

Instructors

Chapter 1 Problem Solutions

Problem 1.1

Write an approximately 200-word report covering building codes. Include information about the building codes that are primarily used in the United States. Identify your local jurisdiction and visit or call to determine the building codes used in your area.

Student solutions vary based on chapter content, Internet, and local research.

Problem 1.2

Write an approximately 200-word report covering the involvement of a Registered Architect (RA) or Professional Engineer (PE) in the home design and building permit application process. Contact your local jurisdiction to determine the building permit application process, requirements for building permit application, and who is permitted to apply for a building permit. Include a copy of the local building permit application with your report.

Student solutions vary based on chapter content, Internet, and local research. Obtain a local building permit application.

Problem 1.3

Write an approximately 200-word report covering public and private land use restrictions. Research the advantages and disadvantages of zoning and then give your own opinion about zoning. Describe and explain deed restrictions and CC&Rs. Find a property owner or search public records to locate a deed with restrictions and a property where CC&Rs apply. Identify the restrictions.

Student solutions vary based on chapter content, Internet, and local research.

Problem 1.4

Write an approximately 200-word report covering the design of plans for a custom or spec home. Determine if a home must be designed in your area by an RA or PE, or if the home can be designed by an architectural designer and under what conditions.

Student solutions vary based on chapter content, Internet, and local research.

Problem 1.5

Write an approximately 200-word report describing the process of hiring a contractor. Identify at least two general contractors in your area. Also list at least four subcontractor categories and identify at least one subcontractor in each category in your area.

Student solutions vary based on chapter content, Internet, and local research.

Problem 1.6

Write an approximately 200-word report covering the process of seeking a construction loan. Contact at least one home lending institution in your area and determine their requirements and procedures for providing a construction loan. Include the loan dispersal and inspection process.

Student solutions vary based on chapter content, Internet, and local research.

Problem 1.7

Find the description of materials form on the Careers Resources for Students website (go to www.careersresourcesforstudents.com to access Appendix D), or search the Internet to find a U.S. Department of Housing and Urban Development–Federal Housing Administration (FHA) description of materials form. Identify proposed construction. Start completing the form

by identifying the property address as the address where you live or the address of a friend or relative. Identify the lender as the lender that you identified in Problem 1.6. Identify the contractor as one of the general contractors that you identified in Problem 1.5. Save the form for use later in a problem for Chapter 3 of this textbook.

Student solutions vary based on the description of materials form information used. Confirm use of correct description of materials form.

Problem 1.8

Write an approximately 200-word report covering the basic function of a cost estimate, and create your own cost estimate sheet based on the example found in this textbook or from other research. Contact a local contractor to determine and describe the cost estimating process used.

Student solutions vary based on chapter content, Internet, and local research.

Problem 1.9

Write an approximately 200-word report describing the purpose of building inspections, and contact your local jurisdiction to include a list and the timing of required building inspections in your area.

Student solutions vary based on chapter content, Internet, and local research.

Chapter 2 Problem Solutions

Student solutions vary based on chapter content, Internet, and local research.

Write a report of 250 or fewer words on one or more of the following topics:

- Problem 2.1** 2012 International Energy Conservation Code (IECC)
- Problem 2.2** Leadership in Energy and Environmental Design (LEED)
- Problem 2.3** Green Building Rating System
- Problem 2.4** Energy Star
- Problem 2.5** Carbon offsets
- Problem 2.6** Greenhouse effect
- Problem 2.7** Environmentally friendly
- Problem 2.8** Controlling indoor air quality and maintaining a healthy living environment
- Problem 2.9** Solar energy design
- Problem 2.10** Thermal storage walls
- Problem 2.11** Active solar systems
- Problem 2.12** Geothermal systems

Problem 2.13 Wind energy

Problem 2.14 Small footprint home, its typical location, and its function

Problem 2.15 Brownfields

Problem 2.16 Green power

Problem 2.17 Living with Solar Energy Systems

Problem 2.18 NAHB Green Building Guidelines

Problem 2.20 The LEED for Homes program

Problem 2.21 National Green Building Standard

Problem 2.22 EnviroHome Initiative, Canadian Home Builders' Association

Problem 2.23 Roof ponds

Problem 2.24 Green roof

Problem 2.25 Solarium

Problem 2.26 Solar collectors and storage

Problem 2.27 Solar architectural concrete products

Problem 2.28 Photovoltaic collectors

Problem 2.29 Hydroelectric power

Problem 2.30 Evaluate and describe your own principles surrounding the energy-efficient design and construction applications discovered in this chapter.

