Apprenticeship Manitoba

Manitoba

Sloped Roofer
Level 1

Rev. March 2014

Apprenticeship Manitoba

Sloped Roofer

Unit: A1 Orientation I: Structure and Scope of Trade Learning

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

This unit provides an orientation to the trades of Roofer and Sloped Roofer, the Manitoba Apprenticeship Program for these trades and the apprenticeship training system. The challenges for the apprentice in practical training (i.e., on the job) and technical training (i.e., in class)will be reviewed.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe the structure and scope of the Roofing trades.	**40%**
a. Background (inc. apprentice experience)	
b. Structure and scope of the roofing trades • International, national, provincial characteristics • Red Seal Roofer trade • Manitoba Sloped Roofer trade • Trade organizations and associations (e.g., Canadian Roofing Contractors; Association, Roofing Contractors Association of Manitoba, Manitoba Shingling Contractors Association)	
c. Career opportunities • Generalists and specialists • “Lead hands” and other immediate supervisors • Job hierarchies, innovations • Geographic mobility	
2. Describe the Manitoba Apprenticeship Program for the Roofer and Sloped Roofer trades.	**20%**
a. Significance of skills stewardship for: • Roofing trades and industry • Apprentices • Journeypersons • Employers • Community	
b. Manitoba Trade Regulations and significance	
c. Practical Training (on the job) roles and responsibilities • Employer • Journeyperson • Apprenticeship Program, Apprenticeship Training Coordinator (ATC) • Apprentice	

- Instructor

d. Technical Training (in school)
   - Roofer Program (3 levels)
   - Sloped Roofer (2 levels)

e. Attendance and progress requirements

f. Reporting of grades

g. Policies and procedures (e.g., fees, missed unit, personal conduct)
   - Apprenticeship Manitoba
   - Training provider

3. Explain training challenges for the apprentice. 40%

a. Adapting personal learning goals to apprenticeship program
   - Types, characteristics of adult learning
   - Learning and teaching styles
   - Work culture (inc. work crew hierarchy), interpersonal skills and trade learning
   - Integrate Technical Training content with Practical Training
   - Peer learning possibilities and limitations
   - Budgeting and other necessary personal arrangements
   - Recognize and reduce stress at work, school

b. Practical training (i.e., on the job)
   - Describe workplace teaching styles and roles
   - Communicate with journeypersons, employers
   - Cover, document prescribed trade tasks/subtasks
   - Personal record of achievements (Trade Learning Journal option)
   - Getting help and corrective action (i.e., fixing mistakes)

c. Technical Training (i.e., in class)
   - Personal arrangements that support school progress
   - Past school experience, self-assessment
   - Techniques for notetaking, record keeping, study
   - Contact with Instructors, training providers
   - Training resources (e.g., support services, internet, library, etc.)
   - Missed units (Apprenticeship policy on re-test, etc.)

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Apprenticeship Manitoba

Sloped Roofer

Unit: A2 Trade Safety Awareness

Level: One

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

Of primary importance to industry are safe working procedures and conditions, injury prevention and the preservation of health. These responsibilities are shared by government, employers and employees. All parties must be aware of circumstances that could lead to injury or harm.

Safe learning environments and experiences are created by controlling the variables and behaviours that contribute to incidents or injury. Safety conscious attitudes and work practices lead to a healthy, safe and accident-free working environment. Everyone must be aware of and apply workplace safety and health acts, regulations, codes and guidelines. It is essential to identify workplace hazards and take measures to protect yourself, coworkers, the public and the environment.

Safety education is an integral part of apprenticeship technical training and practical training. During technical training, unit content includes discussion or study of trade-specific information on safety hazards and precautions.

