



STUDY GUIDE
For the
REGISTERED ROOF OBSERVER (RRO[®]) EXAM

Prepared By
RRO Examination Development Task Force

RCI, Inc.
1500 Sunday Drive Ste 204
Raleigh, NC 27607
800-828-1902 919-859-0742

RRO Study Guide

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STUDY GUIDE RRO EXAMINATION RCI, Inc.

INTRODUCTION

One early goal of RCI, Inc. was to develop a recognized and highly regarded registration program for Roof Quality Assurance Observers. The registration program was authorized by the RCI Board of Directors in 1989 and implemented in 1992. The primary beneficiaries of this program are the public, the roofing industry, and those who become registered.

RCI offers its RRO Program to all applicants, members and non-members. Registration is a two-part program based on an application process along with satisfactory performance on a comprehensive computer-based examination.

This study guide outlines subjects that are addressed in the examination; however, it is not intended to be an inclusive listing of every topic. This document is strictly a guide.

The latest RRO exam revision was completed in December 2017 in compliance with the Standard for the Accreditation of Certification Programs as published by the National Commission for Certifying Agencies (NCCA). A committee of subject matter experts followed a rigorous psychometric process in its development.

The examination is not tailored to any one particular area of roof observation, or to the design and construction practices unique to any geographic area. It deals primarily with roof observations in general. It may include all phases of roof observations (methodology and construction), both steep and low-slope roofing, and all systems (shingle, tile, slate, single-ply, modified bitumen, built-up, wood, metal and spray applied systems).

In order to receive a passing score on the examination, the examinee must be thoroughly familiar with the basic methodology of Q.A.O. and have a broad knowledge of: basic roof science, documentation and reporting, field testing observation, construction documents, roles, responsibilities and ethics, and roof systems and materials. Preparation for the exam is essential and is unique to each individual depending on one's experience.

The exam is offered online by Castle Worldwide, a computer-based testing company. It consists of 75 multiple choice questions and is up to three hours in duration.

Consult <http://www.castleworldwide.com/mainsite/ibtsites> for a conveniently located testing site near you.

References*

A sample of documents/references that were used to develop the RRO exam is as follows:

<i>Title</i>	<i>Author</i>	<i>Publication Date</i>
1. Construction Specifications Principles and Applications	H. Meier/D. Wyatt	2008
2. Manual of Low-Slope Roof Systems – Fourth Edition	C.W. Griffin & R.L. Fricklas	2006
3. NRCA Roofing Manual: Architectural Metal Flashings	NRCA	2014
4. NRCA Roofing Manual: Membrane Roof Systems	NRCA	2015
5. NRCA Roofing Manual: Metal Panel & SPF Roof Systems	NRCA	2016
6. NRCA Steep-Slope Roofing Systems	NRCA	2017
7. RCI Code of Ethics	RCI	2012
8. RCI Manual of Practice	RCI	2010
9. The Project Resource Manual : CSI Manual of Practice, 5 th Edition	CSI	2005

*The references listed above are only some of the many that were used in the development of this exam. This is meant to serve as a guide to illustrate the types of references used; this is not a recommendation or suggestion to purchase all of the publications listed. The most useful tool in preparation for the exam is the following list of skills, knowledge and responsibilities identified by the task force as those associated with acceptable performance within the quality assurance observer profession. It is recommended that the applicant review this list as it relates to one's experience/skill set and then prepare accordingly with the courses and/or publications which may be helpful to the individual.

As part of the exam revision process, the committee of subject matter experts systematically compiled a list of objectives that relate to the responsibilities, knowledge, and skills associated with acceptable performance within the quality assurance observer profession. This list provided the organizational framework for the exam and is attached below.

Sections	Section/Objective Title	Percentage of questions from section on exam
Section 1	Basic Roof Science	8%
Objective 1.1	Describe a basic understanding of thermal moisture, drainage and wind principles related to roof construction.	
Section 2	Documentation and Reporting	9%
Objective 2.1	Describe the monitoring, recording and reporting of roof installation.	
Objective 2.2	Demonstrate basic math operations as related to roof construction.	
Section 3	Field Testing Observation	5%
Objective 3.1	Describe field testing procedures.	
Section 4	Construction Documents	11%
Objective 4.1	Describe standards and construction documents.	
Section 5	Roles, Responsibilities and Ethics	19%
Objective 5.1	Describe the roles and responsibilities of the RRO.	
Objective 5.2	Demonstrate project-specific roles.	
Objective 5.3	Demonstrate ethics governing the behavior of the RRO.	
Objective 5.4	Demonstrate appropriate PPE, personal safety requirements and job site hazards.	
Section 6	Roof Systems and Materials	48%
Objective 6.1	Describe low-slope roofing systems	
Objective 6.2	Describe steep-slope roof systems	
Objective 6.3	Describe metal roof systems	
Objective 6.4	Describe liquid membranes	
Objective 6.5	Describe sheet metal flashings	
Objective 6.6	Describe roof accessories	
Objective 6.7	Describe roof insulation	
Objective 6.8	Describe roof deck types	

