Tribhuvan University
Institute Of Engineering
Pashchimanchal Campus
Pokhar-16, Lamachaur

BCE SURVEY CAMP - 2082

17th Baisakh to 26th Baisakh 2082

Camp Site : Pashchimanchal Campus,Pokhara 16/Kalikhola

General Instruction and Observation Sheet

Prepared By
Department of Civil Engineering

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE (AB) SURVEY CAMP 2082

Work Schedule

Date:	Work to be Performed	
	For GroupNumbers A,B,C,D,E&F	**ForGroupNumbers G,H,I,J,K&L**
2082/01/ 16	Orientation, Group Division	Orientation, Group Division
2082/01/ 17	Reconnaissance, station fixing, distance and angular measurement and bearing observation for Major traverse.	Selection of an alignment for the road and detail survey of it.
2082/01/ 18	Station fixing, distance and angular measurement and bearing observation for Major and minor traverse.	Level transfer on IP, BC, MC, EC of the road
2082/01/ 19	Two peg test, fly leveling and RL transfer to the stations.	Detail survey of selected alignment and Bridge site survey and reciprocal leveling.
2082/01/ 20	Traverse Calculation, Making grid and computation.	Bridge site survey and road alignment survey completion
2082/01/ 21	Selection of an alignment for the road and detail survey of it.	Reconnaissance, station fixing, distance and angular measurement and bearing observation for Major traverse.
2082/01/ 22	Level transfer on IP, BC, MC, EC of the road	Station fixing, distance and angular measurement and bearing observation for Major and minor traverse.
2082/01/ 23	Detailing by Total Station.	Two peg test, fly leveling and RL transfer to the stations.
2082/01/ 24	Detailing by Total Station .	Traverse Calculation, Making grid and computation.
2082/01/ 25	Detail survey of selected alignment and Bridge site survey and reciprocal leveling.	Detailing by Total Station.
2082/01/ 26	Bridge site survey and road alignment survey completion and closing of camp.	Detailing by Total Station and closing of camp.

Working time: Field work 6:00 AM to 6:00 PM.

Night Class: 6:30PM

PASHCIMANCHAL CAMPUS

1. ADMINISTRATIVE BUILDING
2. RIC BUILDING
3. CIVIL LAB
4. GEOMATICS BLOCK
5. GUEST HOUSE
6. NIC ASIA BANK
7. CARPENTRY WORKSHOP
8. ELECTRICAL BLOCK
9. B-BLOCK
10. PLUMBING WORKSHOP
11. WELDING WORKSHOP
12. STORE
13. MECHENICAL BLOCK
14. FITTING WORKSHOP/ LAB
15. THERMODYNAMICS LAB
16. MECHENICAL WORKSHOP
17. ELECTRICAL LAB
18. AUTOMOBILE WORKSHOP
19. WORKSHOP HOSTEL
20. GIRLS HOSTEL
21. TU HALL
22. AUDITORIUM HALL
23. POWER HOUSE
24. GROUND STADIUM
25. A-BLOCK
26. CIT AND LIBRARY
27. TOILET
28. BOYS HOSTEL
29. QUARTER AREA
30. FSU OFFICE
31. STAFF QUARTER
32. BADMINTON COURT
33. OLD BASKETBALL COURT
34. FUOTBALL GROUND
35. VOLLEYBALL GROUND
36. BASKETBALL COURT
37. B P PARK
38. TCC PARK
39. GIRLS TOILET
40. BOYS TOILET

41,42,43,44,45
(GUARD POST)

(46,47,48,49,50)
(GUARD HOUSE)

Legend

Contour

Coordinate System: WGS 1984 UTM Zone 44N
Projection: Transverse Mercator

Western Region Campus
Survey Camp
LEGEND

SN.	DESCRIPTION	SYMBOL
1	Building (walled)	
2	Building (unwalled)	
3	Fence	OR
4	Stone or brick wall	
5	Boundary wall with fence	
6	Road Metalled	
7	Road unmetalled	
8	Horse / cattle track	
9	Foot track	
10	Electric pole	
11	Lamp post	
12	Drain (unlined)	
13	Drain (lined)	Drain
14	River (Khola)	River
15	Bridge	
17	Culvert	
18	Tree (General)	
16	Tree (Banana)	
20	Cabin Well	

SN.	DESCRIPTION	SYMBOL
19	Major traverse station	A10 685·50
20	Minor traverse station	B5 932·24
21	Tree (Bamboo)	
22	Tree cactus	
23	Hedge	
24	Bush	
25	Grass	
26	Bench mark	BM ⊙ 1308·53
27	Spot height	1301·13
28	Contour line	1300
29	Forest	
30	Slope	
31	Terrace	
32	Cliff	
33	Canal	
34	Manhole	M ⊙ H
35	Water Tank	W T
36	Gate	
37	Septic tank	S T
38	Cattle Grid	

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
(BCE SURVEY CAMP 2082)

General Instruction Sheet

The main objective of survey camp for the civil engineering students is to provide an opportunity to consolidate and update their practical and theoretical knowledge of surveying in the actual field and to build up confidence to handle any civil engineering works independently. As we know that in all engineering projects the detail survey is carried out for planning and designing and hence success of any such project is based upon the accuracy of survey. So we must know the methods, principles, accuracy and handling of instruments used in the surveying. The different groups are formed and each group must carry out field and office work independently.

1. Preparation of topographical map of the given area by using theodolite/Total Station
2. Preparation of topographical map of road alignment including plan, L- section and X- section.
3. Preparation of topographical map for Bridge site including plan, L- section and X- section.

Location:

The camp site will be located at ***Pashchimanchal Campus*** *premise* and ***Kali Khola*** area.

Camping Schedule:

Survey camp is scheduled for 10 days starting from orientation on 2082/01/16 and ending on 2082/01/26. Students must reach the site on time early in the morning at 6:00 AM and daily field work starts at 7:00 AM and ends at 6:00 PM. Night classes will be run for an hour daily to take field work report evaluation and guiding the students for the next day's work. All the students must appear in the night classes.

Accommodation and Mess:

During the camp period, the college will not provide the accommodation, food, mess etc.
Alcohol is strictly prohibited during the camp and if anybody is **found drunk strong action will be taken.** Discipline of each and every student will be marked and evaluated internally while performing his / her behavior during the execution of the survey as well as handling the instruments. Each group students should be co-operative, helpful and laboring during the camp period for completion of survey within the specified time schedule.

Attendance and Evaluation:

Daily regular attendance is taken in the camp site and nobody is allowed to leave the site without the authority's permission. For the individual, who will be absented in a particular day, 5 marks will be deducted for each and every day. Anybody absented for more than 3 days during the camp will not be allowed to continue the remaining work and there will be no other provisions for providing another camp for the absented students. Complete evaluation is done in two stages.

1. Daily evaluation of the individual performance of student will be taken at the field and daily group report should be submitted at night classed.
2. Each and every group should submit their two copies of final report (computer printed) in the given format to the civil engineering department. The final presentation in Power Point and viva will be conducted for the individual students of each group.

Accessories to be carried in the survey camp by individual:

1. Programmable or scientific calculator.
2. Drawing sheet and graph sheets.
3. Pencil, eraser, pen, close pencil, pencil leads, sharpener, loose paper both lined and blanked.
4. Geometry box with necessary tools (protector, divider, compass etc)
5. Field book or reference book.
6. Umbrella / raincoat, bag, water bottle, cap, torch light etc.
7. T-square, set square, different curve setters etc.

Careful handling of surveying instruments:

The surveying instruments are the costlier equipments, so improper handing, carelessness may cause serious damage to the instruments and which is not easy to repair during the camp period. Immediately and permanent adjustment has to be done. Students should be very careful while handling and carrying the instruments. During camp period if any instrument is found to be damaged or lost due to improper handling and carelessness during observing or carrying, **the whole group members will be responsible for damage or loss and will be penalized accordingly.**

Following are the tip points for careful handling and carrying of instrument that may be beneficial.

1. Note down the instrument name, code no and accessories in the box before you carry it to the site.
2. Inspect carefully if the instruments are out of condition or damage.
3. Don't be over confidence to handle the instruments without proper knowledge of handling. Try to be familiar with the handling, functioning and operation of instrument, which you are going to handle them first, so call your teacher if such conditions take place.
4. Save the instrument from direct sunlight and rain by providing shade and umbrella.
5. While finishing the work at one station, instrument should be kept in box and don't try to carry the instrument mounted on the tripod stand for shifting the instrument to next station.
6. Don't sit on the instrument case and close it after taking the instruments from the box.
7. Small accessories like plumb bob, arrows, tape etc are likely to be lost easily so these instruments should be kept in bag after their use.
8. Don't play with the instruments by throwing them that may cause serious accidents, injuries as well as damage of the instruments.
9. Never leave the instruments alone, theft lost and falling of instruments may cause damage.
10. Screws and nuts of instrument's parts may become too loose or tight after the frequent use of instruments, which lead to loose the parts, hence check them periodically.
11. Beware of losing and damaging of instruments and accessories. Count your used accessories and instruments before leaving the field.
12. Place / keep your instruments at safe place that does not disturb your circulation operation.

Guide-Line of Survey Work:

A. *Topographical Survey of the Area:*

1. Conduct reconnaissance survey of the given area and prepare the index sketch in the sheet of drawing paper so that each and every point in the sketch will be given with different numbering which will helpful in recording data of the point to be taken.

2. After reconnaissance survey fix the major and minor traverse stations as minimum numbers as possible such that the previous and following stations are inter visible from that station where peg is going to fix and more details can be obtained from that station making a closed traverse.

3. The ratio of maximum traverse leg to minimum traverse leg should maintain at the ratio not less than 2:1 for major and 3:1 for minor traverse.

4. Take reference sketch for each station from at least (3) three reference points.

5. Measure the traverse legs in forward direction by using TS and after completing forward measurement again take reverse direction measurement in the same process. Take the mean value so that the precision of measurement should within 1:2000.

6. Take two sets of horizontal angles for major traverse and one set of horizontal angle for minor traverse. The difference between face left and face right reading should be within least count of the instruments.

7. Find the sum of the internal angles of the traverse and check the closing error by $e = (2n-4)*90°$ which should be less than $\pm \sqrt{n}$ minuets.
   Where, n= nos. of stations.

8. Take the bearing of one side of traverse and compute the bearing of remaining sides.

9. The permissible relative closing error for major traverse in 1: 2000 and minor traverse in 1:1000.

10. Balance the traverse by Bowditch's rule or using Transit rule.
11. Compute the co-ordinate fo each traverse stations and plot major traverse in 1:1000 and minor traverse in 1:500 scale on A2 size paper.

12. The two peg test should be carried out first to check the collimation error of the level machine and the error should be less than 1:10000 precision. After this the RL of the given PBM is transferred to the site BM by performing fly leveling by maintaining equal fore sight and back sight distance to eliminate collimation error and the permissible error for fly leveling should be $\pm 25\sqrt{k}$ mm. Where, k is the two way distance in kilometer.

13. Determine the RL of the stations by fly leveling from site BM and RL of traverse stations should be checked and errors should be corrected.
14. Perform detail survey of the given area by using Total station from the major and minor traverse stations.

15. Trace the contour lines keeping contour interval of 0.25 to 5m depending upon the site conditions.

B. Bridge Site Survey:

1. Carryout the reconnaissance survey for the selection of the site for bridge by viewing the following points.
    a) Straight reach i.e. no meandering and stable bank of the river so that there is no chance of changing the course of river.
    b) Narrow width of the river.
    c) The RL of the axis is higher than the high flood level of the river.
    d) Site should be accessible to the road and utilized by most pedestrians.
    e) Social & economic criteria should meet to enhance the people of that society / area.
    f) Should have suitable space for providing bridge abutment as well as other necessary structures to have ease and efficient joining with the existing road alignment without sharp curve or bend.
2. Take the bearing of the axis.
3. Establish necessary Triangulation points with reference to bridge axis and try make well conditioned triangle and observe two sets of readings of triangulation angles. Compute the bridge axis using Sine rule and the precision allowed should be 1 in 1000.
4. Establish the BM near the bridge axis and transfer the RL to the triangulation stations by fly leveling and perform reciprocal leveling to transfer level from one bank to another.
5. Prepare the topographical map of the river site by tacheometric survey and longitudinal profile of the river up to (150m upstream and 100m downstream) from the bridge axis and the cross-sections of the river is also taken at an interval of 25m.
6. The contour map of the bridge site is also prepared according to the profile of the site or contour interval of 1m as that of topography.
7. Carry out hydrological survey of the river with appropriate method. Hydraulic data e.g. highest flood level, Ordinary level, low flood level etc can be known from the river bank studies and should be shown in the L- section and x- sections of river.
8. Draw longitudinal section 1: 1000 and cross section in the scale of 1:200.

