

**CENTRAL TEXAS COLLEGE  
SYLLABUS FOR FIRT 1329  
BUILDING CODES AND CONSTRUCTION**

**Semester Hour Credit: 3**

**INSTRUCTOR:  
OFFICE HOURS:**

**I. INTRODUCTION**

- A. Building Codes and Construction is an examination of building codes, standards, and requirements covering various construction categories and different types of building materials. The topics covered includes construction and materials for walls, floorings, foundations, and various roof types and the associated dangers of each type if involved in fires or other emergency situations. Types of construction and their strengths and weakness and precautions to be taken on the fireground are well documented in this course.
- B. This is a required course for an Associate of Applied Science Degree in Fire Protection Technology.
- C. This course is occupationally related and serves as preparation for careers in Fire Protection and Fire Service.
- D. Prerequisite: None
- E. Alphanumeric coding used throughout the syllabus denotes the integration of SCANS occupational competencies ( C ) and Foundation skills. (F)

**II. OVERALL OR GENERAL OBJECTIVES OF THE COURSE.**

Upon successful completion of this course, Building Codes and Construction, the student will:

- A. Explain model building codes, and be able to cite differences in their regulatory bodies; and explain their objectives and necessity.
- B. Compare and contrast various construction types and methods.
- C. Recognize inherent strengths, weaknesses, and collapse zones of structures.

**III. INSTRUCTIONAL MATERIALS**

- A. The instructional materials identified for this course are viewable through [www.ctcd.edu/books](http://www.ctcd.edu/books)

B. Currently (6/15): Glenn P. Corbett & Francis L. Brannigan, Brannigan's Building Construction for the Fire Service, fifth edition 2015, Jones and Bartlett Learning, 9781449688943

C. References: As listed by instructor.

#### IV. COURSE REQUIREMENTS

A. Your first responsibility is scholarship. The grade you receive for this course will not be the grade of the instructor, but the grade you and you alone earn.

B. This course is designed to require a steady, continuous effort from the student. A crash-cram policy will not result in the best grade possible. In addition to exams, factors such as class participation, initiative, attendance, and individual work will be considered in grade computation.

C. You are encouraged to give your best effort throughout the semester. From the beginning, you should plan for a steady, organized, and continuous effort, which in the long run will prove more effective for your final grade than a last minute crash-cram policy. Your course grade is not determined solely by exam grade. Such factors as class participation, initiative, attendance, and individual research papers or projects will be considered in grade computation.

D. From time to time, special library and other assignments may be made to members of the class, individually and in groups. You are expected to read all assignments and fulfill your responsibilities to any group assignments.

E. You are expected to read all assigned material and bring your textbook to class. Keep up to date and informed on assignments, especially after a period of absence.

F. Good class notes are indispensable for earning a good grade since both the material assigned and discussed will be the basis for examination material. Regular attendance is essential for the same reason.

G. Scholastic Honesty: All students are required and expected to maintain the highest standards of scholastic honesty in the preparation of all coursework and during examinations. The following are considered examples of scholastic dishonesty:

Plagiarism: The taking of passages from the writing of others without giving proper credit to the sources.

Collusion: Using another's work as one's own, or working together with another person in the preparation of work, unless such joint preparation is specifically approved in advance by the instructor.

Cheating: Giving or receiving information on examinations.

H. Special Work: Special assignments may be made during the semester, both for regular work or supplemental work.

## V. EXAMINATIONS

A. There will be a minimum of three (3) major examinations as follows:

1. Three-week exam
2. Mid-term exam
3. Twelve-week exam (optional)
4. Final exam

B. Unannounced short quizzes may be given covering any material that has been assigned from the beginning of the course.

C. Occasionally a student will find it unavoidable to be absent from an exam. Only students with excused absences will be permitted to take make-up exams. Unexcused absences will result in a zero for the exam missed. The policy of the college is clearly stated in the catalog. A doctor's excuse is required in case of illness.

