidated as a result of the final Plan of Survey. It will give a detailed analysis of the procedures involved in moving through the survey; 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 a road along the north boundary of Sections 19, 20 and 21 Township 4 Range 14 W2 Meridian, and the north boundary of Sections 22, 23 and 24 Township 4 Range 15 W2 Meridian. In total this road was 6 miles long. The portion along the north boundary 21-4-14 W2 was a new portion of road. The remaining five miles were surveyed as maintenance on previous survey plans.

2.0 Background

Each year, the Information Services Corporation (ISC) arranges a group of road surveys to be done. This is termed the 'Municipal Road Program'. These surveys can

range from maintenance surveys on previously widened road allowances to new surveys widening road allowances to a road that does not parallel road allowances at all. When this list is composed, ISC inquires to surveyors throughout the province as to who would be interested in participating. If a surveyor expresses interest, then ISC will decide which surveys the surveyor will perform. In most cases, the surveys will be in the immediate area in which the surveyor does most of their work. At this point, the surveyor will sign an agreement stating that they will perform the survey, and that it will be done by a certain specified date. As well, ISC lays out a payment schedule based on the total length of the survey, including any extra distance required for meeting survey requirements for the road program.

For this project, as mentioned previously, three different types were performed. A portion of Highway No. 35 (Registered Plan Number 82R18195) intersected the road allowance along the north boundary of Section 21-4-14 W2. It intersected this road allowance at a fairly steep angle, and the road being surveyed with this project was intended to allow for a more secure crossing of the highway. It was intended to, in effect, to divert the road allowance so that when it meets the highway, it would be at an angle closer to 90 degrees. The new road surveyed was an ‘S’ curve. There was an existing road widening on both the east and west sides of the highway (Registered Plan No. 82R18195, and Registered Plan No. 92R22691, respectively). The portions of these plans along the north boundary of Section 21 were to be abandoned and replaced by the new road.

The remaining five miles of road were along Registered Plans 62R43112, and 72R05405. These plans previously widened the road allowances. As there was to be

construction done to these roads, a maintenance survey was performed to ensure that current information on the state of the monuments along these plans was obtained. As part of the requirements for the maintenance survey, reference monuments needed to be place at a safe distance and known orientation from these original monuments. This reason for this was to employ a simple method of re-establishing the original monuments should they be destroyed by construction of the road.

The maintenance survey portion of the project happened prior to construction, while the new portion occurred after construction of the curves was completed.

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, a contract was entered into between our firm and ISC to survey a new road and a maintenance survey. A copy of this contract can be found in

Appendix 'A'. Following the initial request, some office work was done to ensure that the most recent information, pertaining to the corners and boundaries included in the survey, was acquired. These tasks included performing the proper searches for plans that measured to these monuments, contacting the Rural Municipality (R.M.) for the dates of construction on the road, and obtaining the theoretical curve information from the engineering firm that designed the road. These tasks will be described in this section.

3.1.1 Performing Searches

Because of the need for up to date information on any previously measured monument included in the survey, effective legal survey plan searches were essential in making certain that the New Road/Maintenance Survey 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 New Road/Maintenance survey, the most effective search to use is by Corner LLD. A search by Corner LLD 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. This method 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, this type of search 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.

In this project, the Corner LLD search tactic was employed. The project ranged over twelve sections. For the maintenance survey, a total of fifty four specific corners were searched. For the portion of the survey that was new road, a total of thirty six specific corners were searched. An example of the search output for this project can be seen in **Appendix 'B'**.

3.1.2 Contact with R.M. of Lomond No. 37

Prior to commencing any fieldwork for this project, contact was made with the R.M. of Lomond No. 37 in regards to when the construction on the road would commence. This contact was made over the phone, and enabled our firm to coordinate dates with the R.M. During this contact, the R.M. informed our firm that contact with affected landowners would be made through them. The field portion of the survey began on August 29, 2005 and at this point construction had been completed on the curves, but no construction had been done on the portion of road that required the maintenance survey.

3.1.3 Contact with the Engineering Firm

For this particular project, a second contact was required with the engineering firm in charge of the design of the road. The reason for this was the previously mentioned 'S' curve design of the road. In order to survey the road correctly, theoretical curve information for the four curves in the road was needed. Although the survey information would not exactly match the engineer's, a base was needed as a reference when doing the survey. A copy of the engineer's curve information can be found in **Appendix 'C'**.

In some cases, no information is obtained from the engineering firm prior to the survey. For these cases, the survey is designed according to measurements take along the centre line of the constructed road. As this project was able to acquire the proper information, this was not the method employed.

3.2 Fieldwork & Calculations

Following initial research on previous measurements to the relevant corners, the fieldwork for the project began. The investigation of previous plans resulted in some good information, 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. Because multiple trips were made to the field, this section will explain the actual work that was done in the field on each trip, along with the office work and calculations that were performed **after** each trip. The reason for this is that all of the fieldwork done after the first trip was as a result of findings made when performing second, third and fourth checks in the office. By doing

this, a better understanding can be obtained of how the project progressed by maintaining a specific chronology.

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 an iron post marked 'R8' near the N ¼ of Section 23 Township 4 Range 14 W2 Meridian. The coordinate value assigned was N: 0.000 m, E: 0.000 m and ELEV: 606.290 m. As will be discussed in the next section, multiple trips were made to the field for this project. On one occasion, the file created at the beginning of the project was not in the data collector used at the time. Because of this, there were two different GPS files

created for this project. To ensure consistency, the same point was used as a 0, 0 point for both files.