C. Road Survey:

1. Carry out the reconnaissance survey for the road alignment selection by considering the following things.
    a) Site should be stable and permissible gradient according to NRS.
    b) Geometry of road according to NRS.
    c) Location of bridge axis and optimum use by public.
    d) Length of the road as short as possible to connect different places.
    e) Obligatory points should be far away.
    f) Project should be economic.
    g) Inter-visibility between intersection points.
    h) Minimum earthworks i.e. less amount of cutting and filling.

i) Establish the BM near the starting point of the road and observe the bearing of the first line.

j) Observe the deflection angles at each station (IP) and assume radius of the curve according to NRS and then set out the curve by computing tangents, curve length, apex distance, and chainage of BC, MC, and EC etc.

k) Take the maximum gradient up to 12%, minimum radius up to 15m and right of way 20m (District Road). There should not be overlap of curve.

l) Determine the RL of road centerline at an interval of 20m and also at the point of curves like BC, MC, and EC etc establishing TBM at approximately 500m interval and close the level work by fly leveling and check the accuracy by $\pm 25\sqrt{k}$ mm.

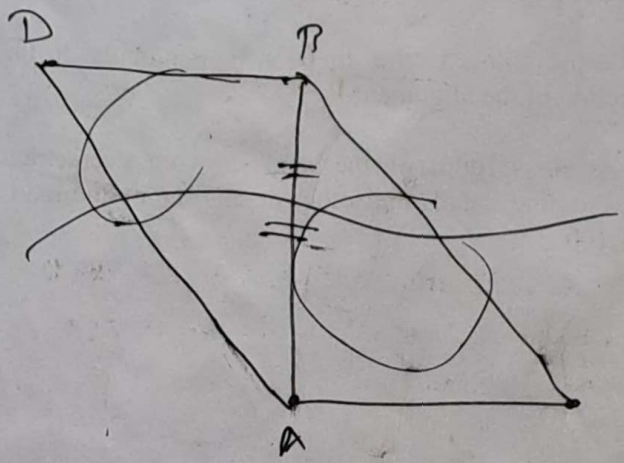
m) Take the cross sections at the same points in the direction perpendicular to the longitudinal profile i.e. in the transverse direction of the alignment.

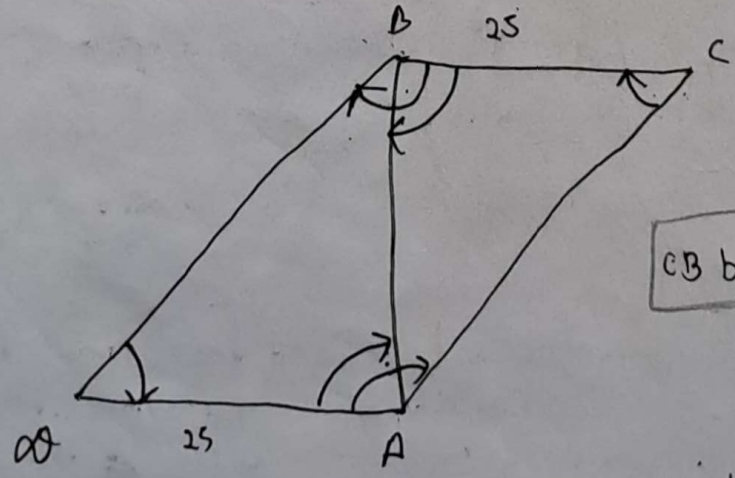
n) Prepare the topographic map (scale 1:1000) of the road showing geometric design, road formation width, right of way, crossing details and other details. Draw the road alignment in 1:1000 and cross – sections in 1:100.

Fwd:

11.48+13.88 = 25.36

12.52 + 12.458 = 24.978





CB bearing = 304° 11' 11"

∠DAB = 96° 54' 16"

∠DAC = 130° 38' 52"

∠BDA = 51° 33' 46"

∠CBA = 89° 49' 13"

∠CBD = 121° 18' 10"

∠BCA = ~~139° 51' 46"~~ 56° 28' 50"

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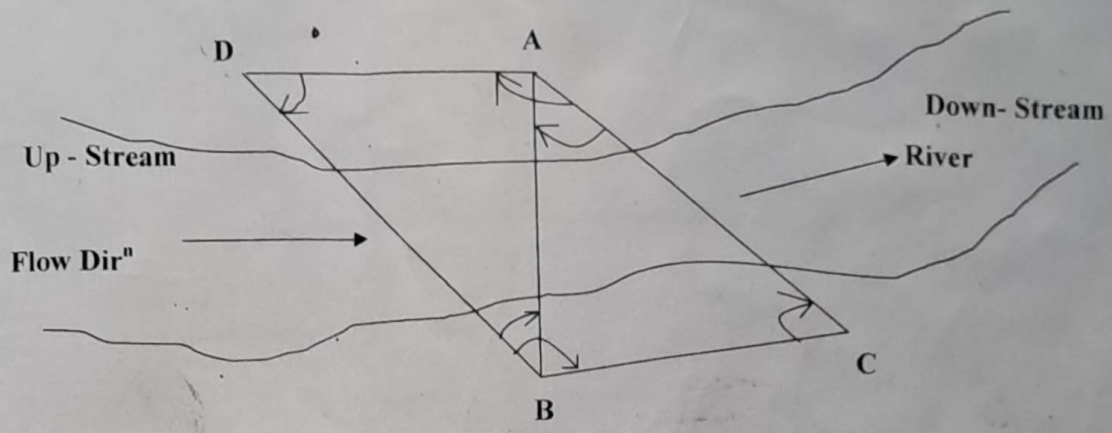
Bridge Sight Survey

i)Bridge Axis Calculation



Select the axis station on the both banks as A, B. Fix triangulation stations C and D at a certain defined length from B and A by measuring with tape to form well conditioned Triangle.

Measure two sets of Horizontal angles from all the Stations.

< CAB = <ADC= <ABC=

< BAD= <DBA= <BCA=

$\triangle$ ADB; $<A+<D+<B = 180^0$ $\triangle$ ABC; $<A+<B+<C = 180^0$

If not, then correct them.

Use sine rule: AB/ Sin D = AD/ Sin B AB/Sin C = BC/ Sin A

Find Axis length AB from both triangles. The difference between both values should be within 1 in 2000.

ii) RL Transfer to all the Stations

Conduct reciprocal leveling to find the level difference of axis stations. Find the RL of other stations by proceeding from axis station.

iii) Detailing and Cross – Sectioning of Bridge Sight

Use tacheometry for finding the position and direction of different features around and in the river. The cross- sections at every 25m interval are to be taken, i.e. in U/S side, up to 150m and in D/S side, 100m. The changing features of ground as well as river banks, edge of river, mid of river, high flood level, meandering condition etc must be taken. The RL of midpoint of river helps also to draw L-section.

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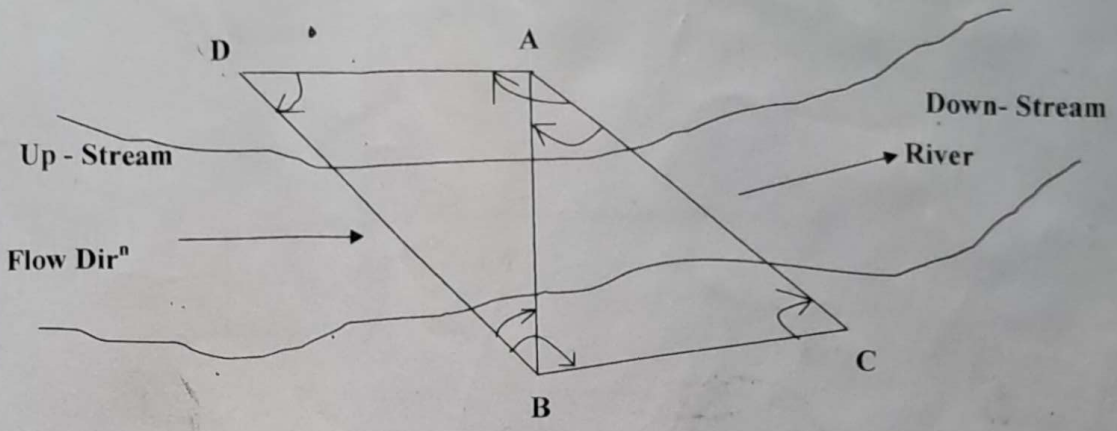
Bridge Sight Survey

i)Bridge Axis Calculation



Select the axis station on the both banks as A, B. Fix triangulation stations C and D at a certain defined length from B and A by measuring with tape to form well conditioned Triangle.

Measure two sets of Horizontal angles from all the Stations.

< CAB =	<ADC=	<ABC=
< BAD=	<DBA=	<BCA=

$\triangle$ ADB; $\angle A + \angle D + \angle B = 180^0$ $\triangle$ ABC; $\angle A + \angle B + \angle C = 180^0$

If not, then correct them.

Use sine rule: AB/ Sin D = AD/ Sin B AB/Sin C = BC/ Sin A

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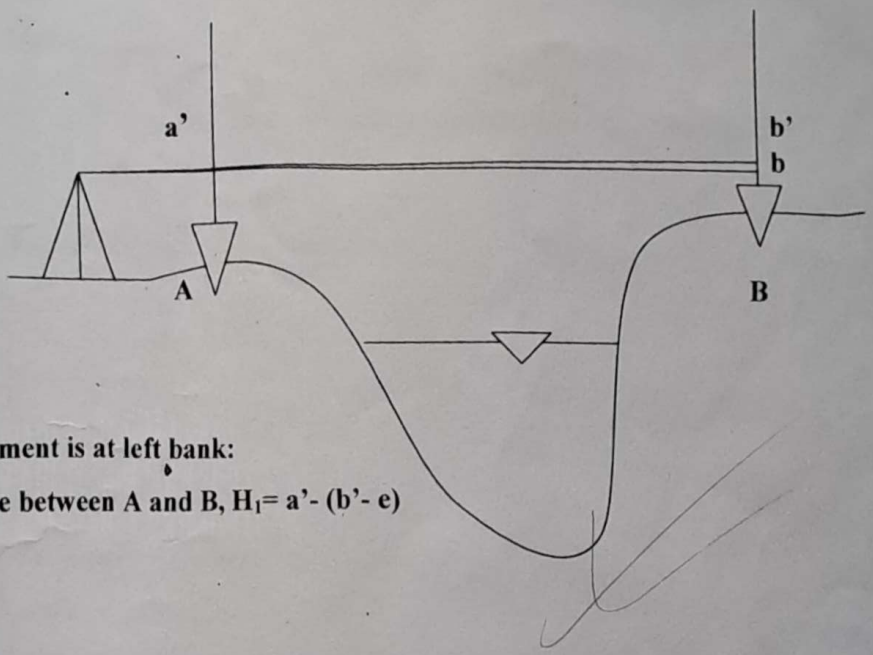
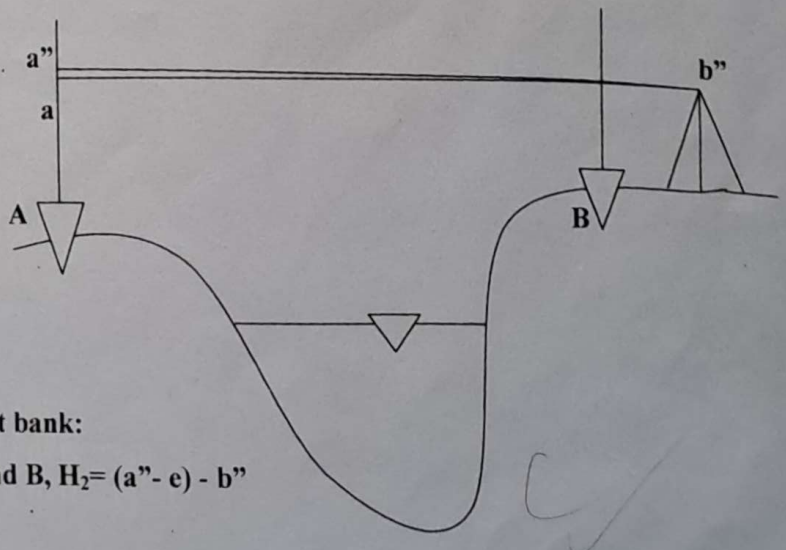
Reciprocal Levelling

HI must be taken



) When instrument is at left bank:

Level difference between A and B, H_1= a'- (b'- e)



b) When instrument is at right bank:

Level difference between A and B, H_2= (a"- e) - b"

Level difference = Taking average value= $(H_1+H_2)/2$

$$[a' - (b'- e) + (a'' - e) - b'']\ /\ 2$$

$$[\ (a' - b') + (a''- b'')\ ]\ /\ 2$$

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Group : ..... Date : .....