Problem 2.31

Go to www.routledge.com/cw/madsen to access the description of materials form, or search the Internet to find a U.S. Department of Housing and Urban Development–Federal Housing Administration (FHA) description of materials form. Identify proposed construction. Start completing the form by identifying the property address as the address where you live or the address of a friend or relative. Identify the lender as the lender that you identified in Problem 1.6. Identify the contractor as one of the general contractors that you identified in Problem 1.5. Save the form for use later in a problem for Chapter 3 of this textbook.

Chapter 3 Problem Solutions

Problem 3.1 Zoning

Zoning is a system of numbers along the top and bottom margins and letters along the left and right margins of the sheet. Zoning allows the drawing to be read like a road map. For example, you can refer to the location of a specific feature as C-5, which means the feature is found at or near the intersection of C across and 5 up or down.

Sheet blocks are a group of informational areas normally surrounded by border lines and grouped in

one consistent location on the drawings. Architectural sheet blocks can include title blocks and revision history blocks. Most architectural firms use one basic sheet size with borders and sheet blocks. A **title block** provides a variety of information about the company, client, and the drawing, such as company and client name, the title of the drawing, sheet size, predominate scale, and sheet page number. The **revision history block**, also called the revision block, is used to record changes to the drawing and is generally located in or next to the title block.

The revision history block and any related **revision clouds** are only created after plans are approved and released for construction. Prior to formal completion, design changes can be documented and recorded depending on the specific practice used by the architectural office. A revision cloud is a cloudlike circle around a change made to a print after the drawing has been released for construction, and to highlight the change in the field.

Architectural sheet blocks are generally placed along the right side of the sheet, or across the bottom of the sheet. Each company uses a slightly different sheet block design, but the following information is found in most sheet blocks:

Drawing number. This can be a specific job or file number for the drawing.

Company name, address, and phone number.

Project or client. This is an identification of the project by company or client name, project title, or location.

Drawing name. This is where the title of the drawing can be placed. For example, MAIN FLOOR PLAN or ELEVATIONS. Most companies omit this information from the title block and place it on the face of the sheet below the drawing.

Scale. Some company title blocks provide a location for the general scale of the drawing. The scale of any view or detail on the sheet that differs from the general scale is identified below the view title and both placed directly below the view. Most companies omit the scale from the title block and place it on the sheet directly below the title of each individual plan, view, or detail.

Drawing or sheet identification. Each sheet is numbered in relation to the entire set of drawings. For example, if the complete set of drawings has eight sheets, each consecutive sheet is numbered 1 of 8, 2 of 8, 3 of 8, and so on, to 8 of 8. Drawings can also be divided into major divisions, such as A (architectural), S (structural), M (mechanical), and P (plumbing).

Date. The date when the drawing or project is completed.

Drawn by. This is where the drafter, designer, or architect who prepared this drawing places his or her initials or name.

Checked by. This is the identification of the individual that approves the drawing for release.

Architect or designer. Most title blocks provide the identification of the individual that designed the home or structure.

Revisions. Many companies provide a revision history block or column in which drawing changes are identified and recorded. Where changes are made on the face of the drawing after it has been released for construction, a circle with a revision number or letter accompanies the change. This revision number is keyed to a place in the drawing title block or revision history block where the revision number, revision date, initials of the individual making the change, and an optional brief description of the revision are located.

