

Field Survey Camp
EG 3201 CE

Year III
Semester: II

Total Hrs.: 80 Hrs. (8 days x 10 Hrs./day)

Course Introduction

Seven days field survey camp (closed camp) will provide exposure to the students to tackle with real field problems in civil engineering surveying.

After completion of the field works, students should have to prepare and submit a detailed report of survey camp including original data recorded in the field book, reference sketches, original plotted drawings and printed report. All the original data and drawings must be compiled and presented as final report during external examination (final viva-voce).

As far as possible, number of students in each group should not be more than 6 (six) and use modern surveying equipment such as Total Station, Theodolite, Auto level etc.

Course Objectives

- The main objectives of the survey camp are to consolidate and update students practical and theoretical knowledge in civil engineering surveying for planning, designing and execution of the works.
- Students get real field-based exposure to learn and apply different surveying methods, modern surveying instruments, computational practices and ways of presentation in their final reports.

Specific Objectives and Contents

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<ul style="list-style-type: none">• Understand reconnaissance survey, establishment of horizons control stations, pegging of major traverse and minor traverse stations.• Able to draw reference sketch of survey stations and index sketch of the area to be surveyed.• Understand the process of measurement of horizontal circle reading and vertical circle reading;• Be able to compute horizontal angles and horizontal distances.• Understand the computational procedures of X, Y and Z coordinates in the Gales Table.	<p>UNIT 1: Horizontal Control for Major Traverse: (2 Days)</p> <p>A closed Major Traverse shall be performed at about 1.0 km periphery area with approximately 9 - 12 stations. Coordinates X and Y shall be controlled by Total Station and coordinate Z must be controlled by Auto Level.</p> <p>Norms:</p> <ul style="list-style-type: none">• One set of horizontal angles (0° set).• Traverse leg ratio 2:1 (Max: Min)• Linear measurement accuracy 1:5,000 for Total Station and 1:2,000 for Tape measurement.• Difference between FL and FR reading $= 180^\circ \pm 30''$ for Total Station and $180^\circ \pm 01'$ for Theodolite.• Angular Accuracy $(LC\sqrt{N}) = (45'' \sqrt{N})$ for Total Station and $(1.5' \sqrt{N})$ for Theodolite.• Relative Accuracy Ratio = 1:5,000.
<ul style="list-style-type: none">• Be able to perform Two Peg Test before Fly Levelling.	<p>UNIT 2: Horizontal and Vertical Control for Minor Traverse inside/outside the Major Traverse. (3</p>

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<ul style="list-style-type: none"> • Collimation precision of Two Peg Test should be $\geq 1:10,000$. • Understand Fly Levelling to Transfer RL from the permanent BM (or given BM) to SBM/TBM; • Know the process to be followed in Fly Levelling such as: • Observe three wire readings: distance between BS and FS should be within the tolerance of $\pm 1\text{m}$ (sight balance); mean BS and mean FS must be compatible with mid BS and mid FS (within a tolerance of $\pm 3\text{mm}$); • Turning Plate must be used in each Changing/Turning points; • Staff readings should be observed above 0.6m and below 2m for fly levelling. 	<p>Days)</p> <p>Detailed topographic survey shall be conducted within the perimeter of the semi built up area (about 700 m perimeter). Coordinates (X, Y, and Z) of these traverse stations including details shall be controlled by using Total Station and Auto level. Link traverse exercise is necessary.</p> <p>Time Allocation:</p> <ul style="list-style-type: none"> • 1 Day for fly leveling and RL transfer from Bench Mark (BM) to Site Bench Mark (SBM) • 1 Days for detailing in minor traverse • 1 Day for computation and plotting of traverse etc. <p>Norms of Horizontal Control:</p> <ul style="list-style-type: none"> • One set of horizontal angles (0° set). • Traverse leg ratio 3:1 (Max: Min) • Linear measurement accuracy $\geq 1:5,000$ for Total Station and $\geq 1:2,000$ for direct Tape measurement. • Difference between FL and FR reading $= 180^\circ \pm 30''$ for Total Station and $180^\circ \pm 01'$ for Theodolite. • Angular Accuracy ($LC\sqrt{N}$) = $(1'0'')\sqrt{N}$ for Total Station and $(2'0'')\sqrt{N}$ for Theodolite. <p>Norms of Vertical Control:</p> <ul style="list-style-type: none"> • Collimation precision of Two Peg Test should be $\geq 1:10,000$. • Circuit must be closed while transferring RL in Major and Minor Traverse stations. • Misclosure in all Vertical Control job should be within the tolerance of $\pm 24\sqrt{K}$ mm, where K= Loop distance in KM.
<ul style="list-style-type: none"> • Determine the length of Bridge Axis by forming two Base Triangles (Well-conditioned triangles). • Perform Reciprocal Levelling to transfer RL from one bank of the river to another bank of the Bridge Axis point. • Perform the detailed topographic survey of bridge site. • Be able to plot the topographic map of Bridge Site Survey, L - Section 	<p>UNIT 3: Bridge Site Survey (1.5 Days)</p> <p>Detailed topographic survey of suitable bridge site area (150m*75m) shall be conducted by which Topographic map, L- section, X section etc. shall be prepared at standard scale.</p> <p>Use Theodolite to measure one set of horizontal angles in base triangles and in other control stations. Use Total Station for Detailing and Auto Level for Vertical control.</p> <p>Norms:</p> <ul style="list-style-type: none"> • While choosing control stations of triangulation, Triangles should be in well condition. • One set of horizontal angles (0° set) in Base Triangles and in other Triangles. • Linear measurement accuracy $\geq 1:2,000$ for Base line of in Base Triangles.