RRO Exam Sample Questions

Refer to Exhibit #1.

1. Which two materials would be appropriate for item A shown in the exhibit? (Choose two.)
 - A. glass fiber insulation
 - B. polyisocyanurate insulation
 - C. polyurethane insulation
 - D. mineral wool insulation

2. When is it appropriate for a change directive to be issued?
 - A. When total agreement on the terms of the change order cannot be reached in a timely manner.
 - B. When the owner and contractor have agreed on the change in contract amount and time after discovery of an unforeseen condition.
 - C. When change in the work exceeds 10% of the contract amount.
 - D. When the RRO submits a statement of non-compliance.

Refer to Exhibit #2

3. Referring to the exhibit, which total percent of the project is complete?
 - A. 34%
 - B. 56%
 - C. 63%
 - D. 72%

4. Who controls the delivery, storage, and handling required for project materials?
 - A. the designer of record
 - B. the roof observer
 - C. the building owner
 - D. the contractor

5. Who is responsible for providing the RRO with personal protection equipment?
 - A. project manager
 - B. contractor
 - C. RRO's employer
 - D. building owner

6. A contractor is installing an SPF roof.

At a minimum, how many degrees should the ambient temperature be above the dew point for this roof?

- A. 2 degrees F [1.1 degrees C]
- B. 5 degrees F [2.8 degrees C]
- C. 7 degrees F [3.9 degrees C]
- D. 10 degrees F [5.5 degrees C]

7. A coating is being applied over an existing metal roof.

Which instrument will measure the thickness of the coating during application?

- A. optical comparator
- B. wet-and-dry-bulb psychrometer
- C. wet-mil gauge
- D. loupe

8. According to NRCA, which two metals are solderable? (Choose two.)

- A. prefinished aluminum
- B. galvanized steel
- C. galvalume
- D. stainless steel

9. When installing fire- and pressure-treated wood shake and shingles, which nail must be used?

- A. copper
- B. 316 stainless steel
- C. electro-galvanized steel
- D. hot-dipped galvanized steel

10. Which two deck types are considered nailable? (Choose two.)

- A. precast concrete
- B. steel deck
- C. light-weight insulating concrete
- D. channel slabs

11. The RRO is observing the Contractor install a 1/2" (13 mm) wood fiber cover board over the base layer of insulation; however the Construction Documents state that a 3/4"

(19 mm) perlite cover board is to be installed. What should the RRO do?

- A. Assume that the 1/2" (13 mm) wood fiber was approved.
- B. Assume that the Contractor is not installing the correct material.
- C. Contact the Owner immediately.
- D. Notify the Contractor, record the deviation and contact the Designer Authority.

12. How would a change to the Specifications be made prior to the submittal of bids?

- A. Change Order
- B. Change Directive
- C. Purchase Order
- D. Addendum

13. Which of the following seaming procedures is appropriate for TPO membranes?

- A. Hot-air welding
- B. Solvent-welding
- C. Liquid-applied adhesive
- D. Mastic-applied

14. The RRO observes that the temperature of the roofing asphalt at the point of application is too low. How should the RRO determine what the proper asphalt temperature at the point of application is?

- A. Review the flash point of the asphalt.
- B. Review the finish blowing temperature of the asphalt.
- C. Review the EVT of the asphalt.
- D. Review the temperature gauge at the asphalt kettle.

