



## ***CUSTOMIZED ASSESSMENT BLUEPRINT***

### **HIGHWAY CONSTRUCTION**

**Test Code: 7569**

**Version: 01**

#### ***Specific Competencies and Skills Tested in this Assessment:***

##### **Orientation, Safety, and Security**

Identify the responsibilities of safety of the highway construction worker and the inspector  
Demonstrate the use and care of appropriate personal protective equipment  
Follow safe procedures for lifting heavy objects  
Describe safe behavior around ladders and scaffolds  
Describe fire prevention and fire-fighting techniques  
Define safe work procedures around electrical hazards  
Explain basic first aid procedures for the construction site  
Describe what OSHA is and what part it plays in job-site safety  
Describe what pieces of equipment are used by flaggers to control traffic  
Describe what stationary operation means to construction traffic control  
Practice job-site safety, prevention of slip and fall and pinch-point accidents and electrocutions  
Identify the different types of shoring and know when each should be used  
Define the responsibilities of highway inspector for job-site and project security

##### **Math**

Add, subtract, multiply, and divide whole numbers, with and without a calculator  
Use a standard ruler or tape measure and a metric ruler to measure  
Explain what an architect's ruler/scale is and how it is used and read  
Explain what an engineer's rule is and how it is used and read

## ***Highway Construction continued***

### **Introduction to Highway Construction Materials**

- Describe what a slump cone is and what it is used for
- Describe what types of air meters there are and what they are used for
- Describe how to use a hammer for testing concrete soundness
- Describe what a pull-off test is and what it determines
- Describe what compression testing is and how it is done
- Describe what a test-beam is and what it is used for
- Describe what a measure wheel is, how it is used, and what it is used for
- Describe what a roll-a-meter is, how it is used, and what it is used for
- Describe what PennDOT Bulletin 15 is, and what it is used for
- Describe what the Department of Transportation 408 Spec Manual is and what it is used for
- Describe what concrete is and its history
- Describe what superplasticizers are, and what they are used for
- Describe what fibermesh is, and what it is used for
- Describe what a concrete retarder is, and what it is used for
- Describe what concrete accelerators are, and what they are used for
- Describe what air entrained concrete is and its benefits
- Describe what curing compounds are, and what they are used for
- Describe what wet curing is and when and how it is used
- Identify the benefits to curing concrete
- Describe the meaning of cold weather curing
- Describe what shocking means during winter curing and identify how it happens
- Identify the curing time requirements according to ACI
- Describe what a bituminous paving is
- Describe what fine aggregate is
- Describe what coarse aggregate is
- Describe what a construction joint is and where it is used
- Describe what re-cycle asphalt pavement is. (RAP) processes, equipment and attachments
- Describe what tack coat is and what it is used for
- List the reasons for taking a core sample of a finished asphalt roadway
- Identify the processes to check for surface tolerances on a roadway
- Describe what concrete reinforcement is
- List the reasons why epoxy coated rebar is now used
- Describe what wire mesh is and what it's used for
- Describe what cement is and what it is used for
- Describe aggregate and how it is manufactured, sized, and graded
- Describe fly ash, where it's originated and why it is used in concrete
- Describe natural sand, manufactured sand and what they are used for in the construction trade
- Identify weights of common construction material

## ***Highway Construction continued***

### **Introduction to Plans, Specs, and Terminology**

Describe what specifications are  
Describe what construction plans are  
Describe what a contract agreement is  
Describe what a right-of-way is  
Describe and list what the parts of a bridge are using construction terminology  
Describe what the crown of a roadway is  
List the major types of ditches used to control drainage and explain why each type would be used  
Describe what a pipe culvert is  
List different types of drainage pipes used in construction and explain why each type is used  
Match terms associated with soil to the correct definitions  
Select from a list of types of compacting equipment  
Name the basic soil stabilization methods  
Define terms associated with basic earth moving operations  
Describe various methods for keeping construction sites well drained  
Demonstrate silt fence inspection to meet PennDOT 408 criteria  
Identify common pipe structures