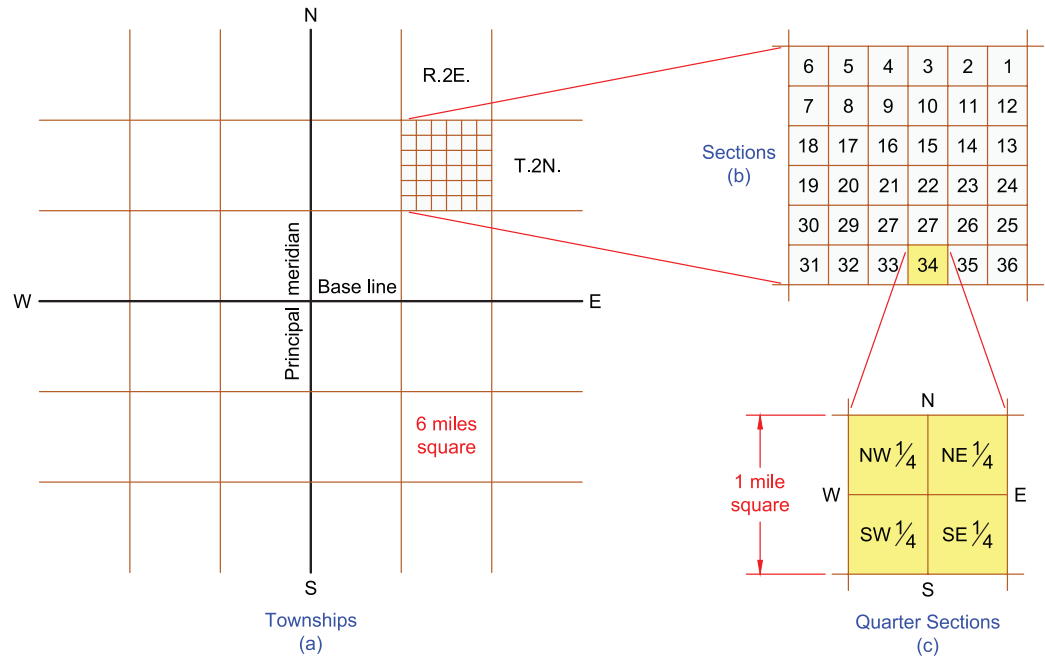
Area. With residential construction, many companies provide the square footage and total area of the home in the title block, or in a block on the front page of the plan set.

Copyright information. House plans and designs are protected by copyright and important information regarding federal regulations and rights associated with construction documents are often included in the title block.