3.2.2 Obtaining Measurements & Performing Calculations

As mentioned previously, multiple visits were required for this project. The term 'required', however, must be taken very loosely as most of the multiple visits were as a result of things missed on the previous trips! In total, four trips were made to the location of the road over a period of 15 months. Although this was not the desired number of trips (that being one), it was what it was, and the following section will outline what was done on each trip to the field along with office work after each trip.

3.2.2.1 First Trip to the Field → August 29 and 30, September 1, 2005

The first trip to the field was on a bright sunny day in August, 2005. The first trip was made under the impression that the road would be surveyed by the time the trip ended. This, unfortunately, was not the case!

The first task undertaken was the maintenance survey. Regrettably, the understanding of what was actually involved in a maintenance survey was not known at this point. What **was** understood to be a maintenance survey was simply finding and measuring the monuments along the previous road widening (Registered Plan Numbers 62R43112 and 72R05405) and that was it. What **was not** understood was that reference monuments were supposed to be planted at each of these monuments. In any case, all of the monuments that were along the previous widening were found and coordinates within the local coordinate system were obtained for their positions.

At this point, it was thought that the field portion for the maintenance section of the survey was complete. So, the fieldwork continued to the new road section of the project. As the new road portion was to cross both the north boundary of 21-4-14 W2 and Registered Plan Numbers 82R18195 and 92R22691, enough monuments had to be occupied and measured to establish these boundaries. This was done and no discrepancies were found with the previous plans. As these boundaries were established, surveying the curves could be performed. As mentioned earlier, theoretical curve information was obtained from the engineering firm performing the construction. Prior to construction, construction surveyors employed by the engineering firm laid out the curves and marked, with wooden stakes, the beginning and end of each curve. The road was constructed using these stakes as a guide. Because the surveyors employed by the engineering firm were not licensed Saskatchewan Land Surveyors, they could not perform the legal survey for the road. So, each of these wooden stakes were occupied and measured. Using these stakes, the theoretical curve information from the engineering firm, and the monuments found during our survey, the curves were designed to be a best fit of all three. Although the curve information was different from the theoretical information, it was close, and the main thing was to ensure that the constructed road was in fact a good fit for the 30 metre right of way. At this point, monuments were planted at the beginning and end of each curve. They were each marked with an ‘R’ number, starting with ‘R1’ at the eastern extent of the road and increasing as the road moved west. Unfortunately, the calculations for these specific curves were done incorrectly in the field the first time and some monuments had to be subsequently moved.

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

As there were two separate files created for this project, there were two separate points reports created. The final point reports can be seen in **Appendix 'D'**.

The file 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 then 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 on earlier plans. Because this was the first time surveying in this specific area, no check could be done relative to our own previous observation as there were none.

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.

Although it would have been nice to have this process move smoothly, this was not the case for this project. During the first set of checks on the field work, it was noted

that some of the monuments planted as the beginning and end of each curve were not in fact tangent to the curve at those points. It is a basic property of simple horizontal curves that their beginning and end points must be tangent to the curve, meaning that is the only point on a line moving through that point can touch the curve. Because of this, curves had to be recalculated in the office, and the affected monuments needed to be moved on the ground. This information was uploaded from the computer to the data collector for use in the field. A total of four monuments fell outside of a satisfactory tolerance, and these four monuments needed to be moved.

A second thing noticed through the first set of checks was that the placement of a monument was in fact omitted in the first trip to the field. Monuments marked ‘R1’ and ‘R2’ were planted at the beginning and end, respectively, of the eastern most curve in the new portion of the road. Because this curve intersected the north boundary of Section 21-4-14 W2, a monument was required to be planted at this intersection. Originally, the impression was that because this road allowance along the north boundary of Section 21 was previously widened, the only intersection needed would be with the surveyed boundary of this widened road. What actually was the case was that this widening was to be abandoned and become part of a parcel consolidation created by the survey. With this parcel, a portion of the original road allowance (before the widening) was closed as well. This intersection monument, marked ‘R1A’ was required to mark the point between the portion of road allowance to be closed and the portion that was to remain active. Figure 3.1 below should illustrate this better.

