Job-Task Analysis (JTA) for ACI Aggregate Base Testing Technician—ASTM Certification

HOW TO USE THIS JTA:

On the written examination, the Candidate must:

- **Understand** the following general concepts, which may not have specified values, procedures, or measurements; *and*
- **Know** the following specific procedures or values; performance of these items may also be assessed on the performance examination.

On the performance examination:

- **Perform**—or describe verbally, where allowed—the following tasks or steps, which are part of the specified procedure; knowledge of these items may also be assessed on the written examination.

RESOURCES:

ASTM D75/D75M Standard Practice for Sampling Aggregates
ASTM C702/C702M Standard Practice for Reducing Samples of Aggregate to Testing Size
ASTM D4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D7928 Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
ASTM D2216 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))
ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

ASTM D75/D75M – Standard Practice for Sampling Aggregates

- Understand scope of practice
- Understand significance and use of practice
- Know general sampling requirements for coarse and fine aggregates
- Know general inspection requirements of sample
- Know and perform procedure for sampling aggregate from a flowing aggregate stream
- Know and perform procedure for sampling aggregate from a conveyor belt
- Know and perform procedure for sampling aggregate from stockpiles
- Know and perform procedure for sampling aggregate from a transportation unit
- Understand scope of sampling practice from stockpiles and transportation units
- Understand requirements for number and masses of field samples
- Know how to determine mass of field samples
- Understanding requirements for shipping samples

ASTM C702/C702M – Standard Practice for Reducing Samples of Aggregate to Testing Size

- Understand scope of practice
- Understand significance and use of practice
- Know requirements for reducing fine aggregate
- Know requirements for reducing coarse aggregate
- Know equipment requirements for mechanical splitters
- Know and perform the procedure for introducing sample to splitter

- Know and perform procedure for quartering sample
- Know and perform procedure for miniature stockpile samples

ASTM D4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

- Understand scope of test method
- Understand terminology and definitions
- Know the summary of how liquid limit, plastic limit, and plasticity index are determined
- Understand the significance and use
- Understand the requirements for equipment used to determine liquid limit
- Understand the requirements for equipment used to determine plastic limit
- Know how to obtain a representative sample of material passing the No. 40 sieve
- Understand how to check the liquid limit device and tools for wear
- Know how to check and adjust the height of drop for the cup
- Know how to prepare an appropriate sized sample of material passing the No. 40 sieve using the wet preparation method
- Know how to prepare an appropriate sized sample of material passing the No. 40 sieve using the dry preparation method
- Know and perform obtaining multi-point liquid limit values by adjusting moisture content
- Know and perform obtaining moisture content on soil samples
- Know and perform the one-point liquid limit determination
- Know how to calculate the one-point liquid limit
- Know how to select a sample for plastic limit determination
- Know and perform procedures for plastic limit
- Know how to calculate the plasticity index using the moisture content values from the liquid limit and plastic limit determinations
- Understand information required on the report

ASTM D7928 Standard Test Method for Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis

- Understand scope of the test method
- Understand requirements for apparatus
- Understand use of a dispersing agent
- Understand use of distilled or demineralized water in the test and control of water temperature during the test
- Know and perform obtaining and preparing a soil sample for the test
- Understand how to determine temperature-density correction using either companion measurements or by determining a calibration relationship
- Understand how to determine the moisture content of the sample to be used in the hydrometer test
- Know and perform steps for sample preparation including dispersion and agitation
- Know and perform taking hydrometer readings and temperature measurements at appropriate time intervals
- Know and perform the washing procedure and sieve analysis
- Know and perform determining the percentages of soil in suspension at each hydrometer reading
- Know determining the diameter of soil particles corresponding to the percentages indicated at each hydrometer reading

- Understand how to develop a graph of the test results
- Understand reporting requirements

ASTM D2216 Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

- Understand scope of the test method
- Understand terminology
- Know the summary of the test method
- Understand significance of use
- Understand requirements for apparatus
- Understand proper handling and transporting of samples
- Understand requirements for test specimen size
- Understand guidelines for selection of samples
- Know and perform determination of the mass of the container (and lid)
- Know how to select a representative sample
- Know and perform determining the mass of the container and the moist specimen
- Know and perform drying the specimen to constant mass
- Know and perform determining the mass of the container and the dry specimen
- Know how to calculate the percent moisture content of the sample
- Understand the reporting requirements

ASTM D1557 Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

- Understand scope of the test methods
- Understand terminology
- Know the summary of the test method
- Understand the significance of use
- Understand requirements for apparatus
- Understand requirements for standardization/calibration of apparatus
- Understand how to estimate the mass of the test specimen needed and how to select the appropriate method for testing
- Understand how to determine the oversize (coarse) fraction percentage
- Understand how to determine the test (finer) fraction percentage
- Understand how to assemble the compaction mold and check equipment prior to testing
- Understand how to select and prepare the required number of subspecimens using the moist or dry preparation method
- Know and perform compaction of subspecimens
- Know and perform removing the mold collar and baseplate and trimming the specimen after compaction
- Know and perform determining the mass of the specimen and the mold
- Know and perform extracting the specimen from the mold and obtaining a representative sample for determining the molded water content
- Know and perform comparing wet weight values and conduct additional test points, if necessary, to obtain test point data which will fall on each side of the optimum water content

- Understand how to calculate the dry mass of each specimen using the wet mass and the water content of the sample
- Know how to calculate molding moisture content, moist density, dry density, and dry unit weight of each compacted specimen
- Understand how to plot the dry unit weight and molding moisture content values, how to draw a smooth curve connecting the points, and how to draw the saturation curve
- Understand the reporting requirements

ASTM D698 Standard Test Methods for Laboratory Compaction Characteristics of Soils Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

- Understand scope of methods
- Understand terminology
- Know the summary of the test method
- Understand the significance of use
- Understand requirements for apparatus
- Understand requirements for standardization/calibration of apparatus
- Understand how to estimate the mass of the test specimen needed and how to select the appropriate method for testing
- Understand how to determine the oversize (coarse) fraction percentage
- Understand how to determine the test (finer) fraction percentage
- Understand how to assemble the compaction mold and check equipment prior to testing
- Understand how to select and prepare the required number of subspecimens using the moist or dry preparation method
- Know and perform compaction of subspecimens
- Know and perform removing the mold collar and baseplate and trimming the specimen after compaction
- Know and perform determining the mass of the specimen and the mold
- Know and perform extracting the specimen from the mold and obtaining a representative sample for determining the molded water content
- Know and perform comparing wet weight values and conduct additional test points, if necessary, to obtain test point data which will fall on each side of the optimum moisture content
- Understand how to calculate the dry mass of each specimen using the wet mass and the moisture content of the sample
- Know how to calculate molding moisture content, moist density, dry density, and dry unit weight of each compacted specimen
- Understand how to plot the dry unit weight and molding moisture content values, how to draw a smooth curve connecting the points, and how to draw the saturation curve
- Understand the reporting requirements