

CMHA CERTIFIED CONCRETE PAVER INSTALLER EXAM BLUEPRINT, STUDY GUIDE AND REFERENCES

The purpose of this guide is to provide candidates with information intended to help focus the study efforts of the test taker. The exam's blueprints include 11 core competencies that are vital to becoming a Certified Concrete Paver Installer.

Examination Blueprint

CORE COMPETENCIES	WEIGHT %	# ITEMS
Paver Fundamentals <ul style="list-style-type: none"> Describe a paver system Contrast types of concrete paver applications 	15%	15
Project Overview <ul style="list-style-type: none"> Determine site specifications Obtain proper permits (if required) Ensure proper communication/planning prior to the job start Evaluate logistics for the job 	11%	11
Sub-Grade Elevation and Preparation <ul style="list-style-type: none"> Identify location of utilities Calculate job layout dimensions Identify proper tools/equipment for excavation/demolition Evaluate the soil/sub-grade Demonstrate proper compaction techniques for the sub-grade Explain the use of geotextile in hardscaping projects Discuss proper disposal of construction spoils 	17%	17
Aggregate Base <ul style="list-style-type: none"> Summarize ASTM standards for proper aggregate base material selection Explain techniques for the installation of aggregate base Determine proper compaction/moisture content of aggregate base 	17%	17
Bedding Sand <ul style="list-style-type: none"> Summarize the ASTM standard for bedding sand Discuss proper storage of bedding sand on the job site Verify proper moisture content for bedding sand Identify proper screed depth of bedding sand Explain proper installation techniques for bedding sand 	7%	7

<p>Installation of Concrete Pavers</p> <ul style="list-style-type: none"> • Determine starting point for installation of concrete pavers • Discuss proper material handling/staging during the installation process • Establish bond lines using string lines/chalk lines • Describe the ergonomics of installation • Employ the click and drop method for installing pavers • Construct interlocking concrete pavements using specified patters/spacing • Straightening of bond lines • Demonstrate proper techniques for cutting/shaping pavers • Ensure proper construction tolerances in the installation • Demonstrate proper compaction techniques for pavers 	17%	17
<p>Edge Restraints</p> <ul style="list-style-type: none"> • Discuss the purpose of edge restraints • Select proper edge restraints for paver installation • Install edge restraints • Determine the correct length and material of spike • Construct the base past the edge restraint by a minimum of 6 inches 	3%	3
<p>Joint Sand</p> <ul style="list-style-type: none"> • Discuss the purpose of joint sand • Summarize the ASTM standard for joint sand • Identify the maximum joint size • Install joint sand • Explain proper techniques for vibrating/consolidating the joints 	6%	6
<p>Care and Maintenance</p> <ul style="list-style-type: none"> • Discuss proper applications for sealers • Describe joint sand stabilization • Outline methods for cleaning pavers • Outline paver maintenance and repair techniques 	2%	2
<p>Safety</p> <ul style="list-style-type: none"> • Perform job hazard analysis • Identify resources for mitigating silica in construction • Identify typical hazards on a hardscape installation project 	5%	5
<p>Construction Tips</p> <ul style="list-style-type: none"> • Describe tips for more efficient paver construction 	0%	0
Total	100%	100

Examination Study Guide

PAVER FUNDAMENTALS

1. Describe a paver system

- a. History
- b. Overview

2. Contrast types of concrete paver applications

- a. List types of concrete paver applications

PROJECT OVERVIEW

1. Determine site specifications

- a. Size and design the pavement

2. Obtain proper permits (*if required*)

- a. Consult local building departments
- b. Consult local building codes/HOA

3. Ensure proper communication/planning prior to the job start

- a. Job costing
- b. Drawing approval from home owner
- c. Slope and drainage
- d. Paver material and color approval
- e. Edge restraint material
- f. Joint materials
- g. Sealing materials
- h. Elevation approval from home owner
- i. Change order

4. Evaluate logistics for the job

- a. Proper equipment selection
- b. Labor requirements
- c. Site access

SUB-GRADE ELEVATION AND PREPARATION

1. Identify location of utilities

- a. Water, gas, phone, power, cable

2. Calculate job layout dimensions

- a. Establish benchmark
- b. Establish sub-grade
- c. Elevation/slope measuring equipment

