CNST-1670: HIGHWAY INSPECTION

Cuyahoga Community College

Viewing: CNST-1670 : Highway Inspection

Board of Trustees:
10/26/2023

Academic Term:
Fall 2024

Subject Code
CNST - Construction Engineering Tech

Course Number:
1670

Title:
Highway Inspection

Catalog Description:
Introduces the concepts of field inspection and testing procedures; their applications to various construction activities, equipment, and products, and general work zone operations; interpretation of contract plans and specifications; project record keeping and reporting; and supervisory functions. Field trips may be required.

Credit Hour(s):
2

Lecture Hour(s):
1

Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
CNST-1290 Construction Print Reading and MATH-0955 Beginning Algebra or qualified math placement.

Outcomes

Course Outcome(s):
Utilize print reading, mathematical, and surveying skills to accurately interpret what is represented by the project plans.

Objective(s):

1. Interpret highway drawings to identify types of views including planned profiles and sections.
2. Interpret specifications on civil highway drawings to identify appropriate materials in accordance with the design intent of the engineer.
3. Convert units from U.S. customary to metric system and vice versa as needed for job site interpretation.
4. Calculate areas and volumes of materials for job site.
5. Measure linear dimensions at job site and compare with plans and specifications.
6. Identify job site survey stakes and markers and interpret notation on stakes.
7. Use drawing scales on the plans to approximate distances at the job site.

Course Outcome(s):
Selecting and using appropriate equipment for testing and inspection at highway construction site.

Objective(s):

1. Identify and demonstrate use of inspection and testing equipment for highway construction.
2. Identify tools and equipment used in highway construction.
3. Identify and demonstrate the use of basic surveying equipment for highway construction.

Course Outcome(s):

Recognize work zone traffic control activities.

Objective(s):

1. Identify and verify the presence of erosion and sediment control components.
2. Identify and verify the presence of types of utility markings.

Course Outcome(s):

Recognize the proper procedures for site preparation of highway construction.

Objective(s):

1. Visually identify soil and aggregate types and their properties.
2. Identify and differentiate between limits of disturbance, rights of way, and easements.
3. Inspect clearing and grubbing.
4. Inspect temporary erosion and sediment controls and stormwater management components.
5. Recognize materials testing, certification, and acceptance requirements.

Course Outcome(s):

Recognize procedures for protecting existing utilities, safety systems, and road barriers and driveway components.

Objective(s):

1. Identify utility facilities affected by construction.
2. Inspect signage, striping, and message marking.
3. Inspect guardrails, safety systems, and fencing.
4. Inspect basic foundations for lighting, traffic signals, ground-mounted signs, and sound walls.
5. Inspect underground electrical conduit.
6. Inspect sidewalks, curbs and gutters, curb ramps, medians/median barriers, and driveways.
7. Inspect landscaping and environmental mitigation.
8. Identify drainage system components.
9. Inspect excavation for drainage.
10. Inspect bedding and backfilling.
11. Inspect installation of drainage components.

Course Outcome(s):

Recognize required procedures for inspection of precast and cast-in-place concrete structures.

Objective(s):

1. Inspect delivered precast box culverts, box beams, and other precast items.
2. Inspect bedding and installation of footings and basic, driven pile.
3. Inspect forms and reinforcing steel for structures and calculate pay weight.
4. Inspect delivery and method of placement of concrete for structures.
5. Inspect cast-in-place structural components.

Methods of Evaluation:

1. Laboratory assignments
2. Written assignments
3. Quizzes
4. Class participation
5. Final Examination

Course Content Outline:

1. Plans and Specifications
   a. Standard construction terminology
   b. Purposes and roles of various project documents
   c. Matching locations on plans to locations on the site
   d. Locating and understanding information on project drawings
   e. Project documents that specify types of project work.
   f. Agency/owner standards and specifications
2. Measurement and Surveys
   a. Converting U.S. Customary and Metric units of measure
      i. Length
      ii. Area
      iii. Volume
      iv. Weight
      v. Mass
      vi. Temperature
      vii. Pressure
      viii. Strength
   b. Arithmetic calculations of simple geometric shapes
      i. Area
      ii. Volume
   c. Dimensions
      i. Site measurements
      ii. Comparison to plans and specifications
   d. Identification of survey stakes and markers, and interpret notation.
   e. Using drawing scales to determine distances
3. Tools and Equipment
   a. Inspection
   b. Testing
   c. Reporting
   d. Surveying
   e. Construction
4. Personal
   a. Personal protective equipment (PPE) for the construction site
   b. Potential safety hazards at construction site
   c. Sources of safety information and requirements
5. Site Operations
   a. Components of work zone traffic control
   b. Identification of construction activities
   c. Erosion and sediment control components
   d. Types of utility markings
6. Earthwork
   a. Types and properties of soils and aggregates
   b. Limits of disturbance
   c. Rights-of-way
   d. Easements
   e. Clearing and grubbing
   f. Temporary erosion and sediment controls
   g. Stormwater management components
   h. Materials testing, certification, and acceptance requirements.
7. Utilities and Incidental Construction

   a. Utility facilities affected by construction
   b. Signage, Striping, and message marking
   c. Guardrails, safety systems, and fencing
   d. Basic foundations for lighting, traffic signals, ground-mounted signs, and sound walls.
   e. Underground electrical conduit
   f. Sidewalks, curbs and gutters, curb ramps, medians/median barriers, and driveways
   g. Landscaping and environmental mitigation
8. Drainage
   a. Drainage system components
   b. Excavation for drainage
   c. Bedding and backfilling
   d. Installation of drainage components
9. Concrete Structure Construction
   a. Delivered Precast box culverts, box beams, and other precast items
   b. Bedding and installation of footings and basic driven pile
   c. Forms and reinforcing steel for structures and calculation of pay weight
   d. Delivery and method of placement of concrete structures
   e. Cast-in-place structural components
   f. Verification of concrete for structures meeting testing and certification requirements

Resources

National Institute for Certification in Engineering Technologies. (2016) *Highway Construction Inspection Certification. Level 1 Content Outline.*, Alexandria, VA.

National Institute for Certification in Engineering Technologies. (2013) *Highway Construction Inspection- Program Detail Manual*, Alexandria, VA.

American Concrete Institute. (2016) *Concrete Fundamentals*, Farmington Hills, MI.

American Concrete Institute. (2019) *Manual of Concrete Inspection*, Farmington Hills, MI.

American Society for Testing and Materials. (2008) *Standard Practice for Silt Fence Installation*, West Conshohocken, PA.

Occupational Safety and Health Administration. (2022) *OSHA 29 CFR 1926: Safety and Health Regulations for Construction*, Washington D.C.

Mehta, Scarborough and Ampriest. (2018) *Building Construction: Principles, Materials, and Systems*, New York, NY.

Resources Other

American Concrete Institute. 2023. https://www.concrete.org/

NICET. 2023. https://www.nicet.org/

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