

# Preparing for Carpenter Training



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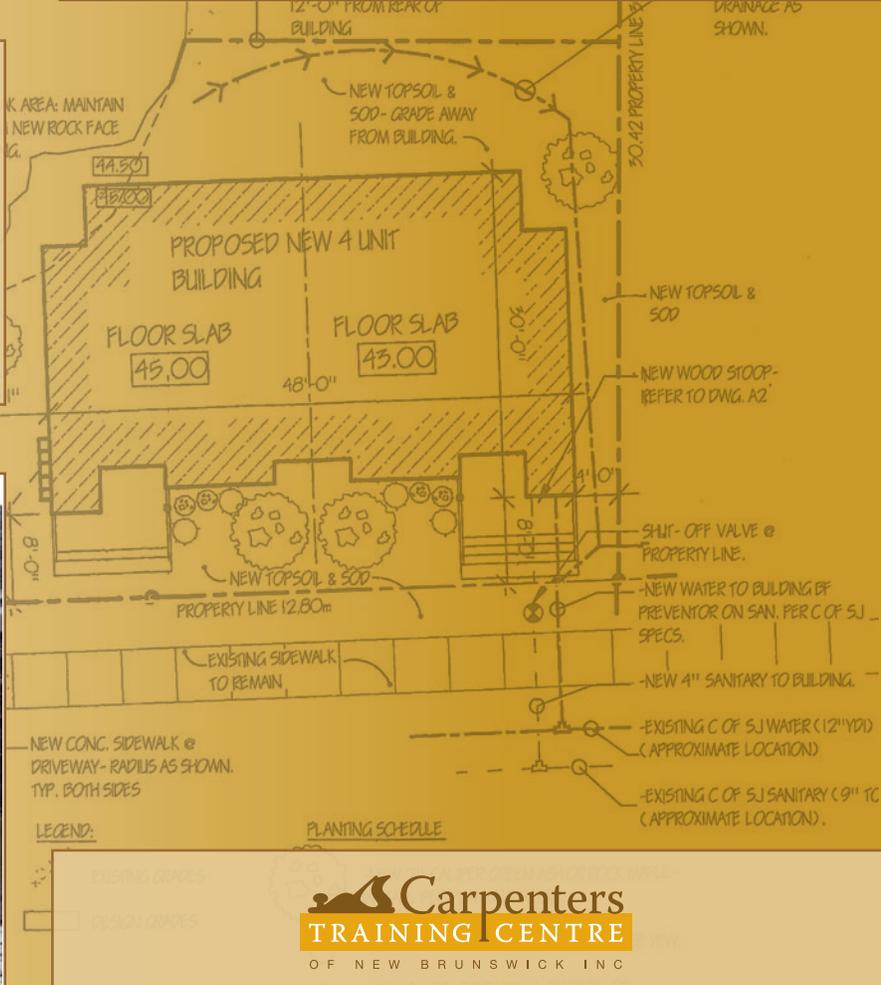
DATE:

COURSE:

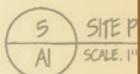
HIGH PLATEAU AREA  
EXISTING TO  
REMAIN

NEW TOPSOIL &  
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LIMITS OF CONTRACT  
TOP OF CLIFF



NEW ASPHALT



The Construction Sector Council is a national organization committed to the development of a highly skilled workforce – one that will support the future needs of the construction industry in Canada. Created in April 2001, and financed by both government and industry, the CSC is a partnership between labour and business.

This material was developed by the Construction Sector Council to further the use of Essential Skills concepts by the industry in its training activities. This part of the Essential Skills Workplace Services Initiative involves industry partners who deliver technical training. This publication is one of a series that is intended to support instructors and apprentices in improving performance and success rates in technical training.

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For more information about *SkillPlan*, visit [www.skillplan.ca](http://www.skillplan.ca).

Sincere appreciation is extended to Melissa Young, Executive Director,  
Gerry Gray, Training Coordinator, and the other instructors at the  
Carpentry Training Centre of New Brunswick. [www.ctcnd.com](http://www.ctcnd.com)

### What is the purpose of this assessment?

The purpose of the Carpenter Training Assessment is to assess your readiness for entering the Carpentry trade. This assessment gives you an opportunity to practice your skills in Reading Text, Document Use and Numeracy. It gives you a review of the math foundation skills you will need during technical training.

### Who should use this assessment?

The questions in this assessment are typical of those you will solve in technical training and on the job as a Carpenter. The Carpenter Training Assessment is intended for individuals:

- considering a Carpentry career
- applying to pre-apprenticeship training
- attending Carpenter training courses

If you want to achieve your career goal in Carpentry, completing this assessment will help you decide what skills you need to improve.

### What skills does this assessment cover?

Essential Skills are the skills that people need for work, learning and life. There are nine Essential Skills: Reading Text, Document Use, Writing, Numeracy, Oral Communication, Thinking Skills, Working with Others, Computer Use and Continuous Learning. You use these skills at different complexity levels at work and during technical training. This assessment assesses three Essential Skills: Reading Text, Document Use and Numeracy.

This assessment is a preview of the skills you need to do well in technical training. Although some of the problems in this workbook may not be familiar to you, it is not necessary for you to know about carpentry. The focus is on Essential Skills, such as Numeracy. All of the information needed to answer the questions is included. There is a list of formulas and conversions at the beginning of the assessment to help you.

### How is the assessment organized?

The assessment is organized into three sections.

#### **Section 1: Math Foundations**

The first section tests basic math skills: whole numbers, decimals, fractions, imperial measurement and metric measurement.

#### **Section 2: Word Problems**

The second section requires you to set up and solve numeracy problems. You may need to do more than one calculation to solve a problem. Some problems require you to use information from drawings or photographs. Although you are given some formulas and conversions at the beginning of the assessment, you are required to decide which formula or formulas to use.

#### **Section 3: Problem Sets**

The third section has four problem sets. Each problem set asks questions about an authentic workplace document. Two of the problem sets use drawings from a residential building project. Two of the problem sets use labels from building materials. All of the information you need to answer the questions is in the workplace document. You do not need a background in carpentry.

### What happens to the results?

This assessment is a general indicator of how prepared you are for technical training and what your skill levels are in Reading Text, Document Use and Numeracy. Your instructor will mark the assessment and make recommendations based on your results. For example, your instructor may recommend tutoring or going to a local learning centre for extra help.

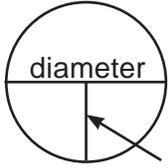
Your instructor will give you a detailed diagnostic sheet that shows what you were able to do and what you had difficulty with. If you are going to a tutor or to a learning centre, you should take this diagnostic with you. The diagnostic sheet will tell the tutor or learning centre which topics you need to review.

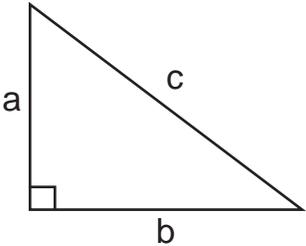
### Introduction

- Use a pen or pencil.
- Take a couple of minutes to look through the entire assessment.
- Do not rush through the assessment, work carefully.
- Do all rough work in the space provided.
- Print all answers clearly. If the answer cannot be read, it will be marked incorrect.
- You can use a calculator during the entire assessment.
- Try every question. The questions are not ordered according to difficulty and you will not lose marks for wrong answers.
- If you find a question difficult, move on to the next question and come back later.
- If you decide to change an answer, make sure you cross out your old answer.

The following formulas and conversions have been provided to help you.

### Formulas

Geometric Shapes	Area	Volume
 <p style="text-align: right;">W</p> <p style="text-align: center;">L</p>	$A = L \times W$	$V = L \times W \times H$
 <p>diameter = radius <math>\times</math> 2</p> <p>radius = <math>\frac{\text{diameter}}{2}</math></p> <p><math>\pi = 3.14</math></p>	$A = \pi r^2$	$V = \pi r^2 H$

Pythagorean Theorem
$a^2 + b^2 = c^2$ $a^2 = c^2 - b^2$ $b^2 = c^2 - a^2$


Conversions Imperial
12" = 1'
3' = 1 yd
144 in <sup>2</sup> = 1 ft <sup>2</sup>
9 ft <sup>2</sup> = 1 yd <sup>2</sup>
1,728 in <sup>3</sup> = 1 ft <sup>3</sup>
27 ft <sup>3</sup> = 1 yd <sup>3</sup>

Converting	
Inches to Feet	Feet to Inches
inches $\div$ 12 =	feet $\times$ 12 =
10" = 10 $\div$ 12 = .83'	.5' = .5 $\times$ 12 = 6"

## Section 1: Math Foundations

### Whole Numbers

1.  $2\,983 + 551 + 1\,865 + 49 =$
2. 4 647 rounded off to the nearest hundred is:
3.  $264 \times 38 =$
4.  $1\,589 \div 14 =$

### Decimals

5.  $6.23 + 149.756 + 0.41 + 8.5 =$
6.  $39.404 - 12.647 =$
7. List the following decimals in order from largest to smallest.  
0.043, 0.251, 0.054, 0.19, 0.250
8. Round off to the nearest hundredth.  
3.5349
9. Convert 0.75 to a fraction.

