A REPORT ON LEVELLING SURVEY

By

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ENGINEERING SURVEY

Introduction to Surveying

Surveying is the techniques, profession and science of determining the terrestrial or three-dimensional position of points, distances and angles between them. It is done in order to achieve the following objectives:

- To determine, measure and represent land, three-dimensional objects, points-fields and trajectories;
- To assemble and interpret land and geographically related information,
- To use that information for planning and efficient administration of land, sea and any structures there on; and
- To conduct research into the above practices and to develop them.

Principles of Surveying

The following are the general principles guiding every survey:

1. An initial frame work before observing.
2. Planning.
3. The need to ensure that sufficient independent checks are incorporated into survey to eliminate or minimize errors.
4. Field work.
5. Computations.
6. Plotting.
7. Safe guarding.

LEVELLING SURVEY

Introduction

Levelling is the measurement of geodetic height using an optical levelling instrument and a level staff having a numbered scale. It is carried out in order to determine differences in elevation between points on the ground.

Objectives

- Find elevation of a given point with respect to the given or assumed datum.
- Establish a point at a given elevation with respect to the given or assumed datum.
- To help students identify compass surveying and be able to conduct the survey.

Guidelines

The following guide lines will help a surveyor to eliminate errors resulting from any line of sight in his/her work:

1. Back sight and fore sight should be equal in distance.
2. The length of sight should be kept less than 100m.
3. Always commence and finish a level run on a known datum or benchmark and close the level traverse; this enables the level run to be checked.

Instruments Used

1. The Level.
2. The Level Staff.
3. Steel Tape (50m).

4. The Tripod Stand.

Procedure

- a. Set up the levelling instrument at level position 1.
- b. Hold the staff vertically on the datum and take a reading. This reading will be the back sight, because it is the first staff reading after setting the instrument.
- c. Move the staff to point A and take a reading. This will be an intermediate sight.
- d. Move the staff to point B and take a reading. This will also be an intermediate sight.
- e. Move the staff to point C and take a reading. This will be an intermediate sight.
- f. Move the staff to point D and take a reading. This will be a fore sight, because after this reading the level will be moved.
- g. The distance between the stations should be measured and recorded into the field book as well.
- h. Set up the level at level position 2 and level the staff at point D, then take a reading. This will be a back sight.
- i. Move the staff to point E and take a reading. This will be an intermediate sight.
- j. Move the staff to point F and take a reading. This will be a fore sight, because after this reading the level will be moved.
- k. Now move the level to level position 3 and leave the staff at point F.
- l. Repeat the above procedure until you reached your destination point.

Site Description

- **Start Point:**

At the start point of my exercise I used the GPS to obtain the reduced level as 327.100m. I started level by using the center line of the drainage behind Computer Engineering Department and the drainage measures 0.2m in to in. The levelling exercise started at the engineering complex.

- **Along the way down to Gate 5:**

There were trees, the ground is undulating except for those places that have been graded with a laterite sub-grade, there were utility lines (electric line of supply) and local farm areas along. The width of the roads that have not been graded was varying from 3.8m to 4.1m and the width of the asphaltic road was 10.6m with a median of 0.6m and each side has two lanes equivalent to 5m.

- **End Point:**

At the end point of my exercise I also obtained another reduced level as 327.100m. Stopped on the center line of the drainage in front of Gate which is face south ways. The drainage has a measurement of 1.1m in to in, it has a height of 1.0m, it is 48.67m from the road. And there were also electric lines, trees, and local farm areas.

Result and Discussion

The following are the data obtained at site during the practical exercise from Engineering Complex to Gate 5.

