

ATLB-2330: HIGHWAY DRAWINGS

Cuyahoga Community College

Viewing: ATLB-2330 : Highway Drawings

Board of Trustees:

2017-06-29

Academic Term:

Spring 2019

Subject Code

ATLB - AIT-Construct/Hazard Material

Course Number:

2330

Title:

Highway Drawings

Catalog Description:

Advanced study of construction drawings covering the interpretation of plans, profiles and related sheets used in roadway construction. Included are standard, detail and typical sheets used to establish elevations, curves, storm water drainage and utility locations.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admission to the Laborer's apprenticeship program.

Outcomes

Course Outcome(s):

Discuss standard conventions used on highway construction drawings.

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. Define the terms typical to highway drawings
2. Identify the different lines shown on highway drawings.
3. Explain the stationing process and discuss stations with respect to offsets and locations of drainage appurtenances and equations.
4. Identify the drawing scales and discuss how they are used in conjunction with roadway drawings.
5. Locate and interpret general notes.
6. Identify three different slopes and discuss how rates per foot, gradients and ratios are related to each other.
7. Discuss and interpret plan specifications.

Course Outcome(s):

Explain the importance of typical drawings and how they are used for locating under drains, roadway widths and thicknesses.

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. Determine roadway thicknesses and base requirements.
2. Explain limiting stations and discuss applications with respect to specific drawings.
3. Locate under drains with respect to centerlines
4. Identify lane and shoulder widths and locations.

Course Outcome(s):

Discuss how plans, profiles and sections are used to determine proposed work, utility locations, elevations and material quantities.

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. Identify horizontal and vertical alignments.
2. Contrast proposed work and existing conditions.
3. Establish the locations of manholes, headwalls and drainage ditches.
4. Recognize flow lines and invert elevations of sanitary and storm water pipe.
5. Identify embankment and excavations and determine cut and fill requirements.

Methods of Evaluation:

1. Quizzes
2. Tests
3. Classroom participation

Course Content Outline:

1. Highway drawing conventions
 - a. Terminology
 - i. Shoulder
 - ii. Profile grade
 - iii. "As per plan"
 - iv. Slope
 1. Ratio
 2. Rate
 3. Gradient
 - v. Storm Water Pollution Plan SWPP
 - vi. Silt fence
 - vii. Storm drainage
 1. Under drains
 2. Manholes
 3. Catch basins
 4. Conduit
 5. Reinforced Concrete Pipe RCP
 - b. Highway drawing lines
 - i. Centerline
 - ii. Existing conditions
 - iii. Proposed new conditions
 - iv. Contours
 - v. Slope breaks
 - vi. Leader lines
 - vii. Extension and dimension
 - viii. Guardrail
 - ix. Hidden
 - x. Object
 - i. Station offset
 - c. Stationing process and offsets

- i. Orientation
 - 1. West to East
 - 2. South to North
- ii. Engineering format
 - 1. Feet and decimal parts of a foot
 - 2. Hundredths of a foot
- iii. Station referencing
 - 1. County line
 - 2. First station number 0+00
 - 3. Values and increments
 - 4. Equations
 - a. Intersection of alignments
 - b. Ramp equations
- iv. Offsets
 - 1. Perpendicular to centerline
 - 2. Locators
 - a. Pipe lengths
 - b. Manholes
 - c. Headwalls
 - d. Signs
- v. Curves
 - 1. Standard
 - 2. Constant radius
- vi. Spiral radius
 - 1. Tangent to spiral
 - 2. Variable radius
- vii. Terminology
 - 1. Point of Tangent
 - 2. Delta
 - 3. Degree of curve DC
 - 4. Tangent T
 - 5. Point of intersection PI
 - 6. Point of Curve PC
 - 7. Point of Vertical Curvature PVC
 - 8. Point of Vertical Tangent Curvature PVCT
 - 9. Point of vertical Intersection PVI
- d. Drawing scales
 - i. Engineers scale
 - 1. Schematic 1:: 100
 - 2. Storm water drawings 1::60
 - 3. Plan and profile 1::20
 - ii. Plans and schematics
 - 1. Roadway project
 - 2. General overview
 - iii. Storm water drawings
 - 1. Pipe locations
 - 2. Headwalls
 - 3. Catch basins
 - 4. Manholes
 - iv. Profiles
 - 1. Horizontal scale
 - 2. Vertical scale
 - 3. Grade lines
 - 4. Under drains
 - 5. Existing grades and centerlines
 - 6. Utility crossings
 - 7. Existing waterlines
 - 8. Underground utilities
 - v. General notes