### Fractions

10.  $3\frac{1}{8} + 1\frac{3}{8} =$
11.  $6\frac{1}{2} + 2\frac{1}{4} =$

12.  $5\frac{7}{8} - 2\frac{3}{8} =$

13.  $\frac{7}{8} - \frac{3}{4} =$

14.  $\frac{3}{4} \times \frac{1}{2} =$

15.  $2\frac{1}{2} \times 1\frac{3}{4} =$

16. Convert the following fractions to decimals.

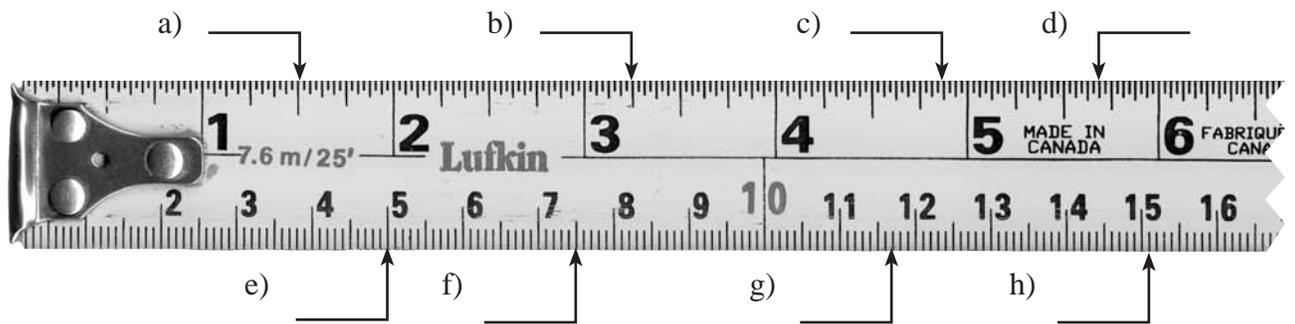
a)  $\frac{1}{4} =$

b)  $\frac{1}{2} =$

c)  $\frac{3}{4} =$

**Measurements**

17. Write the measurements marked with arrows on the tape.



18. Use arrows to mark the tape with the following measurements.

a)  $34\frac{3}{8}$ "

b)  $36\frac{3}{4}$ "

c)  $37\frac{5}{8}$ "

d)  $38\frac{9}{16}$ "



e) 86.5 cm

f) 910 mm

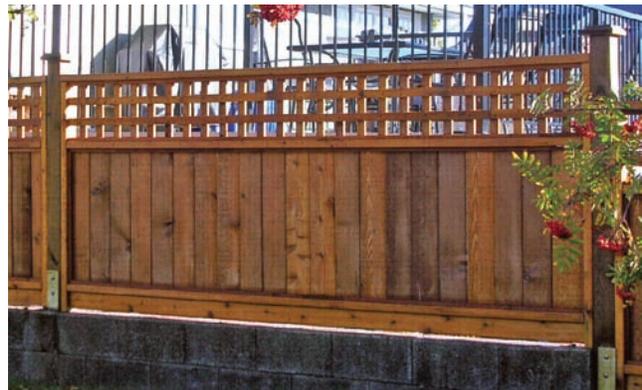
g) 925 mm

h) 968 mm

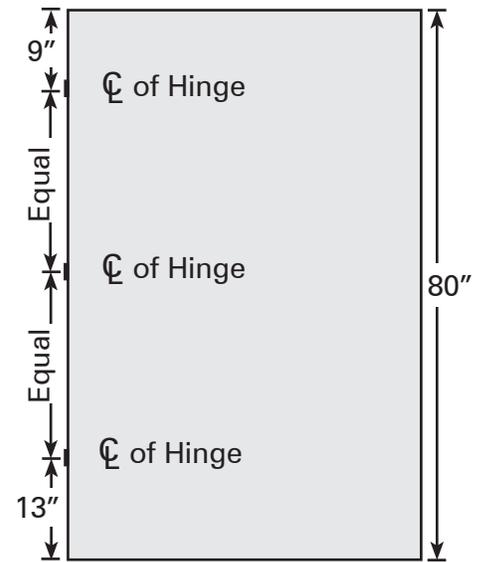
## Section 2: Math Problems

Answer each of the questions below. Show your work. Some formulas have been provided at the front of this booklet.

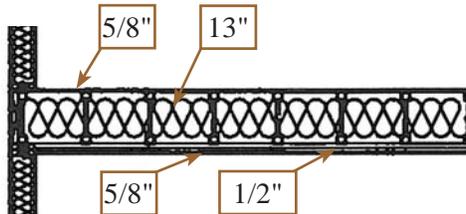
1. It takes about 5 pounds of nails to fasten each 1,000 square feet of drywall. About how many pounds of nails will be needed for 9,545 square feet? Round up to the nearest whole number.
  
2. A contractor purchases lumber at \$2.29 per board foot. Calculate the cost of 365 board feet.
  
3. Twenty-five sheets of drywall cost \$748.75.
  - a) Calculate the cost of one piece of drywall.
  
  - b) Calculate the cost of 12 pieces of drywall.
  
4. A carpenter is building a fence along an 86 foot property line. A fence panel measures 8 feet  $\times$  6 feet.
  - a) Calculate the number of fence panels required to build the fence.
  
  - b) Calculate the number of fence posts. Hint: there is a fence post at each end.



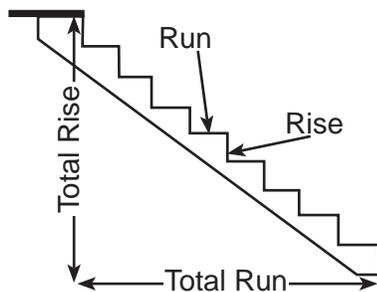
5. A carpenter is installing a door. Calculate the centre to centre (  $\text{C}$  ) distance between hinges.



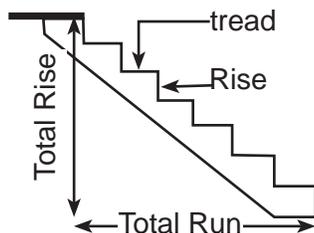
6. Calculate the thickness of the floor.



7. There are 9 risers in a staircase that has a total rise of  $67 \frac{1}{2}$  inches. What is the height of 1 riser?

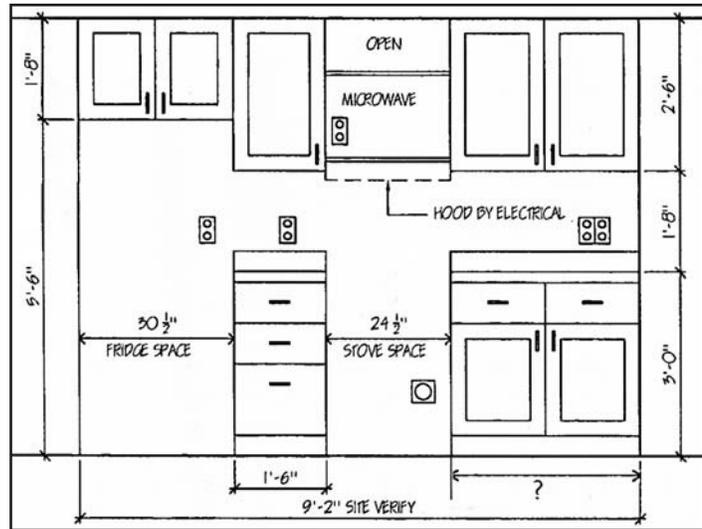


8. The total run of a staircase that has 7 risers and 6 treads measures  $55 \frac{1}{2}$  inches. Calculate the length of one tread.



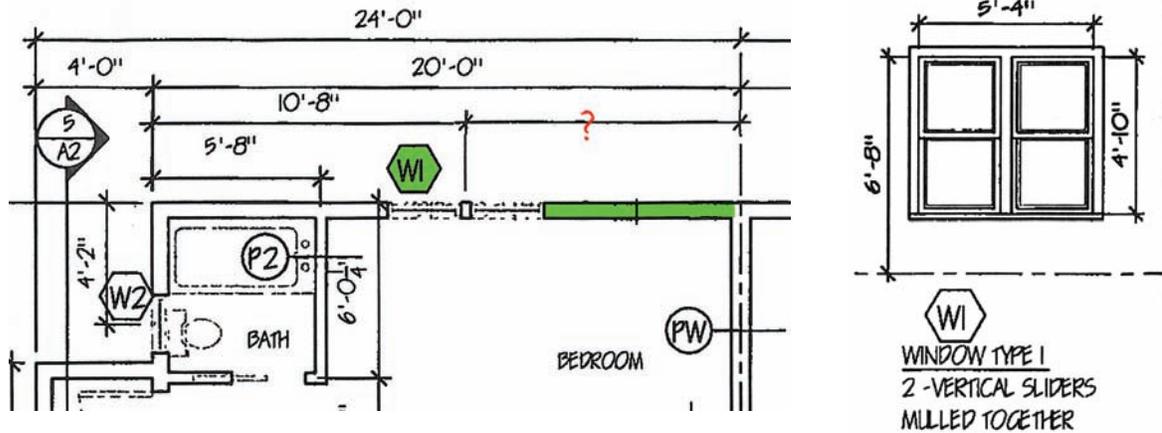
9. Use the drawing to answer a) and b).

a) Calculate the length of the kitchen cupboard in the drawing.



b) Calculate the total length of countertop needed for the kitchen cupboards in the drawing.

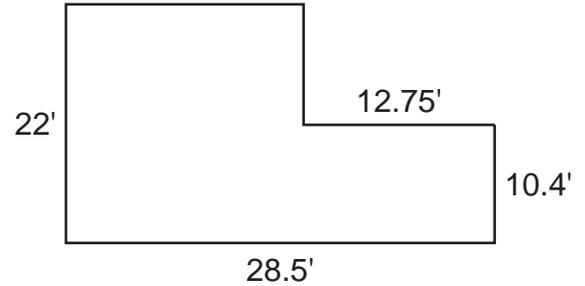
10. Use the drawing below to answer a) and b).



a) Calculate the missing dimension.

b) Calculate the length of the wall highlighted in the drawing.

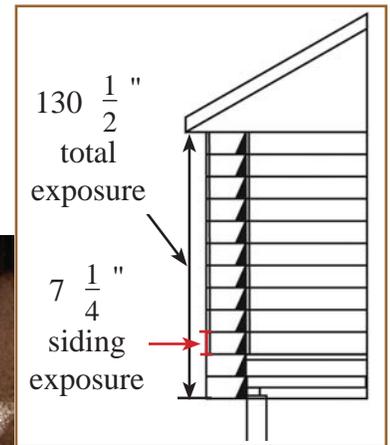
11. a) Calculate the linear feet of baseboard required for the room shown in the drawing.



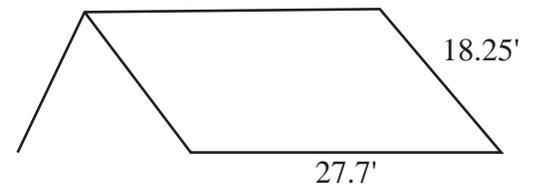
- b) Estimate the number of studs needed for framing. Use the formula:

$$\text{Number of studs} = \frac{\text{Perimeter}}{2}$$

12. Carpenters apply wooden siding to outside walls. The siding is overlapped so it will shed water and provide a windproof and dustproof covering. The overall height of the wall is  $130 \frac{1}{2}$ ". The siding exposure is  $7 \frac{1}{4}$ ". Calculate the number of rows of siding needed for the wall.