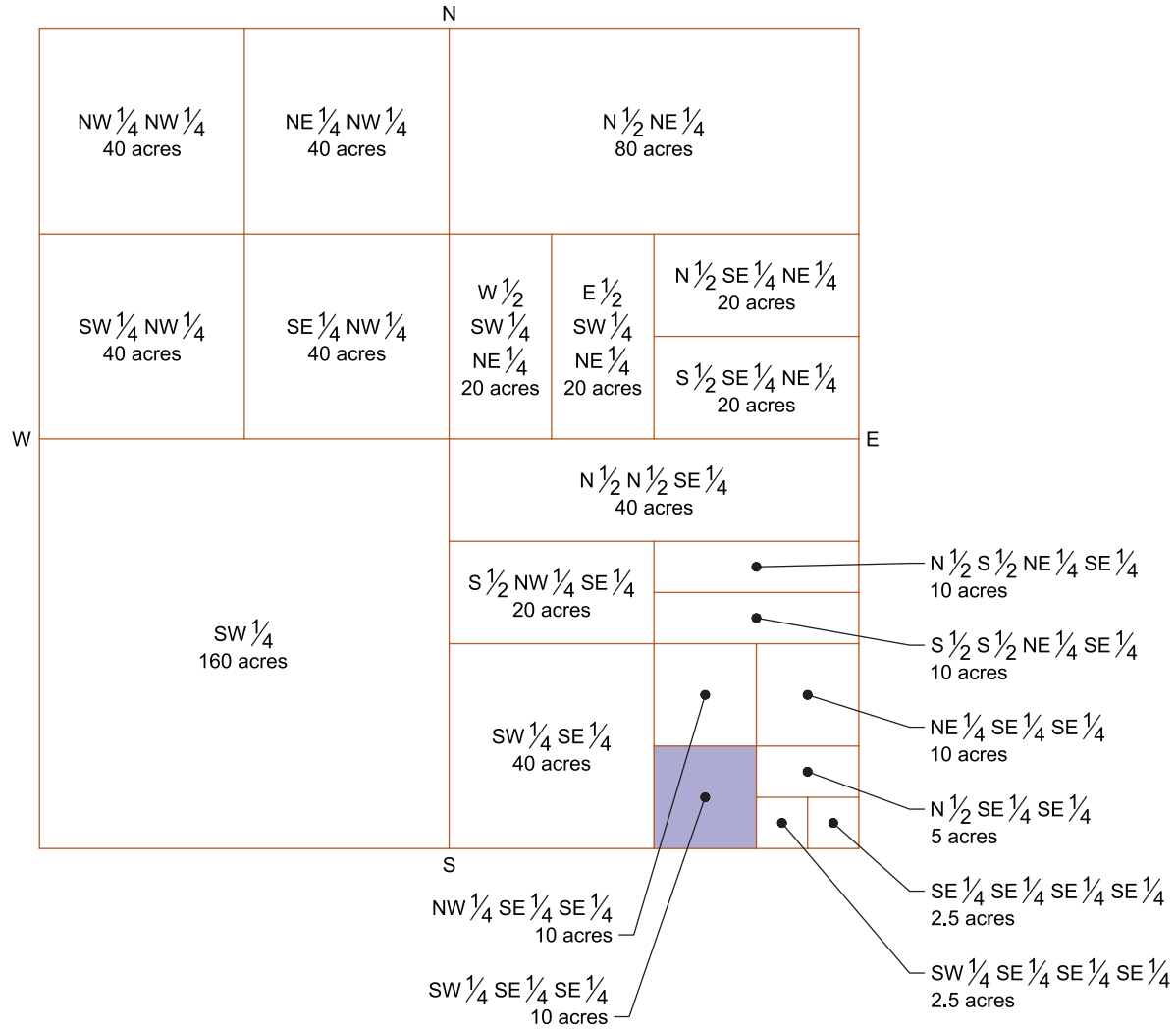
Problem 3.2

- A Bearing
- B Elevation
- C Topography (contour lines)
- D Property line
- E Dimension
- F Setback
- G Driveway
- H Title
- I Drawing scale
- J Legal description
- K Direction to north (north arrow)
- L Road (street)
- M Walkway
- N Utility lines
- O Curb
- P Sidewalk
- Q Outline of structure (home)
- R Road (street)
- S Easement