Observation and calcutions of reciprocal levelling

For condtion (i) , Stadia reading at

	T	M	B
A			
B			

Level difference (H) =

For condtion (ii) , Stadia reading at

	T	M	B
A			
B			

Level difference (H') =

Mean =

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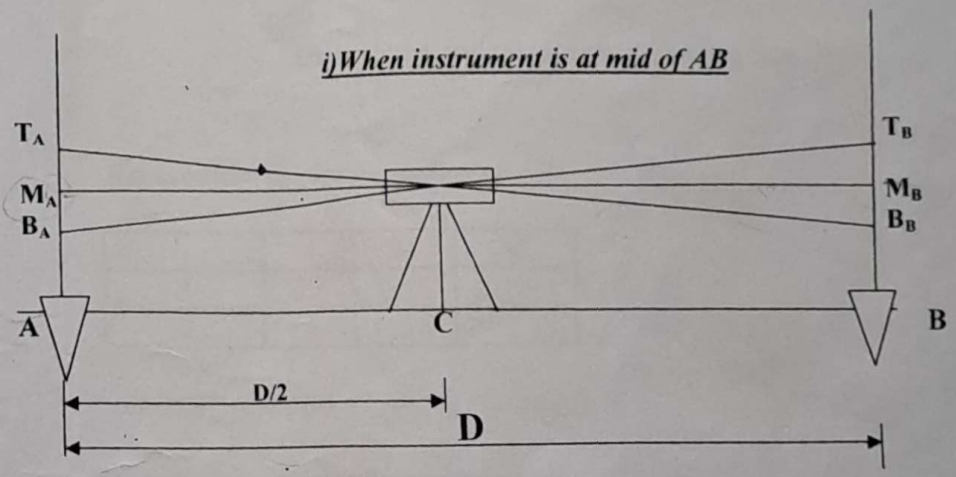
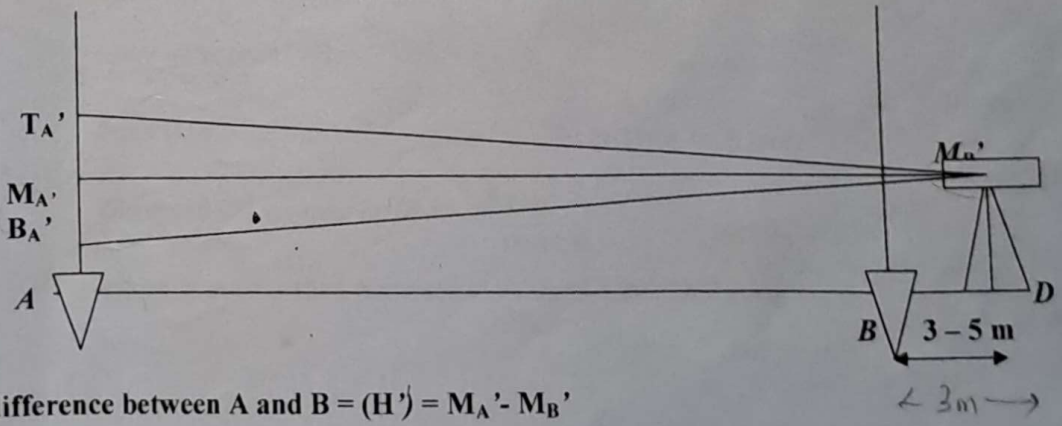
Two Peg Test

i)When instrument is at mid of AB



Height difference between A and B, $(H) = M_A - M_B$

ii) When instrument is near B



Height difference between A and B = $(H') = M_A' - M_B'$

If, $H = H'$ no collimation error

If, $H \neq H'$ i.e. $H - H' = e$, Collimation Error exists.

Permissible Range $(e / D) = 1$ in 10,000. No need of permanent adjustment

If, (e/D) is beyond 1 in 10,000. Permanent adjustment is required.

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Group : .....

Date : .....

Observation and calcutions of two peg test

For condtion (i) , Stadia reading at D

	T	M	B
A	1.244	1.144	1.044
B	1.304	1.295	1.286

Level difference (H) = A-B = 0.151

For condtion (ii) , Stadia reading at C

	T	M	B
A	1.274	1.24	1.206
B	1.430	1.389	1.339

Level difference (H') = 0.149

Error (e) = 2×10^{-3} m Distance = 20m

Observed Value range (e/D) = $\frac{2 \times 10^{-3}}{10000}$

Which is greater than permissible value of 1 in 10000

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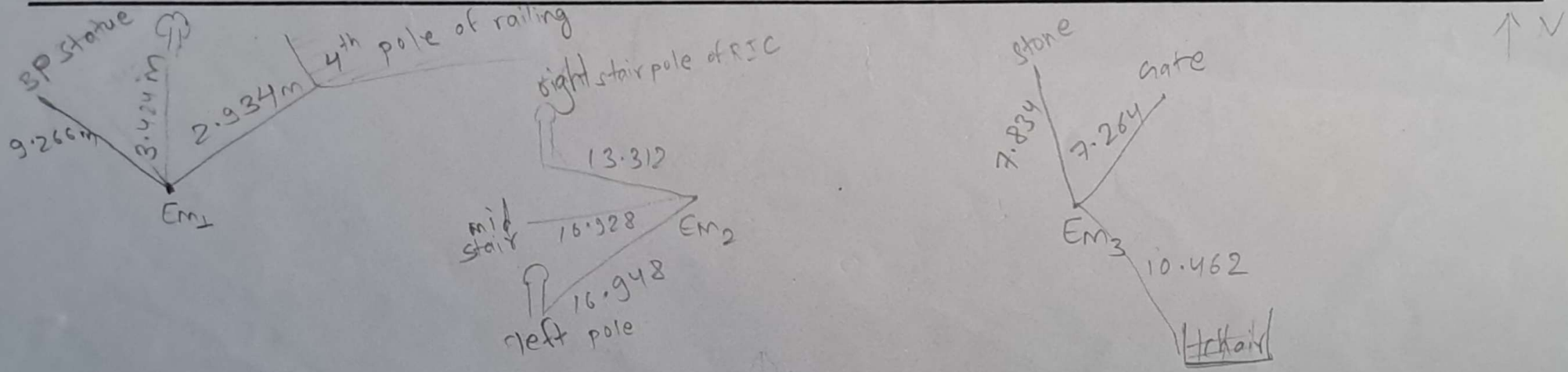
Group :
Observer :
Instruments :

Recorder:

Date :
Weather :
Tamperature :

Minor

Sketch of ~~Major~~ and Minor Traverse



Checked By :

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Group :
Observer :
Instruments :

Recorder:

Date :
Weather :
Tamperature :

Sketch of Major and Minor Traverse

Checked By :

E_1E_2 = 14.388 + [illegible]
21.202 +
19.400 +
27.804 = 81.394

$CP_1 : E_{10}$
$CP_2 : E_2$

E_2E_3 = 21.786 + 17.268 + 18.514 + 26.150
= 83.698

E_3F_4 = 19.706 + 20.698 + 16.586 + 13608 = 70.598

Forward F_2E_4 correction
= 18.506 + 17.798 + 18.686 + 14.508 = 69.498

F_4F_5 13.500 + 16.206 + 15200 + 16.962 + 16.554
= 77.926

F_5F_6 19.492 + 12.364 + 14.532 + 14.600 + 15.366 + 13.35 +
9.22 = 53.904

E_6E_7 = 15.792 + 15.83 + 15.442 + 19.092 + 10.830
+ 12.04 = 89.026

E_7E_8 = 17.450 + 15.484 + 18.544 + 18.000 = 69.478

E_8E_9 = 18.100 + 21.634 + 21.730 + 18.912 = 80.376

E_9E_{10} = 14.352 + 10.786 + 14.694 = 39.832
19.874 + 15.048 + 14.904

$E_{10}CP_1$ = 19.808 + 14.348 + 11.082 =

CP_1CP_2 = 16.2 + 14.902 + 15.262 + 12.342 + 19.648
= 78.627

E_9CP_1 = 18.984 + 17.254 + 18.578 + 16.408 + 13.02 = 84.154

E_8E_9 = 18.532 + 18.8 + 21.192 + 19.542 + 12.792
= 90.858

Backward:

$CP_2\ CP_1$ - 19.024 + 15.3 + 21.824 + 22.314

78.588 ✓

$CP_1\ E_9$ = 15.744 + 13.722 + 16.665 + 18.552

19.509 = 84.195

$E_9\ E_8$ = 18.82 + 21.022 + 19.712 + 18.626 + 12.7 *

= 90.88 ✓

$E_8\ E_7$ = 15.664 + 11.620 + 19.872 + 22.658 = 69.814

17.424 + 13.55 + 18.572 + 19.928 = 69.474

$E_7\ E_6$ = 12.890 + 13.214 + 12.900 + 15.740 + 13.930

+ 20.350 = 88.984 ✓

$E_6\ E_5$ = 18.942 + 22.238 + 19.65 + 16.136 +

18.96 = 93.926 ✓

$E_5\ E_4$ = 17.162 + 13.932 + 24 + 12.97 + 12.69 = 77.954 ✓

$E_4\ E_3$ = 16.596 + 14.212 + 21.55 + 18.114 = 70.472 *

$E_3\ E_2$ - ~~15.016~~ 14.658 + 16.8 + 16.362 + 12.35

+ 23.5 = 83.67 ✓

$E_2\ E_1$ = 19.340 + 13.096 + 22.822 + 13.49 + 13.656

= 81.404 ✓

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BCE Survey Camp, 2082

Date : 082-07-17

Group : E

Distance Measurement Sheet

Line	Forward Distance	Backward Distance	Mean M	Discrepancy	Precision (1:2000) M/D	Remakss
E1 E2	81.394	81.404	81.399	0.010	1 : 8139	
E2 E3	83.698	83.670	83.684	0.028	1 : 2989	
E3 E4	69.498	69.474	69.486	0.024	1 : 2895	
E4 E5	77.976	77.954	77.965	0.022	1 : 3544	
E5 E6	93.904	93.926	93.915	0.022	1 : 4269	
E6 E7	89.026	88.984	89.005	0.042	1 : 2119	
E7 E8	69.478	69.454	69.466	0.024	1 : 2894	
E8 E9	90.858	90.880	90.869	0.022	1 : 4130	
E9 CP1	84.154	84.195	84.175	0.041	1 : 2053	
CP1 E1	78.627	78.588	78.608	0.039	1 : 2015	
Minor CP1E01	60.115					103°46'14"

Co-Ordinator

BCE Survey Camp, 2082

Group.....

Horizontal Angle Measurement Sheet

Inst. Stn.	Sighted to	HCR d	HCR m	HCR s	Mean m	Mean s	Horiz. Angle	Distance by TS	Remarks
EM43	EM32	0	0	0			164°36'40"	70.642	
		180	0	0				70.647	
	EM54	164	36	40				77.883	
		344	36	39				77.883	
EM4	EM3	0	0	0			150°48'22"	77.882	
		180	00	07				77.881	
	EM5	150	48	21				93.961	
		330	48	30				93.960	
EM5	EM4	0	0	0			131°31'56"	93.967	
		180	00	08				93.965	
	EM6	131	31	56				89.105	
		311	32	04				89.106	
EM6	EM5	0	0	0			130°53'33"	89.100	
		180	00	02				89.100	
	EM7	180	53	37				69.519	
		310	58	31				69.518	
EM7	EM6	00	00	00			167°28'53"	69.520	
		179	59	52				69.519	
	EM8	167	28	52				90.916	
		347	28	46				90.916	
EM8	EM7	00	00	00			116°41'56"	90.912	
		180	00	02				90.912	
	CP1	116	41	54				84.481	
		296	41	59				84.481	
CP1	EM8	00	00	00			169°13'01"	84.482	
		180	00	06				84.482	
	CP2	169	13	06				78.607	
		349	13	01				78.607	
CP2	CP1	00	00	00			143°13'44"	78.618	
		180	0	0				78.617	
	EM1	143	13	47				82.357	
		323	13	40				82.356	

Coordinator

BCE Survey Camp, 2082

Group………

Horizontal Angle Measurement Sheet

Inst. Stn.	Sighted to	HCR d	HCR m	HCR s	Mean m	Mean s	Horiz. Angle	Distance by TS	Remarks
EM_1	CP_2	00	00	00			135° 21' 49"	82.3534	
		179	59	54				82.3534	
	EM_2	135	21	41				83.6543	
		315	21	50				83.6523	
EM_2	EM_1^2	00	00	00			130° 09' 49"	83.690	
		179	59	59				83.691	
	EM_3^4	130	09	46				70.618	
		310	09	51				70.618	

Coordinator

BCE Survey Camp, 2082

Group.....