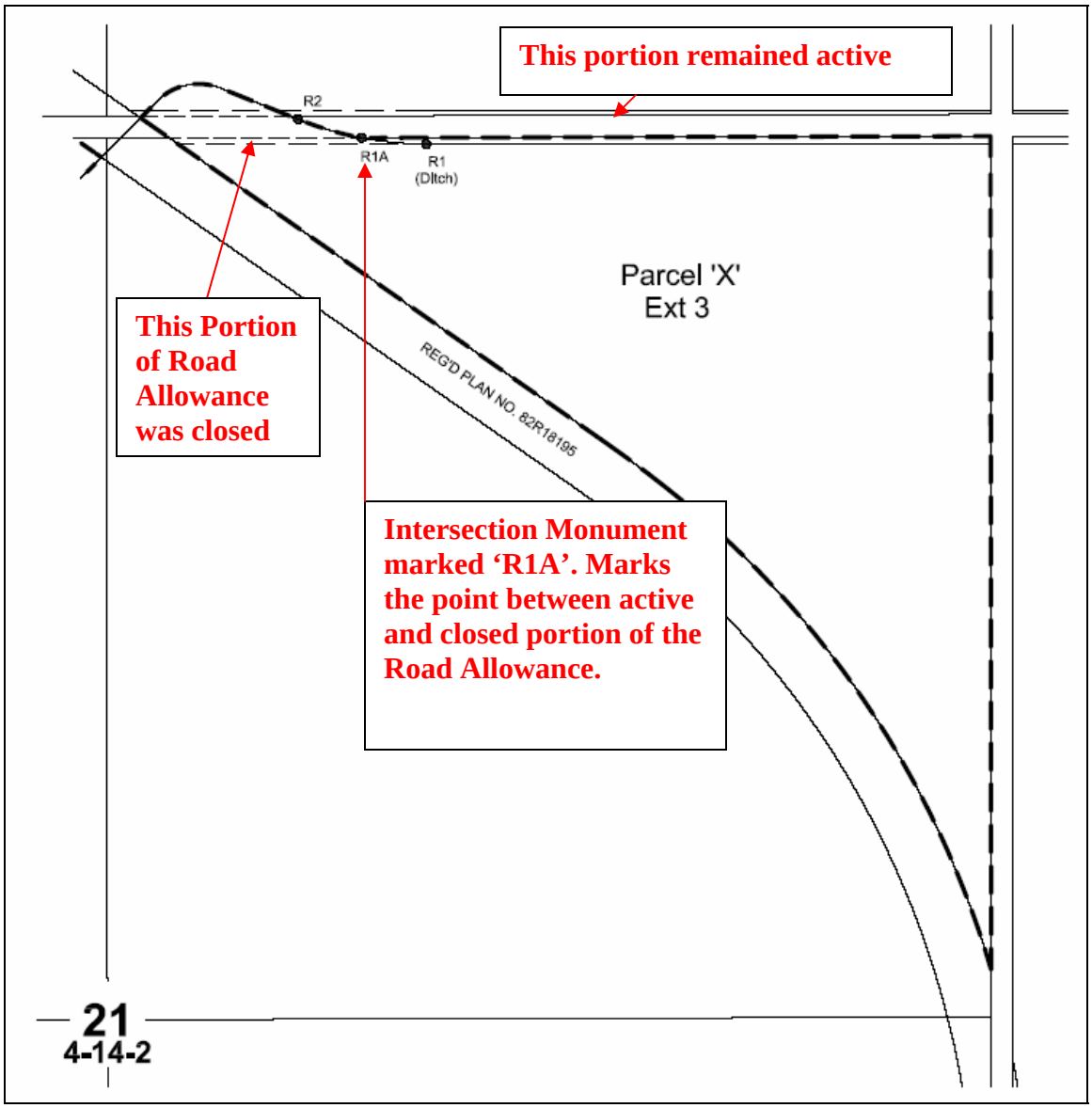

Figure 3.1 → Parcel 'X' – Intersection Monument 'R1A'

The third thing noted in the office work was to do with agreement with the previous surveys done on the maintenance portion of the survey. There were two monuments found along the original survey that were intended to have an angle 180 degrees around them and this was not in fact the case. To fix this, positions for these monuments were calculated so as to maintain the angle of 180 degrees around them. This

information was uploaded from the computer back to the data collector for use in the field.

Finally, less a calculation error, but more so an omission, it was realized that reference monuments were to be planted opposite each of the monuments found along the maintenance portion of the survey. Although this seems trivial knowledge now, at that point it was not known. No calculations could be done, prior to more fieldwork, as to the position of these reference monuments as more measurements were needed.

3.2.2.2 Second Trip to the Field → October 31, November 5 and 8, 2005

The second trip to the field occurred on slightly cooler days in October and November, 2005. This trip occurred as a result of the above mentioned realizations that were made following the unsuccessful first trip. Because calculated points had been uploaded to the data collector, the same file as the first trip was used. As the original base point was still in the ground, the base station was set up over that point. Check measurements were made to monuments measured in the first trip. This allowed for a comparison of the two set ups and ensured that any measurements take on this trip would remain satisfactorily within the coordinate system originally established.

The first task on the second trip was to move any new road monuments that were placed incorrectly on the first trip. As the correct information for the curves was already calculated, this was just a matter of visiting the incorrect monument, removing it and placing it in the correct position. Also, the monument marking the point between active and closed portions of the road allowance along the north boundary of Section 21 (R1A) was placed at this time.

The second task was placing the reference monuments opposite the found monuments on the previous road widening. The reference monuments were established at a distance of 20 meters from the original road monument. When crossing a north/south road allowance, the east boundary of that section was established, and the reference monument was planted along that line. To establish the section line, the quarter section corner monuments to the south (E ¼ of the section) were found. The line between the found monument at the E ¼ of the section and the NE corner of the section was the section boundary. However, in most sections, no monument was actually found at the NE corner as a result of the previous road widening. Because of this, the position of the NE corners had to be established. Although no monument was required to be planted here, its position was needed in order to ensure that the reference monument was planted at the correct position. Because there had been different methods of planting road monuments in the past, care had to be taken as to how the positions of the NE corners were established. In some cases, the original road monument was not in fact placed on the section line. For these cases, the line between the NE corner of the section and the road monument was in fact perpendicular to the surveyed boundary of the road. Therefore, in order to establish the NE corner, an angle of 90 degrees was turned from the road monument, backsighting the previous (lower number) road monument and moving the distance of the widening shown on the previous plan. Following this calculation, the section boundary was established, and the reference monument could be place on this boundary at the specified distance. Also at this point, the original road monuments were adjusted (if needed) to be on the section line as well. In other cases, the road monument was originally placed on the section line. In these cases, establishing the NE corner was

just a matter of finding the monument at the E ¼ of the Section, and producing the line, between that monument and the original road monument, out for the distance of the widening.