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

Objectives and Content:	**Percent of Unit Mark (%)**
1. Identify safety and health requirements.	**N/A**
a. Overview of the Manitoba Workplace Safety and Health Act • Employee rights and responsibilities • Employer rights and responsibilities • Supervisor rights and responsibilities b. Occupational health and safety regulations c. Codes of Practice d. Guidelines e. Right to refuse work • Explain the right to refuse work process • Employee rights and responsibilities • Employer rights and responsibilities • Supervisor rights and responsibilities	
2. Identify Personal Protective Equipment (PPE) and procedures.	**N/A**
a. Employer and employee responsibilities re: PPE b. Standards and guidelines: Canadian Standards Association (CSA), American National Standards Institute (ANSI) c. Work protective clothing (inc. danger if clothing fits poorly)	

d. Hand protection - select and use appropriate gloves for task (e.g., chemicals, cold and hot items, slivers)
e. Headwear – standards, requirements to select, use
f. Eye protection – compare/contrast eyeglasses, industrial safety glasses and safety goggles
g. Foot protection – when required according to safety standards (inc. kneepads)
h. Hearing protection
   - Hazards of noise levels (hearing protection must be worn)
   - Laws
   - Types of hearing protection (class/grade, selection based on exposure level)
i. Respiratory protection – types, selection, fit
j. Fall protection – Manitoba requirements, standards, guidelines
   - Canadian Standards Association (CSA), American National Standards Institute (ANSI)
   - Fall restraint, fall arrest, harness, lanyard, lifelines
k. Ladders and scaffolding
l. Safety principles for working with or around industrial trucks, site specific (forklifts, pallet trucks, etc.)
m. Moving equipment and supplies (e.g., handling materials, load trucks, loading roof)

3. Identify electrical safety. **N/A**

a. Effects of electric current on the human body
b. Three factors affecting severity of an electric shock
c. Effects of electrical arcs/blasts on the human body, equipment
d. Hazards/precautions re: working with energized equipment

N/A

4. Identify fire safety.

a. Types of fires and conditions to support fire
b. Types of fire fighting equipment
c. Classes of fires and fire extinguishers (A, B, C, D)
d. Location of fire extinguishers, fire exits
e. Fire alarms and drills

5. Identify ergonomics. **N/A**

a. Definition of ergonomics and conditions that may affect the body
   - Working postures
   - Repetition
   - Force
   - Lifting
   - Special hazards/precautions re: materials handling
   - Special hazards/precautions re: lift, carry, setdown a load
   - Tools
   - Identify tool and safety equipment
   - Causes of hand tool accidents
   - Equipment

6. Describe hazard recognition and control. **N/A**

a. Safe work practices
b. Basic risk assessment
c. Injury prevention and control measures
d. Identify hazards re: pneumatic tool use, explain how to guard against hazards.

7. Describe the hazards of confined space entry. **N/A**

a. Identify confined space (inc. Canadian Standards Association, CSA B52)

b. Hazards of a confined space
   - Physical
   - Biological
c. Working in a confined space
d. Emergency response plan
e. Self Contained Breathing apparatus (SCBA)

8. Identify First Aid/CPR. **N/A**

a. Overview of First Aid, regulations
b. Obligations of employers regarding First Aid
   - Who is certified to provide First Aid
   - What to do while waiting for help
   - Location, access of First Aid kit
c. Define First Aid, explain First Aid requirements and techniques
   - Scope and limits of First Aid intervention
   - Specific interventions (cuts, burns, abrasions, fractures, suffocations, shock, electrical shocks, etc.)
   - Contact with other services and agencies (e.g., Workers Compensation claims)
d. Describe basic CPR requirements and techniques
   - Obtaining certification
   - Scope and limits of CPR intervention (include types of CPR certification)

9. Identify safety requirements as they apply to Workplace Hazardous Materials Information System (WHMIS). **N/A**

a. WHMIS as a system
b. Provincial Regulation under the Workplace Safety and Health Act
   - Each province has WHMIS regulations
c. Federal Hazardous Products Act
d. WHMIS generic training
   - WHMIS defined, format to convey information about hazardous materials in the workplace
   - Information found on supplier and workplace labeling using WHMIS
   - Hazardous materials in accordance with WHMIS
   - Compliance with government safety standards, regulations
e. Describe WHMIS (inc. types of WHMIS Certification)
   - Typology of WHMIS labels, symbols and classifications
   - Scope and use of Materials Safety Data Sheets (MSDS)

10. Describe identification and control of specified hazards. **N/A**

a. Basic control measures (injury prevention)
b. Safe work procedures
c. Explain importance of industrial housekeeping
d. Employer responsibilities
e. How and where to store materials
f. Safety measures related to walkways, stairs and floor openings
g. Traffic pathway protection of workers and others

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Apprenticeship Manitoba

Sloped Roofer

Unit: B1 Trade Mathematics

Level: One

Duration: 35 hours

Theory: 21 hours

Practical: 14 hours

Overview:

This unit explores the use of mathematics for the roofing trades ("applied trade math"). Concepts to be reviewed include basic mathematics (i.e., whole numbers, fractions, decimals, ratios, area, volume, conversion), problems solving, the use of a calculator and techniques to perform trade-related calculations.

