Roofer
Level 3

Rev. May 2015

Apprenticeship Manitoba

Roofer

Unit: A3 Orientation II: The Job of Journeywork

Level: Three

Duration: 21 hours

Theory: 21 hours

Practical: 0 hours

Overview:

Roofer Level One, Unit A1 "Orientation I: Structure and Scope of Trade Learning" gave an overview to the Apprenticeship Manitoba programs for the trades of Sloped Roofer and Roofer. This unit focuses on the Roofer trade by a review of the trade regulation and certification.

This unit also reviews the journeyperson's role and responsibility for trade teaching. As the certified trade expert, the journeyperson trains, supervises and mentors apprentices in the workplace.

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

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe the scope and significance of journey level status for the trades. **20%**

a. Historical background and trade traditions.
- Origin, definition and examples of journey level status
- Obligations to employers, trade clients and apprentices
- Concept of skills stewardship and rationale
- Contribution of Roofer industry to trade learning
- Journeyperson responsibilities as workplace trainer/supervisor
- Overview of development of formal systems to regulate/recognize journey level competence in designated trades
- Contributions of "unticketed journeymen" and other informally qualified Roofers to workplace trade learning.
- Limits of informal systems for workplace training
- Canadian/other trends (e.g., succession planning in the trades, essential skills, recognition of credentials and prior learning; defined standards for industry training standards)

b. Rights, obligations and laws/regulations re: journey level status in designated trades
- Canada Interprovincial Red Seal Program (e.g., rationale, scope, National Occupational Analysis, interprovincial examination)
- Manitoba designated trades (e.g., *Apprenticeship and Certification Act, Roofer Trade Regulation,* National Occupational Analysis, Apprenticeship Manitoba policies)
- Trade-specific requirements for practical training supervision and documentation (e.g., quality assurance, prescribed task content, ratios)

c. Other (specified by Instructor)

2. Identify the roles and responsibilities of the supervising Journeyperson. **20%**

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 Roofer Journey level supervision. 30%

a. Review 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 (Roofer National Occupational Analysis 2012), 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 “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 TASK: 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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Apprenticeship Manitoba

Roofer

Unit: A4 Pre-Interprovincial Review

Level: Three

Duration: 77 hours

Theory: 77 hours

Practical: 0 hours

Overview:

This unit offers senior apprentices an opportunity to review the knowledge and skills for the Interprovincial (IP) Red Seal Roofer Examination. Study strategies are presented to prepare for the certification exam.

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

Objectives and Content: **Percent of Unit Mark (%)**

1. Review the structure and scope of the Roofing trades. **N/A**

a. Compare the structure and scope of the roofing trades
- Roofer trade (Red Seal)
- Manitoba Sloped Roofer trade (Manitoba designated trade)

2. Describe the Red Seal Roofer exam significance, format and content. **N/A**

a. Significance of Interprovincial Red Seal certification for the trade
- Red Seal trade exam based on industry trade practices and national standards
- Certified journeyperson to protect trade certification (e.g., maintain exam confidentiality)

b. Red Seal Exam content and format
- Exams developed using national standards for test construction
- Multiple choice format with 4 responses
- Each question tests 1 concept (inc. use of metric/imperial)

c. Apprenticeship Manitoba exam policy and procedures
- Exam procedures (e.g., schedule date, sign-in, photo ID, use of calculators, whether books allowed in exam room, time allowed to write exam)
- Retesting policy (e.g., Supplemental policy)

d. Government and other documents relevant to the examination
- Roofer National Occupational Analysis (e.g., Scope of Occupation, Occupational Observations, Pie-chart "Blocks," tasks and subtasks)
- Manitoba Apprentice Program materials (i.e., Roofer Regulation, Profile Chart of Technical Training, Level Chart, Sub-task to Unit Comparison, Technical Training units of instruction)
- Other documents (e.g., code books)

3. Identify strategies to increase exam success **N/A**

a. Personal preparation (get sufficient rest, nutrition, vision check if needed)

b. Study habits

- 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)

4. Review Roofer Trade Foundations (Course A) **N/A**

a. Structure and Scope of the Sloped Roofer and Roofer trades
b. Trade Safety Awareness
c. Job of Journeywork