D. The exams may be structured to include subjective, objective, or a combination of both types of questions.

## VI. SEMESTER GRADE COMPUTATION

<u>EXAM</u>	<u>POINTS</u>	<u>POINTS</u>	<u>GRADES</u>
Three Week Exam	150	900-1000	A=4pts/sem hr.
Mid-Term Exam	200	800-899	B=3pts/sem hr.
Twelve Week Exam(opt)	200	700-799	C=2pts/sem hr.
Final Exam	250	600-699	D=1pt/sem hr.
Homework/Quizzes	<u>200</u>	0-599	F=0pts/sem hr.
<b>Total</b>	<b>1,000</b>		

The Twelve Week Exam is optional: if it is not given, then those points will default to Homework/Quizzes and to Incentive points. Incentive points may be earned for factors such as attendance, initiative, participation in class discussions, and timely completion of assignments. Three points will be deducted for each unexcused absence. Military assignments or unavoidable circumstances will be evaluated upon notification to class instructor.

## VII. NOTES AND ADDITIONAL INSTRUCTIONS FROM COURSE INSTRUCTOR

A. Withdrawal from course: It is the student's responsibility to officially drop a class if circumstances prevent attendance. Any student who desires to, or must, officially withdraw from a course after the first scheduled class meeting must file a Central Texas College application for Withdrawal (CTC Form 59). The withdrawal form must be signed by the student.

CTC Form 59 will be accepted at any time prior to Friday of the 12<sup>th</sup>. Week of classes during the 16 week fall and spring semesters. The deadline for sessions of other lengths is as follows:

10 week session	Friday of the 8 <sup>th</sup> . Week.
8 week session	Friday of the 6 <sup>th</sup> . Week.
5 week session	Friday of the 4 <sup>th</sup> . Week.

The equivalent date (75% of the semester) will be used for sessions of other lengths. The specific last day to withdraw is published each semester in the Schedule Bulletin.

Students who officially withdraw will be awarded the grade of "W", provided the student's attendance and academic performance are satisfactory at the time of official withdrawal. Students must file a withdrawal application with the college before they may be considered for withdrawal.

At student may not withdraw from a class for which the instructor has previously issued the student a grade of "F" or "FN" for nonattendance.

- B. An Administrative Withdrawal: An administrative withdrawal may be initiated when the student fails to meet College attendance requirements. The instructor will assign the appropriate grade on the Administrative Withdrawal Form for submission to the Registrar.
- C. An Incomplete Grade: The College catalog states, “An incomplete grade may be given in cases where the student has completed the majority of the course work but, because of personal illness, death in the immediate family, or military orders, the student is unable to complete the requirements for a course...” Prior approval from the instructor is required before the grade of “I” is recorded. A students who merely fails to show for the final examination will receive a zero for the final and an “F” for the course.
- D. Cellular phones and Pagers: Cellular phones and pagers will be turned off while the student is in the classroom or laboratory.
- E. Americans with Disabilities Act (ADA): Disability Support Services provides services to students who have appropriate documentation of a disability. Students requiring accommodations for class are responsible for contacting the Office of Disability Support Services (DSS) located on the central campus. This service is available to all students, regardless of location. Explore the website at [www.ctcd.edu/disability-support](http://www.ctcd.edu/disability-support) for further information. Reasonable accommodations will be given in accordance with the federal and state laws through the DSS office.

## VIII. COURSE OUTLINE

- A. Units One and Two: Chapter 1, Introduction; and Chapter 2, Concepts of Construction
  - 1. Unit Objectives: Upon successful completion of this unit, the student will be able to:
    - a. Understand the importance of studying building construction as a fire fighter; why using proper language is so important for comprehending building construction techniques and for fireground safety; and why evacuation protocols are critical.
    - b. Identify the role of prefire plans and prefire analysis in firefighting operations.
    - c. Understand the importance of looking for building deficiencies and dangerous conditions while conducting prefire planning.
    - d. Explain why it is so important to study reports of significant fires, NIOSH Fire Fighter Fatality and Near Miss reports of the past.
    - e. Understand the relationship between risk and benefit and its impact on fire fighter safety.
  - 2. Learning Activities:
    - a. Read Chapters 1 & 2. pages 4-35.
    - b. Read Tactical Considerations at the end of the chapter.

- c. Review Key Terms and Case Study questions at end of chapters.
- d. Answer Challenging Questions at end of chapters.

