ATLB-1030: LABORERS: INTRODUCTION TO TRANSITS

Cuyahoga Community College

Viewing: ATLB-1030 : Laborers: Introduction to Transits

Board of Trustees:
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Academic Term:
Fall 2020

Subject Code
ATLB - AIT-Construct/Hazard Material

Course Number:
1030

Title:
Laborers: Introduction to Transits

Catalog Description:
A study of construction site layout for building positioning using digital instruments. Emphasis is placed on instrument applications and field data recording.

Credit Hour(s):
2

Lecture Hour(s):
2

Requisites

Prerequisite and Corequisite
Departmental approval by Program Training Director.

Outcomes

Course Outcome(s):
A. Perform set up procedures and identify relative components of digital equipment used in construction.

Objective(s):
1. List the various applications of the digital transit relative to construction tasks.
2. Define the terms commonly used in conjunction with field layout exercises.
3. Identify the components of the equipment and discuss their respective functions.
4. Explain the importance of proper equipment handling and maintenance.
5. State the procedures followed for proper equipment set up including placement and application.

Course Outcome(s):
B. Describe the different geometric shapes used in construction and explain the fractional parts in terms of angles and angle subdivisions and compute problems involving distances and lengths.

Objective(s):
1. Establish point locations on circles in terms of the Cartesian plane.
2. List the different geometric shapes used in construction and common angles used in construction.
3. Compute internal angles relative to different regular and irregular shapes.
4. Explain circles in terms of angles and angle measurement with respect to degrees, minutes and seconds.
5. Solve problems involving addition and subtraction of angles in terms of degrees, minutes and seconds.
6. Determine angles of right triangles using side lengths.

Course Outcome(s):
C. Demonstrate accurate recordkeeping, including correct entries and proper geographic references, while performing field layout tasks on jobsites.

Objective(s):

1. Define the terms commonly used in conjunction with field layout exercises.
2. Discuss the importance of accurate field notes with respect to potential legal ramifications.
3. Identify standard procedure for entering data in field notebooks.
4. Explain the importance of field sketches with respect to boundaries and elevations.

Course Outcome(s):

D. Demonstrate the ability to perform field layout exercises, including data entry, using a standard digital transit and position structures on sites using established base and property lines.

Objective(s):

1. Prepare the field notebook for recordkeeping and provide rough sketches and entry columns including sites, points and angles.
2. Position a standard tripod and digital transit over an occupied point using the optical plummet.
3. Employ standard procedures to locate hubs and tacks for offset lines and establish building corners from offset hubs.
4. Record offset information, including hub identification and offset distances, on layout lath and hubs.
5. Verify layout accuracy using calculations and taped distances.

Methods of Evaluation:

1. Quizzes
2. Tests
3. Final exam

Course Content Outline:

1. Digital equipment
    a. Applications
        i. Site layout
        ii. Offset points
        iii. Traversing
        iv. Centerlines
        v. Plumbing operations
        vi. Hub and tack
    b. Digital transit
        i. Components
            1. Horizontal circle
            2. Vertical circle
            3. Optical plummet
            4. Laser
            5. Leveling screws
            6. Degrees
        ii. Types
            1. One face
            2. Two face
    c. Handling and maintenance
        i. Lifting points
        ii. Storage
        iii. Lubrication
        iv. Calibration and cleaning
    d. Equipment set-up
        i. Accuracy
        ii. Efficiency
2. Geometric applications
    a. Shape
        i. Right triangles
        ii. Squares
        iii. Rectangles

    iv. Polygons
    v. Arcs and angles
  b. Internal angles
    i. Regular shapes
      1. Computation
      2. Angle derivation
    ii. Irregular shapes
      1. Ellipse
      2. Trapezoid
      3. Unit shapes
  c. Circles
    i. Angles
      1. Continuous arcs
      2. Multiple polygons
      3. Angle measurement
        a. Degrees
        b. Minutes
        c. Seconds
      4. Arc length
        a. Circumference
        b. Partial circumference
  d. Angle computation
    i. Addition
    ii. Subtraction
    iii. Division
  e. Right triangles
    i. 90
    ii. 45
    iii. 30-60-90
    iv. Hypotenuse
  f. Cartesian plane
    i. x-y coordinates
    ii. Relationships
    iii. Applications
      1. Horizontal
      2. Vertical
    iv. Grid systems
3. Recordkeeping
  a. Application
    i. Historical data
    ii. Reference
    iii. Orientation
    iv. Legal
  b. Terminology
    i. Field book
    ii. Stations
    iii. Back sights
    iv. Foresights
    v. Occupied point
    vi. Note taker
    vii. Instrument man
    viii. Head chainman
    ix. Tail chainman
    x. Integrity
    xi. Accuracy
    xii. Clarity
    xiii. Base line
  c. Note taking

i. Identify work performed
ii. Legal court document
iii. Historical document
iv. Standardized format

d. Standard procedure for data entry
i. Job description
ii. Date
iii. Weather
iv. Crew members
v. Instrument identification
vi. Note takers signature
vii. Hand sketches
viii. North arrow for orientation
ix. Identify landmarks
x. Some notes
xi. Some computations

e. Importance of sketches
i. Identifies work area
ii. Identifies permanent features
iii. North orientation
iv. Shows professionalism of note taker

f. Prepare field book for notes
i. Left hand page contains six columns
ii. Each column is titled based on type of work being performed
iii. Right hand page contains sketches of work area
iv. Brief notes are written for reference may be necessary to use multiple pages

g. Instrument setup
i. Install instrument on top of tripod
ii. Position tripod, with legs spread apart, over a reference point or hub
iii. Adjust the height of the legs, and the leveling screws to position point above reference point
iv. Repeat steps for setup if necessary

h. Locating and setting hubs
i. Establish a base line
ii. Measure and set points on base line with respect to building corners
iii. Occupy base line points and turn various angles to set building corners
iv. Measure a pre-calculated distance from the Instrument to building corners and set hubs and tacks

i. Record Offset information
i. Install a lath behind the hub
ii. Write the offset distance on the lath
iii. Write any other pertinent information on the lath

j. Verify layout accuracy
i. Calculate diagonal distances
ii. Use measuring chain to verify points
iii. Use right angle trigonometry to turn odd angles to do additional verification

Resources

LIUNA Training and Education Fund. *Construction Measuring Techniques and Elevation Control.* 2nd. LIUNA Training and Education Fund, 1995.

LIUNA Training and Education Fund. *Basic Construction Math.* current. LIUNA Training and Education Fund, 2000.

Wesley G. Crawford. *Construction Surveying and Layout*. 3rd ed. Creative Construction Publishing Co., 2002.

Resources Other

"Construction Surveying"
http://surveying.wb.psu.edu/psu-surv/SURIs/construction.htm

Construction Surveying and Project Layout

http://cset.mnsu.edu/cm/students/aic-study-guide/level1kconstsurveying (http://cset.mnsu.edu/cm/students/aic-study-guide/level1kconstsurveying/)

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