Note:
This unit is not a remedial mathematics course. Apprentices who need basic mathematics must immediately advise the Instructor and/or Apprenticeship Training Coordinator (ATC). Available upgrading resources and options will be reviewed to help the apprentice.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe use of mathematics in the roofing trades.	**25%**

a. Basic mathematics (e.g., arithmetic, geometry)
b. Examples of applied math
   - Roof pitch (i.e., ratio of rise to span)
   - Roof slope (i.e., vertical rise of horizontal run)
   - Types of roof slopes (e.g., flat, low, normal, steep)
   - Plane geometry and calculating rates of coverage by roofing materials
   - Ratio/proportion and technical drawing to scale
   - Other (specified by Instructor)
c. Timesheets, wages and personal budgeting
d. Engineering of tools and equipment
e. Manufacture and packaging of roofing materials, products
f. Trade documents
g. Standards, codes, tolerances and other specifications
h. Computer technology, applications (e.g., Excel, 2D and 3D geometry, trade-related computer applications)
i. Design, technical drawing
j. Estimates, bids
k. Project planning and monitoring
l. Roofing materials procurement, inventory and optimization
m. Machinery and equipment set-up
n. Measurement and layout (inc. chalkline, square, metric and imperial tape measures, levels, builder levels, marking tools, pencil, graph paper)
o. Temperature, pressure and other measured quantities re: properties of materials and tools

p. Customer relations (e.g., schedules, timetables, etc.)
q. Business management
r. Apprentice to master math concepts early in the apprenticeship (inc. options and resources for remedial math)

2. Review math concepts. 25%

a. Basic operations of whole numbers
- Add
- Subtract
- Multiply
- Divide

b. Solve basic problems using fractions, ratios and decimals
- Identify fractions, ratios, decimals
- Convert between decimal and fraction
- Convert measurements to ratios

c. Add, subtract, multiply and divide using units of linear measure
- Imperial
- Metric units

d. Convert within Imperial system
- Feet to inches
- Square feet to square inches

e. Convert between Metric and Imperial measurement (inc. Imperial vs. US standard)
- Weights
- Lengths
- Volumes
- Temperature
- Prefixes (e.g., one half, one quarter)

f. Solve plane geometry problems
- Perimeter of shapes (e.g., square, rectangles, rhombus, triangles, law of right triangles, Pythagoras theorem, pentagons, higher order polygons, circles)
- Areas of shapes (e.g., square, rectangles, triangles, pentagons, higher order polygons, circles)
- Angular measurements
- Practical word problems

3. Describe use of calculator. 25%

a. Calculator types, maintenance
b. Calculator functions
- Basic operation
- Percentage
- Trig keys, functions
- Formulas
- Memory and constants (e.g., keys, functions)

4. Perform trade-related calculations (specified by Instructor). 25%

a. Linear measurement
- Rectangular, triangular dimensions
- Radius, diameter, circumference

b. Area and volume
- Squares, rectangles
- Triangles
- Circles, cylinders
- Irregular shapes

c. Ratio and proportion

- Ratio
- Percentage
- Rates
- Convert between Metric and Imperial

d. Problem solving
   - Estimate fall distance
   - Calculate roof area
   - Calculate roof features (e.g., gable roof area, hip/valley length)

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Apprenticeship Manitoba

Sloped Roofer

Unit: B2 Roof Design and Technical Drawing

Level: One

Duration: 35 hours

Theory: 14 hours

Practical: 21 hours

Overview:

This unit introduces technical drawing and roof design concepts commonly used in the roofing trades.

Topics include: use of technical drawing, equipment and materials, and techniques to produce roofing sketches and drawings. Apprentices will practice technical drawing and sketches of roofing components.