3. Unit Outline:

- a. Introduction to Chapter 1
- b. Watch Your Language
- c. Prefire Planning and Analysis
- d. Expect the Unexpected
- e. Study Fire Reports
- f. Why We Do What We Do
- g. Introduction to Chapter 2
- h. Gravity
- i. Definitions of Loads
  - 1. Stress and Strain
  - 2. Compression, Tension, Torsion, and Shear Forces
  - 3. Dead Loads
  - 4. Live Loads
  - 5. Impact Loads
  - 6. Static and Repeated Loads
  - 7. Wind Loads
  - 8. Concentrated Loads
  - 9. Imposition Loads
  - 10. Fire Loads
  - 11. Suspended Loads
- j. Safety Factor
- k. Composite Materials
  - 1. Composite Structural Elements
- l. Structural Elements
  - 1. Beams
  - 2. Trusses
  - 3. Columns
  - 4. Walls
  - 5. Roofs
  - 6. Arches
- m. Transmission of Loads
  - 1. Foundations
  - 2. Connections

B. Units Three and Four: Chapter 3, Methods and Materials of Construction, Renovation, and Demolition; and Chapter 4, Building and Fire Codes

- 1. Unit Objectives: Upon successful completion of this unit, the student will be able to:
  - a. Identify and describe the basic regulations that apply to building construction projects; the roles of the typical members of a building design team; the roles of the various members of a construction team.

- b. Recognize why it is important for fire fighters to be able to read building plans and specifications.
- c. Identify the tasks performed during site preparation prior to construction.
- d. Point out the unique features of modular construction that influence firefighting operations.
- e. Identify and describe the hazards to fire fighters during the construction, renovation, and demolition of a building.
- f. Identify and describe the hazards to fire fighters of the different types of materials used in the construction of buildings
- g. Recognize how the shape of a material affects its ability to resist a compressive load or a deflective one.
- H. Explain the history and basis for building and fire codes.
- i. Explain the differences between fire and building codes.
- j. Identify other construction codes and standards that have an impact on the fire service.
- k. Identify important fire protection features of building and fire codes.
- l. Identify construction-related provisions of fire codes.

2. Learning Activities:

- a. Read Chapters 3 & 4, pages 64-109.
- b. Read Tactical Considerations at the end of each chapter.
- c. Review Key Terms and Case Study questions at end of each chapter.
- d. Answer Challenging Questions at end of each chapter.
- e. Three-week examination will be administered if one is given.

3. Unit Outline:

- a. Introduction to Chapter 3
- b. Construction Regulations
- c. The Building Design and Construction Process
- d. Building Plans and Specifications
- e. Plans and Blueprints
- f. Site Preparation
- g. Modular Construction
- h. The Hazards of a Building Under Construction
- i. The Hazards of a Building Under Renovation
- j. The Hazards of a Building Under Demolition
- k. The Characteristics of Materials
  - 1. Wood
  - 2. Masonry and Stone
  - 3. Concrete
  - 4. Metal
  - 5. Glass
  - 6. Asbestos

- 7. Synthetic Materials
  - 8. Gypsum
  - 9. “Alternative” Organic Materials
  - l. The Effects of Shape
  - M. A History of Building Codes and Fire Protection
  - n. Fire Codes and Standards
    - 1. Fire Protection Basics of the Building Code
      - a. Type of Construction
      - b. Occupancy Classifications
      - c. Area and Height
      - d. Special Hazards
      - e. Egress
      - f. Fire Protection Systems
      - g. Disable Occupants
      - h. Elevators
    - 2. Building Construction and the Fire Codes
  - o. Code Implications for Firefighting
- C. Units Five and Six: Chapter 5, Fire Behavior and Building Construction; and Chapter 6, Features of Fire Protection

- 1. Unit Objectives: Upon successful completion of this unit, the student will be able to:
  - a. Identify fundamentals of fire behavior and key fire phenomena.
  - b. Describe the development of a compartment fire.
  - c. Identify the ways fire is influenced by a building and its characteristics.
  - d. List the ways buildings and their components are affected by a fire.
  - e. Explain how specific building materials behave under fire attack
  - f. Describe smoke behavior and the effects it can have on the building, occupants, and fire fighters.
  - g. Understand the basic concepts of providing fire protection in buildings.
  - h. Define the fire resistance and understand how it is determined.
  - i. Identify the primary laboratory fire tests and the characteristics they assess.
  - j. Describe research being conducted and enhance fire protection capabilities.
  - k. Explain the ways in which smoke and fire containment is achieved.
  - l. Describe the various types of fire protection systems.

