

# Sloped Roofer Level 2

## Sloped Roofer

**Unit: A3 Orientation II: The Job of Journeywork**

**Level:** Two

**Duration:** 21 hours

Theory: 14 hours

Practical: 7 Hours

### Overview:

Level One, Unit A1 “Orientation I: Structure and Scope” gave an overview of the Sloped Roofer and Roofer trades, the Apprenticeship Manitoba Program, and the apprenticeship training system.

This unit further examines the Sloped Roofer trade with a review of the trade regulation, certification and the journeyperson’s responsibility for trade teaching. As the certified trade expert, the journeyperson’s role is to train, supervise and mentor apprentices in the workplace.

Unit content will vary at the discretion of the instructor and experience of the apprentices.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Describe the scope and significance of journey level status for the trades.</b>	<b>20%</b>
a. Historical background and trade traditions. <ul style="list-style-type: none"><li>• Origin, definition and examples of journey level status</li><li>• Obligations to employers, trade clients and apprentices</li><li>• Concept of skills stewardship and rationale</li><li>• Contribution of Sloped Roofer industry to trade learning</li><li>• Journeyperson responsibilities as workplace trainer/supervisor</li><li>• Overview of development of formal systems to regulate/recognize journey level competence in designated trades</li><li>• Contributions of “unticketed journeymen” and other informally qualified Sloped Roofers to workplace trade learning.</li><li>• Limits of informal systems for workplace training</li><li>• Canadian/other trends (e.g., succession planning in the trades, essential skills, recognition of credentials and prior learning; defined standards for industry training standards)</li></ul>	
b. Rights, obligations and laws/regulations re: journey level status in designated trades <ul style="list-style-type: none"><li>• Manitoba provincial designated trades (e.g., <i>Apprenticeship and Certification Act</i>, <i>Sloped Roofer Trade Regulation</i>, Provincial Occupational Analysis, Apprenticeship Manitoba policies)</li><li>• Trade-specific requirements for practical training supervision and documentation (e.g., quality assurance, prescribed task content, ratios)</li></ul>	
c. Other (specified by instructor)	
<b>2. Identify the roles and responsibilities of the supervising Journeyperson.</b>	<b>20%</b>
a. Describe typical supervision assignments in the workplace	
b. Discuss roles, expectations and implications in supervising apprentice (i.e.,	

- employer, journeyperson, apprentice)
- c. Role “overlap” and risks in trade practice
- d. Formal and informal supervision (e.g., mandated by employer’s succession plan)
- e. Training structure (e.g., Individual Training Plan negotiated with employer, series of assignments with specific journeypersons,)
- f. Training standards/content (i.e., explicit or implicit, training goals codified, use of assessment measures)
- g. Accountability of results (e.g., journeyperson or third party assesses assignment, journeyperson conducts performance evaluation)
- h. Role of Apprenticeship Training Coordinator, Apprenticeship Manitoba
- i. Journeyperson assignments for apprentice
  - Rationale for assignment (e.g., source, requirements)
  - Identify general/specific task for apprentice
  - Expectation for task mastery and assessment
  - Duration of assignment (e.g., short or long-term, latitude for apprentice to repeat assignment)
- j. Common supervisory roles and description
  - Coach:  
Limited to a particular skill set, task or production requirements (Initiated by individual other than apprentice)
  - Mentor:  
Flexible content, duration (Initiated by apprentice)
  - Peer:  
Cross-training between several journeypersons (may include senior apprentice and less-experienced trade learner)
  - Managerial:  
Journeyperson as lead hand or site boss (inc. potential impact on apprentice’s employment or termination)
  - Coordinator:  
Organization appoints senior level Journeyperson to monitor the apprentice’s progress
  - Other: Journeyperson improvises
- k. Developing supervisory skills and trade knowledge:
  - Internet sites on coaching, teaching, trade learning, etc.
  - Trade journals, books, industry websites and associations
  - Workshops, courses and certificates (e.g., industry-based, Train the Trainer)
  - Contact with Instructors, Journeypersons and peers
- l. Other (specified by Instructor)

**3. Describe common requirements for Sloped Roofer Journey level supervision. 30%**

- a. Review Sloped Roofer Level 1, Unit A1 “Orientation I: Structure and Scope of Trade” from perspective of Journeyperson:
  - Discuss adult education concepts (e.g., instruction, learning needs)
  - Assist apprentices to integrate Technical Training (in school) and Practical Training (on-the-job) experiences
  - Provide guidance on new tasks, skills and corrective action (e.g., fix mistakes, lessons learned)
  - Teach workplace culture (e.g., how to borrow tools, approach a Journeyperson, find a mentor, handle difficult co-workers)
  - Document prescribed tasks and subtasks (Sloped Roofer: Provincial Occupational Analysis 2010), include responsibility for logbook sign-off (where applicable)
  - Consult with Apprenticeship Training Coordinator (ATC), Manitoba Apprenticeship Branch
  - Communicate with employers and apprentices about assignments (inc. journeyperson boundaries re: confidentiality, personal, health and social issues such as substance-abuse)
  - Keep inventory of training ideas, activities and resources
- b. Discuss past experience in teaching and learning

- Identify “best practices” of supervising journeyperson
  - Assess personal experience in supervising/coaching individuals in skill development (e.g., entry-level apprentices, sports, volunteer, etc.)
  - Identify factors for positive learning in the workplace
  - Setting standards and developing trade skills (e.g., being a trade expert)
- c. Future journey level supervision assignments
- Characteristics of a good workplace coach
  - Suggested practices for workplace coaching, mentoring and supervision
  - Providing constructive feedback on assignments, potential issues
- d. Other (specified by instructor)

**4. Workplace training plan, lessons and assessment.**

**30%**

- a. Develop training plan
- Review main learning goals/objectives and needs of apprentice
  - Sequence content (e.g., what apprentice must learn, logical or practical order)
  - Timing (when to introduce or reinforce lesson)
  - Logistics (e.g., location, tools/equipment needed)
- b. Deliver lesson (use the “ROPES”)
- REASON for lesson (e.g., apprentice to learn “x” in order to “y”)
  - OVERVIEW of lesson (e.g., apprentice will learn “skill x” by doing ... )
  - PRESENT lesson (e.g., tell what to do, show how, state expectations re: when practicing skill)
  - EXERCISE: apprentice practices skill
  - SUMMARY: review lesson, discuss questions
- c. Assess apprentice’s progress
- Identify apprentice’s learning from lesson(s)
  - Provide constructive feedback (e.g., guidelines, tips, “lessons learned”)
  - Identify gaps and remedial action (e.g., steps needed to improve skill)
- d. Review the lesson delivered (e.g., can lesson be improved?)
- e. Other (specified by Instructor)

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## Sloped Roofer

**Unit:** A4 Pre-Provincial Review

**Level:** Two

**Duration:** 42 hours

Theory: 42 hours

Practical: 0 hours

### Overview:

This unit provides a comprehensive review of technical training in preparation for the Manitoba Sloped Roofer certification exam. Strategies are included to help apprentices study and write exams.