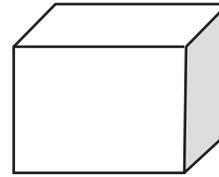


13. a) Calculate the area of the gable roof in the drawing below.  
Hint: There are two sides to the roof.



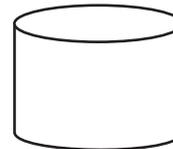
- b) One bundle of shingles covers  $32.5 \text{ ft}^2$ . Calculate the number of bundles of shingles required for the roof.

14. a) Calculate the volume of concrete in cubic feet required for six footings that measure  $2' \times 2' \times 0.75'$ .



- b) Concrete is ordered in cubic yards. Convert cubic feet to cubic yards.

15. a) Calculate the volume of concrete required for four footings with a diameter of 1.5 feet and a height of 0.5 feet.



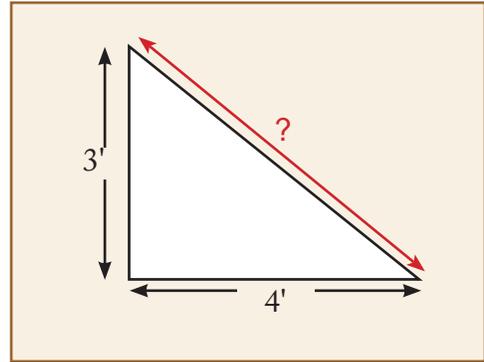
- b) Concrete is ordered in cubic yards. Convert cubic feet to cubic yards.

16. Use the label to answer the questions below.

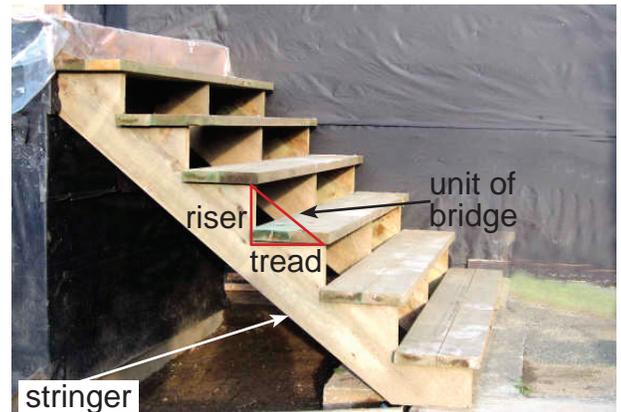
<p><b>POSTS (Standard fence)</b>  <b>POTEAUX DE CLÔTURE (standard)</b></p>		<p><math>2.6 \times</math>  = 1 Post/Poteaux</p>
<p><b>CONCRETE SLAB</b>  <b>DALLES DE BÉTON</b></p>		<p><math>5 \times</math>  = 6 sq.ft./pi.ca.</p>
<p><b>SONOTUBE® (For each 4' length)</b>                  (Par longueur de 4 pi)</p>		<p><math>3.5 \times</math>  = 8" Diameter/Diamètre      <math>5.5 \times</math>  = 10" Diameter/Diamètre</p>

- a) A carpenter is building a fence that requires 8 posts. How many bags are required to set the posts?
- b) The cement is mixed at a ratio of 0.55 gallons of water per bag of cement product. How many gallons of water are required to set the posts?

17. A carpenter is framing walls and needs to make sure the corners are square (90°). The carpenter measures 3' from the corner along one wall and 4' from the corner along the other wall. Then he measures the length of the diagonal connecting these two points. Calculate the length of the diagonal line.

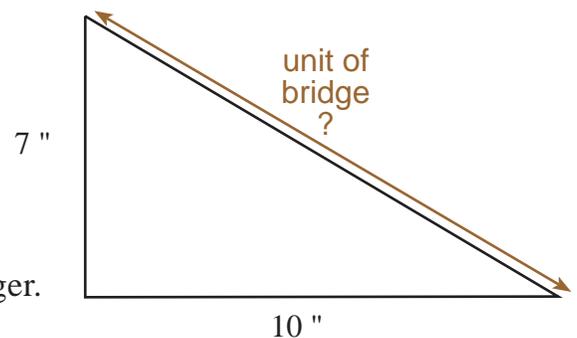


18. Carpenters calculate, lay out and construct stairs. The stringer is the inclined side of a staircase. It supports the treads and risers. One way to calculate the length of the stringer is to calculate the unit of bridge. Then, multiply the length of bridge by the number of risers.



- a) Calculate the unit of bridge.

- b) Calculate the length of the stringer.



**Section 3: Problem Sets**

2 A1	GROUND FLOOR PLAN	4 A2	WINDOW/ DOOR SCHEDULE
	SCALE, $\frac{3}{16}$ " = 1'-0"		SCALE, $\frac{3}{16}$ " = 1'-0"

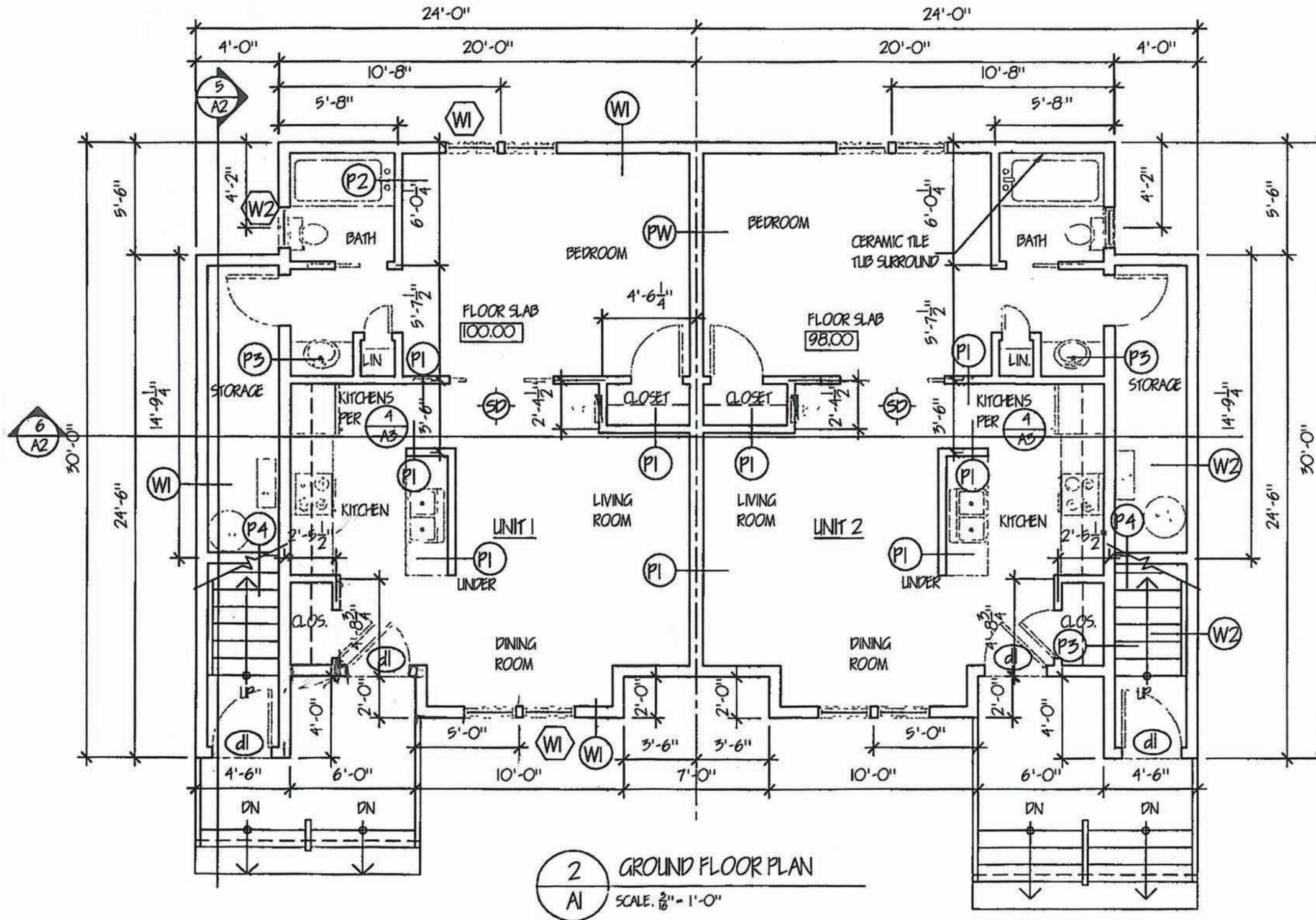
A ground floor plan is a view from above. It shows the room layout, types and positions of doors and windows and the location of stairways.

Look at the Ground Floor Plan and Window/Door Schedule.