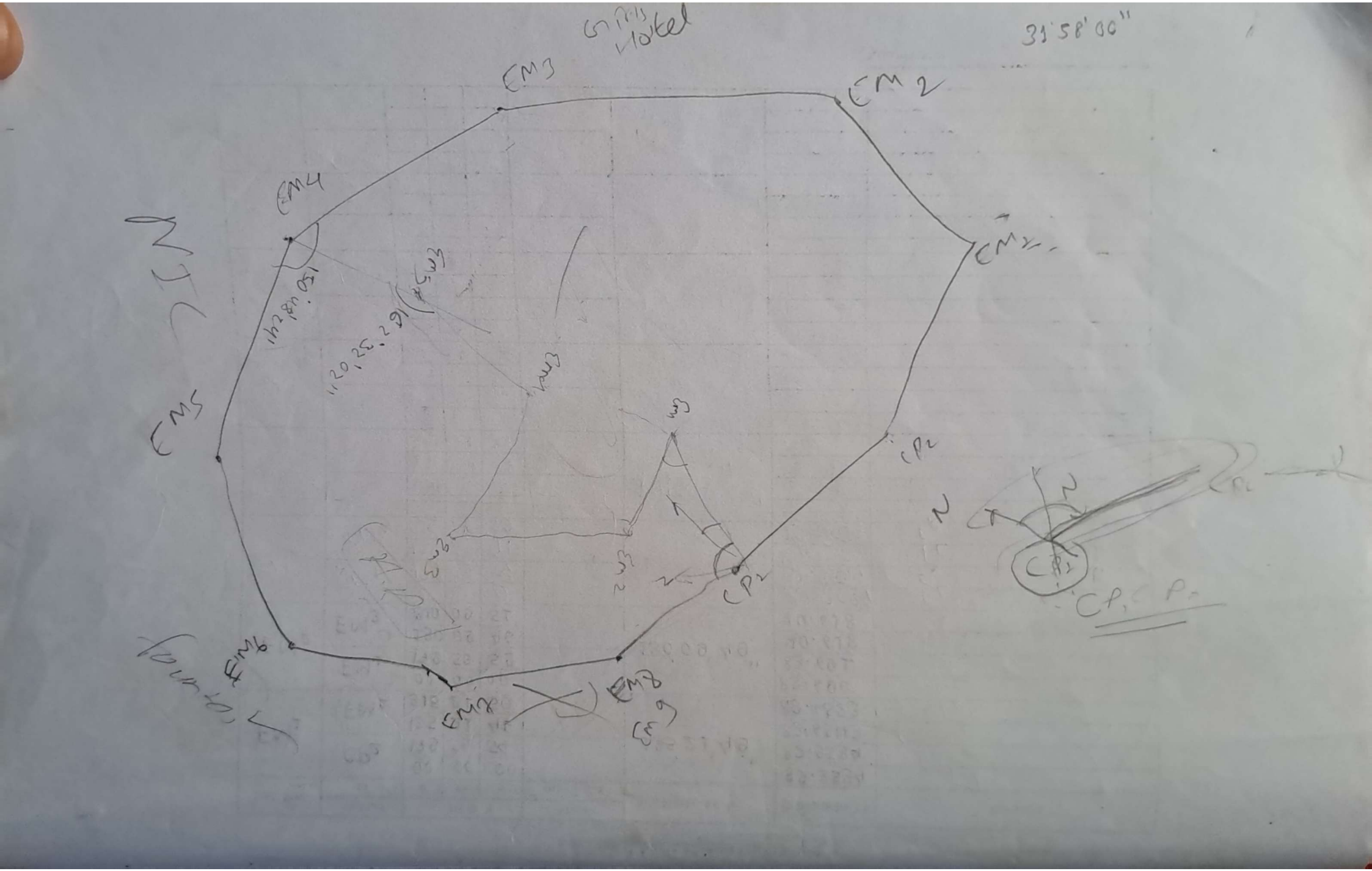
Horizontal Angle Measurement Sheet

minor traverse

Inst. Stn.	Sighted to	HCR d	HCR m	HCR s	Mean m	Mean s	Horiz. Angle	Distance by TS	Remarks
CP_1	EM_3	0	0	0	0'	0"	65°26'40"	84.383	FL
		180	0	0				84.383	FR
	Em_1	65	26	38	26'	40"		60.114	FL
		245	26	42				60.113	FR
Em_1	CP_1	0	0	0	0'	0"	158°10'48"	60.120	FL
		180	0	0				60.120	FR
	Em_2	158	10	48	10'	48"		59.273	FL
		338	10	49				59.274	FR
Em_2	Em_1	0	0	0	0'	2"	235°32'23"	59.223	FL
		180	0	4				59.223	FR
	Em_3	235	32	27	32'	23"		35.002	FL
		55	32	19				35.003	FR
Em_3	Em_2	0	0	0	0'	2"	250°40'57"	35.003	FL
		180	0	4				35.003	FR
	Em_4	250	40	58	40'	57		53.875	FL
		70	40	56				53.873	FR
Em_4	Em_3	0	0	0			116°15'21"	53.879	FL
		179	59	59				53.879	FR
	Em_5	116	15	22				45.380	FL
		296	15	19				45.379	FR
Em_5	Em_4	0	0	0			162°32'02"	45.379	FL
		180	0	1				45.378	FR
	EM5	162	32	0				49.326	FL
		342	32	5				49.325	FR
EM5									

CP_1 CP_2
= 135°44'23"

Coordinator


EM3
EM2
EM4
EM5
EM6
EM7
EM8
EM9
CP2
CP1
N
N
31°58'00"

middle
0.096

reading

SLN	Target	Top	middle	bottom
	B	1.590	1.520	1.450
C		1.949	1.924	1.855
	A			
	A'	1.403	1.258	~~1.113~~
		1.405	1.255	1.102
D	B'	1.856	1.396	1.337

~~E 0.096~~

A

A

~~H' 0.088~~
~~e=8×10⁻³~~

H = 0.021
H' = 0.096
e = H' − H = 0.005

D = 20m

e/D = 0.005/20 = 1/6000

1:3750

Group………

Horizontal Angle Measurement Sheet

1.337[illegible] L
1.346 M
1.356 T

1.346 mean

31-
350

1.405
1.255
1.107

Inst. Stn.	Sighted	HCR			Mean		Horiz. Angle	Distance by TS	Remarks
	to	d	m	s	m	s			

Coordinator

0.987 0.942 0.805

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group....E.... Date : 2082/11/19

Field Book for Fly Levelling

No	BS			FS			Rise	Fall	RL	Distance		Remarks
	T	M	B	T	M	B				BS	FS	
	2.283	2.278	2.273						820	20		BM
	1.345	1.299	1.253	0.069	0.015	0.078	2.7045		822.2045	20	20	0+000
	1.628	1.580	1.532	1.933	1.286	1.239	0.013		822.2175		20	0+020
	1.604	1.557	1.510	1.550	1.505	1.460	0.075		822.2925			0+040
	1.553	1.507	1.461	1.596	1.550	1.504	0.007		822.2995			0+060
	1.570	1.5275	1.485	1.587	1.540	1.493		0.033	822.2665			0+080
	2.068	2.010	1.952	1.400	1.349	1.298	0.1785		822.445			0+100
	1.703	1.656	1.609	1.452	1.412	1.372	0.598		823.043			0+120
	1.974	1.926	1.878	1.219	1.173	1.127	0.483		823.526			0+140
	1.8715	1.8245	1.7775	1.2175	1.1725	1.1275	0.7535		824.2795			0+160
	2.356	2.310	2264	0.987	0.941	0.895	0.8835		825.163			0+180
	1.905	1921	1.897	0.661	0.615	0.569	1.695		826.858	0	20	0+200
	1.988	1.964	1.94	1.062	1.040	1.018	0.861		827.719	10	10	0+210
	1.824	1.8045	1.785	1.150	1.127	1.104	0.857		826.576			0+220
	1.798	1.773	1.748	1.026	0.999	0.972	0.8055		829.3815			0+230
	1.952	1.906	1.86	1.055	1.035	1.015	0.738		830.1195			0+240
	1.7	1.655	1.61	0.92	0.874	0.828	1.032		831.1515			0+260
				0.977	0.937	0.887	0.723		831.8745			0+279.54
							11.9075					
	0.815	0.725	0.635	~~2.573~~	~~2.479~~	~~2.385~~		1.	831.8745			0+279.54
	0.68	0.77	2.515	2.573	2.479	2.385		1.754	830.1205			0+240
	0.624	0.5765	0.529	2.515	2.47	2.425		-1.7	828.4205			0+220
	0.7545	0.7075	0.6605	2.744	2.698	2.6521		-2.1215	826.299			0+200
	0.7605	0.667	0.5735	2.65	2.605	2.560		1.8975	824.4015			180
	1.26	1.167	1.074	2.484	2.392	2.3		1.725	822.6765			140
	1.4325	1.339	1.2455	2.328	2.235	2.142		1.068	821.6085			100
	1.5725	1.48	1.3875	1.568	1.476	1.384		0.137	821.4715			60
	1.565	1.473	1.381	1.653	1.56	1.467		0.08	821.3915			20
				2.94	2.8475	2.755		1.3745	820.017			0.00

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group..... Date : .....

To gate

Field Book for Fly Levelling

13.80

S. No	BS			FS			Rise	Fall	RL	Distance		Remarks
	T	M	B	T	M	B				BS	FS	
	1.55	1.505	1.46						831.8745			0+0
	1.47	1.425	1.38	1.61	1.656	1.71		0.151	831.7235			0+20
	1.41	1.3625	1.315	1.51	1.465	1.42		0.04	831.6835			0+40
	1.432	1.387	1.342	1.145	1.141	1.137	0.2215		831.905			0+60
	1.394	1.349	1.304	1.497	1.449	1.401		0.062	831.843			0+80
	1.454	1.408	1.362	1.544	1.497	1.45		0.148	831.695			0+100
	1.467	1.421	1.375	1.602	1.555	1.508		0.147	831.548			0+120
	1.574	1.527	1.480	1.562	1.515	1.468		0.094	831.454			0+140
	1.531	1.484	1.437	1.627	1.581	1.535		0.054	831.4			0+160
	1.532	1.485	1.438	1.602	1.556	1.51		0.072	831.328			0+180
	1.604	1.558	1.512	1.644	1.598	1.552		0.113	831.215			0+200
	1.577	1.531	1.485	1.650	1.604	1.558		0.046	831.169			0+220
	1.579	1.555	1.531	1.654	1.608	1.562		0.077	831.092			0+233.80
				1.387	1.347	1307	0.208		831.3			
	1.424	1.344	1.264						831.3		0	29389
	1.664	1.571	1.478	1.578	1.501	1.424		0.157	831.143			0+200
	1.687	1.593	1.499	1.528	1.436	1.344	0.135		831.278			0+180
	1.713	1.619	1.525	1.584	1.491	1.398	0.102		831.38			0+160
	1.664	1.571	1.478	1.492	1.400	1.308	0.219		831.599			0+80
	1.676	1.583	1.490	1.579	1.486	1.393	0.085		831.684			0+40
				1.484	1.392	1.300	0.191		831.875			0+0

831.875

(12)

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group... E ... Date : .....

Field Book for Fly Levelling

S. No	BS			FS			Rise	Fall	RL	Distance		Remarks
	T	M	B	T	M	B				BS	FS	
	1·125	1·048	0·971						831·909			TBM1
				1·657	1·593	1·529		0·545	831·364			EM8
	1·672	1·618	1·564									EM8
				1·377	1·289	1·201	0·329		831.693			①
							~~0·329~~					
	1·580	1·425	1·290									①
				1·258	1·115	0·972	0·31		832.003			EM7
	~~1·290~~ ~~1·169~~	1·181	1·092									EM7
				1·754	1·659	1·564		0·478	831 525			②
	1·254	1·172	1·09									②
				1·389	1·33	1·271		0·158	831·367			EM6
	1·240	1·165	1·09									EM6
				1·540	1·61	1·68		0·145	830·822			③
	~~1·1~~ ~~1·04~~ ~~0·98~~	1·04	0·98									④
	0·89	0·79	0·69									③
				1·725	1·885	2·045		1·095	829·827			EM5
	1·055	0·945	0·835									EM5
				1·785	1·705	1·625		0·76	829·067			④
	1·28	1·185	1·09									④
				1·985	1·830	1·675		0·645	828·422			EM4

Institute of Engineering

Pashchimanchal Campus

Pokhara-16, Lamachaur

BCE Survey Camp, 2082

Group.....