Note: This unit will be graded as a “pass” or “fail.”

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Review the structure and scope of the Roofing trades.</b></p> <p>a. Compare the structure and scope of the roofing trades</p> <ul style="list-style-type: none"> <li>• Roofer trade (Red Seal)</li> <li>• Manitoba Sloped Roofer trade (Manitoba designated trade)</li> </ul>	<b>N/A</b>
<p><b>2. Describe the Manitoba Provincial Roofer Examination significance, format and content.</b></p> <p>a. Significance of provincial certification for the trade</p> <ul style="list-style-type: none"> <li>• Provincial certification based on industry trade practices and standards</li> <li>• Certified journeyman to protect trade certification (e.g., maintain exam confidentiality)</li> </ul> <p>b. Provincial exam content and format</p> <ul style="list-style-type: none"> <li>• Exams developed using national standards for test construction</li> <li>• Multiple choice format with 4 responses</li> <li>• Each question tests 1 concept (inc. use of metric/imperial)</li> </ul> <p>c. Apprenticeship Manitoba exam policy and procedures</p> <ul style="list-style-type: none"> <li>• Exam procedures (e.g., schedule date, sign-in, photo ID, use of calculators, whether books allowed in exam room, time allowed to write exam,)</li> <li>• Retesting policy (e.g., Supplemental policy)</li> </ul> <p>d. Government and other materials relevant to the examination</p> <ul style="list-style-type: none"> <li>• Manitoba Provincial Occupational Analysis for Sloped Roofer (e.g., Scope of Occupation, Occupational Observations, Pie-chart “Blocks,” tasks and subtasks)</li> <li>• Apprenticeship Manitoba documents for Sloped Roofer (i.e., Sloped Roofer Regulation, Profile Chart, Level Chart, Units)</li> <li>• Other documents (e.g., code books)</li> </ul>	<b>N/A</b>
<p><b>3. Identify strategies to increase exam success</b></p> <p>a. Personal preparation (get sufficient rest, nutrition, vision check if needed)</p> <p>b. Study habits</p>	<b>N/A</b>

- Review documents and content, anticipate questions
- Review material over several days (i.e., not day before)
- Study schedule – block study time, find quiet area to study at your place or the library, focus on study material (e.g., turn off phone, TV, music while studying)

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|---|-------------------|
| <p><b>4. Review Trade Foundations (Course A)</b></p> <p>a. Structure and scope of the Sloped Roofer trade</p> <p>b. Trade safety awareness</p> <p>c. Job of Journeywork for Sloped Roofer</p>                                 | <p><b>N/A</b></p> |
| <p><b>5. Review Trade Mathematics, Documents and Design (Course B)</b></p> <p>a. Trade mathematics</p> <p>b. Roof design and technical drawing</p> <p>c. Estimate sloped roof construction projects</p>                       | <p><b>N/A</b></p> |
| <p><b>6. Review Tools, Equipment and Materials (Course C)</b></p> <p>a. Roofing tools and equipment</p> <p>b. Roofing materials and products overview</p>   | <p><b>N/A</b></p> |
| <p><b>7. Review Sloped Roofer Projects (Course D)</b></p> <p>a. Prepare sloped roof projects</p> <p>b. Sloped roof cavity ventilation</p> <p>c. Install sloped roof, flashing and shingles</p>                                | <p><b>N/A</b></p> |
| <p><b>8. Review Steep Roof Practices and Specialties (Course E)</b></p> <p>a. Steep roof construction and products</p> <p>b. Shingled roofwork</p> <p>c. Tiled roofwork</p> <p>d. Pre-formed metal roofwork</p>               | <p><b>N/A</b></p> |
| <p><b>9. Review Maintenance, Troubleshooting and Other Specialties (Course F)</b></p> <p>a. Analyze and troubleshoot sloped roofs</p> <p>b. Sloped roof repair</p>  | <p><b>N/A</b></p> |
| <p><b>10. Review Jobsite Applications (Course G)</b></p> <p>a. Fall protection, scaffolding and roof access structures</p> <p>b. Sloped roofer lifting, rigging and hoisting</p> <p>c. Sloped roofer jobsite coordination</p> | <p><b>N/A</b></p> |

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## Sloped Roofer

**Unit: B3 Estimate Sloped Roof Projects**

**Level:** Two

**Duration:** 28 hours

Theory: 28 hours

Practical: 0 hours

### Overview:

This unit describes techniques to prepare estimates for sloped roof projects. Topics include: effective communication, the use of trade-related mathematics, and preparing general and detailed estimates for sloped roof projects.

Apprentices will learn about the typical challenges, methods and available resources when preparing project estimates (e.g., Building Codes, industry standards).