1. Job specific information
2. Drawing information hierarchy
3. Graphics
4. Project information
 - a. Work limits
 - b. "As per plan" items
 - c. Clearing and grubbing
 - d. Endangered species information
 - e. Drainage facilities
 - f. Contingency items
- vi. Scopes
 1. Rate
 - a. Rise per foot
 - b. Fall per foot
 - c. Cross slope
 2. Gradients
 - a. Rate times 100
 - b. Profile box
 - c. Pipe
 3. Ratio
 - a. Change in elevation
 - b. Horizontal to vertical
 - c. Fore slopes and back slopes
 - d. Reference to centerlines
- vii. Plan specifications
 1. Purpose
 - a. State requirements for highway construction
 - b. Quality control
 2. Interpretation
 - a. State Project Engineer
 - b. Project Superintendent
 3. Items of work
 - a. Earthwork
 - b. Pavement repair
 - c. Flexible pavement
 - d. Rigid pavement
 - e. Structures
 - f. Incidentals
 - g. Roadside
 - h. Material details
2. Typical drawings
 - a. Drains and centerlines
 - i. Under drains
 1. Notation
 2. Location
 3. Depth
 4. Length
 5. Limiting station
 - ii. Centerline
 1. Project orientation
 2. Roadways
 3. Reference items
 - a. Edge of pavement
 - b. Edge of shoulder
 - c. Guardrail
 - d. Construction limit
 - b. Lanes and shoulders

- i. Pavement
 - 1. Travel width
 - 2. Lane width
 - a. Existing
 - b. Revisions
- ii. Shoulders
 - 1. Rate differences
 - 2. Width
 - 3. Outside and median
 - 4. Berms
- c. Roadway
 - i. Thickness
 - 1. Vehicular use
 - 2. Road classification
 - 3. Load limits
 - 4. Base
 - 5. Intermediate
 - 6. Surface
 - ii. Material
 - 1. Asphalt
 - 2. Concrete
 - iii. Base
 - 1. Thickness
 - 2. Sub grade compaction
 - 3. Material items
 - a. Crushed slag
 - b. Crushed limestone
 - c. Special tests
 - iv. Limiting stations
 - 1. Alignment
 - 2. Curves
 - 3. Bridges
 - 4. Ground conditions
 - 5. Applications
 - a. Under drain locations
 - b. Under drain depth
- 3. Plans, Profiles and Sections
 - a. Plans
 - i. Proposed work
 - 1. Drainage ditches
 - 2. Pipe crossings
 - 3. Surface features
 - 4. Centerline alignment
 - ii. Utility locations
 - 1. Gas
 - 2. Water
 - 3. Electrical
 - iii. Material quantities
 - iv. Horizontal alignment
 - b. Profiles
 - i. Vertical alignment
 - 1. Curves
 - 2. Under drain depth
 - 3. Roadway gradient
 - 4. Utility crossings
 - ii. Elevations
 - 1. Invert
 - 2. Under drain
 - 3. Environmental concerns
 - 4. Water level elevations

- a. Normal
- b. Twenty-five year
- iii. Existing and proposed
- c. Sections
 - i. Work contrast
 - 1. Proposed
 - 2. Existing
 - ii. Material quantities
 - 1. Dirt
 - a. Cut
 - b. Fill
 - 2. Seeding
 - iii. Undercut information
- d. Appurtenances
 - i. Headwalls
 - ii. Manholes
 - iii. Catch basins
 - iv. Drainage ditches
- e. Flow line
 - i. Invert elevation
 - ii. Direction
- f. Embankment and excavations
 - i. Cut
 - ii. Fill

Resources

Thomas P. Olivo, C. Thomas Olivo. *Basic Blueprint Reading and Sketching*. current. Delmar Learning; Clifton Park, NY 12065, 2005.

Thomas E. Proctor, Leonard P. Toenjes. *Printreading for Residential Construction*. current. Orland Park, IL; American Technical Publishers, Inc, 2010.

Charles Willis. *Blueprint Reading for Commercial Construction*. current. Albany NY; Delmar Publishers Inc, 1979.

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.pdf>

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