### **Introduction to Concrete Testing**

Identify what ACI is and what it means to the construction industry  
Demonstrate the use of a slump cone to perform a slump test on a sample of concrete  
Describe what types of molds are used for cementitious samples  
Describe and demonstrate the proper use of a thermometer to test concrete samples  
Describe the weight of a cubic yard of concrete  
Identify the weight of a bag of Portland cement

### **Introduction to Hand and Power Tools**

Recognize and identify some of the basic hand tools used in the construction trade  
Recognize and identify some of the commonly used power tools in the construction trade  
Describe proper power tool maintenance  
Demonstrate/describe the safe use of a bench grinder  
Demonstrate/describe the safe use of a chop-saw  
Demonstrate/describe the safe use of electric power hand tools  
Demonstrate/describe the safe use of a power tamper  
Demonstrate/describe the safe use of a jack-hammer  
Demonstrate/describe the safe use of generators/light towers  
Demonstrate/describe the safe use of portable pumps. Battery powered tools  
Demonstrate/ describe the safe use of gas powered saws

### **Basic Rigging**

Identify and describe the use of slings and common rigging hardware  
Describe the basic inspection techniques and rejection criteria used for slings and hardware  
Describe basic load-handling safety practices  
Demonstrate proper use of American National Standards Institute (ANSI) hand signals  
Demonstrate the proper placement and the safe use of wooden cribbing to support heavy equipment

## *Highway Construction continued*

### **Welding and Cutting**

Successfully complete written welders safety test with a score of 100%

Properly demonstrate how to set up an oxy-fuel torch set

Properly demonstrate how to cut a piece of steel with an oxy-fuel cutting torch

### **Identification of Equipment**

Identify the various types and uses of compaction equipment

Identify purpose and function of GPS systems

## **Written Assessment:**

Administration Time: 3 hours

Number of Questions: 216

### ***Areas Covered:***

19%	Orientation, Safety, and Security
5%	Math
35%	Introduction to Highway Construction Materials
15%	Introduction to Plans, Specs, and Terminology
4%	Introduction to Concrete Testing
9%	Introduction to Hand and Power Tools
4%	Basic Rigging
6%	Welding and Cutting
3%	Identification of Equipment

### ***Sample Questions:***

Oil rags should be stored in a

- A. self-closing metal box
- B. wooden crate
- C. tool box
- D. paper bag

Measure wheels are used to measure

- A. linear distances
- B. cubic feet
- C. volume
- D. square yards

Relief valves protect the hydraulic system from

- A. over-pressurizing
- B. over-speeding
- C. under-pressurizing
- D. under-speeding

Fly ash is a byproduct of

- A. wood burning
- B. recycled tires
- C. coal burning
- D. air filtering

A cementitious sample is used to perform which type of concrete test?

- A. compression
- B. stability
- C. density
- D. design

## **Performance Assessment:**

Administration Time: 2 hours and 50 minutes  
Number of Jobs: 5

### ***Areas Covered:***

- 23%      **Oxyacetylene Burning and Cutting**  
*Comply with safety PPE requirements, assemble and set up the torch, verify no leaks at hose and body connection, layout the cutting on the steel, light torch, perform cutting operation, time to complete, accuracy of cutting.*
- 11%      **Set Up a Traffic Control and Work Zone**  
*Review PennDOT 213 and their assigned blueprint, measure and layout, efficiency in layout procedures, time to complete.*
- 23%      **Form 10' x 10' Pad**  
*PPE and safe work procedures, measurements and square, walls plumb, slope, pinning, time to complete.*
- 23%      **Tie Rebar 10' x 10' Mat**  
*PPE and safe work procedures, secure the correct rebar for the diagram, lay out the pattern in the box, standard ties procedures, saddle ties procedures, edge clearance.*
- 20%      **Test Concrete Using Air, Slump, and Test Specimen**  
*Prepare tools for slump test, collect sample material, conduct slump test, conduct air test, sample for compression test, proper cleanup, time to complete.*

***Sample Job:*** Tie Rebar for 10' x 10' Mat

***Maximum Job Time:*** 40 minutes

***Participant Activity:*** The participant will lay out the rebar with chairs and tie every intersection (8 standard and 8 saddle). Comply with all safety regulations.