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Review communication related to organizing work.</b></p> <p>a. Describe types of communication</p> <ul style="list-style-type: none"> <li>• Written (work orders, inspection reports, manufacturers' documentation, permits)</li> <li>• Drawings and specifications</li> </ul> <p>b. Describe reasons for communication</p> <ul style="list-style-type: none"> <li>• Safety</li> <li>• Project coordination, planning, scheduling</li> <li>• Give, receive, clarify and understand instructions</li> <li>• Customer relations</li> <li>• Project notifications (shutdowns, precautions, noise, fumes/dust, customer safety)</li> <li>• Training</li> </ul> <p>c. Communicate with others (e.g., supervisors, workers, apprentices, architects, engineers, inspectors, other trades, suppliers, customers, etc)</p> <p>d. Order/receive supplies (e.g., ensure accuracy, logistics)</p> <p>e. Arrange worksite schedule (e.g., estimate time, project planning)</p>	<p><b>20%</b></p>
<p><b>2. Review and use trade mathematics for estimates.</b></p> <p>a. Perform mathematical calculations using whole numbers, fractions, decimals and ratios (e.g., fractions, ratios, decimals, linear measure, conversion)</p> <p>b. Convert within imperial system (e.g., feet to inches, square feet and inches)</p> <p>c. Convert between metric and imperial (inc. weights, lengths, volume, temperature, prefixes)</p> <p>d. Solve plane geometry (inc. perimeter, area and shapes, angular measurement, word problems)</p> <p>e. Other (specified by Instructor)</p>	<p><b>10%</b></p>
<p><b>3. Estimate materials for sloped roof project.</b></p>	<p><b>20%</b></p>

- a. Prepare roof sketch for estimate
  - Take measurements (inc. identify number of existing layers)
  - Roof slope calculations
  - Roof height
- b. Describe venting requirements
  - Building code, manufacturer's requirements, industry standard)
  - Types of vents
  - Net free area
  - Sizing
- c. Estimate materials for project
  - Eave protection
  - Underlay
  - Starter course
  - Shingles, roll roofing
  - Wastage
  - Flashing
  - Built-in gutter material
  - Valley material
  - Capping
  - Fasteners
  - Other (e.g., skylights, accessories)

**4. Estimate specific details related to sloped roof project. 20%**

- a. Estimate shed, gable and gambrel roofs
- b. Calculate slope/pitch
  - Use a pitch card
  - Use a folding carpenter's rule re: reading point conversions to pitch and slope
  - Other
- c. Project horizontal areas, including
  - Allowances for valleys, dormers and ridges at different elevations
  - Calculate deduction of different sloped areas from net projected area of main roof
- d. Factor-in duplicated areas (e.g., where dormer/main eaves overhang)
- e. Translate calculated, total projected horizontal areas for each roof slope to actual areas using area/rake conversion factors
- f. Other (specified by Instructor)

**5. Complete Materials Estimating Assignment per Instructor's specifications and requirements. 30%**

- a. Identify relevant information from drawings, codes and other sources
- b. Interpret product information and industry standards
- c. Apply math formulas to determine length, area and volume for rectilinear, irregular and curved details.
- d. Make allowances for overlaps, architectural features and project specific factors affecting estimate of materials
- e. Revise original calculations to reduce waste and optimize use
- f. Revise original calculations to reflect unforeseen event or characteristic of jobsite (e.g., damaging ice storm halfway through project)
- g. Perform all calculations/estimates using both Imperial and metric units
- h. Other (specified by Instructor)

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## Sloped Roofer

**Unit: D1 Prepare for Sloped Roof Projects**

**Level:** Two

**Duration:** 21 hours

Theory: 14 hours

Practical: 7 hours

### Overview:

This unit reviews concepts and techniques to prepare the worksite and roof for sloped roof projects (i.e., new installation or replacement). Topics include: debris management, protect the worksite, prepare for equipment/materials on the ground and roof, and assess the substrate.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Prepare worksite for debris management (e.g., remove and demolish watershed materials).</b></p> <ul style="list-style-type: none"> <li>a. Components (e.g., wheel barrows, garbage bags, tarps, chutes, hoists, disposal bins)</li> <li>b. Separate materials (e.g., regulations, penalties, recycling)</li> <li>c. Erect and disassemble chutes and counterweights</li> </ul>	<b>10%</b>
<p><b>2. Prepare worksite to protect job site, building finishes and landscaping.</b></p> <ul style="list-style-type: none"> <li>a. Protection materials (e.g., tarps, plywood, blankets, fabric)</li> <li>b. Types of damage (e.g., broken glass, fume infiltration, staining, fire)</li> <li>c. Identify areas of potential damage               <ul style="list-style-type: none"> <li>• Windows and skylights</li> <li>• Walls</li> <li>• Mechanical equipment</li> <li>• Vehicles</li> <li>• Landscaping</li> </ul> </li> <li>d. Erect barriers and place materials</li> </ul>	<b>10%</b>
<p><b>3. Assess project for substrate structures, roofing components and modification needed for job specifications.</b></p> <ul style="list-style-type: none"> <li>a. Code requirements for reroofing (inc. number of layers), compatibility of materials</li> <li>b. Starting and finishing points</li> <li>c. Adequate curb and parapet height</li> <li>d. Equipment requirements (e.g., disposal chutes, emission control kettles, lifting and hoisting equipment, fall protection)</li> <li>e. Deck type</li> <li>f. Problem areas (e.g., mechanical utilities, windows, skylights, roof resign)</li> <li>g. Hazards</li> <li>h. Access and egress</li> <li>i. Onsite utilities (e.g., electrical, water, gas)</li> </ul>	<b>20%</b>