- 2. Learning Activities:
  - a. Read Chapter 5 & 6, pages 110-189.

- b. Read Tactical Considerations at the end of each chapter.
- c. Review Key Terms and Case Study questions at end of each chapter.
- d. Answer Challenging Questions at end of each chapter.

3. Unit Outline:

- a. The Basics of Fire and Fire Behavior
  - 1. Compartment Fires
  - 2. Backdraft
- b. Fire Behavior, Fire Fighters, and Buildings
- c. Fire Growth and Spread
  - 1. Examples of Fire Growth and Spread
  - 2. Building or Contents Hazard?
  - 3. Hidden Building Elements
  - 4. Interior Finishes
  - 5. Other Hazards Associated with Interior Finishes
  - 6. Void Spaces
  - 7. Remodeled Ceiling Hazards
  - 8. Aircraft Interiors
  - 9. Acoustical Treatment
  - 10. Open-Plan Offices
  - 11. Alterations
  - 12. Decorations and Contents
- d. Today's Fire Loads
  - 1. First Interstate Bank Fire
  - 2. Hotel Remodeling
  - 3. Regulations'
  - 4. Certification of Interior Designers
  - 5. Residential Fire Tests
  - 6. Available Films
- e. Control of Rapid Fire Growth
  - 1. Eliminate High Flame Spread Surfaces
  - 2. Separated the Material from the Source of Combustion
  - 3. Cut Off the Extension
  - 4. Coat the Material
- f. Products of Combustion
  - 1. Smoke
  - 2. Smoke Gases
  - 3. Physical Effects of Smoke
  - 4. Smoke Damage
  - 5. Contaminated and Toxic Smoke
  - 6. Corrosion
  - 7. Smoke Movement
- G. Building Fire Protection: A Short History
- h. Fire Terminology
  - 1. Confusing Language
  - 2. Noncombustible Buildings

- 3. Fire Resistance Distinguished
- 4. Early Fire Tests
- i. Standards for Fire Resistance
  - 1. What does Fire Resistance Mean?
  - 2. Fire Resistance Testing
  - 3. Minimum Requirements for Fire Resistance Listing
- k. Testing and Rating Materials
  - 1. Steiner Tunnel Test
  - 2. Radiant Panel Test
  - 3. FM Approvals Corner Test
  - 4. Carpet Tests
  - 5. Critical Radiant Flux of Floor Covering Systems Test
  - 6. Don't Be Mousetrapped
- l. Research
- m. Containment of Fire and Smoke
  - 1. Fire Doors
  - 2. Using Smoke Detectors for Release
  - 3. Stairwells
  - 4. Horizontal Exits and Smoke Barriers
  - 5. Penetrations in Fire-Resistant Walls and Floors
  - 6. Escalators
  - 7. Thoughts on Smoke and Compartmentation
- n. Fire Protection Systems
  - 1. Automatic Sprinkler Systems
    - a. Types of Sprinkler Systems
    - b. Design and Operation of Sprinkler Systems
    - c. Sprinkler Installation Incentives
    - d. Opposition to Sprinklers
    - e. Popular Misconceptions about Sprinklers
    - f. Fire Service Activities to Correct Erroneous Opinions about Sprinklers
    - g. Fire Service Misconceptions about Sprinklers
    - h. The Fire Department and Sprinklers
    - i. Why Were the Sprinklers Installed?
    - j. Fire Department Policy
    - k. Fire Department Instructions
    - l. Company-Level Inspections
    - m. Sprinkler Fraud
    - n. Management of Sprinkler Systems
    - o. Special Situations Involving Flammable Liquids
    - p. Protection of Glass Fire Barriers with Sprinklers
    - q. Early Suppression/Fast Response Sprinklers
    - r. Preplanning Considerations
  - 2. Standpipe Systems

