Report Writing

(as a document accompanying all survey work submitted to the Municipality)

(by SM Ndlovu – June 2017)

Introduction

The survey branch undertakes various types of surveys every day, from control surveys, detail surveys, monitoring surveys and cadastral surveys. Some surveys are done internally and other issued out to external (private) surveyors.

Every survey done, needs to be accurately documented and clearly reported on, such that we understand exactly what was done and how all information was gathered in the survey.

Such practice helps create a trail of evidence for surveys conducted, which is helpful in refreshing a surveyor's memory or even educating them about a particular survey.

Moreover, by informing us of what was done, such practise helps to show and prove the accuracies achieved on the job at hand.

Example: A Cadastral Survey Report

ETHEKWINI MUNICIPALITY

HUMAN SETTLEMENT, ENGINEERING & E.T.A CLUSTER
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SURVEY REPORT

Road Servitude 3,5m wide over Erf 527 Isipingo and Road Servitude 1,31m wide over Erf 556 Isipingo

Purpose of the Survey
Road Servitude Development for Ally/Rana Road over Erf 527 and Erf 556 as depicted on the following hand plans SJ4528-5 Revision 1 and SJ4529-1Revision1

Statutory Consents
Not applicable. Road Servitude 3,5m wide over Erf 527 Isipingo and Road Servitude 1,31m wide over Erf 556 Isipingo.

Survey System
Survey is based on WG31 where coordinates of previous survey record, diagram data and adjoining. Survey data used was selected from the following survey records: SR 614/2010 and SR 196/2010.

Survey Method
GPS Control Points (G777, G778, G779) used on this survey were fixed by post processing from the previous survey done in 2005 through following network of trigs UMGDWE, UMLAZI and LAMONT.

I used a single base Visual Reference System (VRS) on Trimble R8 to calibrate on GPS Control Points G779 and check on G778 and G777. Due to construction upgrading of roads and sidewalks it was difficult to find control points from previous work within the vicinity of the site Ally/Rana Road. Therefore nine beacons were found P31, C48, FS202, P10, P24, P23, P21, P20, and P13. Comparison of beacon was done and some beacon were in agreement with another. I checked the beacons from a line of best fit. Three beacons were reject based on the following. C48 was found as 16mm Iron Peg disturbed/tilted due to upgrading of sidewalks and roads. P24 was found as 12mm Iron Peg under electricity cable next to wall fence it was challenge to take measurements and seems as if it was moved. P23 found as 12mm Iron Peg on top of wall under palisade fence. It was a challenge to take measurements on this point and I believe it was disturbed when the palisade fence was erected on top of Wall.

The mean difference (dy= -0.07 dx= -0.12) between six found beacons was distributed to actual data to calculate the new coordinate beacons to be placed.

General
The survey was straightforward.

Assistants
Msomi Richard (Survey Assistant), Khehla Johannes Nkosi (Survey Assistant)

NP Khoza
Professional Land Surveyor
October 2015

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Reasons for Reporting

The main reason for all survey reports and their content is such that they piece together a picture about the survey at hand for any other surveyor using that particular survey.

The survey report thus becomes a 'plan/design' of the actual survey, from which we can all study and understand how the overall survey was tackled.

A document called the history sheet is used for reporting on engineering surveys at the eThekwini Surveying and Land Information Department and with that we are able to view and use the data supplied effortlessly, even if the surveyor who did the survey originally is not present to explain anything.

It is not the case though with work supplied by external surveyors to the branch. External surveyors supply plans and control point's information if any extra control points were placed in addition to the ones given.

However, information relating to the survey method used to derive those control points coordinates is never included in the submission.

Without information on how a surveyor arrived at a control point coordinate, we are unable to determine how accurate and trustworthy those coordinates are. This then means;

1. Control points can't be used for future reference, without necessary independent checks.

2. It also places uncertainty on the accuracy of all survey done under such control.

Some survey companies have their own control network systems and so the use of our control points is not a priority for them, but since their control points are permanent points on the ground, we are able to survey, obtain differences between the systems and adjust accordingly.

For other survey firms, control points are placed as they go along with all new survey work. In their case they combine our existing control with their own new control points, and thus making a survey report really necessary for us to understand how their control was fixed and view any adjustments that were conducted.

Report Suggestions

Below is a list of a few documents which I feel would provide clarity for all survey work submitted to our branch:

1. History – A history sheet, as seen on the attachment below, briefly giving details of the surveyor, survey description, data files submitted, the control used, the survey method used to fix new points and finally the survey technique used to execute the survey itself. Any other general information that maybe useful regarding the survey should appear here as well. For example, it is important to know which control point was spirit levelled as opposed to other survey methods such as trig levelling or GPS heighting.