Date : .....

Field Book for Fly Levelling

. No	BS			FS			Rise	Fall	RL	Distance		Remarks
	T	M	B	T	M	B				BS	FS	
	0.91	0.825	0.74									EM 4
				1.977	1.903	1.829		1.078	827.344			(5)
	1.202	1.112	1.022									(5)
				2.153	2.038	1.923		0.926	826.418			EM 3
	1.254	1.191	1.128									EM 3
				1.819	1.743	1.667		0.552	825.866			(6)
	1.27	1.195	1.120									(6)
				1.651	1.535	1.419		0.34	825.526			EM 2
	1.06	0.982	0.904									EM 2
				1.692	1.616	1.54		0.634	824.892			(7)
	1.15	1.054	0.958									(7)
				1.895	1.755	1.615		0.701	824.191			EM 1
	1.57	1.47	1.37									EM 1
				1.512	1.442	1.342	0.028		824.219			(4)
	2.258	2.163	2.068									(8)
				1.174	1.082	0.99	1.081		825.3			CP 2
	1.728	1.661	1.594									(1)
				0.939	0.837	0.735	0.824		826.124			(2)
	2.015	1.922	1.829									(3)
				0.845	0.74	0.635	1.182		827.306			CP 3

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Pashchimanchal Campus

Pokhara-16, Lamachaur

BCE Survey Camp, 2082

Group.....

1.387

Date : .....

Field Book for Fly Levelling

S. No	BS			FS			Rise	Fall	RL	Distance		Remarks
	T	M	B	T	M	B				BS	FS	
	1.638	1.563	1.488									CP
				0.468	0.401	0.334	1.162		828.468			(10)
	2.373	2.328	2.283									(10)
				0.892	0.86	0.828	1.468		829.936			(11)
	2.166	2.116	2.066									(1)
				1.474	1.429	1.384	0.687		830.623			(2)
	2.186	2.150	2.114									(12)
				1.434	1.387	1.340	1.387		83201			EM 8
					Minor							CP
	1.412	1.353	1.294						827.306			CP
				0.38	0.31	0.24	1.043		828.349			(9)
	2.77	2.709	2.648									(a)
				0.801	0.704	0.607	2.005		830.354			EM 1
	1.944	1.871	1.798									EM 1
				2.024	1.934	1.844		0.063	830.291			(b)
	1.619	1.562	1.505									(b)
				1.641	1.582	1.523		0.02	830.271			EM 2
	1.526	1.450	1.374									EM 2
				1.733	1.646	1.559		0.196	830.075			EM 3

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Pashchimanchal Campus

Pokhara-16, Lamachaur

BCE Survey Camp, 2082

Group.....

Date : .....

Field Book for Fly Levelling

S. No	BS			FS			Rise	Fall	RL	Distance		Remarks
	T	M	B	T	M	B				BS	FS	
	1.618	1.545	1.472									EM_3
				1.94	1.857	1.774		0.312	829.763			C
	1.338	1.2775	1.217									C
				1.5925	1.557	1.5215		0.2795	829.484			EM_4
	1.421	1.336	1.251									EM_4
				2.546	2.521	2.396		1.185	828.299			EM_5
	1.554	1.454	1.354									EM_5
				1.452	1.322	1.192	0.132		828.431			EM_4
			Total error in minor = 0.009m = 9mm									
			Per each minor stn = 1.8×10^{-3} mm									

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group.....

Date : ...

Total Station Detailing Sheet

S.N	Station & HI	Sighted to	Ref. Ht.	Coordinate			Remarks
				Northing (N)	Easting (E)	Elevation (Z)	
	1.536	RD 4	1.5	3129113.994	97 2120.172	829.725	
		RD 5		9119.861	2120.284	829.884	
		RD 6		9128.716	2120.708	830.108	
		7		9131.574	2122 441	830.122	
		8		9131.609	2125.663	830.059	
		9		9130.975	2130.549	829.914	
		10		9130.311	2134.910	829.851	
		11		9129.056	2143.204	829.670	
		12		9126.238	2150.811	829.553	
		13		9123.013	2154.768	829.421	
		14		9118.923	2158.506	829.371	
		15		9101.706	2174.130	828.987	
		16		9090.332	2184.490	828.973	
		17		9091.730	2189.642	828.739	
		18		9092.163	2190.208	828.740	
		19		9092.820	2190.213	828.676	
		20		9093.378	2189.865	828.750	
		21		9095.303	2189.363	828.888	
		22		9096.569	2189.521	829.131	
		23		9098.955	2191 215	828.935	
		24		9097.014	2184.829	828.836	
		25		9122.631	2161549	829.423	
		26		9128.866	2155.394	829.665	
		27		9131.314	2151.706	829.680	
		28		9133643	2143.984	829802	

Co-Ordinator

Institute of Engineering

Pashchimanchal Campus

Pokhara-16, Lamachaur

BCE Survey Camp, 2082

Group..... : Date : ...

Total Station Detailing Sheet

S.N	Station & HI	Sighted to	Ref. Ht.	Coordinate			Remarks
				Northing (N)	Easting (E)	Elevation (Z)	
		29		9135.777	2129.898	829.939	
		30		9137.432	2118.389	830.241	
		31(RD)		9138.908	2118.487	830.215	
		32(PV)		9138.573	2118.624	830.533	
		33(BOX)		9136.938	2124.907	830.741	
		34		9137.657	2124.973	830.741	
		35		9137.731	2124.264	830.743	
		36		9137.020	2124.185	830.756	
		37(SPL)		9135.801	2136.984	830.174	
		38(FT)		9134.821	2144.619	830.061	
		39		9133.201	2150.467	829.934	
		40		9132.314	2152.518	829.987	
		41		9130.510	2155.394	829.910	
		42		9127.948	2158.995	829.817	
		43		9121.898	2163.683	829.692	
		44(SPL)		9115.963	2169.597	829.607	
		45(FT)		9111.386	2173.360	829.516	
		46.		9092.296	2190.091	829.004	
		47		9091.787	2189.596	829.012	
		48		9105.000	2177.645	829.378	
		49		9124.471	2159.945	829.892	
		50		9128.941	2156.413	829.919	
		51		9130.072	2150.080	829.943	
		52		9131.982	2150.412	830.001	
		53		9133.817	2143.939	830.111	

Co-Ordinator

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group..... : Date : ...

Total Station Detailing Sheet

S.N	Station & HI	Sighted to	Ref. Ht.	Coordinate			Remarks
				Northing (N)	Easting (E)	Elevation (Z)	
		54(FT)		9137.155	2121.336	830.477	
		55(FT)		9114.058	2120.211	830.042.	
		56		9120.497	2120.314	830.224	
		57		9127.268	2120.502	830.294	
		58		9130.113	2121.265	830.393	
		59		9131.800	2124.165	830.330	
		60		9130.469	2133.514	830.222	
		61		9129.295	2141.616	830.073	
		62		9127.311	2148.184	829.945	
		63		9125.743	2151.350	829.872	
		64		9123.652	2154.187	829.774	
		65		9120.860	2156.624	829.747	
		66		9110.854	2165.711	829.520	
		67		9088.900	2185.816	829.002	
		68		9088.064	2185.309	828.958	
		69		9111.412	2163.884	829.526	
		70		9122.604	2153.639	829.721	
		71		9124.269	2151.825	829.765	
		72		9120.333	2152.364	829.554	
		73		9126.230	2148.027	829.912	
		74		9128.231	2142.258	829.994	
		75		9130.472	2126.489	830.287	
		76		9130.760	2123.497	830.298	
		77		9128.346	2121.769	830.231	
		78		9121.083	2127.312	830.196	

Co-Ordinator

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group.....

Date : 01-2

Total Station Detailing Sheet

S.N	Station & HI	Sighted to	Ref. Ht.	Coordinate			Remarks
				Northing (N)	Easting (E)	Elevation (Z)	
	✓	79		9114.337	2121.303	830.069	
		80		9113.990	2125.629	829.697	
		81		9112.894	2133.909	829.503	
		82		9113.814	2127.959	829.409	
	✓	83		9112.740	2150.051	829.304	
	✓	84		9120.305	2150.780	829.601	
	✓	85		9112.380	2149.921	829.281	
	✓	86		9109.932	2152.054	829.244	
		87		9109.998	2149.660	829.090	
		88		9105.818	2150.739	829.146	
		89		9112.499	2127.650	829.414	
	✓	90		9117.725	2120.480	829.744	
		91		9123.473	2121.550	830.089	
		92		9122.549	2132.978	829.876	
		93		9122.384	2134.756	829.860	
		94		9129.274	2134.324	829.993	
	✓	95		9129.373	2133.379	830.073	
		96		9120.979	2134.098	829.842	
		97		9121.246	2133.080	829.849	
		98		9114.222	2133.982	829.786	
		99		9114.201	2132.780	829.766	
	✓	100		9121.604	2136.184	829.840	
	✓	101		9122.238	2138.453	829.781	
		102		9121.946	2137.699	829.773	
	✓	103		9121.217	2143.476	829.773	

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Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group..... : Date : ...

Total Station Detailing Sheet

S.N	Station & HI	Sighted to	Ref. Ht.	Coordinate			Remarks
				Northing (N)	Easting (E)	Elevation (Z)	
		104	911	919.975	2146.382	829.831	
		105		9123.653	2143.856	829.805	
		106		9122.626	2147.220	829.8	
		107		9123.275	2146.498	829.789	
		108		9126.176	2148.121	829.780	
		109		9126412	2147.397	829887	
		110		9122.682	2146.935	829.897	
		111		9119.157	2167.902	829.390	
		112		9100.940	2172.177	829.023	
		113		9108.421	2165.559	829.110	
		114		9112.717	2161.565	829.398	
		115		9103.013	2161.066	829.013	
		116		9117.551	2157.910	829.599	
		117		9109.359	2157.881	829.39	
		118		9121.831	2159.074	829.830	
		119		9127.729	2160.810	829760	
		120		9123.721	2151.076	829.826	
		121		9131.002	2157.422	829.524	
		122		9133.336	2153.996	829.722	
		123		9124.911	2149.314	829.765	
		124		9122.411	2145.661	829.931	
		125		9115.010	972140.035	829.665	
		126		9126.691	2143.187	829.810	
		127		9136.440	2142.732	829.885	
		128		9126.773	2140.641	829.829	
		129		9141.181	9140.415	830.162	
		130		9143.248	2138.510	830.154	

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Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group..... : Date : ...

Total Station Detailing Sheet

S.N	Station & HI	Sighted to	Ref. Ht.	Coordinate			Remarks
				Northing (N)	Easting (E)	Elevation (Z)	
		131		9140.133	2135.419	830.216	
		132		9154.622	2134.659	830.259	
		133		9158.613	2131.180	830.311	
		134		9128.072	2136.479	829.886	
		135		9128.738	2131.008	830.131	
		136		9129.307	2127.643	830.177	
		137		9129.637	2123.101	830.316	
		138		9127.211	9721223.73	830.108	
		139		9124.301	2122.325	830.118	
		140(Parking)		9179.511	2121.692		
		141		9183.508	2126.028	830.695	
		142		9134.146	2156.706	830304	
		143		9137.711	2161.069	830.327	
		144		9131.649	2161.145	829.525	
		146		9132.444	2165.163	829.476	
		1467		9114.117	2179.043	829.037	
		1465		9137.649	2161.145	829.525	
		~~148~~ 148		9131.834	2114.743	830.263	
		149		9129.096	2115.553	830.149	
		150		9117.854	215.574	829.864	
		151		9133.242	2111.693	830.317	
		152		9134.904	2098.522	830.647	
M5	M6/	153		9135.242	2147.310	829.835	
✓	1.302	154(FN)	JS	9144.175	2075.716	831.239	
		155		9152.305	2083.766	831.199	

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Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2082