An interesting note here was that the E 19-4-14 W2 was controlled by a witness monument a distance of 3.85 chains north of the actual corner. A significant amount of time was spent slopping around in a slough looking for a monument at the E 19 when there was in fact no monument there. After a good amount of frustration was had, the Township Plat was referred to, and a good amount of yelling and screaming ensued. The witness monument was found with no problems and it was subsequently connected to the survey.

When crossing a north/south quarter line not previously surveyed, the reference monument was established at an angle of 90 degrees to the boundary of the original survey and at a distance of 20 metres from the original monument. There was one section that had a monument at its centre point and was therefore deemed a surveyed quarter line. For this case, this line had to be established, and the reference monument placed along that line. At this point of the field work, however, confusion was still one of the largest elements in the project, and this element was unfortunately overlooked. The ‘fourth trip’ section will outline the measures take to correct this mishap.

The last task accomplished with the second trip to the field were the adjustments to monuments found along the original road widening in order to maintain straight line intended. These adjustments are shown on the Plan of Survey.

Following this trip, the new information gained was brought back to the office, once again under the impression that the survey was complete. The same process of

downloading the information was performed and checks were done to make sure that the information obtained was agreeable to previous plans. At this point, the Plan of Survey was drafted and submitted to ISC. A general outline of the processes involved for submitting a road plan will be outline in the plan approval section of this report.

Following the submission, it was brought to our attention that a reference monument was omitted on this trip. Because the new portion of road ended near the NE 21-4-14 W2, a reference monument needed to be placed on the east boundary of Section 21. This section of the new portion of the road was in fact widened previously on Registered Plan Number 92R22691, however this project was re-taking that area to consolidate the original widening back in to the quarter. This is indicated by Figure 3.1. Because of this, the reference monument was required. Once again, not enough information was obtained to be able to pre-calc this position, so a third trip to the field was required. This omission was brought to our attention before a complete examination of the Plan of Survey was performed by the examiner at ISC. There were in fact more errors found following the complete examination, but these were not known until after the third trip to the field, and therefore not addressed until the fourth trip to the field.

3.2.2.3 Third Trip to the Field → September 3, 2006

The third trip to the field was, as mentioned, after a realization that one reference monument was omitted on the second trip. It occurred approximately a year after the first trip to the field occurred and by this point things were starting to get a little exasperating.

To establish this reference monument, the east boundary of Section 21 needed to be established. Registered Plan Number 92R22691 showed the monument at the NE 21

as found, however, at the time of this project, that monument was no longer there, and no evidence of it existed. This was more than likely due to construction on the road after Registered Plan Number 92R22691 was issued. So, once again, the position of the NE corner of the section had to be established. To do this, the previous road plan was used. On this road plan, the road monument near the NE 21 was planted on the section line. Therefore, the same method, as was previously explained for this case, was used. In this particular case though, things went a little differently. For Section 21, the E ¼ monument was lost and landed in the middle of Highway Number 35. In order to plant the reference monument properly, this point needed to be established. To do this, the NE 16 was established and this line was used to plant the reference monument. The reason this was able to be used as the line was that the previous road plan showed the established point at E 21 as being on line between the NE 21 and the NE 16. To establish the NE 16, the line formed between a monument found at the NE 17 and a road monument found near the NE 16 was produced out for the distance indicated by the widening on the plan. Following this establishment, the NE 21 could be established along with the E 21. No monuments were planted at any of these section and quarter section corners. The only monument that was planted was the reference monument at a distance of 20 metres from the road monument near the NE 21. This was the only task performed on the third visit to the field.

During this trip to the field, a different data collector was used. This data collector used did not have the file that was used for the first two trips. This did not actually present that big of a problem because, as mentioned earlier, the same 0, 0 point was assigned to the new file. This created the same local coordinate system that was used

during the first two visits. To ensure that this was the case, monuments common to the first file measured with the one. When the file was downloaded, as before, following the field work, the common points were compared to make certain that the two files matched. This was in fact the case.

As mentioned earlier, this trip to the field was made prior to the complete examination of the Plan of Survey by ISC. After this trip, the complete examination was performed and more errors were found that required fieldwork!

The first thing was to do with the placement of the reference monument near the N 24-4-15 W2. This was the north/south quarter line that was surveyed. The section was centred on a Restoration/Re-Establishment plan (Plan Number 100983067). This plan was obviously overlooked in the initial stages of this project. Because the line was a surveyed line, it had to be established and the reference monument had to be placed on that line.

The second thing had to do with the west end of the maintenance portion of the survey, specifically the road monument (R7) found near the NE 21-4-15. Had a closer look been taken at this corner in the initial stages of this project, it would have been seen that there were in fact two monuments planted approximately 1 metre apart. Both monuments were marked R7. There are 3 different plans that meet at the NE 21-4-15 W2.