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Example: A History Sheet

SURVEYOR SHARLENE NAIDOO					**SURVEY NO.** E2017_048		
DESCRIPTION OF WORK DETAIL SURVEY OF 151 CANEHAVEN DRIVE							
TYPE OF SURVEY	DETAIL SURVEY		NAME	NEIL MURRAY			
REQ. BY	ARCHITECTURE		TEL. NO.	031 311 7111			
DATE OF REQUISITION 16 MAY 2017	DATE RECEIVED 06 JUNE 2017		DATE STARTED 08 JUNE 2017	DATE FINISHED 12 JUNE 2017			
RELEVANT PLANS ETC.			DRG. NO.	E2017_048			
			CORRESPONDENCE REFERENCE:				
			WO NUMBER	282364			
BEACON RECEIPT NO.			NOTED ON VISUAL INDEX				
DIGITAL DATA TO BE ADDED TO COMPLETED							
E2017_048.mal		E2017_048.kcd	E2017_048.bot		E2017_048.csv		
E2017_048.dxf		E2017_048.dwg	E2017_048.pdf				
HISTORY							
THE PRIMARY CONTROL POINTS FOR THIS JOB WERE THE GPS CONTROL							
THE GPS (VRS) INSTRUMENT WAS USED IN THIS SURVEY AS WELL AS THE TRIMBLE M3 TOTAL STATION							
THERE WERE NO DIFFICULTIES THROUGHOUT THE SURVEY.							
DATA SUPPLIED TO CLIENT							
HARDCOPY PLAN		DATE :					
DIGITAL DATA		DATE :					
OTHER DATA		DATE :					

2. Coordinate List – Control point name, coordinates and descriptions, should all appear here.

3. Coordinate Comparison – To show differences between the original control and the control that was actually found on site. From such a list we can view the residuals, control points used and the ones disregarded.

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Point Residuals

Residuals sign: Calculated-Control

GNSS Point		Calculated Point		Grid Point	
Point	WLOO-NF	**Point**	WLOO-NF	**Point**	WLOO-N
Latitude	S29°39'51.25440"	**Easting**	-6818.777 m	**Easting**	-6818.770 m
Longitude	E31°04'13.57396"	**Northing**	3282895.904 m	**Northing**	3282895.900 m
Height	181.890 m	**Elevation**	160.298 m	**Elevation**	160.300 m
		Horiz. residual	0.008 m	**Type**	Horz and Vert
		Vert. residual	-0.002 m		
		3D residual	0.008 m		
Point	LA-M-RF	**Point**	LA-M-RF	**Point**	LA-M-R
Latitude	S29°36'27.86009"	**Easting**	-13722.645 m	**Easting**	-13722.640 m
Longitude	E31°08'30.01897"	**Northing**	3276639.571 m	**Northing**	3276639.580 m
Height	178.909 m	**Elevation**	157.332 m	**Elevation**	157.400 m
		Horiz. residual	0.010 m	**Type**	Horizontal
		Vert. residual	?		
		3D residual	?		
Point	VICF	**Point**	VICF	**Point**	VIC
Latitude	S29°33'22.48899"	**Easting**	-9514.153 m	**Easting**	-9514.150 m
Longitude	E31°05'53.42802"	**Northing**	3270927.551 m	**Northing**	3270927.550 m
Height	211.705 m	**Elevation**	190.195 m	**Elevation**	190.200 m
		Horiz. residual	0.003 m	**Type**	Horz and Vert
		Vert. residual	-0.005 m		
		3D residual	0.006 m		

4. Field book – not the whole but rather an extract from the original showing Orientation and Fixing Rays to new control points only.

(To support calculations for Traverses, Polars, Resections, etc.)

File Edit Format View Help

```
2       GP1$HILT NAIL$1.405$$$MON 10 NOV 2014 11:16:51$

14      L801$JOIN$241.1512$$$
10      L801$O$241.1512$$$
14      L802$JOIN$207.0630$$$
10      L802$O$207.0635$$$

3       GP2$$341.4731$96.3343$34.073$1.580$
3       ZM1$$61.0419$88.4903$15.097$1.580$
3       ZM2$$138.2143$84.0913$13.202$1.580$

10      L801$CL$241.1512$$$
```

5. Calculations – A calculation sheet for all Traverse, Double Polars, Resections, etc. Should there have been any of these survey methods of control fixing executed.

Traverse Calculations

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L186			**17001.166**	**3306044.662**	**308.464**	**(Original)**
	to	SN3	9.31.58	22.956	field	
SN3			17004.968	3306067.301	314.834	
SN3	to	SN4	38.56.02	43.445	field	
SN4			17032.269	3306101.095	327.031	
SN4	to	SN5	34.55.45	58.205	field	
SN5			17065.705	3306148.995	342.863	
SN5	to	L187	247.11.52	142.485	field	
L187			16934.434	3306093.739	309.065	
L187			**16934.420**	**3306093.735**	**309.080**	**(Original)**
Diff			**.....0.014**	**.....0.004**	**-...0.015**	**(Residuals)**

Conclusion

The survey branch works with Registered Survey Professionals, who understand the required survey standards as issued out for all survey work. It's a fact that no two surveys are ever similar, however, adjustments can always be applied to reduce the errors present in our work.

With a control point network already established and in use by the eThekwini survey branch, it is upon us to make sure all survey work that is handled by the branch conforms to this system.

This undertaking of a more detailed way of reporting might come at an extra - Cost and Time, but, is a great step in securing all survey work into our control network and putting any doubt regarding accuracies beyond us. The examples given in this article are merely suggestions that can however, with their inclusion as documents accompanying all survey work submitted to the municipality can help with that goal of assured accuracy for every survey job.