- a. Standpipe Operations
- 3. Fire Alarm, Detection, and Communications Systems
  - a. Public Education and Alarm Systems
  - b. Unwarranted and Delayed Alarms
- 4. Smoke Management Systems
- 5. Other Fire Protection Systems

D. Units Seven and Eight: Chapter 7, Wood-Frame Construction; review and Mid-Term Examination.

1. Unit Objectives: Upon successful completion of this unit, the student will be able to:
  - a. Understand and correctly use the terminology associated with wood construction.
  - b. Identify and describe six types of wood-frame structures, classified as Type V construction
  - c. Identify and describe the specific fire protection differences between balloon-frame and platform-frame construction.
  - d. Describe the construction of a platform-frame building.
  - e. Understand how a truss is constructed and how it performs from a fire protection perspective.
  - f. Explain the difference between fire-stopping and draft-stopping.
  - g. Describe the behavior of engineered and manufactured wood products under fire attack.
  - h. Describe the different types of sheathing, siding, and roof materials.
  
2. Learning Activities:
  - a. Read Chapter 7, pages 190-223.
  - b. Read Tactical Considerations at the end of each chapter.
  - c. Review Key Terms and Case Study questions at end of each chapter.
  - d. Answer Challenging Questions at end of each chapter.
  - e. Review first seven chapters and administer Mid-Term Examination.
  
3. Unit Outline:
  - a. Introduction to Chapter 7
  - b. Definitions
    1. Wood-Frame Terminology
  - c. Uses of Wood in Buildings
  - d. Types of Wood-Frame Buildings
    1. Log Cabin
    2. Post and Frame
    3. Balloon Frame
    4. Platform Frame

5. Plank and Beam
- e. Lightweight Trusses and Other Wooden Members
  1. Lightweight Wood Trusses
  2. Dangers of Lightweight Wood Truss Floors
  3. Dangers of Lightweight Wood Truss Roofs
  4. The Truss Void Itself
  5. Catastrophe Potential
  6. Automatic Sprinklers and Truss Voids
- f. Lightweight Wooden I-Beams
- g. Truss Frame
- h. Firestopping and Draftstopping
  1. Types of Firestopping
- i. Protecting Wood from Ignition
  1. Impregnation
  2. Surface Coating
  3. Dangerous Treated Wood
- j. Plywood and Other Wood Building Materials
  1. Spliced and Laminated Timbers
  2. Paper Wrapping
  3. Planks
  4. Chipboard
  5. Flitch Plate Girders
- k. Sheathing
- l. Siding
  1. Brick Veneer
  2. Stone Veneer
- m. Wood Shingle Roofing
- n. Tile Roofs
- o. Imitation Timber
- p. Making Wood Construction Safe
- q. Review all material and test

E. Units Nine and Ten: Chapter 8, Heavy Timber and Mill Construction; and Chapter 9, Ordinary Construction

1. Unit Objectives: Upon successful completion of this unit, the student will be able to:
  - a. Identify and describe the characteristics of heavy timber buildings and specific characteristics of mill construction (Type IV construction).
  - b. Identify the dimensions of heavy timber members.
  - c. Describe why the misnomer “slow burning” is unfortunate for heavy timber buildings.
  - d. Identify the specific hazards of these conflagration breeders
  - e. Identify specific problems with mill construction
  - f. Identify the dangers of concealed spaces in renovated mill buildings.

- g. Identify differences between new heavy timber buildings and those build in the past.
- h. Describe the hazards of vacant heavy timber buildings and structures under demolition.
- i. Understand the details of ordinary construction, including features found in modern structures of ordinary construction.
- j. Understand how the structural stability of a masonry wall is compromised.
- k. Identify specific wall and wall component problems.
  - l. Recognize collapse indicators
- m. Identify the problems associated with interior structural elements.
- n. Identify fire hazards associated with roofs.
- o. Understand fire spread through void spaces of ordinary construction.
- p. Explain how masonry walls and fire doors act as fire barriers.

2. Learning Activities:

- a. Read Chapters 8 & 9, pages 224-280.
- b. Read Tactical Considerations at the end of each chapter.
- c. Review Key Terms and Case Study questions at end of each chapter.
- d. Answer Challenging Questions at end of each chapter.