Registered Plan Number 65R10865 is a subdivision plan that surveys a portion out of the NE ¼ 21-4-15 W2 (Parcel ‘A’). The north boundary of the subdivision is a line parallel to the north boundary of 21-4-15 W2 and 5.182 metres south of that boundary. A portion of this plan is shown below.

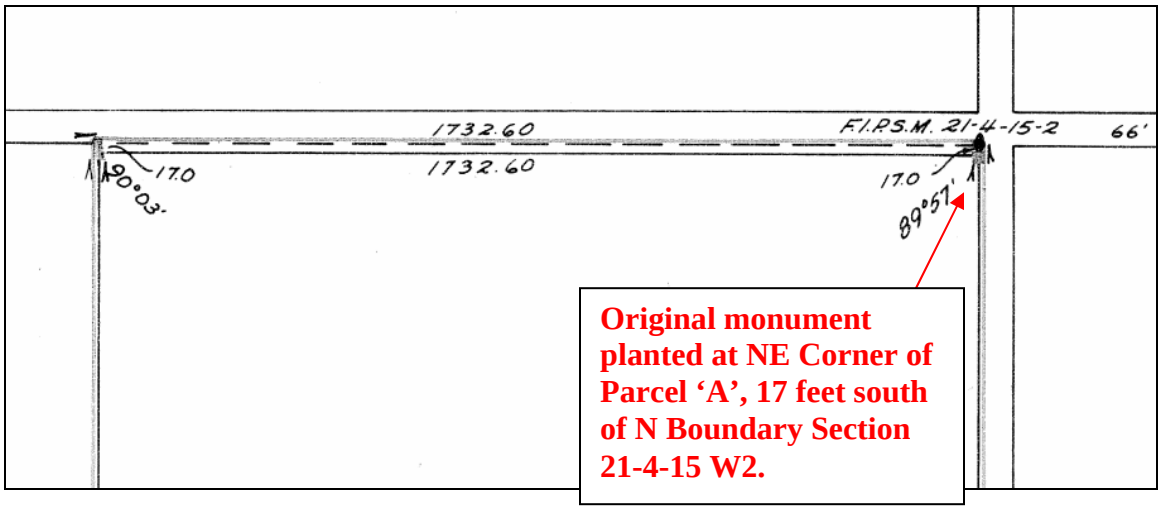

Figure 3.2 → North Boundary of Subdivision (Reg'd Plan No. 65R10865)

Following this plan, two road plans were surveyed that near the NE 21-4-15 W2. Registered Plan Number 72R05405 surveyed a widening on the road allowance moving east from this corner, and Registered Plan Number 74R03228 surveyed a road moving west from this corner. Although these plans were registered at different times, the actual field surveys were done at the same time; in 1967. Registered Plan Number 74SC03228 shows the monument at the NE of Parcel 'A' as being found. It notes that during the survey, this monument was used to mark the boundary of the new road. Because of this, the monument was marked as a road monument and stamped 'R7'. On the same plan, a second monument marked 'R7' was planted on the east boundary of 21-4-15 W2. This monument was planted a distance of 1.280 metres to the north of the monument at the NE corner of Parcel 'A'. This monument marked the west limit of the road widening surveyed by Registered Plan Number 72R05405. The response from ISC requested that verification be made as to which 'R7' monument had been connected to the survey as up to that point, only one monument had been measured. The northernmost monument was

the one of concern to this project as the maintenance portion of the survey was dealing with Registered Plan Number 72R05405. Figures 3.3 and 3.4 show the pertinent portions of these plans below.

