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Profile (Longitudinal Section)

Method of profile leveling: A longitudinal section is generally carried out along the center line of the proposed alignments e.g. highways, pipelines or canals. The alignment may consist of a straight line or series of straight lines connected by curves. With the help of the profile of the surface of the earth the designer studies the relationship between the existing ground surface and the levels of the proposed construction work in the direction of the progress of the work.

A profile leveling is generally carried out in conjunction with the cross – sectioning for any project except in the case of pipeline. The profile is usually plotted with the vertical scale much larger than horizontal scale. For proportional grades and correct estimate of the earth work with least expenditure the engineer has to study the profiles of the work carefully.

1 Station = 100 m

A 0 + 00 ⇨ 0 m distance on A = 0 m

B 0 + 20 ⇨ 20 m distance on AB = 20 m

C 0 + 50 ⇨ 50 m distance on AC = 50 m

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Grade calculation:

تصاعدي

Grade Elev. (for unknown point) = **Grade Elev.** (known point) ± **Slop** x **Dist.** (between known and unknown point)

تنازلي

$$\textbf{Slope} = \frac{(\Delta\ grade) between\ two\ point}{(\Delta\ dist.) between\ the\ same\ point}$$

Ground Elev. – Grade Elev. =

+ cut

- fill

لكل نقطة

Example:

The following data represent a page of a level book showing the readings observed on the first few of series of pegs 30 m a part from which the levels of a sewer are to be calculated . The R.L of the invert of the large pipe line sewer at A is 72.500 and it falls with a gradient of 1 in 200 from A draw up a list of the depths from several pegs to invert levels of the sewer .

B.S	I.S	F.S	R.L	Remarks
1.825			71.00	
2.120		0.725		
1.005		0.670		
	1.430			Peg A
	1.605			Peg B
	2.035			Peg C
	1.475			Peg D
	1.970			Peg E
1.110		1.325		Peg F
		1.875		Peg G

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Solution:

a. R.L of top of pegs by rise and fall method B.S

B.S	I.S	F.S	Rise (+)	Fall (-)	R.L	Remark
1.825					71.00	
2.120		0.725	1.1		72.10	
1.005		0.670	1.45		73.55	
	1.433			0.428	73.122	Peg A
	1.605			0.172	72.95	B
	2.035			0.43	72.52	C
	1.475		0.56		73.08	D
	1.970			0.495	72.585	E
1.110		1.325	0.645		73.23	F
		1.875		0.765	72.465	G
∑ B.S= 6.06		∑ F.S = 4.595	∑ rise = 3.755	∑ fall = 2.29		

$$\sum B.S - \sum F.S = \sum rise - \sum fall = R.L\ last - R.L\ first$$

$$6.06 - 4.595 = 3.755 - 2.29 = 72.465 - 71.00$$

$$1.465 = 1.465 = 1.465$$

b. R.L of the invert of the sewer at various pegs

حسب السؤال فأن خط grade او (grade line) يبدأ من نقطة A او من peg (A) والذي يكون مساوي الى 72.500 ويميل تنازلي بأنحدار $\frac{1}{200}$ لغاية نقطة G (given)

Peg	Dist	Ground R.L - Grad Elev.		+ Cut	- Fill
A	0	73.122	72.500	0.622	
B	30	72.95	72.350	0.6	
C	30	72.52	72.200	0.32	
D	30	73.08	72.05	1.03	
E	30	72.585	71.900	0.685	
F	30	73.23	71.75	1.48	
G	30	72.465	71.600	0.865	

الطريقة الاولى

• Grade Elev. B = grade Elev. A – slope x (dist. from A)

= 72.500 - $\frac{1}{200} \times$ 30

= 72.350 m

• Grade Elev. C = grade Elev. A – slope x (dist. From A)

= 72.500 - $\frac{1}{200} \times$ 60

= 72.20 m

• Grade Elev. D = grade Elev. A – slope x (dist. From A)

= 72.500 - $\frac{1}{200} \times$ 90

= 72.05

• Grade Elev. E = grade Elev. A – slope x (dist. From A)

=72.500 - $\frac{1}{200} \times$ 120

= 71.900

• Grade Elev. F = grade Elev. A – slope x (dist. From A)

= 72.500 - $\frac{1}{200} \times 150$

= 71.75

• Grade Elev. G = grade Elev. A – slope x (dist. From A)

= 72.500 - $\frac{1}{200} \times 180$

= 71.600

الطريقة الثانية

• Grade Elev. B = grade Elev. A – slope x (dist. from A)

= 72.500 - $\frac{1}{200} \times 30$

= 72.350 m

• Grade Elev. C = grade Elev. B – slope x (dist. from B)

= 72.35 - $\frac{1}{200} \times 30$

= 72.2 m

• Grade Elev. D = grade Elev. C – slope x (dist. from C)

= 72.2 - $\frac{1}{200} \times 30$

= 72.05

• Grade Elev. E = grade Elev. D – slope x (dist. From D)

=72.05 - $\frac{1}{200} \times 30$

= 71.900 m

• Grade Elev. F = grade Elev. E – slope x (dist. From E)

= 71.900 - $\frac{1}{200} \times 30$

= 71.75 m

• Grade Elev. G = grade Elev. F – slope x (dist. From F)

= 71.75 - $\frac{1}{200} \times 30$

= 71.600 m