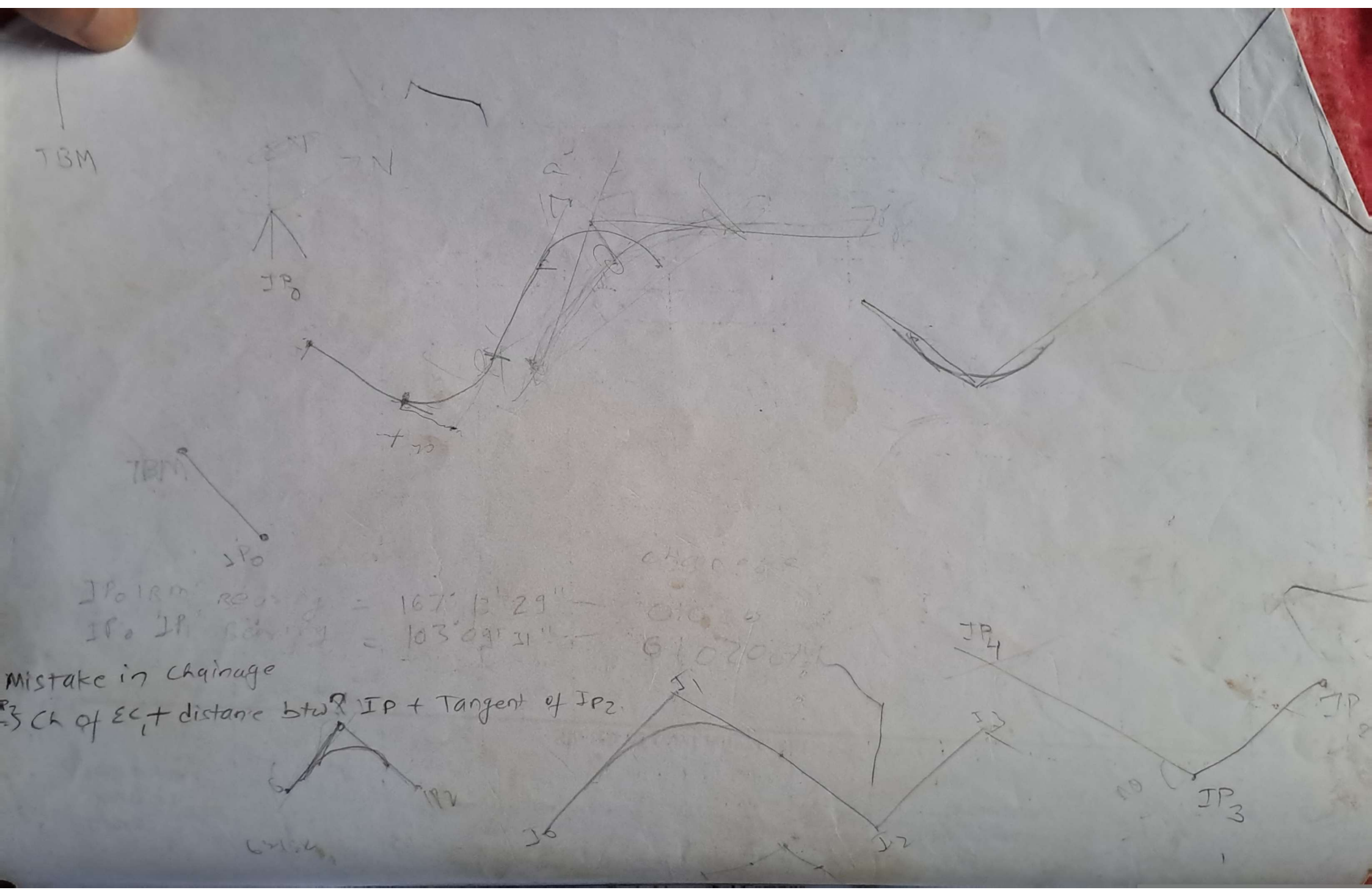
FLW = Flower

Group..... : Date : ...

Total Station Detailing Sheet

S.N	Station & HI	Sighted to	Ref. Ht.	Coordinate			Remarks
				Northing (N)	Easting (E)	Elevation (Z)	
	✓	156		9142.023	2086.451	830.982	
		157		9143.450	2076.582	831.181	
	✓	158		9145.914	2076.567	831.239	
		159(TEMP)		9125.817	2060.675	830.703	
		160		9124.949	2067.641	830.556	
		161		9116.979	2059.499	830.636	
		162.	156	9151.176	2085.106	831.131	
		163		9139.885	2094.520	830.721	
		164		9123.910	2092.943	830.573	
		165		9124.843	2085.376	830.807	
		166		9125.124	2083382	830.853	
		167		9126.064	2073.816	830.955	
		168		9126.295	2074.653	830.975	
		169		9127.127	2073.899	831.030	
		170		9133.024	2066.885	831.149	
		171		9133.608	2065.477	831.234	
		172		9131.918	2062.504	831.309	
	FLW	173		9132.508	2065.055	831.458	
		174		9124.555	2074.456	831.258	
		175		9123.445	2083.173	831.154	
		176		9123.211	2085.202	831.107	
		177		9122.216	2093.411	830.887	
		178		9147.765	2080.159	831.588	
	FLW	179		9144.774	2084.136	831.541	
	Mistake as FLW upto 182	180		9148.420	2085.676	831.592	

Co-Ordinator


TBM
N
JP_0
JP_1
JP_2
JP_3
JP_4
TBM
JP_0
Mistake in Chainage
Ch of EC + distance btw IP + Tangent of JP_2

Group.....TBM

Date : .....

Road Alignment Sheet

IP	Distance betn. IP	Deflection angle (Δ) R/L	Radius R	Tangent length(TL) = Rtan Δ/2	Curve Length(L) πRΔ/180	Mid Ordinate(Mo) = R(1- cos Δ/2)	Apex Distance = R(secΔ/2 -1)	Chainage of IP	Chainage of BC = Ch. Of IP - TL	Ch. of Mo = Ch.of BC+L/2	Ch. Of EC = Ch. of Mo +L/2	Remarks
		15562"						000				
	2.674											
IP1		47°0'33"	20	8.8717	16.70	1.7179	1.8794	20.674	11.802	20.152	28.502	RD
	16.350											RD
IP2		34°26'05"	20	6.198	12.0199	0.896	0.938	51.63	45.432	51.442	57.452	LD
	32.000											
IP3		28°42'26"	40	10.235	20.041	1.248	1.288	100.457	90.222	100.2425	110.263	RD
	49.232											
IP4		35°41'37"	50	16.098	31.148	2.406	2.527	132.388	116.292	131.866	147.44	LD
	36	35°41'37"										
IP5												
	40.42	22°28'58"	30	5.963	11.772	0.575	0.587	171.762	165.799	171.685	177.571	RD
IP6					24.114							
	44.28	69°4'57"	20/20	13.766	48.227	3.525	4.28	215.838	202.072	214.129	226.186	RD
IP7												
	47.2	20°6'35"	30	8.11	16.09	0.646	0.654	259.62	251.51	259.555	267.6	RLD
IP8												

Co-Ordinator

Pokhara-16, Lamachaur

BCE Survey Camp, 2082

Group.....

Date : .....

Road Alignment Sheet

IP	Distance betn. IP	Deflection angle (Δ) R/L	Radius R	Tangent length(TL) = Rtan Δ/2	Curve Length(L) $\frac{\pi R\Delta}{180}$	Mid Ordinate(Mo) = R(1- cos Δ/2)	Apex Distance = R(sec Δ/2 -1)	Chainage of IP	Chainage of BC = Ch. Of IP - TL	Ch. of Mo = Ch.of BC+L/2	Ch. Of EC = Ch. of Mo +L/2	Remarks
IP_2	44.56	15° 18'29"	30	6.719	13.358	0.445	0.449	304.05	297.331	304.01	310.689	LD
IP_9	47.64	77°20'16"	15	12.003	20.24	3.288	4.211	351.61	339.607	349.727	359.847	RD
IP_{10}	47.25	26°31'58"	25	5.897	11.584	0.668	0.686	395.094	389.197	394.989	400.781	LD
		25°47'5"	25	5.722	11.25	0.63						
IP_{11}	28.622	32°46'34"	25	7.352	14.301	1.0156	1.0587	423.506	417.784	423.409	429.034	LD
IP_{12}	42.438			13.817	22.332	3.967	5.394	465.75	451.933	463.099	488082.	
	13.114	59°44'09"	15	8.616	15.641	1.993	2.298					RD
IP_3												
		42°52'06"	15									
IP_4	42.3	36°09'52"	25	8.162	15.78	1.27	1.394	516.565	508.403	516.293	524.183	RD
IP_{14}	26.12	66°16'29"	20	11.611	21.039	2.703	3.172	542.141	530.53	541.0485	551.569.	LD
IP_5												

Co-Ordinator

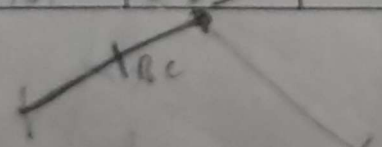
Group.....

Date : .....

88372

Road Alignment Sheet

IP	Distance betn. IP	Deflection angle (Δ) R/L	Radius R	Tangent length(TL) = RtanΔ/2	Curve Length(L) $\frac{\pi R\Delta}{180^\circ}$	Mid Ordinate(Mo) = R(1- cos Δ/2)	Apex Distance = R(secΔ/2 -1)	Chainage of IP	Chainage of BC = Ch. Of IP - TL	Ch. of Mo = Ch.of BC+L/2	Ch. Of EC = Ch. of Mo +L/2	Remarks
IP 4												
	73.74	29°42'16"	50	13.259	25.922	1.670	1.728	613.698	600.439	613.4	626.361	RD
IP 5												
	27.392	84°18'16"	15	13.578	22.070	3.879	5.232	640.494	600.398	611.433	622.783	LD
IP 6												
	33.42	81°20'24"	15	12.888	21.294	3.622	4.776	642.625	629.737	640.384	651.031	RD
IP 7												
	32.57	55°52'39"	20	12.957	22.995	3.214	3.830	676.713	663.756	675.234	686.751	LD
IP 8												
		46°06'12"	25	10.638	20.116	1.996	2.169					LD
IP 9												
	71.794	73°10'14"	25	18.613	31.999	4.947	6.168					RD
10		73°10'14"										
21	44.182	63°10'14"	20	12.296	22.051	2.963	3.478					LD
22												
22	52.520	38°11'43"	50	17.311	33.331	2.951	2.912					



Co-Ordinator

IPs	dist betn IP	defln Δ	R	Tang. length $R\tan\Delta/2$	curve length (L) $\frac{\pi R\Delta}{180}$	mid $R\left(1-\cos\frac{\Delta}{2}\right)$	Apex $R\left(\sec\frac{\Delta}{2}-1\right)$	Chain of IP	Chain of BC	Chain of Mo	Chain of EC	Rem
P_{23}		43°29'37"	20	7.978	15.182	1.423	1.532					L)

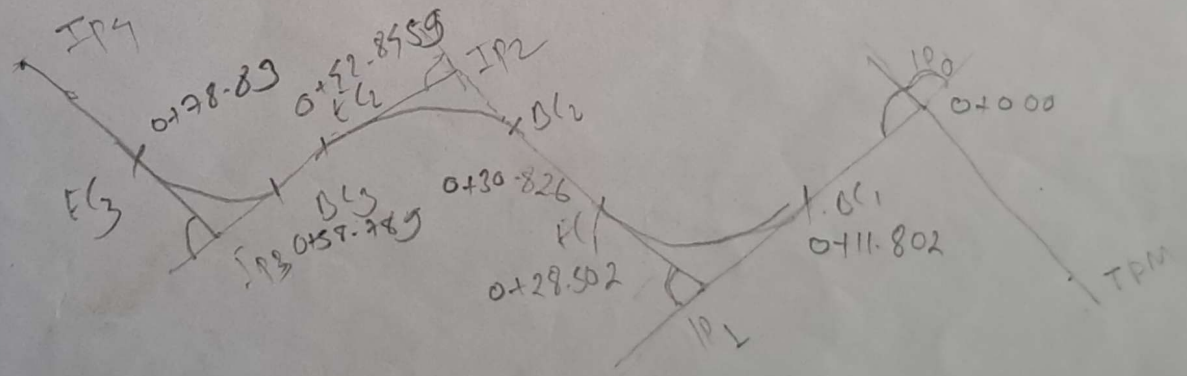
BCE Survey Camp, 2080

Group :
Observer :
Instruments ;

:

Date :
Weather :
Tamperature :

Sketch of Cross-Sections



Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2080

Date : ...

oup.....

Time:

RL of TBM 700

Field Book for Cross- Sectioning

staff

Stn	Distance			BS	IS	FS	HI	Remarks
	Left	Center	Right					
TBM				2.43			700	
IP0					2.28		700.15	
	2.5				2.375		700.053	
	4.5				0.4 : 1.19		700.43	extreme
	7.5							
			1.49		1.08 : 1.27			(rock)
			5					
			7.5					
IP1					2.28			
	2.5				2.375			
	4.5				2.55		699.53	extreme
	7.5							0.4 : 1.19 (Very
			1.49		2.26		700.17	
			5					1.08 : 1.27
			7.5					rock
RC1					1.785		700.045	
			2.5			1.485	700.993	

Co-Ordinator

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2080

Date : ...

oup.....