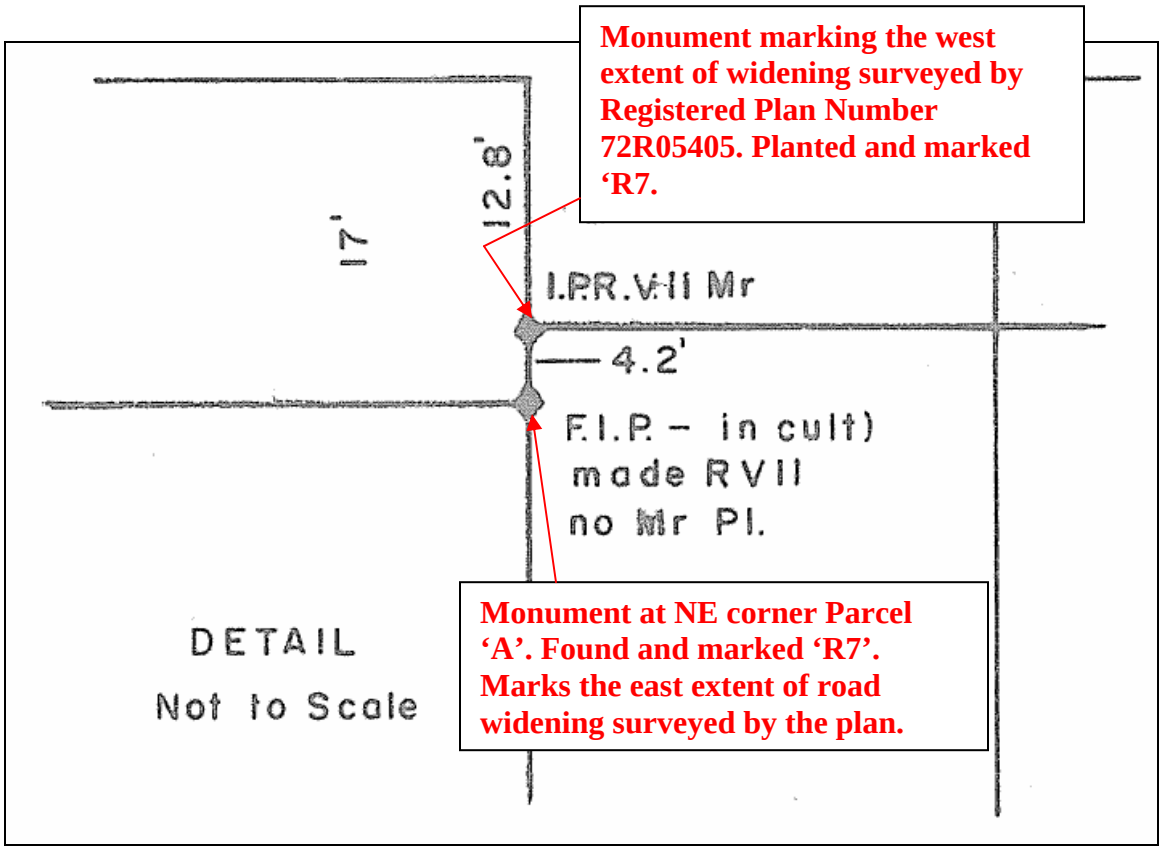

Figure 3.3 → Detail near the NE 21-4-15 W2 (Reg'd Plan No. 74R03228)

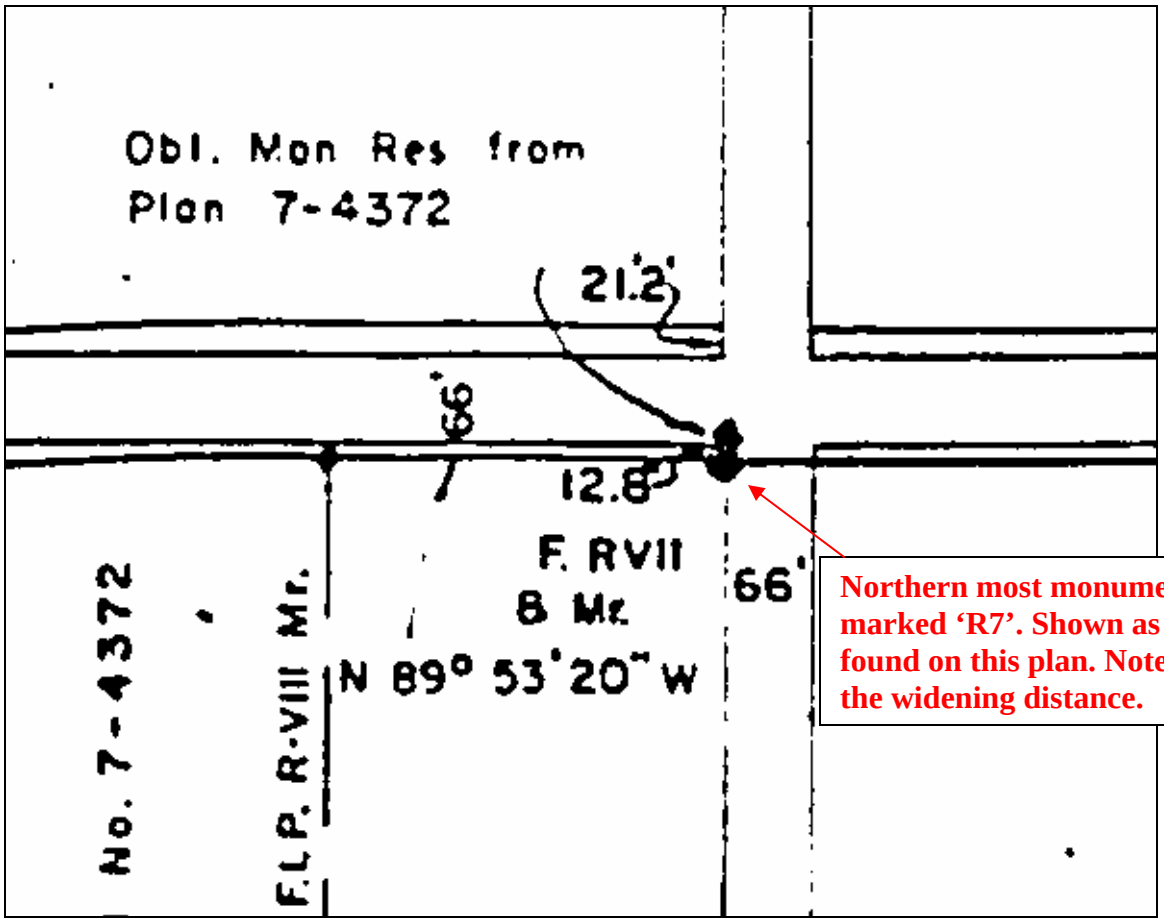

Figure 3.4 → Near the NE 21-4-15 W2 (Reg'd Plan No. 72R05405)

The third and final issue was similar to an issue that was addressed following the first trip to the field. It was to do with another intersection monument that was required but omitted. This one had to do with the same parcel as shown in Figure 3.1. It should have been noticed at that time that the parcel in fact intersects the north boundary 21-4-15 W2 two times, and that both points needed to be monumented. This point required that a monument marked 'R4A' be placed at the position as it also marked a point between active and closed portions of road allowance. Figure 3.5 below should illustrate this better.