5. Review Roofer Trade Mathematics, Documents and Design (Course B) **N/A**

a. Trade Mathematics
b. Roof Design and Technical Drawing
c. Roof Blueprints and Trade Documents
d. Estimate Roof Construction Projects

6. Review Roofer Trade Tools, Equipment and Materials (Course C) **N/A**

a. Roofing Tools and Equipment
b. Roofing Materials and Products
c. Hot Process, Propane and Motorized Equipment

7. Review Low Slope and Flat Roof Projects (Course D) **N/A**

a. Low Slope and Flat Roof Construction
b. Built-Up Roofing (BUR) Installation
c. Membrane Installation

8. Review Steep Roofer Practices and Specialties (Course E) **N/A**

a. Steep-roof Construction and Products
b. Shingled Roofwork
c. Tiled Roofwork
d. Pre-formed Metal roofwork

9. Review Maintenance, Troubleshooting and Other Specialties (Course F) **N/A**

a. Maintain and Waterproof Roof Structures
b. Analyze and Troubleshoot Roof Failures
c. Roof Repair

10. Review Jobsite Applications (Course G) jobsite applications. **N/A**

a. Fall Protections, Scaffolding and Roof Access Structures
b. Roofer Lifting, Rigging, and Hoisting
c. Roofer Jobsite Preparation and Inspection
d. Roofer Jobsite Coordination and Maintenance

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Apprenticeship Manitoba

Roofer

Unit: B4 Estimate Roof Construction Projects

Level: Three

Duration: 35 hours

Theory: 35 hours

Practical: 0 hours

Overview:

In this unit, senior Roofer apprentices will use prepare project estimates for flat, low slope and steep roof projects. Apprentices will prepare estimates for materials using trade mathematics, technical drawings and blueprints, building codes, manufacturer specifications and other industry standards.

Information will be provided on the typical challenges, methods and resources when estimating roof materials (e.g., Building Codes and other industry standards).

Objectives and Content: **Percent of Unit Mark (%)**

1. Review concepts related to organizing work. **10%**

a. Describe types of communication
   - Written (work orders, inspection reports, manufacturers' documentation, permits)
   - Drawings and specifications

b. Describe reasons for communication
   - Safety, project coordination, planning, scheduling
   - Give, receive, clarify and understand instructions
   - Customer relations
   - Project notifications (shutdowns, precautions, noise, fumes/dust, customer safety
   - Training

c. Communicate with others (e.g., supervisors, workers, apprentices, architects, engineers, inspectors, other trades, suppliers, customers, etc)

d. Order/receive supplies (e.g., ensure accuracy, logistics)

e. Arrange worksite schedule (e.g., estimate time, project planning)

2. Review/Use applied trade mathematics to perform common roofing project calculations. **10%**

a. Measure/calculate lineal dimensions

b. Measure/calculate area and volume

c. Measure/calculate ratios, proportions

d. Measure/calculate percentages and rates

e. Other (specified by Instructor)

3. Estimate materials using technical drawings and blueprints. **10%**

a. Prepare roof sketch for estimate
   - Take measurements
   - Roof slope calculations, roof height

4. Estimate materials using information from building codes, manufacturer specifications (e.g., coverage of standard bundle, panel, length, litre, etc.) and other industry standards. **15%**

a. Measure/calculate lineal dimensions
b. Measure/calculate area and volume
c. Measure/calculate ratios, proportions
d. Measure/calculate percentages and rates
e. Other (specified by Instructor)

5. Estimate materials for low slope and flat roof projects. **15%**

a. Measure/calculate lineal dimensions
b. Measure/calculate area and volume
c. Measure/calculate ratios, proportions
d. Measure/calculate percentages and rates
e. Other (specified by Instructor)

6. Estimate materials for steep slope roof projects. **15%**

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

7. Complete Materials Estimating Assignment per Instructor's specifications and requirements. **25%**

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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Apprenticeship Manitoba

Roofer

Unit: F2 Analyze and Troubleshoot Roof Failure

Level: Three

Duration: 35 hours

Theory: 35 hours

Practical: 0 hours

Overview:

This unit reviews the procedures and techniques to assess the condition of the roofing system, components and performance. Senior apprentices will learn procedures to inspect the roofing system, perform a cut test, identify the maintenance or repair required for the problem area.