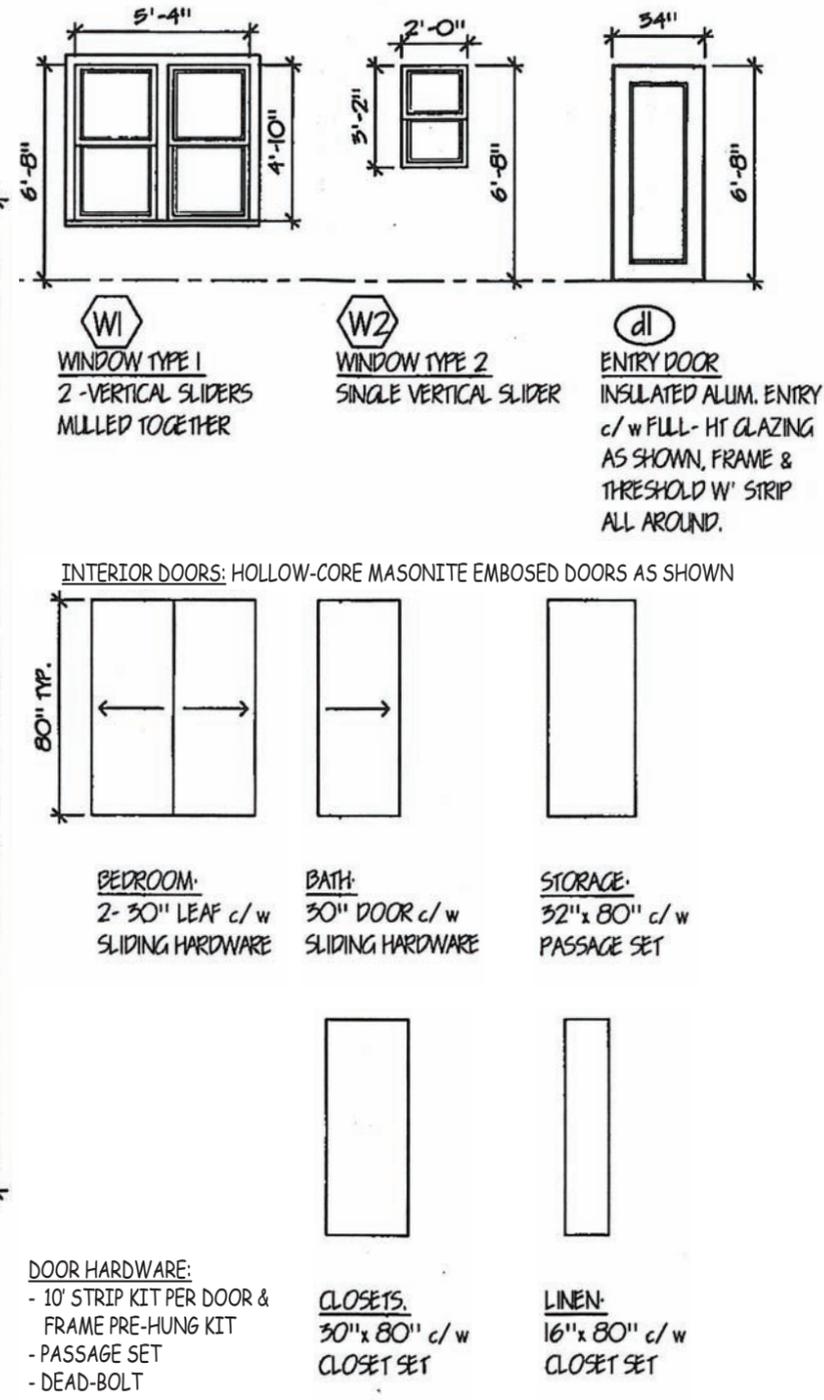
1. This plan shows the ground floor of a four-unit residential building. The two floors have the same layout. How many bedrooms are there per unit?  
*Document Use, Numeracy*
  
2. How many Type 1 Windows are there in Unit 1?  
*Document Use, Numeracy*
  
3. The floor plans for each unit on a floor are mirror images of each other. What type of window is installed in the Dining Room of Unit 2?  
*Document Use*
  
4. Calculate the area of one bathroom in square feet.  
*Numeracy*
  
5. What is the length of each wall on either side of the dining room window?  
*Document Use, Numeracy*
  
6. Carpenters check that plan drawings conform to the National Building Code.
  - a) Calculate the distance of the bedroom window from the finished floor in millimeters. 1 inch = 25.4 millimeters  
*Document Use, Numeracy*

*Continue to 6.b)*





**2** GROUND FLOOR PLAN  
 A1 SCALE:  $\frac{3}{16}'' = 1'-0''$



**4** WINDOW/ DOOR SCHEDULE  
 A2 SCALE:  $\frac{3}{16}'' = 1'-0''$

6. b) Look at the partial section of the National Building Code for *Height of Window Sills above Floors or Ground* below. What does the Carpenter decide regarding whether the plans conform to code?

*Document Use, Numeracy*

**9.7.1.5. Height of Window Sills above Floors or Ground**  
(See Appendix A.)

- 1) Except as provided in Sentence (2), openable windows in *buildings of residential occupancy* shall be protected by
  - a) a *guard*, in accordance with Section 9.8., or
  - b) a mechanism capable of controlling the free swinging or sliding of the openable part of the window so as to limit any clear unobstructed opening to not more than 100 mm measured either vertically or horizontally where the other dimension is greater than 380 mm.
- 2) Windows need not be protected according to Sentence (1) where
  - a) the window serves a *dwelling unit* that is not located above another *suite*,
  - b) the only opening greater than 100 mm by 380 mm is a horizontal opening at the top of the window,
  - c) the window sill is located more than 450 mm above the finished floor on one side of the window, or
  - d) the window is located in a room or space with the finished floor described in Clause (c) located less than 1 800 mm above the floor or ground on the other side of the window.

*From the National Building Code*



**5** SECTION: STAIR @ UNIT 1 & 3  
**A2** SCALE,  $\frac{1}{4}'' = 1'-0''$

Section views show a cross-section of the interior details. Section views are often drawn to a larger scale than other drawings. This makes it easier to show more detail of the interior.

Look at the Section: Stair @ Unit 1 & 3 drawing.

1. What is the ground floor elevation at Unit 1?  
*Document Use*
2. What is the o/c spacing of the roof trusses?  
*Document Use*
3. Calculate the distance from the front outside of the concrete wall to the face of the floor joist.  
*Document Use, Numeracy*
4. List the common materials used in W1 and W2 walls.  
*Document Use*
5. What is the thickness of the common floor?  
*Document Use, Numeracy*
6. Imperial roof framing uses the term **cut of roof** to describe the ratio between the rise (vertical) and the run (horizontal) of the roof. In imperial roof framing the run is always 12. The rise is always written first. What is the cut of roof for this building?  
*Document Use*

5 SECTION: STAIR @ UNIT 1 & 3  
A2 SCALE: 1/4" = 1'-0"

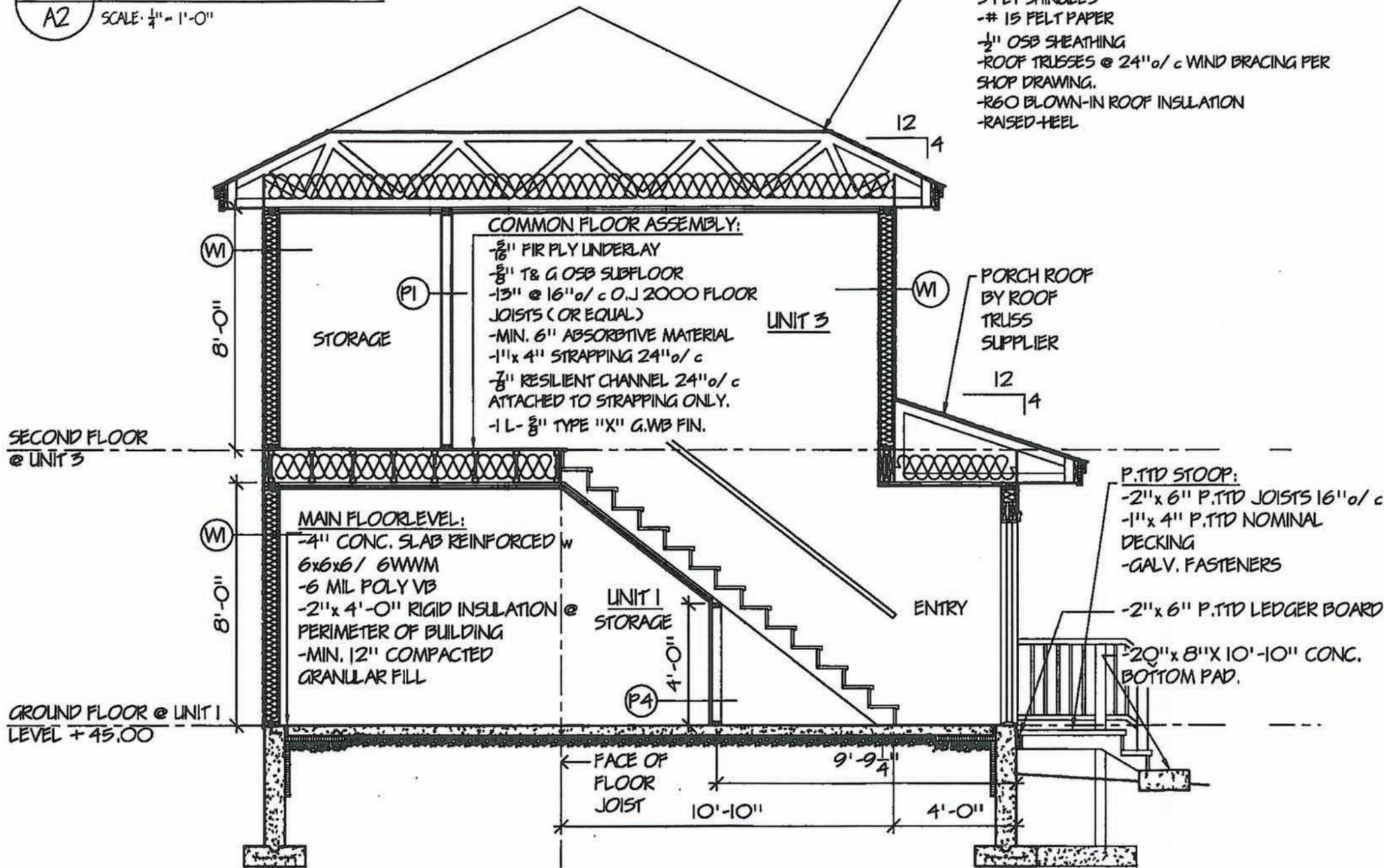
**ROOF CONSTRUCTION**  
 -25 YEAR ASPHALT SHINGLE  
 3 PLY SHINGLES  
 -# 15 FELT PAPER  
 -1/2" OSB SHEATHING  
 -ROOF TRUSSES @ 24" o/c WIND BRACING PER SHOP DRAWING.  
 -R60 BLOWN-IN ROOF INSULATION  
 -RAISED-HEEL

**WALL & PARTITION SCHEDULE**

**(W1) EXTERIOR WALL TYP.**  
 -5 1/2" TO WEATHER CEDAR SHINGLES  
 -CEDAR BREATHER  
 -TYVEK- AIR BARRIER  
 -1/2" OSB SHEATHING  
 -2"x 6" STUD 24" o/c  
 -R20 BATT INSULATION  
 -6 MIL POLY VB.  
 -1/2" G.WB INT. FIN.