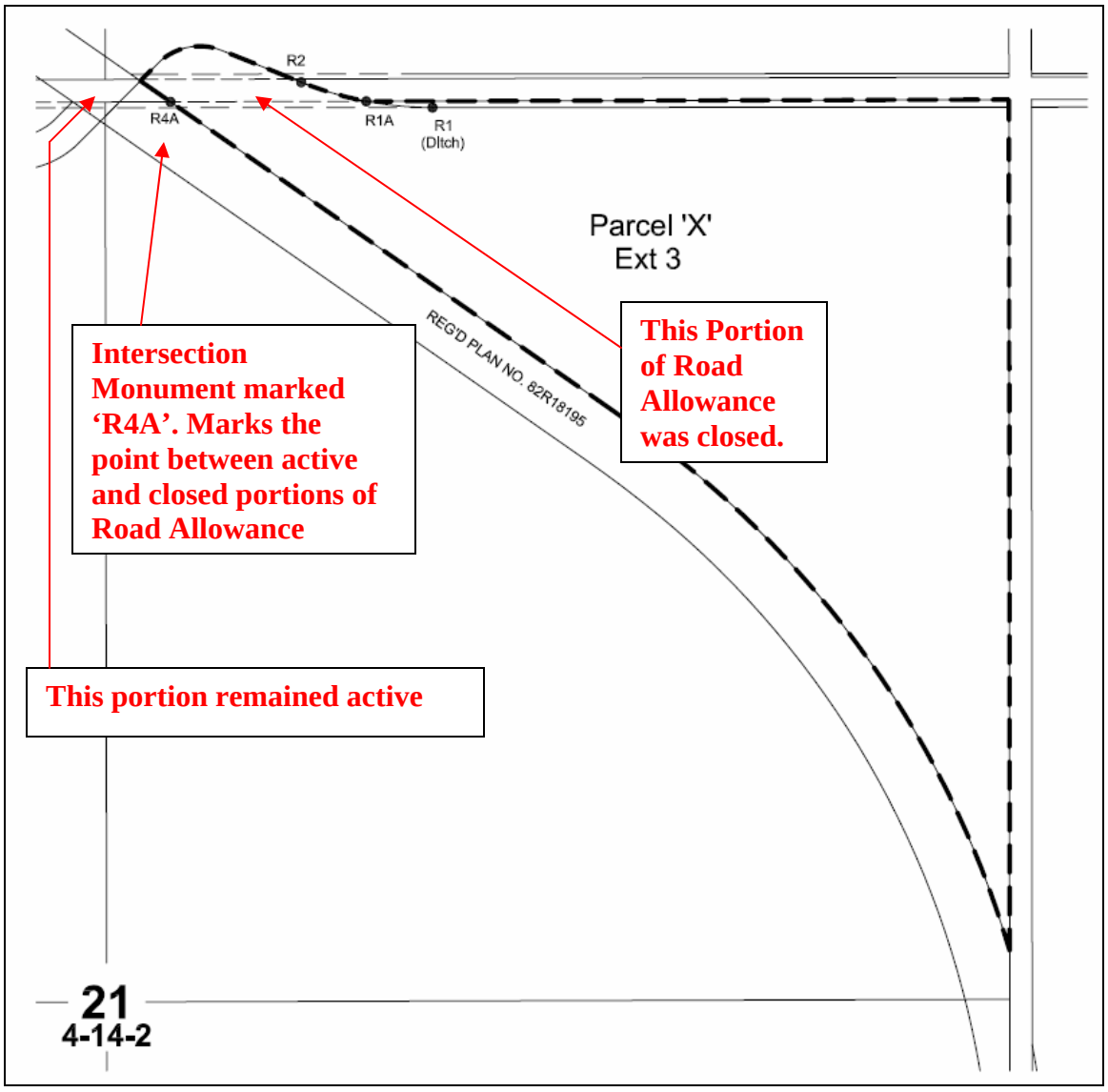

Figure 3.5 → Parcel 'X' – Intersection Monument 'R4A'

It should also be noted that Parcel Y (in the SW ¼ 28-4-14 W2) on the plan encountered the same circumstances. The points where this parcel intersected the north boundary of 21-4-14 W2 were monumented as well, even though these points were on the un-posted boundary of the new road. This is shown in detail on the Plan of Survey.

3.2.2.4 Fourth Trip to the Field → November 20, 2006

The fourth and final trip to the field happened on a glorious day in November of this past year…15 months after the first optimistic day of surveying began for this project. Feeling like a total idiot by now, there were the three above mentioned tasks to be performed.

This trip saw that the same data collector used in the first two trips was used once again. Because of this, the original file was added to when making new measurements. Once again check measurements were made to previously measured monuments to ensure that the setup was in fact correct, and this was once again the case.