As well, apprentices will learn about the considerations when reviewing roof systems and components. These include: roof slope, characteristics of old and new roofing materials, how roof components interact over time and other factors (e.g., building movement, wind, water).

Objectives and Content: **Percent of Unit Mark (%)**

1. **Describe procedure and considerations to inspect condition and performance of roofing systems/components.** **30%**
   a. Compare and contrast typical inspection and repair requirements as they vary with type of roof system/components
      - Review common sources of roof system problems, including building movement, substandard design, materials, building practices, age, exposure, etc.
      - Built Up Roofing (BUR) systems/components
      - Single-ply roofs
      - Steep roofs

   b. Factors influencing quality of inspection
      - Roofer's technical knowledge re: industry standards, roof system construction details and materials (e.g., BUR vs. shingled system)
      - Roofer's knowledge of symptoms and significance of roof failures
      - Roofer's knowledge from personal experiences, tradeworkers and other sources re: predictable and unanticipated causes of roof failure
      - Consideration of client-reported problems and expectations re: history of structure and anticipated future requirements
      - Thoroughness and suitability of roof inspection criteria (e.g., seasonal timing)
      - Accuracy of observation
      - Testing/confirmation of initial observations via trial and error, cut-tests, consultation with other construction specialists), and other methods
      - Documentation of inspection results
      - Analysis/verification of inspection results (e.g., specification of problem area)
      - Identification and consideration of options (e.g., costs/benefits, required durability) for roof repair/maintenance project
      - Selection, planning/prioritization, and specification of best option(s) for repair/maintenance project

2. Describe procedure to perform a cut test, analyze and document results. 20%

a. Cut test specifications
- Rationale, including location(s)
- Order of operations
- Adapt procedure to reflect composition of roof and purpose of test
- Document and analyze results of test

b. Hazards and precautions
- Select/apply temporary sealant
- Patch cut-test area (temporary; permanent)
- Adapt procedure to reflect composition of roof and purpose of test

c. Other (specified by Instructor)

3. Describe procedure and considerations to determine maintenance/repair of roof area. 30%

a. Considerations to specify problem area(s), including:
- Consult with clients re: location of problem area and initial identification of problem(s) and/or potential solution(s)
- Identify potential cause(s) 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)
- Extent of damaged roof area and/or area at risk of failure
- Equipment and technical aids for locating leaks (e.g., thermographic, infrared)
- Exterior and interior inspection, including identification/marking of reference points
- Other (specified by Instructor)

b. 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., in eavestrough)
- Separated flashings, eavestroughing, and other metal components
- Ceiling stains (condensation and other causes)
- Intrusion of snowdrift into attic
- Missing shingle tabs
- Mechanical system connections and transitions (HVAC connections; plumbing fixtures, etc)

c. Other (specified by Instructor)

4. Describe procedure and considerations to determine the type of maintenance/ repair for a problem area of the roof. 20%

a. Variability of repair/maintenance requirements re:
- Roof-system type (e.g., asphalt vs. single-ply)
- Preferred techniques (coating, caulking, re-securement, refilling, etc.)

- Building's past, present, and future uses
- Feasibility of maintenance/repair option (e.g., due to specifications re: cost, materials, timeframes, durability, etc.)
- Other (specified by Instructor)

b. General procedure for maintenance/repair of BURs
   - Cut open membrane and remove wet insulation
   - Replace damaged vapour barrier
   - Install new, compatible insulation
   - Spud off flood-coated or gravel-covered roof surface to specified new width
   - Install new felts and ballast (including laps and staggered placement as required)
   - Install curb, cant-strips and tie-ins with felts/flashings as required
   - Construct expansion joint(s) as required
   - Adapt procedure to special requirements of scoured areas (e.g., apply floodcoat, felts, gravel, fascia, scuppers, drain pipes, etc.)
   - Assist in setting up a preventive maintenance schedule for repaired BUR.
   - Other (specified by Instructor)

c. General procedure for maintenance/repair of single-ply roofs.
   - Cut open membrane and remove wet insulation
   - Replace damaged vapour barrier
   - Install new, compatible insulation
   - Reseal flaps; clean an area around the cut to dimensions specified by standards
   - Install membrane over cleaned/cut area
   - Apply metal flashing or sealant to cap compromised walls and parapets
   - Other (specified by Instructor)

d. General procedure for maintenance/repair of steep roofs.
   - Replace curled/degranulated/split shingles and/or shakes.
   - Insulate exhaust pipe and cap any pipe that contains a damper to control condensation
   - Verify and/or ensure adequate venting on roof, soffit, or both
   - Other (specified by Instructor)