- 4. Prepare worksite for equipment/material on the ground and the roof. 20%**
- a. Position equipment/material on the ground
    - Equipment (compressors, disposal bins)
    - Placement (e.g., regulations, access, customer convenience)
    - Safety equipment (e.g., hoses, fire extinguisher, safety cone, safety fence, caution tape)
  - b. Position equipment/material on the roof
    - Hoists
    - Sequence of removal and installation
    - Weight distribution
    - Safety
    - Securement
    - Windows, ventilation openings
    - Ease of access
    - Safety equipment (e.g., water hoses, fire extinguishers)
- 5. Prepare roof for replacement. 20%**
- a. Protect windows, walls, skylights and mechanical equipment
    - Protection materials (e.g., tarps, plywood, blankets, fabric, chute)
    - Types of damage (e.g., broken glass, staining, fire, scratches and dents, punctures)
    - Areas of potential damage (e.g., decks, landscaping, windows, walls, building finishes, eaves troughs, drainage, skylights, mechanical equipment, vehicles)
    - Areas of previous damage (e.g., pre-start walk through, documentation/photos)
    - Erect protection barriers
    - Place equipment and materials
  - b. Describe removal of loose debris
    - Types of debris (e.g., vegetation, gravel, dust, construction materials, environmental concerns)
    - Hazards (e.g., cedar dust, asbestos, mould, animal droppings, coal tar pitch, used needles, flying debris)
    - Safety precautions
    - Gathering, storage and disposal
    - Notify authorities of hazardous materials
  - c. Describe removal of roofing and metal flashings
    - System types and components
    - Effect of weather conditions
    - Materials to remove, sequence, when extra care needed
    - Hazards (e.g., rotten deck, nails, electric wiring, sharp metal, slipping, wildlife)
    - Recyclable materials, regulated and hazardous materials.
    - Select removal equipment, removal techniques and disposal of materials
    - Amount of tear-off in a work period
  - d. Describe roof decking non-structural repairs and preparation of substrate.
    - Types of deck substrate (i.e., steel, wood)
    - Substrate defects and repair (inc. dents, rotten wood, corrosions, knot holes, deflection of plywood, warping, checking, broken boards)
    - Cleaning substrate
    - Vapour barriers (e.g., repair, replace)
    - Insulation (e.g., repair, replace)
    - Secure loose substrate components
  - e. Describe height adjustment of penetrations and parapets
    - New roof composition
    - Change to roof mounted equipment
    - Adjustments (e.g., add slope to coping, extending methods for materials, pipes,

- drains)
- Height calculations (e.g., penetrations, parapets)
- Building extensions
- Material selection to suit new construction
- Dismantle existing construction, add material to existing construction
- Add material
- f. Describe installation of temporary waterproofing
  - Materials (e.g., shingles, underlay, tarps)
  - Material compatibility and determining integrity
  - Removal

**6. Prepare new roof for installation.**

**20%**

- a. Describe requirements/procedures for inspecting decks
  - Deck types (e.g., wood, steel)
  - When to inspect
  - Defects (e.g., height, irregularities, unfinished substrate, plywood not staggered, unfastened substrate, trusses not rimmed, orientation of substrate, deck deflections, corrosion)
- b. Notify responsible parties (inc. severity, timeline)
- c. Verify placement of roof penetration/parapets, prepare roof deck
  - Required penetrations and parapets
  - Coverings and openings
  - Height and fastening requirements
  - Components required (e.g., drains, flashing and counter flashing, skylights, chimneys, plumbing stacks, vents, anti-ponding boards, hip and ridge trees, open lath sheathing)
  - Deck types
  - Component compatibility with roofing system

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## Sloped Roofer

**Unit: D2 Sloped Roof Cavity Ventilation**

**Level:** Two

**Duration:** 14 hours

Theory: 7 hours

Practical: 7 hours

### Overview:

This unit describes ventilation systems for sloped roofs. Topics include: intake and outtake systems, sizing vents, and installation techniques. Under the supervision of a qualified instructor, apprentices will gain practical experience in calculating venting requirements and installation techniques.

<b>Objectives and Content:</b>	<b>Percent of Unit Mark (%)</b>
<p><b>1. Describe roof ventilation systems, sizing and problem prevention.</b></p> <ul style="list-style-type: none"> <li>a. Purpose of ventilation system (e.g., increase air flow, extend shingle life, reduce excess moisture, prevent ice dams)</li> <li>b. Intake vents               <ul style="list-style-type: none"> <li>• Soffit vents (e.g., circular, rectangle, continuous)</li> </ul> </li> <li>c. Outtake vents               <ul style="list-style-type: none"> <li>• Roof, ridge, baffle vents</li> <li>• Gable, dormer vents</li> <li>• Cap roof, turbine, power vent, solar power vents</li> <li>• Chimney, skylight vents (inc. roof vent interruptions for air flow)</li> </ul> </li> <li>d. Sizing vents (e.g., measure floor space, calculate vent area)</li> <li>e. Considerations               <ul style="list-style-type: none"> <li>• Ice dams and prevention</li> <li>• Cold roofs</li> <li>• Cathedral ceilings</li> </ul> </li> </ul>	<b>25%</b>
<p><b>2. Describe installation techniques re: ventilation systems, sizing and problem prevention.</b></p> <ul style="list-style-type: none"> <li>a. Vent lay-outs and clearances               <ul style="list-style-type: none"> <li>• Practical interpretation of specifications/standards re: required type, number, and location of vents</li> <li>• Cutting clearances for different kinds of vent, including special precautions to avoid damage to deck</li> <li>• Calculate number of vents and location per project specification</li> </ul> </li> <li>b. Install and secure vents               <ul style="list-style-type: none"> <li>• Attic type</li> <li>• Turbine type</li> <li>• Ridge type</li> <li>• Other (specified by Instructor)</li> </ul> </li> <li>c. Seal roof projections</li> </ul>	<b>25%</b>

- Apply mastic
  - Caulking
  - Ridge type
- d. Review fire codes in relation to access panels.
  - e. Other (specified by instructor)

**3. Demonstrate eave installation techniques (intake venting). 25%**

- a. Calculate venting requirements
- b. Install ventilation chutes
- c. Install soffit venting
- d. Install eave venting

**4. Demonstrate roof venting installation techniques (outtake venting). 25%**

- a. Calculate venting requirements.
- b. Install roof vents.
- c. Install power vents
- d. Install ridge vents.