The first thing done was to establish the north/south quarter line in Section 24-4-15 W2. To do this, the monument at the centre of Section 24 was found and measured. Following this measurement, it was found that where the monument referencing the original road monument had been place was roughly 0.110 metres from the north/south quarter line. Because of this, the reference monument was removed and placed in the correct position on the quarter line. Although the original road monument (R2) near the N 24-4-15 W2 was not intended to be placed on the quarter line with the original survey, it had to be placed on the quarter line for the maintenance portion of this project, as the section had been centred since the original survey. So, a point was calculated from the established north quarter section corner along the north/south quarter line for a distance of the original widening (7.020 metres). It was found that the difference between the calculated point and the location of the actual monument was negligible and therefore the monument stayed where it was.

The second task was to plant the intersection monument ‘R4A’ mentioned above. Because this position was able to be calculated prior to the trip, this task was just a matter of navigating to the point and planting the monument.

The third task involved the western extent of the maintenance portion of the survey; where the two monuments marked ‘R7’ were located. The second monument was in fact found and measured. This verified that the monument measured on the first trip was in fact the northernmost monument. This was the monument that was of concern to this survey; however, both monuments are shown on the Plan of Survey.

Following this task, we high-tailed it out of that place, hoping that we would never have to travel that road ever again!! All of the new information was brought back to the office for the routine checks and the final plan was prepared and re-submitted to ISC for approval.

A copy of all the field notes for this project can be found in **Appendix ‘D’.**

3.3 Plan Approval Process

The submission of a Plan of Survey for a road under the Municipal Road Program is a little different than the submission for a normal plan. The returns of survey for this submission include the following:

- **A cover letter;**
- **The surveyor’s affidavit;**
- **The surveyor’s report;**
- **The Plan of Survey;**
- **A copy of all field notes; and**

A copy of the survey returns can be found in **Appendix 'D'**.

The initial submission is made containing the returns of the survey, along with the bill for services, to Alan Jensen, Manager of the Municipal Road Program. This submission includes everything that was mentioned above minus the three ISC forms (Plan Processing Packet Cover Page, Plan Processing Request Form and Begin Attachment Sheet). Once the invoice has been processed and approved, he adds the three ISC forms and forwards it on to e-business at ISC for examination. The reason for this is to eliminate any fees normally associated with the submission. Because the surveyor is under contract to ISC, no fees are attached to the submission of the plan. If it needs to be re-submitted and then it is submitted directly to ISC for examination, as a normal plan would be. In this project, as mentioned previously, the plan had to be re-submitted.

Although Mr. Jensen submits the packet to ISC, any correspondence dealing with the plan is between ISC and the actual surveyor of the plan. Following the initial submission of the plan to ISC, an automatic response is generated by ISC acknowledging that the request for examination is on file in their data base. A copy of the acknowledgements for this project can be found in **Appendix 'E'**.

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 response from the plan examiner was unfortunately a memorandum. When the memorandum was received, it listed a number of errors that were to be amended.. Because the project was over such a large span of time, there were actually two separate memoranda received. The first one preceded the third trip to the field and was the result of just a quick look over the plan. This took issue with the fact that the survey was not connected to the east side of Section 21-4-14 W2. As discussed in the **Section 3.2.2.3**, this issue was addressed and corrected both in the field and on the plan. The second memorandum preceded the fourth trip to the field and was the result of a more complete examination of the plan. Many of these errors were to do with ISC’s drafting standards that were not met with the plan. There were, however, some issues that required more field work. These issues were the ones explained in **Section 3.2.2.4**. Copies of these memoranda and the responses to them can be found in **Appendix ‘F’**.

Following these memoranda, the plan was reviewed again and the specified corrections were made. After the re-submission, the plan was approved by ISC for survey information and forwarded to the Department of Highways for their approval as well. Following their approval, the titling process can begin. This project did not extend

through the titling process, so after the plan was approved for survey information, our job was complete. The plan was filed in the Land Surveys Directory as Plan Number 101882752. The final Plan of Survey can be found in **Appendix 'D'** with the returns of the survey.

4.0 Discussion and Conclusions

As indicated by this report, this project ended up being a rather confusing one right from the beginning. Because of a lack of experience, there were many things that were done wrong initially and were corrected once the right way was discovered. In hindsight, the actual surveying for this project (had everything been done correctly the first time) was not that difficult. Any monuments that needed to be found were there, and for the most part agreed with the previous plans that had measured them.

There were some measured distances moving west from the road monument R5, near the NE 20-4-14-2 that disagreed with distances shown on Registered Plan Numbers 62R43112, and 72R05405. These discrepancies were in the range of 0.100m to 0.350m. In every case, however, measured distances were longer than those shown on the plans, and their proportion of total distance matched the originally intended proportions. This, I believe, can be explained by the time at which the original survey was done, and the limiting factors involved with equipment used for distance measurement.

Generally most problems encountered in this survey were to do with the procedure required for doing a road. As discussed in the field portion of this report, numerous elements were overlooked on the first, second and third trips to the field. This

can be chalked up to inexperience, and although it didn't get done in short order, it did get done, and done correctly in the end.

If I had it to do again, I would have taken more time at the beginning to try and understand better what was required. If more time had been taken at the start of this project to review the legislation and standards in place for surveying roads, more time would have been saved in the end. Unfortunately, this did not happen and the whole project turned into a giant learning experience; one that I will not soon forget. However, learning is what these projects are intended to be about. So, deduction would then say that this was an effective project in the end. I am sure that should another road survey come my way, I would be well versed in the process involved in carrying it out from start to finish….maybe even in a shorter time than 15 months!!