

ATLB-1410: PIPE LASERS

Cuyahoga Community College

Viewing: ATLB-1410 : Pipe Lasers

Board of Trustees:

2018-01-25

Academic Term:

Spring 2019

Subject Code

ATLB - AIT-Construct/Hazard Material

Course Number:

1410

Title:

Pipe Lasers

Catalog Description:

Introductory course describing the pipe laser, its components and set up procedures. Included is an overview of the safety standards as prescribed by the Occupational Safety and Health Administration for worker safety and equipment applications for storm water and sanitary sewer installations.

Credit Hour(s):

1

Lecture Hour(s):

1

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Laborer's apprenticeship program.

Outcomes

Course Outcome(s):

Evaluate the standards relative to the safe operation of laser equipment as prescribed by the Occupational Safety and Health Administration (OSHA) and discuss the procedures required for worker safety.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Assess the qualifications required by OSHA for laser operation.
2. Review the OSHA standard for unattended equipment.
3. Describe the requirements for worker safety, including signage, while operating lasers on construction sites.
4. Outline the hazards of the laser beam and explain how beams can be affected by changing weather conditions.

Course Outcome(s):

Select the equipment used for pipe alignment and grade setting and discuss the maintenance and care procedures for the equipment.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. List the applications of pipe lasers for storm water and sanitary sewer installations.
2. Differentiate between red and green beam lasers.

3. Identify the components of pipe lasers.
4. Discuss the limitations of pipe lasers with respect to grade tolerances.
5. Identify procedures used in the maintenance of the equipment.

Course Outcome(s):

Demonstrate the ability to set up a pipe laser to establish pipe alignment and grade using basic math concepts and applications.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Interpret site drawings and apply basic math concepts to verify percent and grade of respective sewer pipe.
2. Establish top of pipe elevations using verified elevations and distances from drawings.
3. Position the pipe laser in respective manholes and catch basins and adjust the equipment with respect to horizontal and vertical specifications.
4. Install storm water and sanitary sewer pipe to proper grade and alignment using the pipe laser.
5. Compare various field methods used to facilitate pipe installations.

Methods of Evaluation:

1. Quizzes
2. Tests
3. Class participation
4. Hands-on skill-based demonstration projects

Course Content Outline:

- I. Laser safety
 1. Laser operator qualifications
 - a. Training
 - b. Proof of training
 - c. Qualified person
 - i. Manufacturer representative
 - ii. Extensive training in laser operation
 - iii. Laser equipment experience
 - iv. Recognized degree
 2. Unattended equipment
 - a. Beam shutters
 - b. Time duration
 - c. Safety concerns
 3. Worker safety
 - a. Signage
 - b. Sign location
 - c. Worker languages
 - d. Beam rotation height
 - e. Reflective materials
 4. Laser hazards
 - a. Eye
 - b. Light refraction
 - c. Light intensity
 - i. Pipe laser equipment
 1. Applications
 - a. Sanitary and storm water manholes
 - b. Sewer laterals
 - c. Pipe alignment and grade
 2. Red beams versus green beams
 - a. Hazards
 - b. Visibility

- c. Physical properties
- d. Applications
- 3. Pipe laser components
 - a. Trivet stand
 - b. Target
 - c. Power source
 - d. Laser
 - e. Dials and indicators
 - f. Wireless remote
- 4. Limitations
 - a. Grade tolerances
 - b. Distance
 - c. Environmental
- 5. Maintenance procedures
 - a. Calibration
 - b. Lubrication
 - c. Cleaning
- ii. Equipment set up and pipe alignment
 - 1. Site drawings
 - a. Pipe sizes
 - b. Invert elevations
 - c. Locations
 - d. Grade percent
 - e. Pipe type
 - 2. Pipe elevation
 - 3. Equipment positioning
 - a. Storm
 - b. Sanitary
 - c. Catch basins
 - d. Pipe flow line
 - e. Distances
 - 4. Adjustments
 - a. Horizontal alignment
 - b. Vertical alignment
 - c. Beam elevation
 - d. Pipe and target
 - 5. Pipe installation
 - 6. Field methods
 - a. Top of manhole set up
 - b. Blocks
 - c. Centerline of pipe
 - d. Miscellaneous

Resources

Wesley G. Crawford. *Lasers on the Jobsite*. current. West Lafayette, IN., Purdue University, 1992.

Wesley G. Crawford. *Construction Surveying and Layout*. second. West Lafayette, IN; Creative Construction Publishing Co., 1995.

Royal Institution of Chartered Surveyors. *A Guide to the Safe Use of Lasers in Surveying and Construction*. current. London, England; Royal Institution of Chartered Surveyors, 1980.

Resources Other

"Construction Laser Levels Explained"
<http://www.engineersupply.com>

Top of page

Key: 408