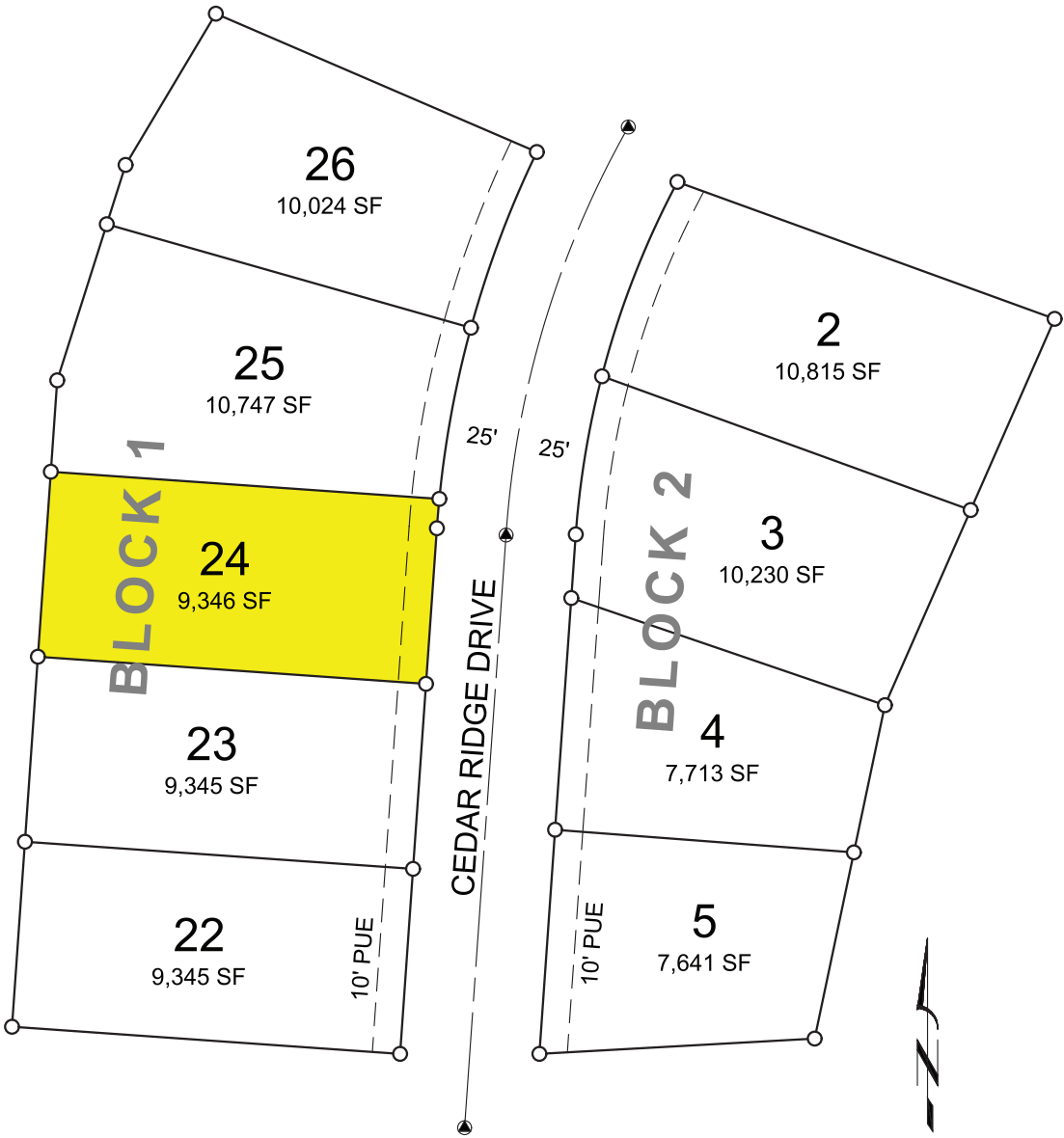
Problem 3.3



Problem 3.4 Given the shaded parcel labeled A in the section, provide the legal description.



Problem 3.5 Lot 24, Block 1, Cedar Ridge Estates, your city, your county, and your state.



Problem 3.6

- A Ground
- B Footing
- C Key
- D Foundation wall
- E Anchor bolt
- F Footing
- G Sill
- H Stud
- I Plate
- J Cylindrical pier
- K Rectangular pier
- L Moisture barrier

- M Post
- N Beam

Problem 3.7

- A Cutting plane line
- B Exterior wall
- C Window
- D Base cabinet
- E Upper cabinet
- F Room title
- G Room dimensions
- H Fireplace
- I Note

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- J Stairs
- K Interior dimension
- L Masonry veneer
- M Exterior dimension
- N Exterior entry door
- O Interior partition
- P Drawing scale
- Q Title
- R Header
- S Overhead garage door
- T Post
- U Beam
- V Interior door
- W Water closet
- X Construction framing

Problem 3.8

- A Vent
- B Post
- C Cutting plane line
- D Foundation wall
- E Beam
- F Beam pocket
- G Pier
- H Cut-out
- I Crawl space access
- J Block out
- K Note
- L Edge of slab
- M Masonry veneer
- N Dimension
- O Footing
- P Drawing scale
- Q Title

Problem 3.9

- A Ground
- B Footing
- C Key
- D Foundation wall
- E Sill (mud sill)
- F Footing
- G Sill
- H Stud
- I Plate
- J Pier
- K Moisture barrier
- L Post
- M Beam
- N Rim joist
- O Joist
- P Plywood subfloor (subfloor, OSB subfloor)
- Q Crawl space

Problem 3.10

- A Construction framing
- B Cutting plane line
- C Foundation wall
- D Pier
- E Dimension
- F Cut-out
- G Drawing scale
- H Title
- I Note
- J Footing
- K Vent
- L Post
- M Beam
- N Beam pocket

Problem 3.11

- A Ground
- B Compacted gravel
- C Vapor barrier
- D Footing
- E Concrete slab
- F Steel reinforcing
- G Control joint
- H Anchor bolt, washer, and nut
- I Sill (mud sill)
- J Stud

Problem 3.12

- A Plumbing fixture reference
- B Cutting plane line
- C Note
- D Cut-out
- E Dimension
- F Edge of slab
- G Drawing scale
- H Title
- I Footing
- J Foundation wall

Problem 3.13

- A Unexcavated ground
- B Footing
- C Key
- D Concrete or concrete block foundation wall
- E Horizontal reinforcing
- F Vertical reinforcing
- G Compacted gravel fill
- H Vapor barrier
- I Concrete slab
- J Welded wire reinforcing
- K Expansion joint
- L Waterproof coating
- M Rigid insulation

