

ANNEX 640.1-1

Job Task Analysis (JTA) for ACI Concrete Flatwork Associate, Finisher, and Advanced Finisher Certification

RESOURCES:

CCS-1, *Concrete Craftsman Series: Slabs on Grade*, Chapters 1-10

Written Examination

Required for Advanced Concrete Flatwork Finisher

Required for Concrete Flatwork Associate

- **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.

Chapter 1

- Know PPE
- Understand what specifications are and how to apply them
- Know floor tolerances
- Understand size of placement and how much concrete to order
- Know how much concrete to order per hour depending on placement options
- Know manpower requirements for the size and rate of placement
- Know layout of placement equipment to maximize production
- Understand waiting time on trucks
- Know spacing of trucks
- Know the equipment needed for placement
- Know how to anticipate problems and preparation for them
- Understand the finisher foreman's responsibilities
- Know the concrete discharge crew's responsibilities
- Know the screeding crew's responsibilities
- Know the finisher's responsibilities
- Understand what is needed per pour (placement, screeding, edges, machines, etc.)
- Know the proper crew to be productive and efficient
- Understand items to discuss in pre-construction meetings

Chapter 2

- Understand portland cement sets and hardens by reacting chemically with water and creates heat
- Understand the types of portland cement
- Understand supplementary cementitious materials
- Understand aggregates and the types of aggregates
- Know how to determine the maximum aggregate size
- Understand the types of admixtures
- Know that entrained air makes concrete more workable for a given water content and helps reduce bleeding and segregation
- Know the function of accelerating admixtures
- Understand mixture proportioning is based on a combination of experience and trial batches

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- Know the factors that affect the strength of concrete
- Understand the effect of specifications on mixture proportions
- Understand who performs concrete control tests and what information the tests provide
- Know the frequency for checking air content in concrete
- Know the problems with finishing air entrained concrete
- Understand the methods for measuring air content of concrete
- Understand the yield of concrete
- Understand the purposes of compressive strength test specimens
- Understand the purpose of handling, shipment, and storage requirements for compressive strength test specimens

Chapter 3

- Understand why proper preparation before the concrete arrives is important
- Understand how to remedy a nonuniform subgrade
- Know how to compact granular subbases and sandy soils
- Know proper depth to bury electrical conduit and pipes
- Understand elevation checks before concreting
- **Know** sequencing for large placements, and know checkerboard placements are no longer recommended
- Know the effects of floor placing and finishing operations on floor flatness and levelness
- Know how to achieve close surface tolerances
- Understand water transmission through hardened concrete
- Know placement of vapor retarders
- Know when the vapor retarder isn't required to be in direct contact with the concrete, placing a layer of granular fill over it may reduce potential problems
- Know proper placement of reinforcement
- Know when and where to mark the locations of joints

Chapter 4

- Understand floor flatness and levelness
- Know how to check levelness
- Know the specification requirements for checking flatness and levelness
- Understand the significance of FF and FL numbers
- Know why floor flatness and levelness have time requirements
- Know concerns related to high FF numbers
- Know how to achieve high FL numbers

Chapter 5

- Know the effects of placing and finishing equipment selection and operation on set time
- Know safety requirements for delivery trucks near excavations
- Know how to place concrete directly from a delivery truck using a chute
- Understand how and when to use truck-mounted conveyors
- Understand how to position trucks to maintain a continuous flow of concrete
- Know discharge rates from a delivery truck

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- Understand when direct placement is not possible
- Know the proper planning for and use of motorized buggies
- Understand when to use a crane and bucket
- Know the capacities of buckets
- Understand the safety implications of using buckets
- Understand when to use a trailer pump
- Know the capacities and reaches of trailer pumps
- Know how to set up a hose for use with a trailer pump and the proper hose size
- Understand when to use a boom pump
- Know the capacities and reaches of boom pumps
- Know proper boom pump positioning
- Understand what jobsite conditions are important when using a boom pump
- Understand when to use multiple pumps

Chapter 6

- Understand the factors that control equipment selection
- Understand the factors that control effort required to spread concrete
- Know the tools used to spread concrete by hand
- Understand the purpose of and methods for consolidating concrete
- Understand and identify types of screeds
- Understand when to use a hand float versus a hand trowel
- Know when to use a hand trowel
- Understand the purpose of pan floats
- Understand the trade-off when using curved pans
- Know the purpose of frequently checking power trowel blade conditions
- Understand and identify the types of saws used to cut joints