Time:

Field Book for Cross- Sectioning

Stn	Distance			BS	IS	FS	HI	Remarks
	Left	Center	Right					
TBM_1				2.430				
IP0					2.280			
	2.5m				2.375			
	4.5m				2.550			
	7.5m							0.4:1.19 EX
			1.490 m		2.26			
			5m					1.08:1.27 RO
BC_1		✓ ✓			1.785			
			2.5m	2.835		1.485		TP1
			5m		2.225			
								0.3:1.06 R
MC_1		✓			1.966			
	2.5				2.106			
	3				2.194			
			2.5		2.015			
			4.85		1.937			
FC_1		✓			1.482			
	2.5				1.640			
			2.5		1.382			0.96 0.8 (R)
BC_2					1.545			
			2.34		1.289			0.616 0.644
	2.5				2.636			2:1.2 (EX)
MC_2		✓			0.942			
	2.5				0.975			
			1.648		0.853			0.602 0.738 R
FC_2					0.282			
	2.5				0.311			
	3.9			4.632		0.241		

Co-Ordinator

* Inst set between IP_3 and IP_4

From BC4 11m towards IP_3

2.732

25m right → 2.899

5m right → 2.794 slope: 0.95 : 0.9 (Rock/Stone)

25m left → 4.428 slope: 1 : 1.132 (extreme)

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2080

Date : ...

oup.....

Time:

Field Book for Cross- Sectioning

Stn	Distance			BS	IS	FS	HI	Remarks
	Left	Center	Right					
BC_3		✓			2.459			
	0.6		0.6		3.212			
			1.5		3.149			
			3.5		2.067			0.75 : 0.45
	2.5				2.335			
MC_3					0.874			
			2.5		1.156			
			5		1.052			
	2.5				0.827			
			5.6		0.979			0.77 : 0.58
EC_3		✓			0.850			
	2.5				2.541			
	5				3.715			1.0728
			2.5		0.428			
			5		0.192			
			7.5	3.521		0.137		
*								
BC_4		✓			1.712			
			2.5		1.928			
			4.m		1.466			0.71 : 1
	2.5				2.989			1.1276
	5				3.952			
MC_4		✓						
			2.5		0.165			0.6 : 1.1
	2.5				0.292			
	3				0.256			
	4.5				1.072			
	6				2.246			1.0.71
MC_4		✓	5	4.222		0.207		

Co-Ordinator

*1

MC6 to ~~MEC6~~ EC6 की दूरी

17.5

17.5m ~~की~~ point ~~to~~ on the way to EC6

14.6

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2080

Date : ...

oup.....

Time:

Field Book for Cross- Sectioning

Stn	Distance			BS	IS	FS	HI	Remarks
	Left	Center	Right					
EC4		✓			2.463			
			1.3		1.874			0.94:1
	2.5				2.506			
	5				3.464			1:0.71
BC5	2.5				0.718			
	5				0.598			
			0.95		0.483			0.625:1.01
		✓		4.235		0.69		
MC5		✓			3.26			
			2.5		2.962			
	2.5				3.135			
	5				3.194			1.2:0.985
EC5		✓			2.447			
			2.5		2.571			
			3.7		2.377			
	2.5				2.529	~~2.529~~		
	3.4				1.612			0.66:0.76
Fira	at ~~ex~~	Inst change. d		4.546		0.10		TP2
316					4.058			
			2.1		3.632			
	2.5				4.048			
	5				3.563			0.9:0.5
MI6			2.5		0.271			
	2.5				1.242			
	5				1.019			
	7.5				1.000			
	9.2				1.447	~~1.057~~		
		✓		3.315		1.057		

Co-Ordinator

SP→ lai eliminate garera st. Patn banayeko.
fig level haneko.

Institute of Engineering
Pashchimanchal Campus
Pokhara-16, Lamachaur
BCE Survey Camp, 2080

Date : ...

oup.....

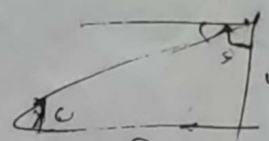
Time:

Field Book for Cross- Sectioning

Stn	Distance			BS	IS	FS	HI	Remarks
	Left	Center	Right					
EC6					~~0.681~~			
	1				0.572			
			2.5		1.383			
			5		1.110			
			7		1.508			
			10		1341			
				4.145		0691		
	EC6+20m							
BS		✓			1.08			
	2.5				0.8			
	4		18	-	0.705			0.55:0.56
Turning Point (TP)			2	3.556		0.556		0.72:1
MC7		✓			2.8			
			2		2.884			0.825:1
	2.5				2.661			
	4				2.498			0.62:0.65
EC7		✓			1.819			
			2.5 ok		1.337			0.6:0.96
	2.5			2.795		1.584		TP
EC7+20								
		✓						
	2.5				0.532			
			2.5		0849			
			3.5		037			
				4.082		0.552		

Loose sheet.

Co-Ordinator



$\tan\theta = V/D$

$\tan\theta = \frac{V}{D}$

$V = D\tan\theta$

	T	B	M	MCR	UCR
J	0.8	0.6	0.4	188°09'39"	73°11'18"

+ = up
− = down

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Pokhara-16, Lamachaur
BCE Survey Camp, 2082

Group..E.. HI = 1.64 Date 2082/01/26

Tacheometric Detalling Sheet

Station / Ht. of inst.	Sighted to	HCR	Staidia Reading			VCR	Vertical Angle (θ)	Distance D = KScos²θ	Vertical Ht V=D tanθ	RL = RL of Station + HI ± V - M	Remarks
			T	M	B						
B	mid of river (J)(m)	1°14'59"	1.93	1.825	1.72	98°22'55"					
	2 Rc	0°19'59"	1.485	1.355	1.225	97°26'31					
	3 LB	0°23'29"	1.3	1.24	1.18	105°33'48"					
	4 LB	3°35'19"	1.89	1.86	1.83	114°01'00"					
	5 RB	3°45'16"	1.845	1.695	1.545	92°56'50"					
	6 H	2°08'44"	1.82	1.8	1.78	105°47'13"					
	C	182°24'04"	1.355	1.305	1.255	91°32'56"					
	b	359°58'23"	1.77	1.58	1.39	85°35'39"					
	D	182°41'49"	1.328	1.265	1.202	84°44'49"					
	E	181°50'27"	1.405	1.29	1.175	88°15'36"					
	F	181°24'17"	1.472	1.322	1.172	80°38'07"					
	G	0°14'38"	1.825	1.605	1.385	86°09'14"					
	H	2°56'39"	1.59	1.58	1.57	94°22'48"					J ← PQ HI
	I	162°12'03"	2.18	1.8	1.42	72°05'46"					
B	G	334°48'24"	1.955	1.695	1.435	86°43'32"					axis of 25m downstream
	b	330°44'27"	1.650	1.415	1.18	86°43'42"					staff
	RB_1	325°30'19"	0.874	0.662	0.45	92°22'52"					
	RB_2	320°43'02"	1.395	1.198	1.001	92°22'56"					slope
	RB	319°15'46"	2.10	1.92	1.74	93°40'17"					right bank
	RE	307°13'21"	1.715	1.555	1.395	95°16'33"					right edge
	M	299°11'46"	1.65	1.53	1.385	97°27'35"					mid of river
	LE	289°45'46"	1.99	1.86	1.73	97°27'26"					left edge
	LB	283°34'48"	1.410	1.28	1.15	97°27'26"					left bank
	LB_1	281°23'23"	1.23	1.105	0.98	94°42'28"					left bank ~~staff~~
	H	273°22'29"	1.592	1.468	1.344	90°08'58"					
	C	249°01'09"	1.725	1.645	1.515	90°08'58"					
	~~D~~	~~249°29'59"~~	~~1.495~~	~~1.355~~	~~1.215~~	~~84°05'06"~~					
	ED	242°29'37"	1.82	1.68	1.54	86°25'36"					
	E	217°29'22"	1.45	1.225	1.10	87°33'19"					
	F	214°11'28"	1.22	1.535	1.35	86°04'32"					
	I										

Co-Ordinator

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BCE Survey Camp, 2082

TACHEOM

Group.....

Date : .....

Tacheometric Detalling Sheet

Station / Ht. of inst.	Sighted to	HCR	Staidia Reading			VCR	Vertical Angle (Θ)	Distance $D = KS\cos^2\theta$	Vertical Ht. $V = D\tan\theta$	RL = RL of Station + HI ± V - M	Remarks
			T	M	B						
											Axis at 2
B	G1	321°49'43"	1.405	1.025	0.745	87°30'07"					50 M down stream
	RB_1	312°51'59"	1.76	1.47	1.18	91°29'15"					
	b	316°56'06"	1.52	1.19	0.86	87°17'51"					
	R_B	307°00'34"	1.67	1.406	1.142	93°30'36"					
	R_F	291°35'05"	2.164	1.92	1.678	94°13'39"					
	M	288°13'36"	1.9	1.75	1.60	94°42'57"					
	LE	282°52'59"	1.835	1.6	1.365	94°42'46"					
	LB	281°05'20"	1.97	1.735	1.50	94°12'52"					
	LB_1	279°40'13"	2.02	1.79	1.56	92°11'59"					
	H	273°40'28"	1.478	1.243	1.008	90°22'11"					
	C	258°41'30"	1.88	1.65	1.42	90°15'07"					
	D	253°52'31"	1.902	1.665	1.428	88°08'07"					
	E	239°26'06"	1.98	1.72	1.46	88°10'33"					
	I										
											axis at 25m upstream
B	F	127°16'14"	1.58	1.435	1.29	88°10'27"					
	D	114°29'59"	1.7	1.59	1.48	87°23'25"					
	C	110°22'58"	1.79	1.685	1.58	89°41'35"					
	H	83°18'22"	1.74	1.65	1.56	89°40'45"					
	LB_1	69°48'45"	1.29	1.195	1.1	95°22'26"					
	LB	58°47'44"	1.685	1.585	1.485	96°58'59"					
	LE	54°49'47"	1.895	1.775	1.655	69°20'23"					
	M	40°33'51"	1.77	1.625	1.48	96°09'19"					
	R_F	31°36'48"	1.79	1.615	1.44	95°03'34"					
	R_B	30°09'50"	1.51	1.33	1.15	91°58'13"					
	B_2	26°11'16"	1.45	1.255	1.06	91°25'31"					
	B	29°03'59"	1.86	1.624	1.388	85°54'36"					
	G	24°36'04"	2.505	2.26	2.015	85°33'30"					
	I	139°06'19"	2.12	1.76	1.4	73°25'43"					
	J	145°25'38"	2.9	2.7	2.5	73°14'01"					

Co-Ordinator

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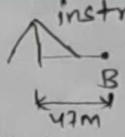


Group.....

Date : .....

HI = 1.578

Tacheometric Detalling Sheet

Station / Ht. of inst.	Sighted to	HCR	Staidia Reading			VCR	Vertical Angle (Θ)	Distance D = KScos²θ	Vertical Ht. V=D tanθ	RL = RL of Station + HI ± V - M	Remarks
			T	M	B						
47m	H	89°37'41"	1.432	1.42	1.408	91°26'36"					axis ⊥r
left from	C	262°44'30"	1.302	1.24	1.17	91°28'45"					50m upstream
'B'	D	263°29'18"	0.818	0.74	0.662	85°09'10"					
HI = 1.578	E	260°05'17"	1.34	1.165	0.99	87°09'11"					
	LB1	98°07'05"	2.102	2.07	2.038	104°00'06"					
	LB	96°33'55"	2.854	2.82	2.786	103°59'33"					
	LE	86°48'03"	2.558	2.5	2.442	103°46'37"					
	M	87°17'42"	1.732	1.7	1.668	101°38'19"					
	RE	88°00'06"	3.62	3.495	3.37	94°04'05"					
	RB	89°15'35"	1.273	1.11	0.94	96°36'40"					
	RBL	88°28'17"	3.54	3.37	3.20	88°54'05"					
	B	89°23'31"	1.255	1.06	0.865	87°29'33"					
	G1	89°37'11"	2.95	2.72	2.49	85°28'47"					
47m	G1	117°15'51"	0.91	0.66	0.41	88°14'20"					axis ⊥r
left from	B	119°39'22"	0.67	0.44	0.21	88°14'42"					75m upstream
B	RB1	119°59'03"	0.49	0.3	0.11	94°42'21"					
1.578 = HI	RB	120°22'14"	1.65	1.46	1.27	94°42'44"					
	RE	124°48'04"	0.572	0.4	0.228	87°38'45"					
	M	135°37'18"	0.505	0.36	0.21	99°23'34"					
	LE	151°05'59"	1.08	0.96	0.84	89°24'58"					
	LB	160°14'41"	3.45	3.34	3.23	92°40'41"					
	LB1	164°51'44"	1.56	1.46	1.36	92°41'01"					
	H	170°53'00"	0.65	0.55	0.45	91°27'34"					
	C	289°54'14"	0.6	0.5	0.4	91°27'13"					
	D	205°51'58"	1.785	1.685	1.585	84°27'31"					
	E	229°55'28"	1.22	1.04	0.86	87°52'04"					

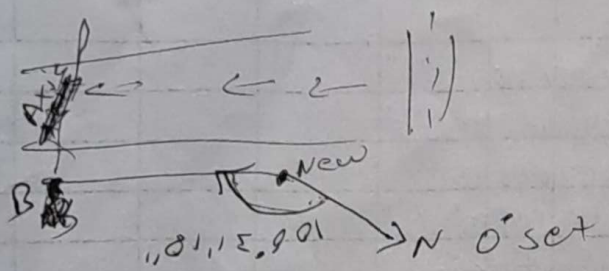
Co-Ordinator

To transfer RL to new stn.