**(W2) EXTERIOR WALL RATED & NON-COMBUSTIBLE**  
 -5" TO WEATHER HARDI PLANK SIDING  
 -TYVEK- AIR BARRIER  
 -1/2" EXT. GD. G.WB SHEATHING  
 -2"x 6" STUD 24" o/c  
 -R20 BATT INSULATION  
 -6 MIL POLY VB.  
 -5/8" 'X' G.WB

**(PW) 1 HOUR FIRE RESISTANCE RATING/ STC 60. FIRE SEPARATION BETWEEN UNITS:**  
 -2L 5/8" TYPE 'X' G.WB  
 -2"x 4" WD. STUD 16" o/c  
 -SOUNDBATTING  
 -1" AIR SPACE  
 -2"x 4" WD. STUD 16" o/c  
 -SOUNDBATTING  
 -7/8" RESILIENT CHANNEL  
 -5/8" TYPE 'X' G.WB



**COMMON FLOOR ASSEMBLY:**  
 -5/8" FIR PLY UNDERLAY  
 -5/8" T & G OSB SUBFLOOR  
 -13" @ 16" o/c O.J 2000 FLOOR JOISTS (OR EQUAL)  
 -MIN. 6" ABSORBITIVE MATERIAL  
 -1"x 4" STRAPPING 24" o/c  
 -7/8" RESILIENT CHANNEL 24" o/c ATTACHED TO STRAPPING ONLY.  
 -1L-5/8" TYPE 'X' G.WB FIN.

**MAIN FLOOR LEVEL:**  
 -4" CONC. SLAB REINFORCED w 6x6x6 / 6WWM  
 -6 MIL POLY VB  
 -2"x 4'-0" RIGID INSULATION @ PERIMETER OF BUILDING  
 -MIN. 12" COMPACTED GRANULAR FILL

**P.TTD STOOP:**  
 -2"x 6" P.TTD JOISTS 16" o/c  
 -1"x 4" P.TTD NOMINAL DECKING  
 -GALV. FASTENERS  
 -2"x 6" P.TTD LEDGER BOARD

-20"x 8" x 10'-10" CONC. BOTTOM PAD.

**(P1) COMMON:**  
 -1/2" G.WB EA. SIDE WD. STUD  
 -16" o/c FLOOR TO u/s STRUCTURE OVER. USE M.R. G.WB AT WASHROOMS,

USE CEMENT BOARD @ AREAS TO BE TILED.  
 -PARTITIONS ARE P1 UNLESS NOTED OTHERWISE.

**(P2) BATHROOMS:**  
 -1/2" M.R. G.WB ON BATHROOM SIDES, USE CEMENT BOARD AT TILED AREAS  
 -2"x 4" WD. STUD 24" o/c  
 -1/2" G.WB OUTSIDE, FIN.

**(P3) LOAD-BEARING:**  
 -5/8" 'X' G.WB FIN.  
 -SOUNDBATTING  
 -2"x 6" WD. STUD 16" o/c  
 -7/8" RESILIENT CHANNEL  
 -5/8" 'X' G.WB FIN.

**(P4) RATED FURRING:**  
 -2"x 4" WD. STUD 16" o/c  
 -2L 5/8" 'X' G.WB FIN.



## Hardiplank® Lap Siding

Carpenters read material labels to follow manufacturers' installation procedures. This document tells Carpenters how to install Hardiplank® lap siding.

Look at the Hardiplank® Lap Siding page.

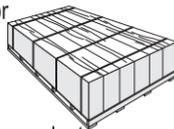
1. What could happen if the siding is installed when it is wet?  
*Reading Text*
2. Why is it important to use either HEPA vacuums or wet cleanup methods during cleanup?  
*Document Use, Reading Text*
3. What is the purpose of installing a 1 1/4" starter strip shown in Figure 2?  
*Document Use, Reading Text*
4. What personal protective equipment is recommended when installing or handling this product?  
*Reading Text*
5. Highlight, circle or underline the section that lists the places where a clearance between the product and other building features are needed.  
*Document Use, Reading Text*
6. What additional information is provided about face nailing corrosion resistant siding nails that are 0.091" shank x 0.221" HD x 1-1/2" long?  
*Document Use*
7. Why is kickout flashing needed?  
*Reading Text*

SELECT CEDARMILL<sup>®</sup> • SMOOTH • COLONIAL SMOOTH<sup>®</sup> • COLONIAL ROUGHSAWN<sup>®</sup> • BEADED CEDARMILL<sup>®</sup> BEADED SMOOTH • STRAIGHT-EDGE SHINGLE PLANK

IMPORTANT: FAILURE TO INSTALL AND FINISH THIS PRODUCT IN ACCORDANCE WITH APPLICABLE BUILDING CODES AND JAMES HARDIE'S WRITTEN APPLICATION INSTRUCTIONS MAY LEAD TO PERSONAL INJURY, AFFECT SYSTEM PERFORMANCE, VIOLATE LOCAL BUILDING CODES, AND VOID THE PRODUCT ONLY WARRANTY.

### STORAGE & HANDLING:

Store flat and keep dry and covered prior to installation. Installing siding wet or saturated may result in shrinkage at butt joints. Carry planks on edge. Protect edges and corners from breakage. James Hardie is not responsible for damage caused by improper storage and handling of the product.



### CUTTING INSTRUCTIONS

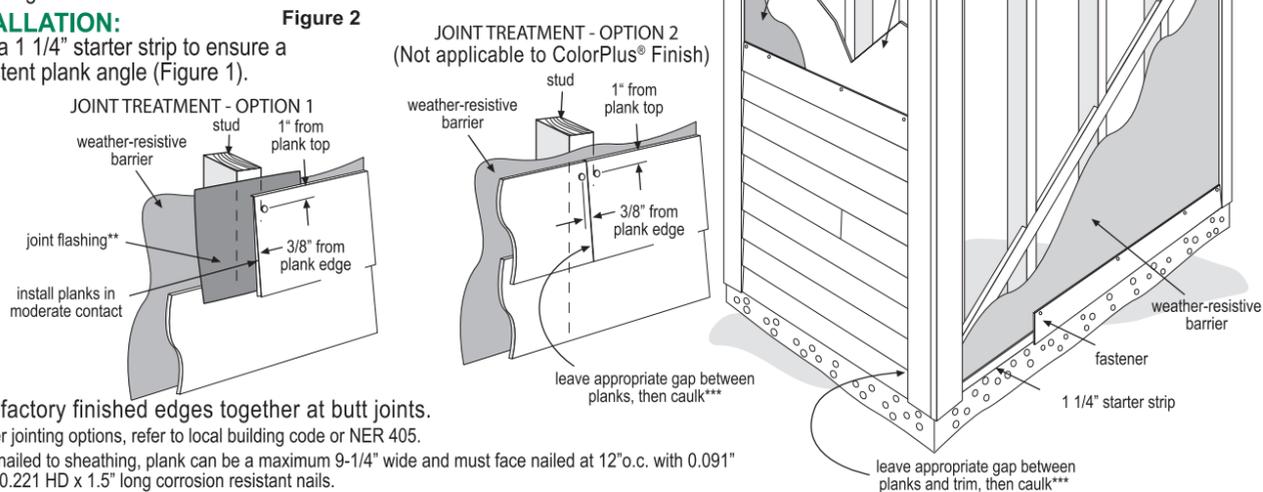
OUTDOORS	INDOORS
<ol style="list-style-type: none"> <li>Position cutting station so that wind will blow dust away from user and others in working area.</li> <li>Use one of the following methods:                             <ol style="list-style-type: none"> <li>Best:                                     <ol style="list-style-type: none"> <li>Score and snap</li> <li>Shears (Pneumatic or Handheld)</li> </ol> </li> <li>Better:                                     <ol style="list-style-type: none"> <li>Dust reducing circular saw equipped with a Hardiblade<sup>®</sup> saw blade and HEPA vacuum extraction</li> </ol> </li> <li>Good:                                     <ol style="list-style-type: none"> <li>Dust reducing circular saw with a Hardiblade saw blade (only use for low to moderate cutting)</li> </ol> </li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>Cut only using score and snap, or shears (manual, electric or pneumatic).</li> <li>Position cutting station in well-ventilated area.</li> </ol> <p>- NEVER use a power saw indoors                      - NEVER use a circular saw blade that does not carry the Hardiblade saw blade trademark                      - NEVER dry sweep - Use wet suppression or HEPA Vacuum</p>
<p>Important Note: For maximum protection (lowest respirable dust production), James Hardie recommends always using "Best"-level cutting methods where feasible.</p>	
<p>NIOSH-approved respirators can be used in conjunction with above cutting practices to further reduce dust exposures. Additional exposure information is available at <a href="http://www.jameshardie.com">www.jameshardie.com</a> to help you determine the most appropriate cutting method for your job requirements. If concern still exists about exposure levels or you do not comply with the above practices, you should always consult a qualified industrial hygienist or contact James Hardie for further information.</p>	

### GENERAL REQUIREMENTS:

- Hardiplank<sup>®</sup> lap siding can be installed over braced wood or steel studs spaced a maximum of 24" o.c. or directly to minimum 7/16" thick OSB sheathing\*. Hardiplank lap siding can also be installed over foam insulation up to 1" thick. Irregularities in framing, sheathing, and/or foam insulation can mirror through the finished application
- A Weather-resistive barrier is required in accordance with local building code requirements. The weather resistive barrier must be appropriately installed with penetration and junction flashings in accordance with local building code requirements. James Hardie will assume no responsibility for water infiltration.
- Install James Hardie<sup>®</sup> products with a minimum 6" clearance to the finished grade on the exterior of the building or in accordance with local building codes if greater than 6" is required (fig. 3).
- Maintain a minimum 2" clearance between James Hardie products and roofs, decks, paths, steps and driveways (figs. 4 & 5).
- Maintain a 1/4" clearance between James Hardie products and horizontal flashing (fig. 6).
- Install kickout flashing at roof-wall junctions. (fig 7.) Ensure gutters have end caps and do not terminate against siding and trim.
- Adjacent finished grade must slope away from the building in accordance with local building codes - typically a minimum of 6" in the first 10'.
- Do not install James Hardie products, such that they may remain in contact with standing water.

### INSTALLATION:

Install a 1 1/4" starter strip to ensure a Consistent plank angle (Figure 1).



Install factory finished edges together at butt joints.

For other jointing options, refer to local building code or NER 405.

\* If only nailed to sheathing, plank can be a maximum 9-1/4" wide and must face nailed at 12" o.c. with 0.091" shank x 0.221 HD x 1.5" long corrosion resistant nails.

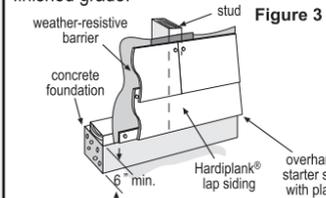
\*\*As required by local building code \*\*\*Apply caulk in accordance with caulk manufacturers written application instructions.