STN	B.S	I.S	F.S	RISE	FALL	R.L	REMARK
CP ₁	0.225					327.100	TBM 327.100
		0.885		1.340		328.440	
CP ₂	0.978		0.710	0.175		328.615	
		1.468			0.490	328.125	
		1.020		0.448		328.573	
CP ₃	0.799		0.388	0.632		329.205	
		1.012			0.213	328.995	
		0.662		0.350		329.342	
CP ₄	0.999		0.261	0.401		329.743	
		1.599			0.600	329.143	
CP ₅	0.735		0.744	0.855		329.998	
		0.831			0.960	329.038	
		0.910			0.076	328.962	
CP ₆	0.585		0.720	0.190		329.152	
		0.999			0.414	328.738	
		1.089			0.090	328.648	
CP ₇	1.210		0.691	0.398		329.046	
		1.230			0.020	329.026	

		0.865		0.365		329.391	
CP ₈	0.399		0.382	0.483		329.874	
		0.631			0.232	329.642	
		0.829			0.198	329.444	
		0.938			0.109	329.335	
CP ₉	1.045		0.520	0.418		329.753	
		1.231			0.186	329.567	
		1.301			0.070	329.497	
		1.100		0.211		329.708	
		1.089		0.011		329.719	
CP ₁₀	1.125		1.028	0.061		329.780	
		1.639			0.514	329.266	
		2.145			0.506	328.760	
		1.999		0.146		328.906	
		1.710		0.289		329.195	
		1.349		0.361		329.556	
CP ₁₁	1.395		0.979	0.370		329.926	
		1.139		0.256		330.182	
		0.689		0.450		330.632	
		0.359		0.330		330.962	
CP ₁₂	1.049		0.520		0.161	330.801	
		0.490		0.559		331.360	
CP ₁₃	0.897		0.299	0.075		331.551	

CP ₁₄	1.415		0.189	0.708		332.259	
		1.445			0.030	332.229	
		1.524			0.079	332.150	
		1.515		0.090		332.240	
CP ₁₅	1.342		1.410	0.105		332.345	
		1.407			0.065	332.280	
		1.365		0.420		332.700	
		1.335		0.030		332.730	
CP ₁₆	1.190		1.238	0.097		332.827	
		1.231			0.041	332.786	
		1.339			0.108	332.678	
		1.225		0.114		332.946	
CP ₁₇	1.793		1.278	0.053		332.999	
		1.529		0.264		333.263	
		1.543			0.014	333.249	
		1.235		0.308		333.557	
		0.921		0.323		333.880	
CP ₁₈	1.395		0.711	0.201		333.081	
		1.532			0.137	333.944	
		1.429		0.103		334.047	
		1.288		0.141		334.188	
		0.789		0.499		334.687	
CP ₁₉	1.256		0.581	0.208		334.895	

		1.682			0.426	334.469	
		2.021			0.339	334.130	
		2.520			0.499	333.631	
		1.962		0.568		334.199	
		1.499		0.463		334.662	
CP ₂₀	1.782		1.421	0.078		334.740	
		1.621		0.161		334.901	
		1.169		0.452		335.353	
		0.372		0.797		336.150	
		0.738			0.366	335.784	
CP ₂₁	1.499		0.539	0.199		335.983	
		1.625			0.126	335.857	
		1.622		0.003		335.860	
		1.382		0.240		336.100	
CP ₂₂	2.385		0.851	0.531		336.631	
		1.799		0.586		337.217	
		1.011		0.788		338.005	
		0.450		0.561		338.566	
		0.758			0.308	338.258	
CP ₂₃	1.000		0.649	0.109		338.367	
		1.380			0.380	337.987	
		1.520			0.140	337.847	
		1.828			0.308	337.539	

		1.477		0.351		337.890	
CP ₂₄	1.482		1.450	0.027		337.917	
		1.538			0.056	337.981	
		1.289		0.249		338.232	
		0.967		0.332		338.554	
			1.831		0.864	327.690	TBM 327.690

Field Survey, 2016.

$$\sum B.S - \sum F.S = 29.980 - 19.390 = 10.590$$

$$\sum RISE - \sum FALL = 18.854 - 8.264 = 10.590$$

$$R.L_{last} - R.L_{first} = 337.690 - 327.100 = 10.590$$

CONCLUSION

In conclusion, the exercise had achieved its aims, since the difference in elevation from point to point were determine and as a student, I was able to know how to read the staff from the level and also conduct a levelling exercise.

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