- N Sill (mud sill)
- O Rim joist
- P Joist
- Q Drain tile with filter fabric sock
- R Drain gravel
- S Filter fabric
- T Backfill

Problem 3.14

- A Ceiling-mounted light fixture
- B Cutting plane line
- C Window
- D Window well
- E Foundation wall
- F Beam
- G Beam pocket
- H Pier
- I Stairs
- J Post
- K Construction framing
- L Masonry veneer
- M Dimension
- N Drawing scale
- O Title
- P Edge of slab
- Q Footing
- R Note
- S Furnace
- T Cut-out
- U Water heater

Problem 3.15

Framing materials shown and labeled on the floor plans.

Problem 3.16

- A Drop beam
- B Joist
- C Flush beam
- D Joist hanger
- E Joist

Problem 3.17

- A Beam
- B Foundation wall
- C Footing
- D Solid blocking
- E Rim joist
- F Joist
- G Pier
- H Post
- I Construction framing
- J Cutting plane line
- K Drawing scale
- L Title

- M Construction framing
- N Crawl space access
- O Plumbing fixture reference

Problem 3.18

Typical wall section for the plan found in Figure 3.9.

Problem 3.19

Sections A and B. Compare the locations of the cutting-plane line symbols in Figure 3.26 as you look at the sections in Figure 3.27.

Problem 3.20

- A Outline of roof
- B Ridge
- C Nailer (valley)
- D Cutting plane line
- E Downspout
- F Outline of gutter (gutter)
- G Outline of upper floor
- H Construction framing
- I Stairs
- J Girder
- K Skylight
- L Cricket
- M Overhang dimension
- N Drawing scale
- O Title
- P Note
- Q Roof pitch
- R Roof vent

Problem 3.21

Detail markers and details. Details can be correlated to a plan with a detail marker that identifies the specific detail by number and the page where the detail is found. The correlated detail drawing is found on the sheet identified in the marker.

Problem 3.22

Cabinet elevations for the floor plans shown in Figure 3.9 with descriptive titles provided, such as KITCHEN, BATH, and LAUNDRY.

Problem 3.23

Student solutions can be different, but each should display a door schedule, window schedule, and a finish schedule.

Problem 3.24

Refer to Problem 1.7 where you started completing the U.S. Department of Housing and Urban Development–Federal Housing Administration (FHA) description of materials form. Go to www.routledge.com/cw/madsen and access the set of plans for the One-story Slab, or the One-story Post

and Beam of your choice, unless otherwise assigned by your instructor. It is recommended that you select the set of plans that is most consistent with the type of construction used in your area. Use the information provided on the set of plans to complete the description of materials form for the selected home. You will need to conduct additional research to select fixtures, appliances, and finish materials. This research can be conducted online or by visiting building materials suppliers, such as Home Depot.

Problem 3.25 Team Problem

Refer to Problem 1.7 where you started completing the U.S. Department of Housing and Urban Development–Federal Housing Administration (FHA) description of materials form. Go to www.routledge.com/cw/madsen and access the set of plans for the One-story Slab, or the One-story Post and Beam of your choice, unless otherwise assigned by your instructor. It is recommended that you select the set of plans that is most consistent with the type of construction used in your area. Use the information provided on the set of plans to complete the description of materials form for the selected home. You will need to conduct additional research to select fixtures, appliances, and finish materials. This research can be conducted online or by visiting building materials suppliers, such as Home Depot. To complete this problem, divide the class into teams of four or five students per team. There are 27 categories on the description of materials form. Write each category on a separate piece of paper and put all pieces of paper in a bowl. Have each team member pick a piece of paper until all categories have been selected. Each team member is responsible for completing the portion of the description of materials form related to the categories selected. Each team member will also report findings back to the team in addition to completing the required part of the form.