15. Which of the following could be a cause of blistering on an SBS roof?

- A. Voids in the interply moppings
- B. Excessive amounts of asphalt
- C. Incorrect type of asphalt
- D. Improper installation of the underlayment

16. Which of the following surface textures are acceptable for SPF?

- A. Smooth, orange peel, coarse orange peel, or popcorn
- B. Smooth, orange peel, coarse orange peel, or treebark
- C. Smooth, orange peel, popcorn or verge of popcorn
- D. Smooth, orange peel, coarse orange peel, or verge of popcorn

17. Per OSHA, what is the proper distance from the wall that the base of a ladder should be placed?
- A. One-fifth of the working height
 - B. One-fourth of the working height
 - C. One-third of the working height
 - D. One-half of the working height
18. The RRO would be involved in which of the following tasks:
- A. Direct construction means and methods
 - B. Document and quantify unforeseen conditions
 - C. Accept material substitutions
 - D. Help enforce project schedule
19. The RRO is reviewing the installation of a roof system over a steel deck. The RRO observes that the deck has been modified in order to accommodate the installation of piping with an opening between 8 in. to 13 in. (200 mm to 325 mm) in diameter. The RRO is concerned about the integrity of the deck around this opening. What action should the RRO take?
- A. Tell the Roofing Contractor to remove the piping and repair the deck opening.
 - B. Inform the Roofing Contractor that plate reinforcement is required over the top of the deck due to the size of the opening.
 - C. Inform the Roofing Contractor that plate reinforcement is required on the underside of the deck due to the size of the opening.
 - D. Document the condition and contact the Designer of Record for direction.
20. A roof is 85 squares in area. The Contractor has $\frac{1}{8}^{\text{th}}$ of the total roof left to complete. What area has been completed so far?
- A. 10 squares
 - B. 70 squares
 - C. 1,063 sq. ft. (99 sq. m.)
 - D. 7,438 sq. ft. (691 sq. m.)
21. When installing asphalt shingle on a plywood deck, what is the MINIMUM depth the nails should penetrate through the plywood deck?
- A. $\frac{1}{8}$ " (3 mm)
 - B. $\frac{1}{4}$ " (6 mm)
 - C. $\frac{1}{2}$ " (13 mm)
 - D. $\frac{3}{4}$ " (19 mm)

22. According to the NRCA Roofing Manual, how often should a termination bar be fastened on single-ply base flashings?
- A. 6" (150 mm)
 - B. 8" (200 mm)
 - C. 12" (300 mm)
 - D. 18" (450 mm)
23. What is the MAXIMUM roof slope recommended for the application of a coal-tar roof?
- A. Less than $\frac{1}{4}$ inch per foot
 - B. Less than $\frac{1}{2}$ inch per foot
 - C. Less than $\frac{3}{4}$ inch per foot
 - D. Less than 1 inch per foot
24. Proper documentation of Contractor manpower, crew size, weather conditions, and weather related work stoppages can be used to determine which of the following?
- A. If the Contractor's crews are being efficient with the installation of the material
 - B. If the Contractor should be paid for the work completed
 - C. If the RRO should direct the contractor to add manpower
 - D. If contract time extensions are granted, or if financial penalties are imposed
25. ASTM D312 - Standard Specification for Asphalt Used in Roofing lists four types of roofing asphalt based on resistance to flow. The preferred type of asphalt for a built-up membrane being installed on a roof having a slope greater than 1:12 is:
- A. Type I Asphalt.
 - B. Type II Asphalt.
 - C. Type III Asphalt.
 - D. Type IV Asphalt.
26. What information should be contained in the RRO's daily report?
- A. Work activities, installation procedures, and the RRO's opinion of Contractor performance
 - B. Work activities, materials being used, and installation procedures
 - C. Work activities, equipment being used, and number of apprentices on the job
 - D. Work activities, Contractor break times, and weather conditions

27. In what Division in the CSI Specification Format would the RRO expect to find criteria for thermal roof insulation?
- A. Division 6
 - B. Division 7
 - C. Division 8
 - D. Division 9
28. NRCA recommends that the board size of polyisocyanurate roof insulation in adhered application not exceed:
- A. 2' x 4' (600 x 1200 mm)
 - B. 3' x 4' (900 x 1200 mm)
 - C. 4' x 4' (1200 x 1200 mm)
 - D. 4' x 8' (1200 x 2400 mm)
29. The RRO is observing the installation of a slate roof system with a pitch of 10:12. What is the recommended head lap for 12" x 24" (300 mm x 600 mm) slate?
- A. 2" (50 mm) head lap
 - B. 3" (75 mm) head lap
 - C. 4" (100 mm) head lap
 - D. 6" (150 mm) head lap
30. When on site, the RRO observes the Contractor is not properly storing material on a daily basis. What is the appropriate action the RRO should take?
- A. Record observations in the field report and report the condition to the Contractor and Design Authority.
 - B. Inform the Contractor of the discrepancy and give the Contractor the opportunity to correct the problem.
 - C. Inform the Owner that the Contractor is not complying with the Specifications.
 - D. Assist the Contractor with correcting the discrepancy.