- 3. Identify proper tools/equipment for excavation/demolition**
 - a. Tools/equipment selection
- 4. Evaluate the soil/sub-grade**
 - a. Evaluation
- 5. Demonstrate proper compaction techniques for the sub-grade**
 - a. Types of equipment
 - b. Moisture content
 - c. Proper compaction techniques
- 6. Explain the use of geotextile in hardscaping projects**
 - a. Proper selection of geotextile
 - b. How to install geotextile
 - c. Common uses
- 7. Discuss proper disposal of construction spoils**
 - a. Concrete
 - b. Soil haul-off

AGGREGATE BASE

- 1. Summarize ASTM standards for proper aggregate base material selection**
 - a. Select proper material
- 2. Explain techniques for installation of aggregate base**
 - a. Proper installation equipment
 - b. Installing in lifts
 - c. Extend 6" beyond outside of edge restraint
 - d. Proper grading
- 3. Determine proper compaction/moisture content of aggregate base**
 - a. Proper grading and tolerances
 - b. Moisture content /remediation
 - c. Proper compacting equipment
 - d. Compaction testing

BEDDING SAND

- 1. Summarize the ASTM standard for bedding sand**
 - a. Size, shape, and hardness
- 2. Discuss proper storage of bedding sand on the jobsite**
- 3. Verify proper moisture content for bedding sand**
 - a. Moisten dry sand
 - b. Do not lay pavers on saturated sand

INSTALLATION OF CONCRETE PAVERS

- 1. Determine the starting point for installing concrete pavers**
 - a. Start from low point and work uphill
 - b. Establish final orientation of layout lines to known surface
- 2. Discuss proper material handling/staging during the installation process**
 - a. Hand vs mechanical
 - b. Verify quality of materials and defective materials
- 3. Establish bond lines using string lines/chalk lines**
 - a. Every 6 to 12 feet
 - b. Verify square (3-4-5 triangle)
 - c. Method of crossing tape measures
 - d. Laser layout stations
- 4. Describe ergonomics of installation**
 - a. Lay pavers from the standing position
- 5. Employ the click and drop method for installing pavers**
- 6. Construct interlocking concrete pavements using specified patterns/spacing**
 - a. Consult manufacturer and follow patterns
 - b. More waste when using intricate patterns/curves
 - c. Borders, inlays, customizing
 - d. Blending colors
- 7. Straighten bond lines**
 - a. Use alignment bar or persuader to straighten lines
- 8. Demonstrate proper techniques for cutting/shaping pavers**
 - a. Joint width
 - b. Marking and cutting pavers
 - c. Do not dry cut
- 9. Ensure proper construction tolerances in the installation**
 - a. Finish grade should be between 1/8" and 1/4" above rigid structures for future settlement
 - b. 3/8 inch finish surface
 - c. 1/4 inch lippage to hard surface
 - d. 1/8 inch lippage between pavers
 - e. 1/2 inch bond lines within 50 feet
- 10. Demonstrate proper compaction techniques for pavers**
 - a. Straighten bond lines

- b. Start at the perimeter, work toward interior with at least two passes, overlapping 4 inches
- c. Mark and remove damaged pavers during compaction BEFORE SANDING JOINTS
- d. Use the proper size and type compactor
- e. Stay 6 feet away from unrestrained edges

EDGE RESTRAINTS

1. Discuss the purpose of edge restraints

- a. Prevent movement and maintain interlock
- b. Bedding sand containment
- c. Use of geotextile to eliminate bedding sand loss along edge restraint

2. Select proper edge restraints for paver installation

- a. Concrete curbs
- b. Manufactured edge
- c. Use products made for pavers
- d. Mortar edge

3. Install edge restraints

- a. Remove excess bedding sand
- b. Install on the base

4. Determine the correct length and material of spike

- a. Use spike holes as recommended by manufacturer

5. Construct the base past the edge restraint by a minimum of 6 inches

JOINT SAND

1. Discuss the purpose of joint sand

- a. Load transfer

2. Summarize the ASTM standard for joint sand

- a. Hardness
- b. Size/shape of sand

3. Identify the maximum joint size

- a. 1/16 to 3/16 inch maximum

4. Identify the maximum joint size

- a. Ensure compaction prior to joint sand installation
- b. Spread with lute rake
- c. Leave consistent surplus of sand on top of pavers