Hight of instrument = 1.75m

BS = T M B

1.603 1.375 1.143



To transfer RL from st^n^ (47m away from B) to new st^n^

~~1.9~~ 1.9
~~1.865~~ 1.43
~~1.685~~ 1.665

HCR 174° 05' 54"
VCR 87° 20' 14"

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Group..... Date : .....

Tacheometric Detalling Sheet

Station / Ht. of inst.	Sighted to	HCR	Staidia Reading T	Staidia Reading M	Staidia Reading B	VCR	Vertical Angle (Θ)	Distance D = KScos²θ	Vertical Ht. V=D tanθ	RL = RL of Station + HI ± V - M	Remarks
B बाट	E	208°24'38"	2.014	1.762	1.510	87°51'19"					axis बाट 100 m upstream
17m left	C	172°57'11"	1.765	1.535	1.41	86°54'17"					
HI=1.578	HB	162°30'39"	1.641	1.405	1.289	92°20'04"					
	LB	161°58'00"	2.49	2.315	2.14	92°20'08"					
	LB	158°31'56"	1.8	1.625	1.45	94°07'07"					
	LE	158°19'00"	2.9	2.725	2.55	94°14'14"					
	M	152°14'32"	1.4	1.2	1.0	95°20'59"					
	RB/RE	143°51'29"	1.4	1.18	0.96	95°09'51"					
	RB	135°03'45"	2.9	2.685	2.415	88°05'22"					
	B	133°10'32"	1.8	1.54	1.28	87°08'05"					
	G	132°19'29"	1.5	1.205	0.91	87°43'15"					
A 125m B											
B बाट											axis बाट
125m left	E	262°39'06"	0.715	0.58	0.44	92°48'18"					125m upstream
HI=1.424	d	220°30'58"	1.824	1.817	1.81	92°45'29"					
	LB	106°20'02"	1.794	1.77	1.746	111°06'44"					
	LB	107°58'25"	4.8	4.77	4.74	110°53'37"					
	LE	98°53'09"	1.38	1.32	1.26	123°12'11"					
	M	101°58'15"	1.51	1.425	1.34	110°43'49"					
	RE	99°55'35"	1.66	1.54	1.42	103°11'29"					
	RB	100°47'39"	1.845	1.725	1.605	100°03'32"					
	RB	104°16'16"	1.68	1.555	1.43	99°27'11"					
	B	99°13'49"	1.755	1.605	1.455	88°01'56"					
	G	99°18'40"	2.11	1.95	1.72	88°01'56"					
	I	253°03'24"	1.455	1.285	1.115	78°54'31"					
	Rd	252°04'10"	1.695	1.495	1.295	80°4'8"					

Co-Ordinator

RL for Axis – 50

T M B

BS = 0.96 0.84 0.72

HI = 1.34m

gb → road

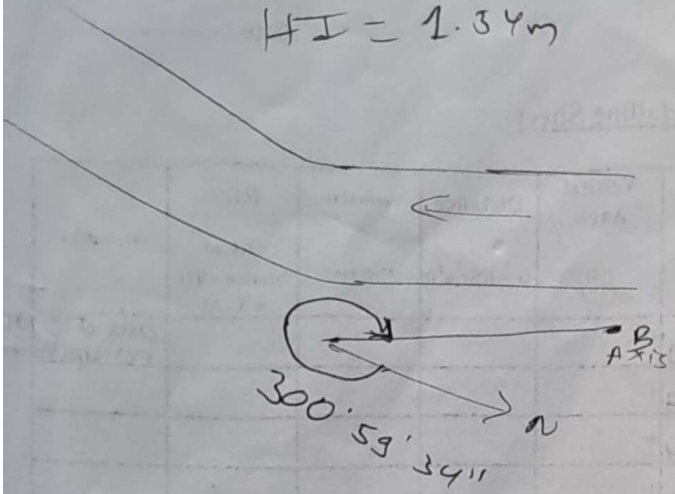
rb → right bank

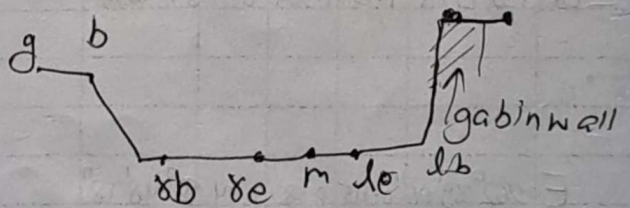
lb → left bank

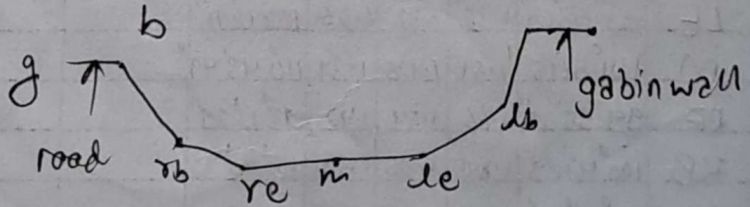
re → right edge

le → left edge

m → middle of river







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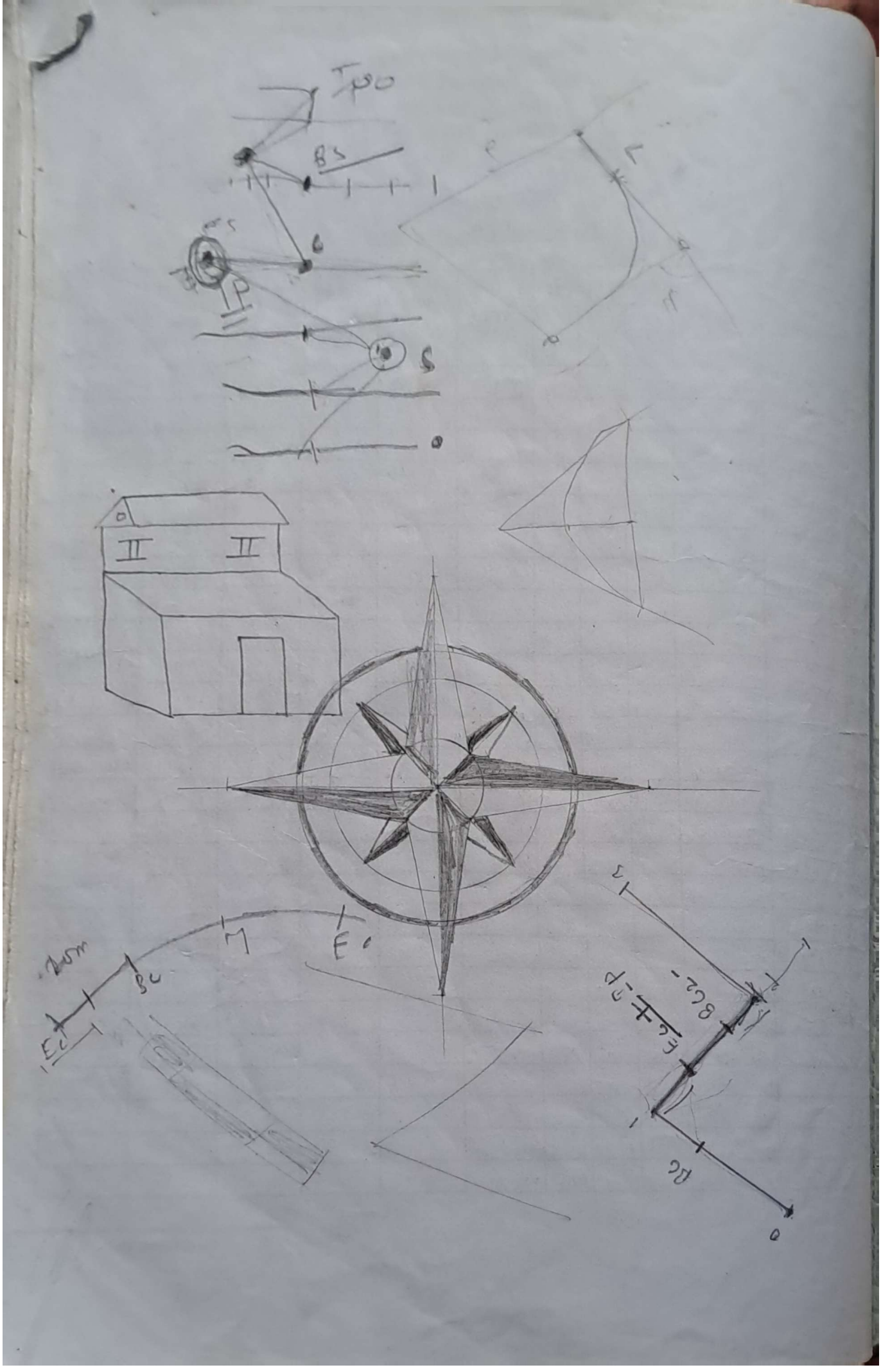
HI=

Group..... Date .....

Tacheometric Detailing Sheet

Station / Ht. of inst.	Sighted to	HCR	Staidia Reading			VCR	Vertical Angle (Θ)	Distance D = K Sin²θ	Vertical Ht. V = D tanθ	RL = RL of Station + HI ± V - SI	Remarks
			T	M	B						
B.M.	I	223°14'13"	1.195	1.044	0.893	81°40'41"					B.M. 350
125 m	Ra	238°08'02"	1.66	1.48	1.30	81°40'46"					m upstream
left	h	185°53'52"	1.915	1.815	1.715	84°26'48"					Staff
inst. & रोक्को	LB	169°41'45"	4.35	4.20	4.105	95°31'17"					
HI=	LE	155°42'40"	1.45	1.35	1.25	105°22'28"					
1.424	M	140°4'25"	1.595	1.475	1.355	103°44'06"					
	RE	128°20'01"	1.67	1.53	1.39	101°01'13"					
	RB	127°15'24"	1.37	1.23	1.09	101°01'12"					
	B	122°35'26"	1.01	0.87	0.73	88°47'14"					
	G	121°54'57"	2.19	2.015	1.84	87°00'56"					
	I	153°35'53"	2.08	1.97	1.86	90°37'08"					
B.M.	h	164°27'04"	2.365	2.255	2.145	90°37'09"					75m
50 m	LB	167°34'36"	2.36	2.255	2.15	97°36'29"					downstream
downstream	LE	179°20'14"	2.985	2.875	2.765	97°36'14"					
inst. रोक्को	M	191°58'23"	12.775 2.665		2.555	97°36'11"					
	RE	196°33'11"	2.394	2.273	2.152	97°36'09"					
HI=	RB	209°37'11"	0.693	0.527	0.361	96°28'32"					
1.34m	B	219°15'15"	1.385	1.165	0.945	85°40'23"					
	G	220°14'06"	1.928	1.678	1.428	85°40'25"					
	a	167°48'18"	1.35	1.15	0.95	92°09'34"					100m downstream
	b	201°28'43"	1.425	1.145	0.865	85°27'26"					
	c	169°53'50"	1.25	1.05	0.845	95°59'03"					
	d	95°58'53"	1.53	1.325	1.12	175°46'54"					
	e	239°12'30"	1.795	1.585	1.375	96°17'17"					
	f	245°56'51"	1.535	1.325	1.115	95°43'01"					
	g	251°40'48"	1.505	1.28	1.055	94°09'04"					

Co-Ordinator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