### WARNING: AVOID BREATHING SILICA DUST

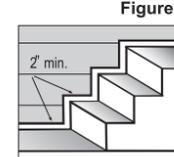
James Hardie<sup>®</sup> products contain respirable crystalline silica, which is known to the State of California to cause cancer and is considered by IARC and NIOSH to be a cause of cancer from some occupational sources. Breathing excessive amounts of respirable silica dust can also cause a disabling and potentially fatal lung disease called silicosis, and has been linked with other diseases. Some studies suggest smoking may increase these risks. During installation or handling: (1) work in outdoor areas with ample ventilation; (2) use fiber cement shears for cutting or, where not feasible, use a Hardiblade<sup>®</sup> saw blade and dust-reducing circular saw attached to a HEPA vacuum; (3) warn others in the immediate area; (4) wear a properly-fitted, NIOSH-approved dust mask or respirator (e.g. N-95) in accordance with applicable government regulations and manufacturer instructions to further limit respirable silica exposures. During clean-up, use HEPA vacuums or wet cleanup methods - never dry sweep. For further information, refer to our installation instructions and Material Safety Data Sheet available at [www.jameshardie.com](http://www.jameshardie.com) or by calling 1-800-9HARDIE (1-800-942-7343). FAILURE TO ADHERE TO OUR WARNINGS, MSDS, AND INSTALLATION INSTRUCTIONS MAY LEAD TO SERIOUS PERSONAL INJURY OR DEATH.

### CLEARANCES

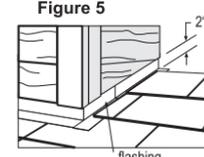
Install siding and trim products in compliance with local building code requirements for clearance between the bottom edge of the siding and the adjacent finished grade.



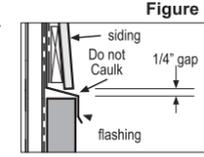
Maintain a minimum 2" clearance between James Hardie<sup>®</sup> products and decks, paths, steps and driveways.



At the juncture of the roof and vertical surfaces, flashing and counterflashing shall be provided per the roofing manufacturer's Instructions. Provide a 2" clearance between the roofing and the bottom edge of the siding and trim.

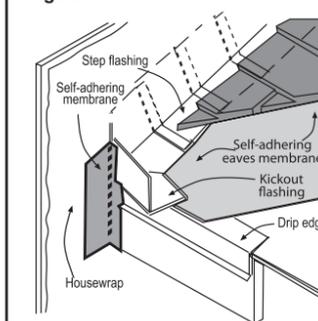


Maintain a 1/4" clearance between the bottom of James Hardie<sup>®</sup> products and horizontal flashing. Do not caulk gap.



### KICKOUT FLASHING

Figure 7



Because of the volume of water that can pour down a sloped roof, one of the most critical flashing details occurs where a roof intersects a sidewall. The roof must be flashed with step flashing. Where the roof terminates, install a kickout to deflect water away from the siding (figure 7).

It is best to install a full rubberized asphalt flashing on the wall before the subfascia and trim boards are nailed in place, and then come back to install the kickout.

**Figure 7, Kickout Flashing†** To prevent water from dumping behind the siding and the end of the roof intersection, bend a small "kickout" from metal flashing to divert water running down the roof away from the siding.

### FASTENER REQUIREMENTS\*\* FACE NAILING

Corrosion Resistant Nails (galvanized or stainless steel)

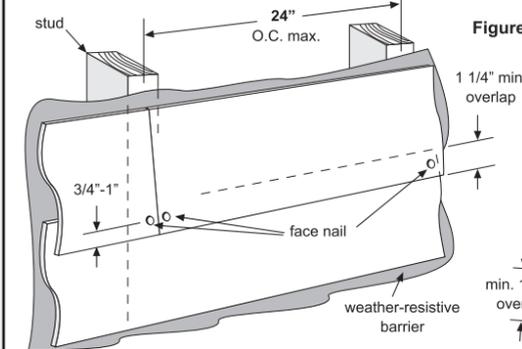
- 6d (0.113" shank x 0.267" HD x 2" long)
- Siding nail (0.089" shank x 0.221" HD x 2" long)
- Siding nail (0.091" shank x 0.221" HD x 1-1/2" long)\*

Corrosion Resistant Screws

- Ribbed Wafer-head or equivalent (No. 8-18 x 0.323" HD x 1-5/8" long) Screws must penetrate 1/4" or 3 threads into metal framing.

Corrosion Resistant Fasteners

- ET & F pin (0.100" shank x 0.25" HD x 1-1/2" long)



### BLIND NAILING\*\*

Corrosion Resistant Nails (galvanized or stainless steel)

- Siding nail (0.089" shank x 0.221" HD x 1-1/4" long)
- 11ga. roofing nail (0.121" shank x 0.371" HD x 1-1/4" long)

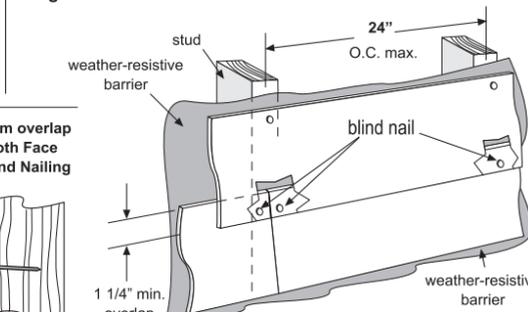
Corrosion Resistant Screws

- Ribbed Wafer-head or equivalent (No. 8-18 x 0.323" HD x 1 5/8" long) Screws must penetrate 1/4" or 3 threads into metal framing.

Corrosion Resistant Fasteners

- ET & F Panelfast™ (0.100" shank x 0.313" HD x 1-1/2" long)

Figure 9



Laminate sheet to be removed immediately after installation of each course.

\* The illustration (figure 7) and associated text was reprinted with permission of THE JOURNAL OF LIGHT CONSTRUCTION. For subscription information, call (800) 375-5981 or visit [www.jlconline.com](http://www.jlconline.com).

\*\* When face nailing to OSB, planks must be no greater than 9 1/4" wide and fasteners must be 12" o.c. or less.

\*\* Also see General Fastening Requirements.

## Product Safety Information- HARDIPLANK<sup>®</sup> Lap Siding

**Risk Phrases:** Product contains respirable crystalline silica, which is known to the State of California to cause cancer and is considered by IARC and NIOSH to be a cause of cancer from occupational sources. Breathing excessive amounts of respirable silica can cause a disabling disease and potentially fatal lung disease called silicosis, and has been linked with other diseases.

**Precautionary Statements:** During installation or handling: (1) work in outdoor areas with ample ventilation; (2) use fiber cement shears for cutting or, where not feasible, use a Hardiblade<sup>®</sup> saw blade and dust-reducing circular saw attached to a HEPA vacuum; (3) warn others in the immediate

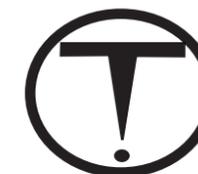
area; (4) wear a properly-fitted, NIOSH-approved dust mask or respirator (e.g. N-95) in accordance with applicable government regulations and manufacturer instructions to further limit respirable silica exposure.

**First Aid Measures: Inhalation:** Remove yourself to fresh air. **Eye Contact:** Flush eyes out with running water for at least 20 minutes. **Skin Contact:** Wash thoroughly with mild soap and water if skin is irritated. If any of the above measures are taken and still have irritation seek medical attention.

### See Material Safety Data Sheet

James Hardie Building Products  
 Technical Services  
 26300 La Alameda Suite 250  
 Mission Viejo, CA92691 USA

Call 1-800-9HARDIE. From U.S. or Canada



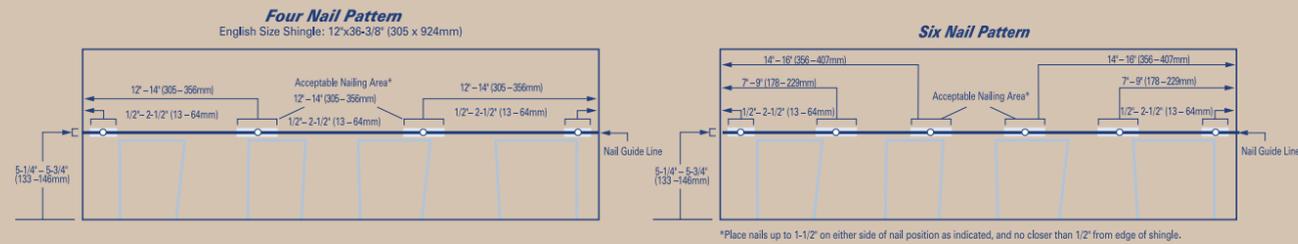


Carpenters read material labels to follow manufacturers' installation procedures. This document tells Carpenters how to install shingles on a roof.

Look at the Application Instruction.

1. Highlight, underline or circle the section that shows the nailing patterns.  
*Document Use*
  
2. Why is through ventilation important?  
*Reading Text*
  
3. The first step for installing these shingles, either step 1 or step 1a, depends on the slope (or cut) of the roof. Decide which step should be followed first according to the roof information found in the *Section: 3 page 12* drawing.  
*Document Use*
  
4. The carpenter is not using a pre-cut starter strip in the starter course. What should the carpenter do to all starter course shingles?  
*Document Use, Reading Text*
  
5. Timberline shingles are tough, heavyweight shingles. Name two tools that are more effective than straight blade utility knives at cutting these shingles.  
*Reading Text*
  - 
  -
  
6. Why is it important to store shingles properly?  
*Reading Text*
  
7. What causes shingle blisters?  
*Reading Text*

**Note:** These shingles **MUST** be nailed a nominal 5 5/8" (143mm) from bottom of shingles, not in or above self seal, as shown. Nails should remain unexposed.