5. Explain proper techniques for vibrating/consolidating the joints

- a. Vibrate sand into joints using a 5,000 pound compactor

CARE AND MAINTENANCE

1. Discuss proper applications for sealers

- a. Problem areas
- b. Sealers are not required
- c. Change appearance
- d. Purpose of sealer
- e. Sealing is not permanent
- f. Follow all manufacturer's instructions for pavers, sealers, and cleaners

2. Describe joint sand stabilization

- a. Not permanent
- b. Positive reasons to use joint sand stabilization

3. Outline methods for cleaning pavers

- a. Follow all manufacturer's instructions for pavers, sealers, and cleaners

4. Outline paver maintenance and repair techniques

- a. Identify problem areas
- b. Repair problem area

SAFETY

1. Perform a job hazard analysis

- a. Administrative controls
- b. Engineering controls
- c. PPE (boots, gloves, mask, hearing, eye protection)

2. Identify resources for mitigating silica in construction

- a. Cutting (dry cutting, vacuum system...)

3. Identify typical hazards on a hardscape installation project

- a. Back injuries
- b. Muscle pulls
- c. Finger abrasion
- d. Skin rash or burns
- e. Lung and respiratory injuries
- f. Eye injuries
- g. Heat exhaustion
- h. Impact injuries
- i. Vibration-related injuries
- j. Hearing loss
- k. Knee injuries

CONSTRUCTION TIPS

1. Describe tips for more efficient paver construction

- a. Cutting curves/undercutting
- b. Marking
- c. Drainage referring to paver size
- d. Too small compactors
- e. Troubleshooting
- f. Poor effort in edge restraint construction
- g. Efficiency
- h. Proper tools
- i. Right equipment
- j. Staging
- k. Material flow
- l. Material ordering
- m. Subcontracting
- n. Over-excavating
- o. Paver removal
- p. Cuts towards the inside (soldier course)
- q. New construction (settlement)
- r. Sleeving (utility)
- s. Installing edge restraints between pavers and other materials

Examination References

FROM CERTIFICATION OPERATIONS MANUAL:

5.2.1.1 The Certification Body does not accredit or endorse any particular training course or source of education as a guarantee of success on the certification exams.

5.2.1.2 The Certification Body, in keeping with the accreditation requirements of ISO 17024 standard, do not link any training or education programs or any other educational provider's educational programs offered, to facilitate obtaining an CMHA credential.

REFERENCES:

Concrete Paver Installer Course Student Manual v10, Concrete Masonry & Hardscapes Association, Herndon, VA 2023

Tech Spec 1 – Glossary of Terms Used in the Production, Design, Construction and Testing of Interlocking Concrete Pavement, Interlocking Concrete Pavement Institute, Herndon, VA, 2003.

Tech Spec 2 – Construction of Interlocking Concrete Pavements, Interlocking Concrete Pavement Institute, Herndon, VA, 2003

Tech Spec 3 – Edge Restraints for Interlocking Concrete Pavements, Interlocking Concrete Pavement Institute, Herndon, VA, 2003.

Tech Spec 4 – Structural Design of Interlocking Concrete Pavement for Roads and Parking Lots,

Interlocking Concrete Pavement Institute, Herndon, VA, 2003

Tech Spec 5 – Cleaning, Sealing and Joint Sand Stabilization of Interlocking Concrete Pavement, Interlocking Concrete Pavement Institute, Herndon, VA, 2004

Tech Spec 6 – Operation and Maintenance Guide for Interlocking Concrete Pavement, Interlocking Concrete Pavement Institute, Herndon, VA, 2022.

Tech Spec 10 – Application Guide for Interlocking Concrete Pavements, Interlocking Concrete Pavement Institute, Herndon, VA, 2004

Tech Spec 22 – Geosynthetics for Segmental Concrete Pavements, Interlocking Concrete Pavement Institute, Chantilly, VA 2022

TenCate Mirafi Geotextile Technical Data

The Aggregate Handbook, National Stone Association, Edited by R.D. Barksdale, Washington, D.C., 1993

Annual Book of ASTM Standards, Volume 04.02, Concrete and Aggregates, American Society for Testing and Materials, West Conshohocken, Pennsylvania, 2004

Annual Book of ASTM Standards, Volume 04.05, Chemical Resistant Materials; Vitrified Clay, Concrete, Fiber-Cement Products; Mortars; Masonry, American Society for Testing and Materials, West Conshohocken, Pennsylvania, 2004

Construction Tolerances and Recommendations for Interlocking Concrete Pavements, Interlocking Concrete Pavement Institute, Chantilly, VA 2020