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<p>along the flow direction and X - Sections across the flow direction.</p> <ul style="list-style-type: none"> Plot Index contour by precise Arithmetic Mean method, then remaining contours either by Graphical method or by Estimation method. 	<ul style="list-style-type: none"> Difference between FL and FR reading = $180^{\circ} \pm 01'$ for Theodolite. Angular Accuracy ($LC\sqrt{N}$) = $(1.5'\sqrt{N})$ for Base Triangles and for other Triangles. In Reciprocal Levelling, mean BS and mean FS must be compatible with mid BS and mid FS within a tolerance of $\pm 3\text{mm}$, and Misclosure = $\pm 24\sqrt{K}$ mm, where K= Loop distance in KM (2 x length of Bridge Axis). Perform Fly Levelling and close the circuit to transfer RL in all control stations.
<ul style="list-style-type: none"> Understand the techniques of selection of Intersection Points (IP). Measure clockwise angle horizontal circle reading (HCR) with respect to previous IP and forward IP to determine Deflection angle. Understand to compute chainage along the center line of road alignment. Be able to establish points in the simple circular curve like BC, MC, and EC. Understand to take L – Section by Level; and X– Section by both Level instrument and by stepping method (staff and Tape). Be able to draw Road corridor plan, L - section, X - section etc. shall be drawn at standard scale. 	<p>UNIT 4: Road Alignment Survey (1.5 Days)</p> <ul style="list-style-type: none"> Length of road alignment survey shall be at least 400m. Road corridor plan, L - section, X - section etc. shall be drawn at standard scale including selection of grades and formation levels etc. <p>Norms</p> <ul style="list-style-type: none"> As far as possible, select IP in such a way that deflection angles should be $< 90^{\circ}$ (desirable). Gradient between adjacent Intersection Points (IP to IP) should be $\leq 12\%$. Minimum Radius of the curve should be $> 12\text{m}$; choose the Radius of the curve in the multiple of 10m or 5m. Successive curve must not be overlapped. Observe only face left horizontal circle reading by Theodolite and measure deflection angles at each Intersection Point. L - Section and X – Section should be taken at chainage points of 15m interval (multiple of 15 m) and at BC, MC and EC points. In case of deflection angles being $< 3^{\circ}$, MC need not be established as External Distance become very small near to Vertex (IP points). While transferring RL, TBM should be established after covering a tentative length of 500m, and Level Circuit must be closed; misclosure should be within the tolerance of $\pm 24\sqrt{K}$ mm, where K= Loop distance in KM.

Evaluation System

Undergraduate Programs				
External Evaluation	Marks	Internal Evaluation	Weightage	Marks
External examination	40	Regular evaluation in the field throughout the 8 days, and viva-voce in the survey field. Field survey work, computation and plotting of major traverse, minor traverse be completed for internal viva-voce.	50%	60
Total External	40	Total Internal	50%	60

Full Marks: 100, Pass Marks: 50, Time: 3 Hrs]

Each student must secure at least 50% marks in both internal and external evaluation.

Attendance in Field Survey Camp:

Students should regularly attend and participate in the orientation class and field survey camp. Eighty percent class attendance is mandatory for the students. Below 80% attendance in the field survey camp will signify NOT QUALIFIED (NQ), may attend survey camp with junior batch after one year.