Problem 3.26

Find the description of materials form on the website (go to www.routledge.com/cw/madsen to access Appendix D), or search the Internet to find a U.S. Department of Housing and Urban Development–Federal Housing Administration (FHA) description of materials form. Obtain the plans for the proposed construction project that will be built by your building construction program. To complete this problem, divide the class into teams of four or five students per team. There are 27 categories on the description of materials form. Write each category on a separate piece of paper and put all pieces of paper in a bowl. Have each team member

pick a piece of paper until all categories have been selected. Each team member is responsible for completing the portion of the description of materials form related to the categories selected. Each team member will also report findings back to the team in addition to completing the required part of the form. Start completing the form by identifying the property address as the address that you can get from your instructor. Your instructor can give you additional details that have already been determined about the project, if any. Save the form for use later in a problem for Chapter 4 of this textbook.

Team Construction Problems

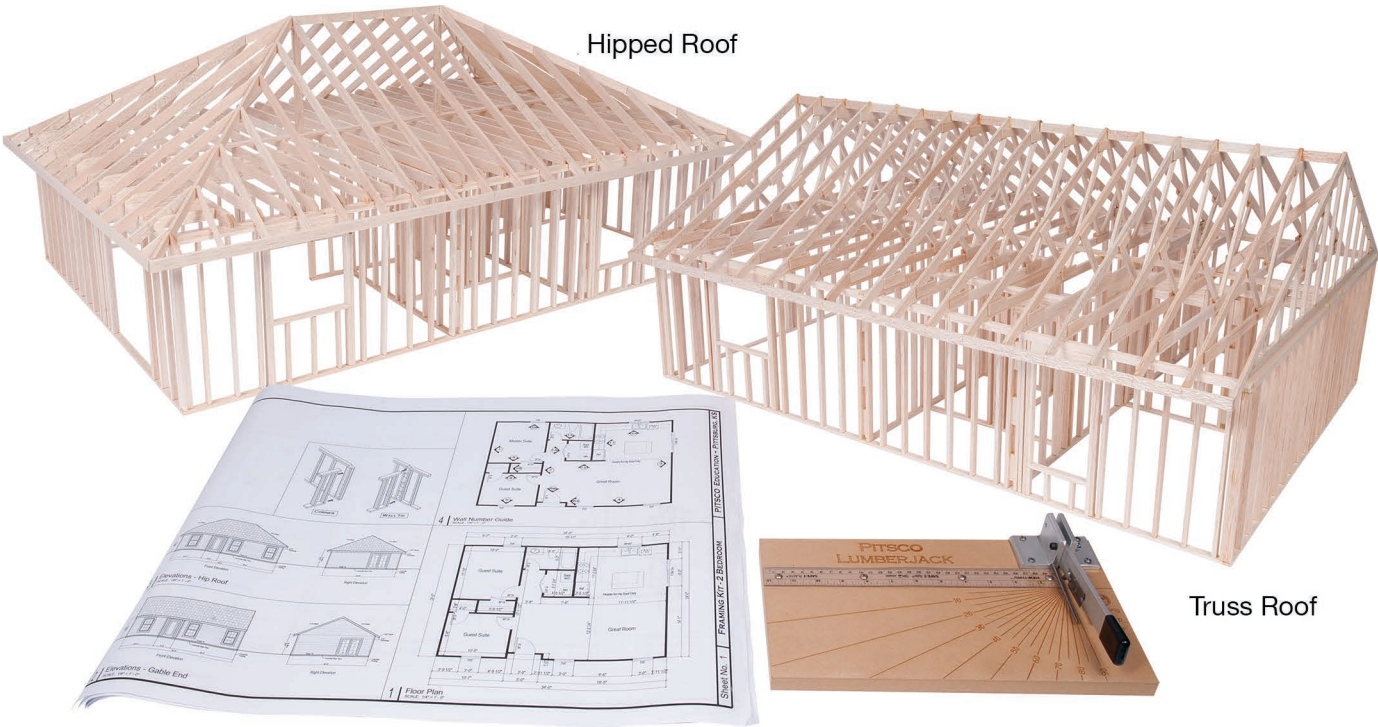
Team construction problems can be used throughout this textbook as projects that help foster leadership and cooperation between team members to solve or construct a specific residential building phase. Construction teams are established with any desired number of members based on the project and curriculum goals. Teams can select a **foreman** by voting in a democratic process, by selecting the person with the highest course evaluation, or as determined by the instructor. A foreman is the person in charge of a construction crew or team in this situation. Use of the title of foreman today is intended to be gender non-specific. The foreman can be responsible for reading prints and providing answers and instructions to the construction workers in cooperation with the instructor. Other team members can include a materials handler and inventory controller, a material processor and cutter, and one or more carpenters or framers. Final team assignments and members are determined by your instructor.