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## Sloped Roofer

**Unit: D3 Install Sloped Roof, Flashing and Shingles**

**Level:** Two

**Duration:** 42 hours

Theory: 35 hours

Practical: 7 hours

### Overview:

This unit reviews techniques to install sloped roof materials, flashing and shingles. Apprentices will gain practical experience in installation techniques for built-in gutter membranes, flashings, saddles/crickets, underlayment, and for shingle layout, fitting and securement.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Describe roofing accessories, materials and flashing for sloped roof.</b></p> <ul style="list-style-type: none"> <li>a. Review safety hazards and practical precautions for sloped roof installation techniques.</li> <li>b. Roofing materials               <ul style="list-style-type: none"> <li>• Eave protection</li> <li>• Underlayment</li> <li>• Asphalt shingles</li> <li>• Other roofing (metal roofing, tile shingles, slate shingles, woods shingles/shakes, rolled products)</li> </ul> </li> <li>c. Flashing               <ul style="list-style-type: none"> <li>• Perimeter flashing (drip edge, rake edge, peak flashing)</li> <li>• Wall to roof intersection flashing (step flashing, wall flashing, counter flashing, cap flashing)</li> <li>• Valley flashing (exposed valley flashing, backpan flashing, cricket flashing)</li> <li>• Roofing materials (cone chimney flashing, plumbing flashing, exhaust vent)</li> </ul> </li> <li>d. Accessories (e.g., skylights, brackets, eavestroughs)</li> <li>e. Review manufacturer's documentation and building codes.</li> </ul>	<p><b>10%</b></p>
<p><b>2. Describe installation techniques re: built-in gutter membranes.</b></p> <ul style="list-style-type: none"> <li>a. Prepare built-in gutter membranes for existing or new installation               <ul style="list-style-type: none"> <li>• Determine membrane types (e.g., modified bituminous member, single ply)</li> <li>• Remove cap, drains and waterproofing membrane</li> <li>• Inspect substrate (e.g., drains, seaming, re-secure, ensure substrate is clean, dry)</li> </ul> </li> <li>b. Inspect existing or new built-in gutters               <ul style="list-style-type: none"> <li>• Slope to drain</li> <li>• Drain locations</li> <li>• Proper, suitable substrate</li> <li>• Cant strips</li> <li>• Vertical terminations</li> </ul> </li> <li>c. Install water cut-offs and temporary seals</li> </ul>	<p><b>10%</b></p>

- Water cut-offs for built-in gutters
- Requirements (e.g., temporary seals, drains)
- Terminations (e.g., corners, slope side, fascia side, under cap flashing, fasteners)

- 3. Demonstrate installation techniques re: flashings for sloped roof. 20%**
- Assess project requirements re: flashings
    - Interpret standards and job specifications/standards
    - Select flashing to suit project type and job specifications
    - Perform layout(s) for installation of flashings
  - Form, joint and fit flashings
  - Secure and caulk flashings
  - Other (specified by instructor)
- 4. Demonstrate installation techniques re: saddles/crickets for sloped roof. 20%**
- Assess project needs for saddles/crickets
  - Design, locate and lay-out of saddles/crickets
  - Fabrication of saddles/crickets
  - Install and secure
  - Other (specified by instructor)
- 5. Demonstrate installation techniques re: underlayment(s) for sloped roof. 20%**
- Select underlayment material(s) per project specifications
  - Relax underlayment
  - Special techniques re: peel-and-stick underlayment
  - Other (specified by instructor)
- 6. Demonstrate techniques re: shingle layouts, fitting and securement for sloped roof. 20%**
- Design and layout techniques
    - Practical design and layout (inc. patterns)
    - Establish special allowances for roof-slope, shape characteristics, exposure/overlaps and course-matching at dormers
  - Cut and fit shingles
    - Adapt techniques to products (e.g. asphalt, wood, and other shingling products)
    - Fit for transitions with ridge-caps, capping, edges, projects and flashings, etc.
    - Other (specified by instructor)
  - Fastening
    - Select and adjust nailing guns
    - Practical design and layout, including patterns
    - Selection of fasteners and fastener patterns to suit project materials and fastener pattern
    - Maintaining/verifying patterns and overlap allowances
    - Special considerations/fastening practices re: hips, ridge-caps, etc.
  - Tabbing
    - Windproofing methods
    - Applying adhesive(s)
    - Caulking the work
  - Other (specified by instructor)

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## Sloped Roofer

**Unit:** D4 Practicum: Sloped Roof Projects

**Level:** Two

**Duration:** 21 hours

Theory: 7 hours

Practical: 14 Hours

### Overview:

This unit reviews the components of sloped roof systems, considerations for sloped roof projects and installation techniques. Under the supervision of a qualified instructor, techniques will be reviewed to install asphalt shingles, wood shingles and shakes, concrete and composite materials, and metallic materials.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Describe components and considerations</b></p> <ul style="list-style-type: none"> <li>a. Decks (e.g., wood, steel)</li> <li>b. Roof slope</li> <li>c. Types of eave protections</li> <li>d. Types of underlayment</li> <li>e. Insulation</li> <li>f. Ventilation (types, application)</li> <li>g. Compare material types, styles, preferred use and potential problems)               <ul style="list-style-type: none"> <li>• Shingles (composition, storage requirements)</li> <li>• Wood shingles and shakes (grades, treatments)</li> <li>• Tiles</li> <li>• Metal roof systems (metallic coated steel, natural weathering metals, painted and laminated metals, galvanic series, expansion and contraction)</li> </ul> </li> <li>h. Fasteners, strapping/lath</li> <li>i. Details</li> <li>j. Flashings, metal flashing</li> <li>k. Effect of weather on installation</li> <li>l. Tools and equipment</li> <li>m. Building codes, industry standards, architectural and manufacturer specifications</li> <li>n. Environmental considerations (e.g., disposal)</li> </ul>	<p><b>10%</b></p>
<p><b>2. Inspect and repair deck.</b></p> <ul style="list-style-type: none"> <li>a. Building code requirements</li> <li>b. Fastening</li> <li>c. Clean</li> <li>d. Defects</li> <li>e. Details</li> </ul>	<p><b>10%</b></p>
<p><b>3. Install insulation and venting.</b></p>	<p><b>10%</b></p>