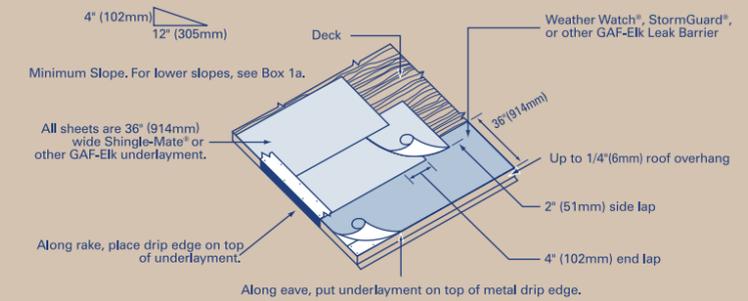


## GENERAL INSTRUCTIONS

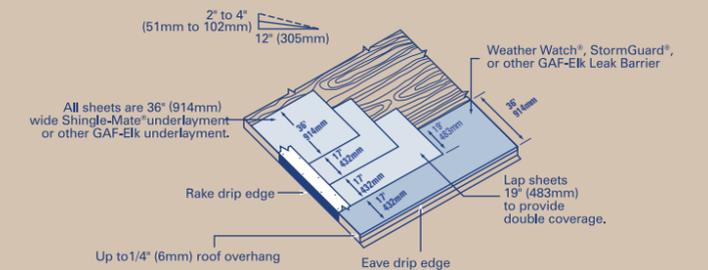
- **ROOF DECKS:** Wood decks must be well-seasoned, supported, and tightly-constructed with maximum 6" (152mm) wide lumber, having adequate nail-holding capacity and a smooth surface. Plywood or OSB decking as recommended by APA-The Engineered Wood Assn. is acceptable. Do not fasten shingles directly to insulation or insulated deck unless authorized in writing by GAF-Elk. Roof decks and existing surfacing material must be dry prior to application of shingles.
- **UNDERLAYMENT:** Underlayment beneath shingles has many benefits, including preventing wind-driven rain from reaching the interior of the building and preventing sap in some wood decking from reacting with asphalt shingles. Underlayment is also required by many code bodies and is required to maintain the UL Class A fire rating. Where an underlayment is to be installed, use a breather-type underlayment such as GAF-Elk Shingle-Mate<sup>1</sup>, Leatherback or Deck-Armor<sup>™</sup> underlayment.
- **FASTENERS:** Use only zinc-coated steel or aluminum, 10-12 gauge, barbed, deformed or smooth shank roofing nails with heads 3/8" (10mm) to 7/16" (12mm) in diameter. Fasteners should be long enough to penetrate at least 3/4" (19mm) into wood decks or just through the plywood decks. Fasteners must be driven flush with the surface of the shingle. Overdriving will damage the shingle. Raised fasteners will interfere with the sealing of the shingles and can back out.
- **WIND RESISTANCE/HAND SEALING:** These shingles have a special thermal sealant that firmly bonds the shingles together after application when exposed to sun and warm temperatures. Shingles installed in Fall or Winter may not seal until the following Spring. If shingles are damaged by winds before sealing or are not exposed to adequate surface temperatures, or if the self-sealant gets dirty, the shingles may never seal. Failure to seal under these circumstances results from the nature of self-sealing shingles and is not a manufacturing defect. To insure immediate sealing, apply 4 quarter-sized dabs of shingle tab adhesive on the back of the shingle 1" (25mm) and 13" (330mm) in from each side and 1" (25mm) up from bottom of the shingle. Press shingle

- firmly into the adhesive. For maximum wind resistance along rakes, install GAF-Elk Starter Strip Shingles with GAF-Elk Dura-Grip<sup>™</sup> sealant or cement shingles to underlayment and each other in a 4" (102mm) width of asphalt plastic cement. Caution: Apply **ONLY** a thin uniform layer of asphalt plastic cement less than 1/8" (3mm) thick. Excess amounts can cause blistering of the shingles and may soften the asphalt in certain underlayments, including StormGuard<sup>®</sup>, Weather Watch<sup>™</sup> and other GAF-Elk Leak Barriers, resulting in the asphalt flowing, dripping and staining.
- **RELEASE FILM:** The film strips on the back of each shingle are to prevent sticking together of the shingles while in the bundle. Their removal is **NOT** required during application.
- **MANSARD AND STEEP SLOPE APPLICATIONS:** For roof slopes greater than 21" per foot (1750mm/m), shingle must be hand sealed (**DO NOT** use on vertical side walls). See "Wind Resistance/Hand Sealing" for the application of adhesive.
- **SHINGLE TAB ADHESIVE:** Use asphalt plastic cement conforming to ASTM D4586 Type I or II.
- **THROUGH VENTILATION:** All roof structures must be provided with through ventilation to prevent entrapment of moisture-laden air behind roof sheathing. Proper ventilation is also necessary to prevent mold growth. Ventilation provisions must at least meet or exceed current F.H.A., H.U.D. or local code minimum requirements. Note: Minimum net free ventilation area of 1 sq. foot per 150 sq. feet (1 sq. meter per 150 sq. meters) of ceiling area is required. When vents are located at the eaves and near the roof's peak (balanced) for maximum air flow, ventilation may be reduced to 1 sq. foot per 300 sq. feet (1 sq. meter per 300 sq. meters).
- **NON-CORRODING METAL DRIP EDGES:** Recommended along rake and eave edges on all decks, especially plywood decks.
- **EXPOSED METAL:** All exposed metal surfaces (flashing, vents, etc.) should be painted with matching GAF-Elk roof accessory paint.

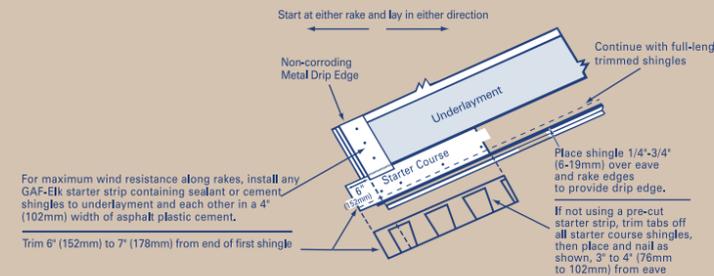
**1 Underlayment: Standard Slope—4/12 (333mm/m) or more**  
**Application of underlayment:** Cover deck with one layer of underlayment installed without wrinkles. Use only enough nails to hold underlayment in place until covered by shingles.  
**Application of eave flashing:** Install eave flashing such as GAF-Elk Weather Watch<sup>®</sup>, StormGuard<sup>®</sup>, or other GAF-Elk Leak Barrier in localities where leaks may be caused by water backing up behind ice or debris dams. Eave flashing must not overhang the eave edge by more than 1/4" (6mm) and extend 24" (610mm) beyond the inside wall line.



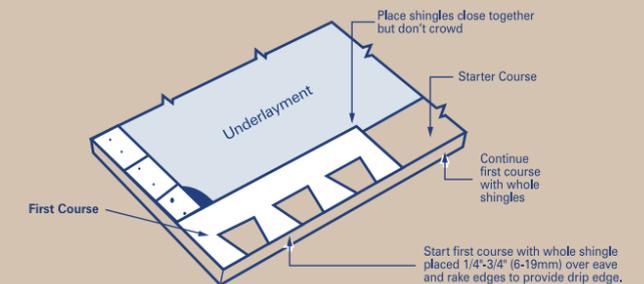
**1a Underlayment: Low Slope 2/12-4/12 (167mm-333mm/m)**  
**Application of underlayment and eave flashing:** Completely cover the deck with two layers of underlayment as shown. Use only enough nails to hold underlayment in place until covered by shingles. Use blind nailing for eave flashings. At eaves and where ice dams can be expected, use one layer of GAF Weather Watch<sup>®</sup>, StormGuard<sup>®</sup> or other GAF-Elk Leak Barrier. Eave flashing must not overhang the roof eave edge by more than 1/4" (6mm) and extend 24" (610mm) beyond the inside wall line. Where ice dams or debris dams are not expected, install 2 plies of Shingle-Mate<sup>®</sup> underlayment.



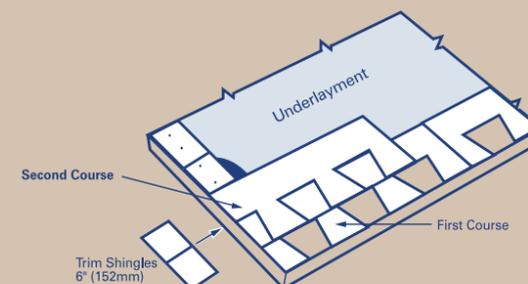
**2 Starter Course**  
Apply as shown **Note:** GAF-Elk starter strips with sealant are recommended at the eaves and rakes for best performance and required for the best limited wind warranties on certain products (see limited warranty for details).



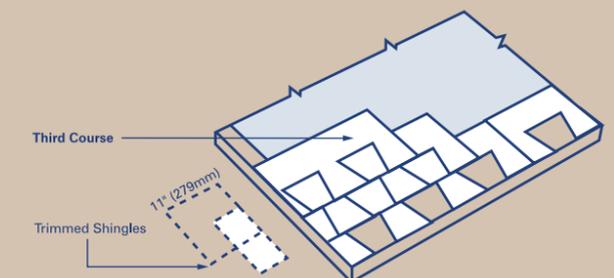
**3 First Course**  
Start and continue with full shingles laid flush with the starter course. Shingles may be laid from left to right or right to left. **DO NOT** lay shingles straight up the roof (racking) since this procedure can cause an incorrect color blend on the roof and may damage the shingles.



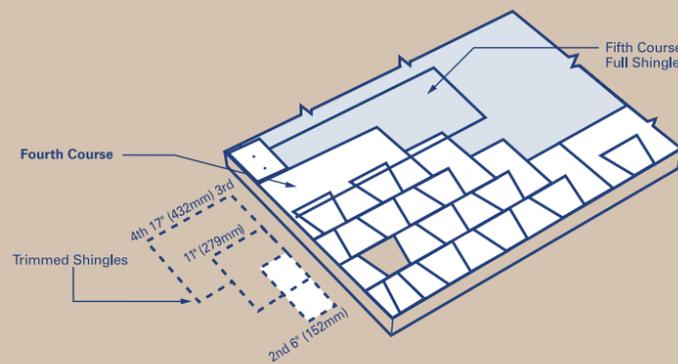
**4 Second Course**  
Start and continue second course as shown. Trim 6" (152mm) from the end of the shingle. Position the shingles in the second and subsequent courses flush with the tops of the wide cut-outs. This results in a 5" (127mm) exposure. Continue with full width shingles across the roof.



**5 Third Course**  
Trim 11" (279mm) from the first shingle in the course; then continue with full shingles across the roof. Strike a chalk line about every 6 courses to check parallel alignment with eaves. **Note:** Shingles may be laid from either left or right-hand side.