3. Unit Outline:

- A. History of Heavy Timber and Mill Construction
- b. Slow Burning?
- c. Conversations, Modifications, and Preservation of Old Heavy Timber Buildings
- d. New Buildings of Heavy Timber Construction
- e. Vacant Buildings
- F. Introduction to Chapter 9
- g. Classifying Ordinary Construction
  - 1. Characteristics of Ordinary Construction
- h. Masonry Construction Terms
- i. Renovation and Restoration of Ordinary Construction
  - 1. Preservation
  - 2. The Owner's Rights
  - 3. Fire Resistance
- j. Recent Construction
- k. General Problems of Ordinary Construction
  - l. Discovery of Hazard
- m. Problems with Types of Walls and Wall Components in Ordinary Construction
  - 1. Hollow or Cavity Walls
  - 2. Composite Walls

- 3. Cast Iron
- 4. Lintels
- 5. Imitation Brick
- n. Structural Stability of Exterior Masonry Walls
  - 1. General Collapse Indicators
  - 2. Specific Factors That Can Lead to Collapse
    - a. Bricks and Mortar
    - b. Wood Beams
    - c. Cracks
    - d. Arches
    - e. Wall Weaknesses
    - f. Steel Lintels
    - g. Bracing
    - h. Eccentric Loads
    - i. Unvented Voids
    - j. Planes of Weakness
- o. Effects of Interior Structural Elements and Building Contents on Exterior Walls
- p. Effects of Fire Streams on Brick Walls
- q. Interior Structural Stability
  - 1. Fire-Resistive Combustible Assemblies
  - 2. Interior Structural Support Systems of Columns, Beams, and Girders
- r. Deficiencies of Materials
- s. Connections in Ordinary Construction
  - 1. Beam-to-Girder Connections
  - 2. Beam-to-Beam Connections
  - 3. Cast-Iron Columns
  - 4. Interior Suspended Loads
- t. Floors
- u. Roofs
  - 1. Fire Characteristics of Conventional Wood Roofs
  - 2. Roof Hazards
  - 3. Lightweight Wood Truss Roofs
  - 4. Bowstring Truss Roofs
  - 5. Treated Plywood Roofs
- v. Void Spaces
  - 1. Interior Sheathing
  - 2. Light Smoke Showing
  - 3. Ceiling Spaces
  - 4. Joist Spaces
  - 5. Combustible Gases in Void Spaces
  - 6. Large Voids
  - 7. Fire Extension
  - 8. Interior Walls
  - 9. Voids in Mixed Construction
  - 10. Cornices and Capopies
- w. Fire Barriers

- 1. Masonry Bearing Walls as Fire Barriers
- 2. Fire Doors
- x. Protection From Exposures
- y. Party Walls
- z. Fireground Safety

F. Units Eleven and Twelve: Chapter 10, Noncombustible Construction; and Chapter 11, Fire Resistive Construction

1. Unit Objectives: Upon successful completion of this unit, the student will be able to:
  - A. Understand the difference between noncombustible and fire-resistive.
  - b. Identify the different types of steel building and their characteristics.
  - c. Describe the use of masonry, including concrete, in non-combustible buildings.
  - d. Describe different types of steel structural systems.
  - e. Describe the hazards of a metal deck roof fire.
  - f. Understand the hazards of high fire loads in unprotected steel structures and ways to improve the situation.
  - G. Recall the difference between noncombustible and fire-resistive.
  - h. Describe different types of concrete structural systems; the two types of prestressing; the hazards of formwork; methods of fireproofing steel and of ensuring a level of fire resistance in concrete; and how concrete and concrete structural elements react in a fire.
  
2. Learning Activities:
  - a. Read Chapter 10 & 11, page 281-348.
  - b. Read Tactical Considerations at the end of each chapter.
  - c. Review Key Terms and Case Study questions at end of each chapter.
  - d. Answer Challenging Questions at end of each chapter.
  - e. Twelve-week exam will be administered if one is given.
  