Model Home Framing Construction

Scale model home framing kits are available for the purpose of learning framing for a home according to building codes. These kits provide on the job training in the classroom similar to constructing an actual home. Scales are $3/4" = 1'-0"$ and $1" = 1'-0"$. Kits include complete plans, instructions, and materials for the homes being built. Model home construction problems are correlated with chapters in this textbook, allowing your team to complete the entire project while learning modern residential construction practices using conventional framing or timber framing practices.

Home Framing Kit 301

This is a scale framing model of a two-bedroom one-story home shown in Figure P.1. This kit provides conventional construction from the foundation to the roof.



Two-story Townhouse Kit

This is a scale framing model of a two-story home shown in Figure P.2. This kit provides conventional construction from the foundation to the roof for students in building construction programs with an emphasis on two-story framing including stairs.



A-Frame Cabin Kit 101

This is a scale framing model of an A-frame cabin shown in Figure P.3. This kit allows your team to construct a complete home using timber-framing concepts.



The model home framing kits previously described can be purchased from these sources:

- Pitsco Education
- Midwest Technology Products

Home Construction

Many school and apprenticeship building construction programs provide students with the opportunity to build actual homes on property near the school and sold when finished, or on the school grounds and then moved to another location after completion and sale. The income from the sale of these homes can help fund the building construction program. The complete sets of residential working drawings, described in Chapter 3, can be used for home construction, or homes are commonly built from the plans designed by the architectural drafting students at the school.

Chapter 4 Problem Solutions

Problem 4.1 Go to www.ngdc.noaa.gov and find a map with lines that represent the magnetic declination at different locations throughout the United States. Use the map to determine the magnetic declination for your area. Also, determine the magnetic declination for your area using the calculator provided on the National Geographic Data Center website. Use a compass to locate the best southern exposure at your school. Write an approximately 200-word report describing the perfect solar site found at your school, the magnetic declination comparison you discovered using the map with different locations throughout the United States, and the calculator provided on the National Geographic Data Center website.

Student solutions vary depending on the magnetic declination for your area.

Problem 4.2 Do research to determine the prevailing wind in your area, and write an approximately 200-word report that describes how you established your findings, and include any information that supports other wind patterns in your area at different times of the year.

Student solutions vary depending on the prevailing wind in your area.

Problem 4.3 Make a sketch by hand or using a computer program of your choice. The sketch should contain the following:

A rectangular site plan with dimensions of your choosing.

A basic house plan with living room, kitchen, bathroom, three bedrooms, and garage. Place rooms that do not require a great deal of glass for view or solar use on the north side or the side toward severe winter winds. Place the garage as a wind break between cold winter winds and the living areas of the home.

Place coniferous trees or other evergreen landscaping materials to provide a windbreak. These trees should be planted in three staggered rows. Include a hedge in one row to provide wind protection.

Place arrows representing wind direction pointing toward the site.

Student solutions can vary. Confirm that all problem requirements are correctly included.

Problem 4.4 Make a sketch by hand or using a computer program of your choice. The sketch should contain the following:

Two sets of contour lines with one set showing contour intervals that is relatively flat or gently sloping land, and the other contour interval showing land that is much steeper. Display at least three index contours as every fifth line with intermediate contours between.

Student solutions can vary. Confirm that all problem requirements are correctly included. See Figure 4.19.

Problem 4.5 Contact local architects and architectural designers in an effort to obtain a site plan to share with your class. The site plan should contain most of the following:

Property lines with bearings and distances.

House with size and location dimensions placed on the site.

Driveway, walkways, patio, and deck.

Contour lines.

North arrow.

Student solutions can vary. Confirm that all problem requirements are correctly included.

Problem 4.6

- A Ground
- B Survey stake is on the exact location when this area is blank
- C Color code ribbon with tail
- D Stake reference number. Refer to surveyor log for details.
- E Fill 6.25 inches
- F Finish grade. SG is subgrade.
- G Top of ribbon is grade

Problem 4.7

- A Ground
- B Stake located at 0+125. 0 is the hub which is the survey base point. +125 is 125 feet from the hub.
- C Centerline
- D Stake is at grade. No cut or fill needed.