- a. Cathedral, vaulted
  - b. Cold systems
  - c. Insulated roof assemblies
  - d. Baffles, stops
- 4. Install eave protection and underlayment. 10%**
- a. Types, composition (felt, self adhered, mineral surface, synthetic)
  - b. Fastening methods
  - c. Overlaps
- 5. Install flashing details. 15%**
- a. Types (drip edge, rake edge, step, base, counter, through-wall, back pan, apron, saddles or crickets, valley, plumbing stacks, air vents)
  - b. Compatibility between materials
  - c. Materials (metal, lead, neoprene, plastic)
  - d. Gauge
  - e. Selection
  - f. Forming (cutting, marking, bending)
  - g. Fasteners (types, location)
  - h. Methods (flashing at valley, vertical walls, chimneys and vent pipes, skylights)
  - i. Caulking and sealants
- 6. Install shingles. 15%**
- a. Styles, applications, details
  - b. Hips and valleys
  - c. Starting point
  - d. Overhangs
  - e. Layout (chalk line, starter course, exposure and overlap, patterns, alignment)
  - f. Fasteners (type, length, number, location)
  - g. Cap shingles (hips, ridges)
  - h. Wind considerations (adhesives, sealants, nailing patterns)
- 7. Install wood shingles and shakes. 10%**
- a. Inspection of material, grades
  - b. Styles, applications, details
  - c. Starting point
  - d. Layout (chalk line, starter course, exposure and overlap, patterns, spacing, open lath, interwoven, alignment)
  - e. Fasteners (type, length, number, location)
  - f. Capping (hips, ridges, underlayment)
- 8. Install concrete (tiles) and composite materials. 10%**
- a. Inspection of material, grades
  - b. Styles, applications, details
  - c. Starting point
  - d. Layout (lath/strapping, spacing, chalk line, starter course for composites, exposure and overlap, patterns, alignment, anti-ponding board)
  - e. Fasteners (type, length, number, locations)
  - f. Cap tiles (hips, ridges, mastic, dentils and frogs)
- 9. Install metal materials for preformed metal roof system. 10%**
- a. Compatibility of components
  - b. Styles, applications, purpose of preformed metal tiles
  - c. Metal panel systems (panel configuration, profiles, hook strips, fastener clips and

- closures)
- d. Strapping
- e. Battens
- f. Details
- g. Metal flashing (cap flashing, wall flashings, seaming methods)
- h. Layout (chalk line, starter course, exposure and overlap, patterns, alignment, calculating angles)
- i. Fasteners and clips (type, length, number, location, drag screws)
- j. Metal cap (hips, ridges)

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## Sloped Roofer

**Unit:** F1 Analyze and Troubleshoot Sloped Roofs

**Level:** Two

**Duration:** 35 hours

Theory: 28 Hours

Practical: 7 Hours

### Overview:

This unit reviews techniques to assess, maintain and repair sloped roofing systems and components. Topics include: considerations in roof inspection, identifying maintenance or repair, and performing required work.

At the discretion of the instructor, apprentices may be required to complete a project to demonstrate capability for content areas.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<b>1. Describe considerations to inspect sloped roofing systems and components.</b>	<b>25%</b>
a. Compare typical inspection and repair requirements for roof systems/components	
• Common sources of roof system problems (inc. building movement, substandard design, materials, building practices, age, exposure, etc.)	
• Single-ply roofs	
• Steep roofs	
b. Factors influencing quality of inspection	
• Technical knowledge of industry standards, roof system construction details and materials (e.g., BUR vs. shingled system)	
• Knowledge of symptoms and significance of roof failure	
• Knowledge from industry and other sources (e.g., predictable and unanticipated causes of roof failure)	
• Client reported problems and expectations (e.g., history of structure, anticipated future requirements)	
• Inspection criteria and accurate observation (e.g., seasonal change)	
• Test/confirm initial observations (inc. consult with other construction specialists)	
• Document and analyze inspection results (e.g., specify problem area)	
• Identify options for maintenance and repair (e.g., client need, cost, benefit, required durability)	
• Select, plan and specify best option for maintenance or repair project.	
c. Common areas and symptoms of failing/failed roof systems	
• Roof penetrations, parapets, and sidewalls	
• Separate/split felts in relation to flashings, flashing joints, and/or base flange of roof jacks	
• Improperly bonded seams	
• Improperly installed valleys and roof jacks	
• Deteriorated caulking (e.g., around pipes)	
• Alligator cracks, and or spongy blistering/buckling of BUR system materials	

- Extruded fasteners
- Cracked/torn membrane
- Fishmouths along rolled-felt edges
- Ridges along deck/insulation joints
- Scouring of ballast and/or granular surfaces
- Accumulated debris (e.g., eavestrough)
- Separated flashings, eavestrough and other metal components
- Ceiling stains (condensation and other causes)
- Snowdrift in attic
- Missing shingle tabs
- Mechanical system connections and transitions
- Other (specified by Instructor)

**2. Describe identification of maintenance or repair of sloped roof system and components. 25%**

- Considerations to specify problem area, including
  - Consult with clients re: location of problem area, initial identification of problem and/or potential solution
  - Identify potential cause and contributing factors (e.g., HVAC, plumbing or other mechanical system defects)
  - Compatibility of repair/maintenance materials, tie-ins, etc. with original construction
  - Implications of roof system type re: repair/maintenance requirements (e.g., asphalt vs. single-ply)
  - Roof area to maintain, risk of failure, extent of damaged area
  - Equipment and technical aids for locating leaks (e.g., thermographic, infrared)
  - Exterior and interior inspection, including identification/marketing of reference points
  - Other (specified by Instructor)
- Repair methods and materials
  - Valleys
  - Nails backing out of deck
  - Broken shingles
  - Details
  - Defective flashing
  - Vents

**3. Describe recommended maintenance or repair project. 25%**

- Review maintenance or requirements
  - Roof-system type (e.g., asphalt)
  - Preferred techniques (e.g., coating, caulking, re-securement, refilling)
  - Past, present, and future use of building
  - Feasibility of maintenance/repair option (e.g., due to specifications re: cost, materials, timeframes, durability, etc.)
  - Other (specified by Instructor)
- Conduct pre-assessment of roof condition
  - Safety hazards and precautions
  - Maintenance and inspection (e.g., historical records, installation deficiencies, types/causes of defects, signs of deterioration, maintenance items, life expectancy, checklist, environmental occurrences)
  - Roof type and detailed roof plan
  - Guarantee programs
  - Testing (e.g., destructive/non-destructive, thermographic imaging/infrared scanning, radios isotopic detection/nuclear surveying)
- Conduct visual inspection and document (e.g., status report, photos)
- Disassemble roof components for problem areas

- e. Identify cause of failure (e.g., moisture, ultra violent, thermal cycling, vegetation, ventilation, underlayment, ice damming, insects, wildlife, traffic, aging, wind, impacts, improper design or installation, structural movement, contamination, mechanical damage, drainage failure)
- f. Write maintenance report and recommend repair solutions
  - Purpose
  - Tools
  - Detailed plan, checklist
  - Observations, recommendations