3. Unit Outline:
  - a. Introduction to Chapter 10
  - b. Fire Characteristics of Steel
    1. Unwarranted Assumptions
    2. Water on Hot Steel
  - c. Definitions
  - d. Steel as a Construction Material
  - e. Steel Buildings
    1. Huge Spans
    2. Exterior Walls of Steel-Framed Buildings
    3. High-Rise Framing

4. Tilt Slab Hazards
5. Steel-Framed Buildings Under Construction
6. Plastic Design in Steel Construction
- f. More on the Fire Characteristics of Steel
  1. Steel Conducts Heat
  2. Steel Elongates
  3. Steel Fails
- g. Overcoming the Effects of a Fire on Steel
  1. Ignoring the Problem
  2. Relying on Inadequate Codes
  3. Taking Calculated Risks
- h. Insulated Metal Deck Fires
  1. Fires of Interest
  2. An Unrecognized Problem
  3. Fighting a Metal Deck Roof Fire
  4. Metal Decks on Nonmetal Buildings
- i. Types of Protection for Steel Structures
  1. Unprotected Steel
  2. Dynamic Fire Protection
  3. Passive Fire Protection
  4. Passive/Dynamic Protection
- j. Code Problems
  1. Code Variances
- k. Preplanning your “McCormick Place”
- l. Be Proactive
- m. Introduction to Chapter 11
- n. Concrete
  1. Concrete Structures
  2. Steel Versus Concrete Framing
  3. Fire Department Problems with Concrete Construction
- o. Types of Concrete Construction
  1. Concrete Definitions
- p. Concrete Structural Elements
  1. Columns
  2. Beams and Girders
  3. T-Beams
  4. Autoclaved Aerated Concrete Units
  5. Concrete Floors
- q. Prestressed Concrete
- r. Reinforced Masonry
- s. Collapse During Construction
  1. An Industry Warning
  2. Problems of Falseworks
  3. Reshoring
- t. Collapse of Floors
  1. A Widely Believed Fallacy
  2. Hazards of Post-Tensioning
  3. Collapse of Reinforced Masonry

- 4. Collapse of Precast Concrete
- 5. Lift-Slab Collapses
- u. Fire Problems of Type I Buildings under Construction
  - 1. Fire Potentials
  - 2. Hazards of Post-Tensioned Concrete
  - 3. Precast Buildings
  - 4. Cantilevered Platforms
  - 5. Tower Cranes
- v. Fire Problems in Finished Buildings
  - 1. Fire Resistance
  - 2. Methods of Providing Fire Resistance for Steel, Including Concrete
  - 3. Hazards of Floor-Ceiling Assemblies
  - 4. Fireproofing and Building Codes
- w. Signs of Trouble
- x. Unprotected Steel
- y. Ceiling Finish and Voids
- z. The Integrity of Floors
- aa. Imitation Materials
- bb. Concrete's Behavior in Fire
  - 1. Cutting Tensioned Concrete
  - 2. Precast Concrete
  - 3. Concrete Trusses
- cc. Fires in Type I Buildings
- dd. Signs of Potential Collapse in Type I Construction
- ee. Know Your Buildings

G. Units Thirteen and Fourteen: Chapter 12, Firefighting Concerns of Green Construction; and Chapter 13, Specific Occupancy-Related Construction Hazards

- 1. Unit Objectives: Upon successful completion of this unit, the student will be able to:
  - a. Define green (sustainable) construction.
  - b. Explain the role of green certification rating programs and green construction regulations.
  - c. Identify and describe the four general categories of green construction.
  - d. Identify firefighting hazards associated with each type of green construction material and green building system.
- 2. Learning Activities:
  - a. Read Chapters 12 & 13, pages 349-426.
  - b. Read Tactical Considerations at the end of each chapter.
  - c. Review Key Terms and Case Study questions at end of each chapter.
  - d. Answer Challenging Questions at end of each chapter.