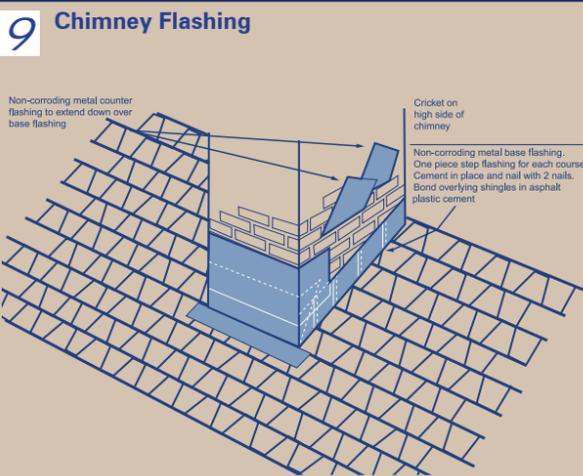
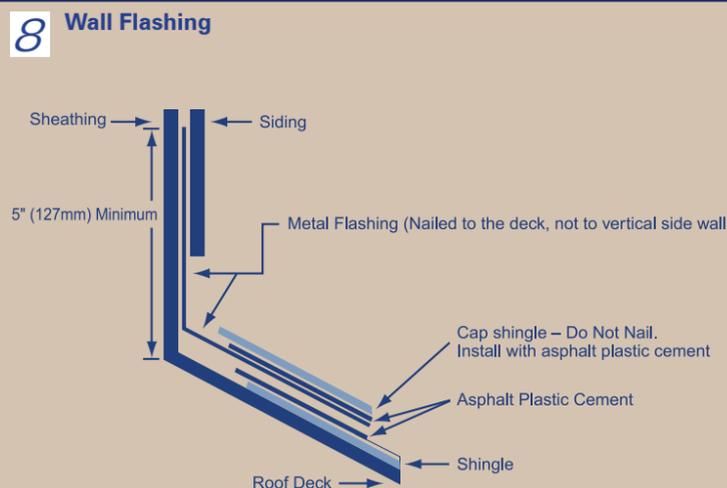
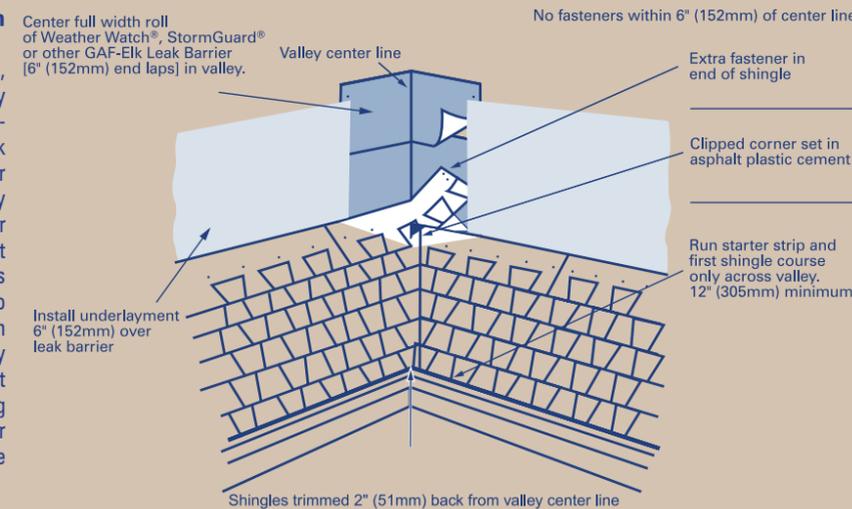


**6 Fourth Course and Remaining Courses**  
Trim 17" (432mm) from first shingle in the course, then continue with full shingles across the roof. Fifth and subsequent courses; repeat Steps 3 through 6.

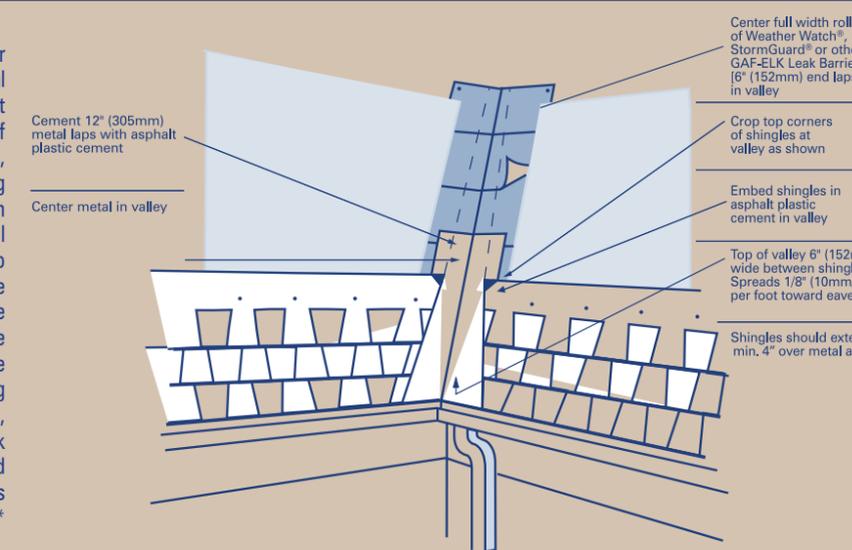


**7 Hip and Ridge**  
Install GAF-Elk TimberTex®, Z®Ridge, Seal-A-Ridge®, or ridglass® hip and ridge shingles (check regional availability). Follow the application instructions shown on the hip and ridge wrapper.

**10 Valley Construction - Closed or Woven Valley**  
Center a full 36" (914mm) width of Weather Watch®, StormGuard® or other GAF-Elk Leak Barrier over entire valley length to seal the valley. Lay Shingle-Mate® or other GAF-Elk underlayment into the valley and overlapping the Leak Barrier a minimum of 6" (152mm). Design the valley for water flow over the trimmed shingle by installing the valley beginning with the roof plane that has the lower slope or lesser height. Extend the bottom shingles 12" (305mm) past the valley center line. Use normal shingle fastening methods (no fasteners within 6" (152mm) of valley center line, two nails at the shingle's end). Continue to the top of the valley in the same manner. Trim shingles 2" (51mm) back from valley center line on top roof plane. Clip shingle corners after the cut to keep water flow in the valley center. Seal the valley using plastic roof cement; seal the valley shingles to each other for the best protection. (Note: Excess cement can cause shingle blisters).



**11 Valley Construction - Open Cut**  
Center a full 36" width of Weather Watch®, StormGuard® or other GAF-Elk Leak Barrier over entire valley length to seal the valley. Lay Shingle-Mate® or other GAF-Elk underlayment into the valley and overlapping the leak barrier a minimum of 6". Center valley metal using 20" (508mm) wide aluminum, galvanized steel, copper, or other non-corroding, non-staining metals (24 gauge minimum). Embed the metal laps in asphalt plastic cement a minimum of 12" (305mm). \*Nail the metal on the edges so the nail heads hold it in place. Do not puncture the metal. Nailing through the metal may cause leaking and buckling due to movement. Install shingles to the valley, covering the metal 4" (102mm) minimum on each side to seal. Clip the top corners to keep water flow toward the valley center. Taper the valley shingles to handle increasing water volume. Start at 6" (152mm) wide at the valley top, widen 1/8" (3mm/m) per foot toward the eave (snap chalk lines to ensure shingles diverge properly in valley). Embed the shingle ends in plastic cement to seal the shingles to the metal and keep water from running under them.\*  
\*Note: Excess cement can cause shingle blisters.



**Precautionary Notes**

These shingles are fiberglass, self-sealing asphalt shingles. Because of the natural characteristics of the high quality waterproofing material used, these shingles will be stiff in cold weather and flexible in hot weather.

1. These shingles are particularly tough, heavyweight shingles with a definitely rugged-looking appearance. They require additional effort to trim to fit on the roof. Curved blade utility knives are more effective than straight blade utility knives in cutting these shingles. Using a circular saw equipped with carbide-tipped blades is also effective.
2. Regardless of the tool used, always wear proper protective wear, i.e. gloves, eye protection, etc; follow all protection procedures and use tools carefully to prevent personal injury when working with these heavier products.
3. Do not drop bundles on edge or on other bundles to separate shingles. Do not load bundles across a hip or ridge. Do not bend bundles over shoulder for carrying. Premium weight may cause cracks at sharp bend points.
4. Handle carefully. Shingles can easily be broken in cold weather or their edges damaged in hot weather.
5. Store on flat surface, in a covered, ventilated area-maximum temperature 110°F (43°C). Do not store near steam pipes, radiators, etc., or in sunlight.
6. GAF-Elk does not recommend long-term storage of double stacked pallets. If double stacking is required for short periods, slip sheets of 1/2" {13mm} plywood cut to the pallet size are required between pallets to minimize damage. Long-term double stacked storage, especially in hot weather, can result in possible sticking, staining and distortion of the shingles in the lower layers of shingle bundles.
7. If shingles are to be applied during PROLONGED COLD periods or in areas where airborne dust or sand can be expected before sealing occurs, the shingles MUST be hand sealed. See "Wind Resistance/Hand Sealing" instructions.

**IMPORTANT:** Repair leaks promptly to avoid adverse effects, including mold growth.

**Re-Roofing**

If old asphalt shingles are to remain in place, nail down or cut away all loose, curled or lifted shingles; replace with new; and just before applying the new roofing, sweep the surface clean of all loose debris. Since any irregularities may show through the new shingles, be sure the underlying shingles provide a smooth surface. Fasteners must be long enough to penetrate the wood deck at least 3/4" (19mm) or just through plywood. Follow above instructions for application.

**Note:** Shingles can be applied over wood shingles if the surface can be made smooth enough. This may include cutting back old shingles at eaves and rakes, installing new wood edging strips as needed, and the use of beveled wood strips. Install #30 underlayment to maintain Class A rating.

For more information, visit our website at [www.gaf.com](http://www.gaf.com) or call Technical Services at 1-800-ROOF-411.

This product is sold with an express LIMITED WARRANTY only. A copy of the LIMITED WARRANTY stating its terms and restrictions is printed on the product wrapper or may be obtained from the distributor of this product or directly from GAF-Elk Corporation. Any deviation from printed instructions shall be the responsibility of applicator and/or specifier.

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# Preparing for Carpenter Training