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Apprenticeship Manitoba

Roofer

Unit: F3 Practicum: Roof Repair

Level: Three

Duration: 28 hours

Theory: 0 hours

Practical: 28 hours

Overview:

This unit provides practical experience under the supervisions of a qualified Instruction in Roofer trade techniques to repair roof systems and components. Topics include: maintain drains and scupper, refilling pitch pockets, replace caulking and sealant, hot and cold process repair membrane defects, apply surfacing and ballast, and secure metal fitting.

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

Objectives and Content:	**Percent of Unit Mark (%)**
1. Demonstrate procedure to maintain drains and scuppers. a. Verify sealing of scuppers and drains b. Inspect for defects c. Dismantle/disassemble drains d. Clean e. Reseal membrane to drains and scuppers f. Other (specified by Instructor)	**25%**
2. Demonstrate procedure to refill pitch pockets. a. Apply two-part pourable sealer and/or mastic b. Determine required volume and curing times of sealer/mastic c. Crown the mastic in pitch pocket d. Determine temperature of penetration e. Ensure securement of pitch pocket f. Assess requirements for refill/replacement g. Other (specified by Instructor)	**10%**
3. Demonstrate procedure to replace deteriorated caulking and sealant(s). a. Select product(s) to suit application and environmental conditions b. Remove deteriorated caulking and cleaning substrate c. Techniques/standards to apply caulking d. Other (specified by Instructor)	**10%**
4. Demonstrate procedure (hot-process and cold-process) to repair membrane defects.	**25%**

a. Prepare surface for membrane repair.
b. Install techniques, including significant variations *per* product and process
c. Apply gravel, coatings, and ballast to resurface membrane *per* industry standards
d. Other (specified by Instructor)

5. Demonstrate procedure for applying surfacing and ballast to bare areas. 10%

a. Select ballast product
b. Select surfacing product
c. Select/use of application method
d. Prepare surfaces
e. Other (specified by Instructor)

6. Demonstrate procedure for securing loosened/separated metal fittings 20%

a. Specify type and quantity of fasteners required
b. Form and fit replacement flashings (cap, counter, and through-wall)
c. Match colour and gauge of flashings
d. Remove/reinstall salvageable flashings
e. Caulk seams of flashings
f. Other (specified by Instructor)

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Apprenticeship Manitoba

Roofer

Unit: G4 Roofer Jobsite Coordination and Maintenance

Level: Three

Duration: 14 hours

Theory: 7 hours

Practical: 7 hours

Overview:

This unit explores the role of Roofer apprentices in the jobsite team. 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.

This unit will be of interest to apprentices who aim to work as project supervisors or jobsite coordination specialists (e.g., lead hands, site bosses and superintendents).

Objectives and Content: **Percent of Unit Mark (%)**

1. Describe coordination and maintenance of roof construction jobsites. **30%**

a. Goals, rationale and major concepts for jobsite coordination/maintenance
b. Jobsite planning for coordination/maintenance requirements (e.g., macro and micro level)
c. Variation in jobsite coordination/maintenance requirements and provisions
   - Jobsite safety assessments
   - Roles, responsibilities, accountability (inc. apprentices)
   - Levels of supervision
   - Scale and complexity of projects
   - Sequencing and scheduling of project phases
   - Composition of project workforce (incl. other trades) and significance
   - Impacts of seasons, adverse weather
   - Revision of schedules
   - Regulatory and other relevant considerations (incl. environmental)
d. Symptoms, consequences of faulty coordination/maintenance
e. Other (specified by Instructor)

2. Describe/demonstrate jobsite coordination and maintenance techniques. **30%**

a. Plan and organize of roofing project jobsite
   - Schedules (inc. procurement, delivery of materials)
   - Layout of physical areas for materials and equipment
   - Temporary utilities (inc. sources of electrical power, light, and water)
b. Consultation and communication (inc. jobsite documentation, inventory-keeping and signage)
c. Handling, storage, and use of roofing materials and equipment

- Lifting and shifting
- Riggins and hoisting
- 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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