3. Unit Outline:
- a. What is Green Construction?
  - b. The Trend Toward Sustainable Construction
  - c. Eco-Friendly Materials
  - d. Energy Conservation
  - e. Green Walls
  - f. Plastic Lumber
  - g. Firefighting Accessibility and Green Construction
  - h. Water Conservation
  - i. Energy Generation
    - 1. PV Roof Panels
    - 2. Roof-Mounted Wind Turbines
    - 3. Solar Water Heating Systems
  - j. Introduction to Chapter 13
  - k. Apartment Buildings
    - 1. Garden Apartments
    - 2. Protected Combustible Construction
    - 3. Fire Walls/Barriers and Draft Stops
    - 4. A Word About Sprinklers
    - 5. Serving the Citizens
    - 6. Older Row-Frame Buildings and Townhouses
    - 7. Tenements
    - 8. The Three-Decker
  - l. Atria
  - m. Houses of Worship
  - n. Covered Mall Buildings
  - o. Factories
  - p. Hazardous Materials Production and Storage
  - q. High-Rises
    - 1. General Classifications of High-Rise Buildings
    - 2. The Fire Command Center
    - 3. General Problems and Hazards with High-Rises
    - 4. Smoke Movement in High-Rise Buildings
    - 5. Smoke Management Systems
    - 6. Compartmentation
    - 7. Pressurized Stairways
    - 8. Air Standpipes
    - 9. Installation of Special Equipment
    - 10. Fire Load and Flame Spread
    - 11. Contents
    - 12. Maintenance Operations
    - 13. Rubbish
    - 14. Alterations to Occupied Buildings
    - 15. Partial Occupancy of Buildings Under Construction
    - 16. Automatic Sprinklers
    - 17. Checklist
  - r. Hospitals and Nursing Homes
  - s. Hotels and Motels

- t. Jails and Prisons
- u. Museums and Libraries
  - 1. Library Stacks
- v. Nightclubs
- w. Office Buildings
- x. Open-Area Structures
- y. Parking Garages
- z. Restaurants
- aa. Schools
- bb. Self-Storage Buildings
- cc. Single-Family Homes
  - 1. The California Bungalow
  - 2. The Cape Cod
  - 3. The Ranch House
  - 4. The Split Level
  - 5. The Victorian
- dd. Stadia
- ee. Taxpayers and Strip Malls
- ff. Theaters
- gg. Underground Buildings
- hh. Warehouses
  - 1. Warehouse Fire Problems
  - 2. Modern Rack Storage Warehouses
  - 3. Dry Storage of Boats
  - 4. Warehouse Concerns
  - 5. The Warehouse Building
  - 6. Static Fire Defenses in Warehouses
  - 7. Dynamic Fire Defenses in Warehouses
  - 8. Attitudes Toward Warehouse Fire Protection
  - 9. Preplanning
  - 10. On the Fireground

H. Units Fifteen and Sixteen: Chapter 14, Collapse; and review, the Final Examination and final grade assignment

- 1. Unit Objectives: Upon successful completion of this unit, the student will be able to:
  - a. Explain the role of situational awareness in collapse.
  - b. Identify the indicators used to anticipate collapse.
  - c. Identify the various types of collapse.
  - d. Apply risk analysis to fireground safety.
  - e. Identify the specific basic competencies all fire fighters should have to perform at a structural collapse.
  - f. Explain the essential elements of the collapse of the World Trade Center twin towers on September 11, 2001.
  - g. Review all materials and chapters covered, discuss all issues, questions and problems, and administer the final

examination; instructor may choose to grade exams and compile final course grade and make it known to the student.

2. Learning Activities:

- a. Read Chapter 14, pages 426-446.
- b. Read Tactical Considerations at the end of each chapter.
- c. Review Key Terms and Case Study questions at end of each chapter.
- d. Answer Challenging Questions at end of each chapter.

3. Unit Outline:

- a. Collapses and Situational Awareness
- b. Anticipating Collapse
  1. General Visual Indicators of Collapse
  2. Audible and Physical Indicators of Collapse
  3. Environmental Precipitators of Collapse
  4. Occupancy Precipitators of Collapse
  5. Existing Structural Instability Precipitators of Collapse
  6. Fire and Explosion Damage Precipitators of Collapse
  7. Lightweight Construction Precipitators of Collapse
- c. Risk Analysis
- d. Types of Collapse
- e. Establishing Collapse Zones
- f. Minimum Collapse Competencies for Fire Fighters
- g. Our Worst Collapse Tragedy
  1. The North Tower (Tower 1)
  2. The South Tower (Tower 2)
- H. Review, discuss, prepare and administer Final Examination.