Chapter 7

- Understand proper method for screeding concrete surfaces
- Know the effect of flatness and levelness requirements on the installation method
- Understand finishing procedures for lower tolerance floors
- Understand finishing procedures for high tolerance floors
- Know the types of equipment used for lower and higher tolerance slabs
- Know when to use a bullfloat and when to use a darbie
- Understand proper time and use for a highway straightedge
- Know when to start floating operations
- Know application, timing, and techniques for edging and jointing of concrete
- Understand the technique to broom a slab
- Know concrete set time and the effect of placement direction
- Understand number of passes and direction to run float or pan machine
- Know proper timing and direction for troweling operations
- Understand when and which machines to use
- Know how to finish a slab with variable set times
- Understand how to machine float an edge

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- Understand how and when to hand float and trowel edges
- Understand blade pitch for floating and troweling operations

Chapter 8

- Understand the types of joints
- Know the purpose of isolation joints
- Know the materials required for isolation joints
- Understand the purpose of contraction joints
- Know contraction joint placement
- Know the purpose of contraction joints at reentrant corners
- Know when concrete is ready for sawed contraction joints
- Understand sawed contraction joint depth
- Understand early saw cutting
- Understand the purpose of construction joints
- Know when to use keyed joints
- Understand doweled construction joints and the types of dowels
- Understand joint filling

Chapter 9

- Understand concrete curing
- Understand continuous moist curing timing when not cold-weather concreting
- Know when to start curing
- Know methods of curing in hot weather before slab finishing is complete
- Understand craze cracking
- Understand when ponding water on slabs is practical
- Know issues caused by curing with clear plastic sheets
- Understand application rates of curing compounds
- Understand the purpose for air-drying concrete after curing in freeze thaw conditions
- Understand finishing in hot weather
- Know the causes of plastic shrinkage cracking
- Know methods to minimize plastic shrinkage cracking
- Understand the purpose of retarding admixtures
- Know the purpose for minimizing the temperature differential between the concrete and the base
- Understand the effects of surface carbonation of concrete
- Know how to determine adequate concrete strength for freeze protection
- Understanding the uses of calcium chloride for cold-weather concreting
- Understand methods to reduce setting time for cold-weather concreting

Chapter 10

- Understand the factors that affect bleed water
- Understand the effects of slow set
- Know the causes of and remedies for surface crusting
- Know the causes of and methods to avoid blisters
- Understand the difference between the causes of delaminations and blisters

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Job Task Analysis (JTA) for ACI Concrete Flatwork Associate, Finisher, and Advanced Finisher Certification-Continued

- Know methods to avoid delamination
- Understand when to avoid fast setting concrete
- Know the effects of erratic set
- Understand the causes of and methods to avoid sticky concrete
- Know how to prevent and mitigate rained-on surfaces
- Understand the causes of random cracking
- Understand the definition of, causes of, and methods to minimize craze cracking
- Understand the causes of concrete color differentials
- Understand the causes of surface dusting of hardened concrete
- Understand the causes of curling
- Understand the causes of scaling
- Know methods to minimize scaling



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Performance Examination

Required for Concrete Flatwork Finisher

Optional for Advanced Concrete Flatwork Finisher (not required if 4500 hrs. work experience)

- 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.

Chapter 1

- Be able to use PPE
- Be able to use placing equipment at the proper time

Chapter 2

- Demonstrate proper preparation before the concrete arrives
- Demonstrate when and where to mark the locations of joints

Chapter 6

- Perform hand spreading of concrete using the proper tools
- Demonstrate the methods for consolidating concrete
- Identify internal vibrator
- Identify types of screeds
- Be able to identify bull floats, highway straightedges, and darbies
- Be able to identify edgers, groovers, and jointers
- Be able to identify straight-edge
- Identify hand floats and hand trowel
- Be able to identify a fresno
- Be able to discern between float and trowel blades
- Identify the types of saws used to cut joints
- Identify power trowel

Chapter 7

- Demonstrate when to start floating operations
- Demonstrate application, timing, and techniques for edging and jointing of concrete
- Demonstrate proper timing and direction for troweling operations
- Demonstrate how to machine float an edge
- Demonstrate how and when to hand float and trowel edges
- Demonstrate blade pitch for floating and troweling operations

Chapter 8

- Be able to properly apply scoring contraction joints

Chapter 9

- Demonstrate when to start curing
- Be able to perform methods of curing in hot weather before slab finishing is complete