**4. Perform projects to maintain and repair sloped roof.**

**25%**

- a. Perform maintenance procedures
  - Maintain/replace caulking and sealants (e.g., select suitable product, removal and application techniques)
  - Clean roof and eavestroughs
  - Secure loose flashings
  - Other (specified by Instructor)
- b. Perform repair of sloped roof
  - Identify repair solutions for roof failure
  - Replace damaged or missing roof products
  - Use repair methods (e.g., valleys, nails backing out of deck, broken shingles, details, defective flashing, vents)
  - Replace shingles (e.g., curled, degranulated, split) and shakes.
  - Insulate exhaust fan to control condensation
  - Verify and/or ensure adequate venting on roof and/or soffit
  - Other (specified by Instructor)

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## Sloped Roofer

**Unit:** F2 Practicum: Sloped Roof Repair

**Level:** Two

**Duration:** 28 hours

Theory: 0 hours

Practical: 28 hours

### Overview:

This unit provides practical experience in trade techniques to identify, maintain and repair sloped roof systems and components. Topics include: roof inspection procedures, identifying maintenance or repair, and performing specific repairs.

At the discretion of the Instructor, apprentices may be required to complete a project to demonstrate capability in content areas.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Describe procedure to identify maintenance or repair of sloped roof system and components.</b></p> <ul style="list-style-type: none"> <li>a. Consult with clients re: maintenance or problem area</li> <li>b. Identify potential cause and contributing factors</li> <li>c. Review compatibility of repair/maintenance materials, tie-ins., etc. with original construction</li> <li>d. Review roof system type (e.g., asphalt, single-ply)</li> <li>e. Inspect roof area to maintain, at risk of failure, extent of damaged area</li> <li>f. Use equipment and technical aids to locate leaks (e.g., thermographic, infrared)</li> <li>g. Inspect exterior and interior roof area (inc. identification, marking of reference points)</li> <li>h. Other (specific by Instructor)</li> </ul>	<b>25%</b>
<p><b>2. Identify repair methods and materials used for sloped roof systems and components.</b></p> <ul style="list-style-type: none"> <li>a. Valleys</li> <li>b. Nails backing out of deck</li> <li>c. Broken shingles</li> <li>d. Details</li> <li>e. Defective flashing</li> <li>f. Vents</li> <li>g. Other (specified by Instructor)</li> </ul>	<b>25%</b>
<p><b>3. Demonstrate maintenance procedures for sloped roof systems and components.</b></p> <ul style="list-style-type: none"> <li>a. Maintain/replace caulking and sealants (e.g., industry standards, select suitable product, removal and application techniques, )</li> <li>b. Clean roof and eavestroughs</li> <li>c. Secure loose flashings</li> </ul>	<b>25%</b>

d. Other (specified by Instructor)

**4. Demonstrate repair procedures for sloped roof systems and components. 25%**

- a. Identify repair solutions for roof failure
- b. Identify repair methods (e.g., valleys, nails backing out of deck, broken shingles, details, defective flashing, vents)
- c. Replace damaged or missing roof products
- d. Replace shingles (e.g., curled, degranulated, split) and shakes.
- e. Insulate exhaust fan to control condensation
- f. Verify and/or ensure adequate venting on roof and/or soffit
- g. Other (specified by Instructor)

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## Sloped Roofer

**Unit:** G2 Sloped Roofer Lifting, Rigging and Hoisting

**Level:** Two

**Duration:** 14 hours

Theory: 7 hours

Practical: 7 hours

### Overview:

Sloped Roofer Level One, Unit G1 “Fall Protection, Scaffolding and Roof Access Structures” introduced equipment use and procedures with an emphasis on workplace safety and health.

This unit identifies procedures for safe lifting, rigging and hoisting to move roofing materials, tools and equipment. There is an emphasis on equipment selection, inspection and maintenance, as well as basic guidelines (e.g., regulations, restrictions).

Apprentices will have the opportunity to practice basic procedures and techniques to stabilize loads of various sizes and shapes.

### Objectives and Content:

### Percent of Unit Mark (%)

- |   |            |
|---|------------|
| <b>1. Describe lifting, rigging and hoisting in the roofing trades.</b>   | <b>15%</b> |
| <ul style="list-style-type: none"><li>a. Scope and rationale for lifting, rigging and hoisting applications</li><li>b. Technical terms and major concepts (e.g., gravitational centres, mechanical advantage)</li><li>c. Calculate loads and weights</li><li>d. General hazards and precautions re: transportation/handling of roofing materials<ul style="list-style-type: none"><li>• Size of load</li><li>• Shape, symmetry of load</li><li>• Fragility of load</li><li>• Rigidity, stability of load</li><li>• Identify balance/stabilization points</li><li>• Identify required clearances re: start/end points</li><li>• Interplay with access/temporary structures (e.g., lifting while on swing stage)</li><li>• Regulatory considerations (e.g., tying off)</li></ul></li><li>e. Other (specified by Instructor)</li></ul> |            |
| <b>2. Describe/demonstrate roofer lifting procedures and techniques.</b>  | <b>15%</b> |
| <ul style="list-style-type: none"><li>a. General guidelines, precautions and regulations re: trade related lifting operations</li><li>b. Manual lifting<ul style="list-style-type: none"><li>• Hazards, precautions (e.g., secure footing, bending of knees)</li><li>• Simple aids (e.g., rope and pulley)</li><li>• General techniques</li><li>• Special considerations re: particular roofing materials, loads</li></ul></li><li>c. Mechanical assisted lifting</li></ul>   |            |



- Hand signals
  - Precautions (e.g., pinch points re: feet/hands, position of other personnel)
  - Mechanical aids (e.g., hydraulic jack)
  - General techniques
  - Special considerations re: particular roofing materials, loads
- d. Basic features and preferred uses of forklifts
- Manitoba requirements and restrictions re: forklift operation
  - Major components
  - Preferred uses
- e. Other (specified by Instructor)