Exhibit #1

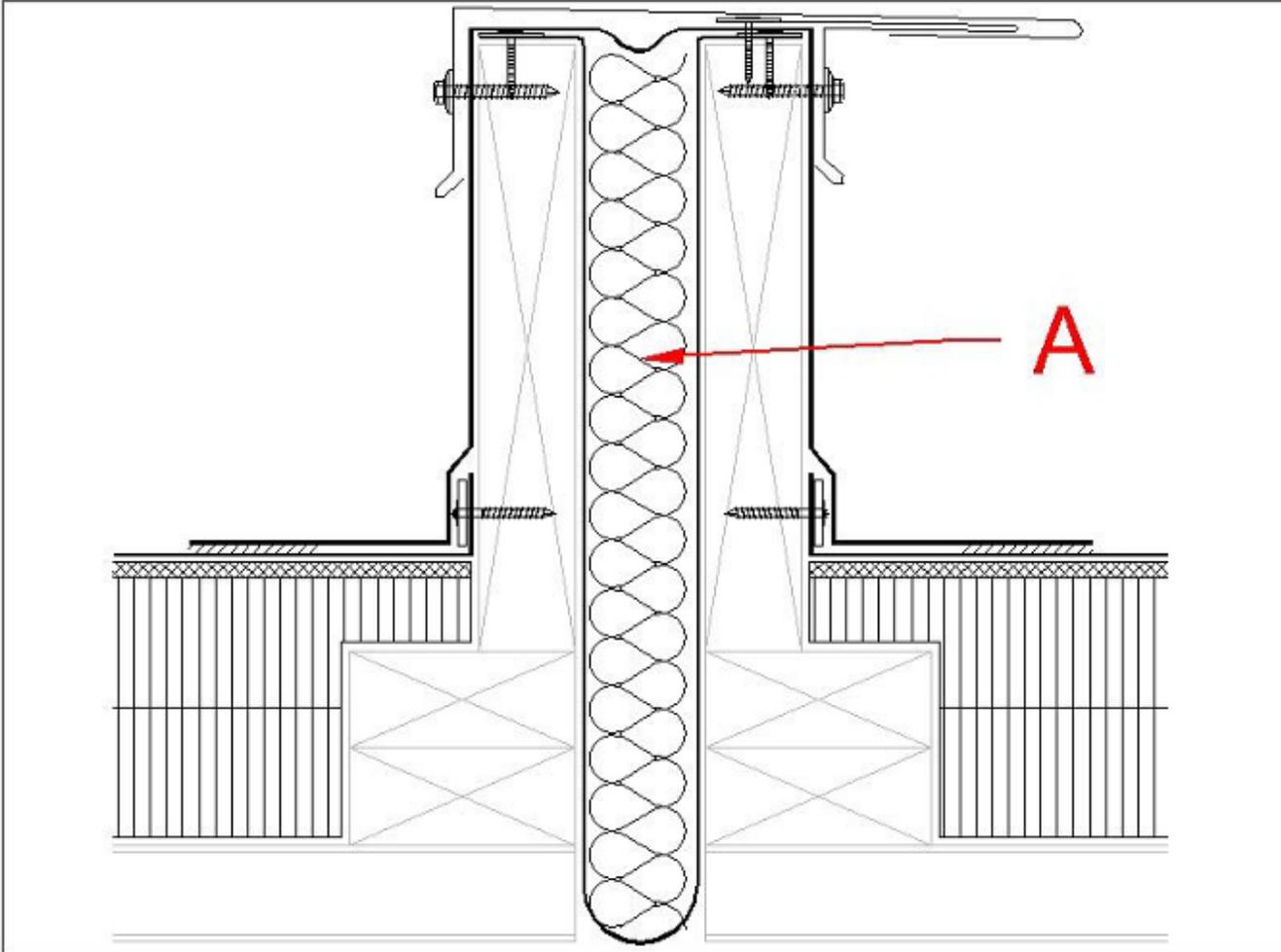
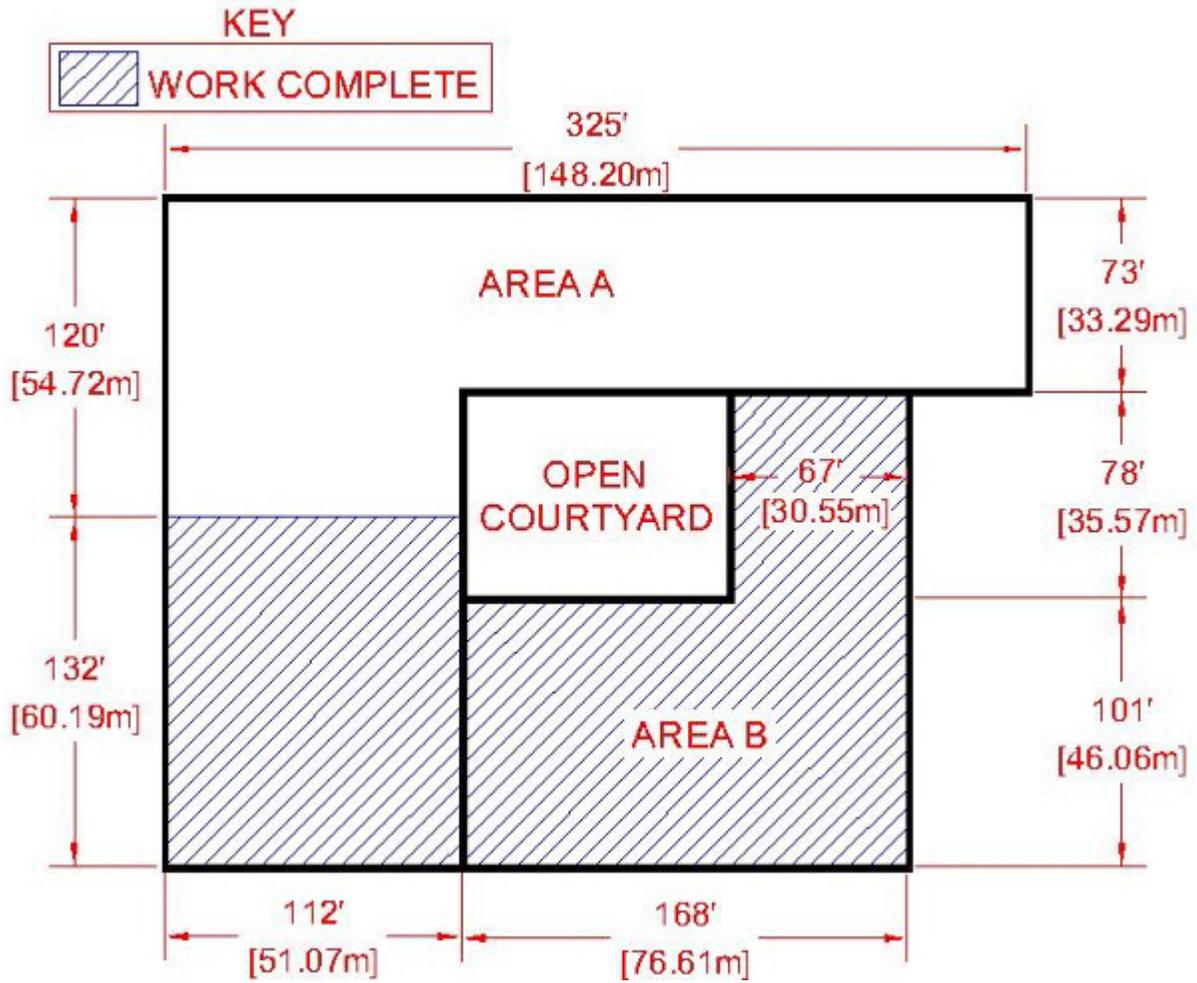


Exhibit #2



Answers to Sample Questions

Note your answers. Review the appropriate document(s) in those areas to better understand the rationale behind the indicated correct answer.

The following courses/course manuals provided by RCI are highly recommended for those pursuing the RRO designation: Roofing Technology and Science I and II, Rooftop Quality Assurance and Building Envelope Quality Assurance.

1. A & D
2. A
3. B
4. D
5. C
6. B
7. C
8. B & D
9. B
10. B & C
11. D
12. D
13. A
14. C
15. A
16. D
17. B
18. B
19. D
20. D
21. A
22. C
23. A
24. D
25. D
26. B
27. B
28. C
29. B
30. A