**3. Describe/demonstrate roofer rigging procedures and techniques.**

**20%**

- a. General guidelines, precautions and regulations re: trade-related rigging operations
- b. Knots and splices
- Bowline
  - Clove-hitch
  - Rescue knot
  - Scaffold-hitch
- c. Identify and use specified rigging aids and equipment such as:
- Balance bar
  - Chain
  - Choker
  - Clip
  - Come-along
  - Deadman
  - Drum
  - Equalizer beam
  - Fid
  - Hitch
  - Hook
  - Marline spike
  - Pulley
  - Ring (core binder)
  - Rope fabric and wire
  - Shackle
  - Sheave
  - Sling
  - Socket
  - Spreader bar
  - Thimble
  - Tirfor
  - Winch
  - Other (specified by Instructor)
- d. Determine load limits
- e. Determine placement of load
- f. Determine Safe Working Load (SWL)
- g. Placement of chokers and taglines
- h. Placement and use of chokers/slings for special requirement loads
- Smooth, heavy loads
  - Long, flexible loads
  - Unbalanced, uneven and excess loads
  - Heavy, fragile loads
- i. Other (specified by Instructor)

- 4. Describe guidelines for hoisting procedures and techniques. 20%**
- a. General guidelines, precautions and regulations re: trade related hoisting operations
  - b. Major types of hoisting equipment and components (inc. preferred use, specific hazards, precautions)
    - Aerial platforms, scissor lifts
    - Winches
    - Boom trucks (including 'zoom boom' cranes)
    - Conventional and hydraulic cranes
  - c. Coordinate/communicate with hoisting equipment operator and other site personnel
  - d. Other (specified by Instructor)
- 5. Describe/demonstrate roofer hoisting procedures and techniques. 30%**
- a. Identify all requirements, including safety hazards/precautions re: rigging and lifting Instructor specified loads of a function of particular roofing materials
  - b. Select and use required lifting/rigging aids re: Instructor-specified load(s)
  - c. Communicate/coordinate (inc. by hand signals) with other jobsite personnel re: lifting Instructor-specified load(s)
  - d. Other (specified by Instructor)

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## Sloped Roofer

**Unit: G3 Sloped Roofer Jobsite Coordination**

**Level:** Two

**Duration:** 14 hours

Theory: 7 hours

Practical: 7 hours

### Overview:

This unit reviews the coordination of the jobsite for sloped roof projects. Senior apprentices may be involved as project supervisors or jobsite coordination specialists (e.g., lead hands, site bosses and superintendents). At the jobsite, the team positions personnel and materials to install roofing materials according to project plans and industry standards. All projects require the ability to move, handle and store roofing materials and equipment in a secure, orderly manner. Some jobsites vary greatly in their complexity, scale and season of projects.

<b>Objectives and Content:</b>	<b><u>Percent of Unit Mark (%)</u></b>
<p><b>1. Describe coordination and maintenance of roof construction jobsites.</b></p> <ul style="list-style-type: none"> <li>a. Goals, rationale and major concepts for jobsite coordination/maintenance</li> <li>b. Jobsite planning for coordination/maintenance requirements (e.g., macro and micro level)</li> <li>c. Variation in jobsite coordination/maintenance requirements and provisions               <ul style="list-style-type: none"> <li>• Jobsite safety assessments</li> <li>• Roles, responsibilities, accountability (inc. apprentices)</li> <li>• Levels of supervision</li> <li>• Scale and complexity of projects</li> <li>• Sequencing and scheduling of project phases</li> <li>• Composition of project workforce (incl. other trades) and significance</li> <li>• Impacts of seasons, adverse weather</li> <li>• Revision of schedules</li> <li>• Regulatory and other relevant considerations (incl. environmental)</li> </ul> </li> <li>d. Symptoms, consequences of faulty coordination/maintenance</li> <li>e. Other (specified by Instructor)</li> </ul>	<b>30%</b>
<p><b>2. Describe/demonstrate jobsite coordination and maintenance techniques.</b></p> <ul style="list-style-type: none"> <li>a. Plan and organize of roofing project jobsite               <ul style="list-style-type: none"> <li>• Schedules (inc. procurement, delivery of materials)</li> <li>• Layout of physical areas for materials and equipment</li> <li>• Temporary utilities (inc. sources of electrical power, light, and water)</li> </ul> </li> <li>b. Consultation and communication (inc. jobsite documentation, inventory-keeping and signage)</li> <li>c. Handling, storage, and use of roofing materials and equipment               <ul style="list-style-type: none"> <li>• Lifting and shifting</li> <li>• Rigging and hoisting</li> </ul> </li> </ul>	<b>30%</b>

- Safety and security
- d. Access, temporary structures (inc. occupation health, environmental considerations)
  - Guardrails
  - Ramps
  - Ladders
  - Shoring
  - Hoardings (environmental, weather related, engineered hoarding equipment)
  - Stages and swings
  - Scaffolding and scaffold systems
- e. Troubleshooting tips and techniques for roof jobsite coordination/maintenance
- f. Other (specified by Instructor)

**3. Describe/demonstrate coordination and maintenance techniques for winter conditions. 40%**

- a. Scope of roof project requirements and implications in winter conditions
  - Regulatory requirements and employer policy (e.g., shutdowns)
  - Scheduling, sequencing and intensity of onsite activity
  - Jobsite conditions (e.g., duration of job, hypothermia/frostbite hazards, etc.)
  - Site and access-structure conditions (e.g., icing, other special hazards)
  - Specific roofing products and materials
  - Required tools and equipment (e.g., heaters)
- b. Use, select, hazards, precautions for materials and equipment to winterize roofer jobsite
  - Tarpaulin, tarpaulin systems (inc. insulated, engineered varieties)
  - Tie wire, other fasteners
  - Lumber and wood products
  - Electrical supply (incl. electrical cords)
  - Ventilation hazards and precautions
  - Generators
  - Propane tanks
  - Heaters (electrical, gas-burning)
- c. Practical procedures and techniques to cover work and storage/supply areas
  - Relevant standards and technical requirements
  - Special safety hazards and precautions (inc. regulatory requirements)
  - Install and secure tarpaulins
  - Construction/inspection of hoarding(s) and other temporary structures
- d. Practical procedure and techniques for heating work, storage and supply areas
  - Relevant standards and technical requirements
  - Special safety hazards and precautions (inc. regulatory requirements)
  - Install, operate and monitor electrical heaters
  - Install, operate and monitor gas heaters
  - Ventilate and fresh-air supply
- e. Other (specified by instructor)

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