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

1. Describe use of technical drawing in the roofing trades. **25%**

a. Use of technical drawing
- Design and production of roofing structures/components (e.g., form/function, job details, application methods, material requirements, project planning, cost considerations, etc.)
- Problem solving and troubleshooting
- Communication among builders, drafting workers, designers, clients, architects, etc.
- Bidding and contracting practices
- Quality assurance to verify compliance with reference to standards and specifications
- Other (specified by Instructor)

b. Types, techniques and terminology
- Freehand sketches and brainstorming
- Develop sketches/drawings from photographs
- Pictorial drawings
- Working drawings
- Drawings to specifications
- Blueprints and blueprint components (inc. schedules)
- Layouts
- Computer Assisted Drawing and Design (CADD)
- Recent technology (e.g., computer programs, software, applications)

2. Describe/demonstrate roof design used in technical drawings. **15%**

a. Basic principles of design

b. Roof shapes and related terminology

c. Major design characteristics of common roof types
- Barrel, flat, gable gambrel, intersecting, dutch/hip, mansard, sawtooth, serpentine, shed

- Other roof shapes and structures (specified by Instructor)

3. Describe/demonstrate use of technical drawing equipment and materials. 10%

a. Rulers and straight edges (inc. T-square, parallel rule)
b. Architect scales (Metric, Imperial)
c. Pencils and leads (e.g., line-weight)
d. Erasers
e. Set squares
f. Protractors
g. Tools for curved work (e.g., compass, French curves)
h. Paper (vellum, grade, “tooth,” etc.)
i. Specialty templates (e.g., lettering guides)
j. Digital photography (e.g., camera, tablets)
k. Other (specified by Instructor)

4. Describe/demonstrate techniques to produce roofing sketches and technical drawings. 25%

a. Basic orthographic projection
   - Visualize and sketch views (i.e., plan view, elevation view, side view, sectional view)
b. Basic oblique projection
c. Basic isometric projection
d. Applied geometry
   - Construct angles
   - Construct circles, arcs, tangents, etc.
   - Dividing lines
   - Construct regular polygons
e. Line work and weight
   - Object line
   - Hidden line
   - Extension line
   - Dimension line
   - Centre line
   - Break line
   - Cutting-plane line
f. Common architectural symbols
g. Measurement and drawing scale (Metric, Imperial)
h. Lettering
   - Basic knowledge of legibility and other requirements
i. Digital photography (e.g., camera, tablets, androids)

5. Design and/or sketch a roof component (specified by Instructor). 25%

a. Interpret technical drawings and other materials to identify/solve a roofing problem
b. Use of scale, accepted conventions re: line-weight, lettering, etc.
c. Use/convert Metric and Imperial units of measure
d. Sequence
   - Freehand sketches (inc. isometric and orthographic projections)
   - Specified detail sketch
   - Finished drawing (inc. application of line-weights)
   - Verification of sketch re: roofing component, original drawing and/or specifications provided

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Apprenticeship Manitoba

Sloped Roofer

Unit: C1 Roofing Tools and Equipment

Level: One

Duration: 28 hours

Theory: 21 hours

Practical: 7 hours

Overview:

This unit describes the use, selection and maintenance of roofing tools and equipment for roofing projects.

Topics include: roofing tools and equipment, personal protective equipment and safety equipment, hand and power tools/equipment, electrical power supply considerations, hot-process and motorized equipment. The unit describes the aids used for rigging, lifting/hoisting and waste disposal.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe selection, use and maintenance of roofing tools and equipment.	**20%**

a. Background on development of modern trade technology, techniques and markets

b. Identify/define major categories re: tool set of modern trade
- Hand tools
- Portable power tools and equipment
- Stationary power tools and equipment
- Air-driven
- Explosive activated
- Computer assisted/controlled
- Common hand-tools compared with power-tool equivalents
- Importance of hand-tools and hand-tool skills
- Tools for working with specialty materials (e.g., manual insulation carrier)

c. Use of tools and equipment
- Safety precautions (inc. use of Personal Protective Equipment)
- Manufacturer and employer requirements

d. Select tools and equipment
- Variation in the cost, quality and capacity of roofer tools
- Match tools/equipment to job requirements
- Select, set-up tools for project (inc. tool limits, settings/adjustments)
- Trade culture re: borrow, use and return tools
- Workplace polices on employee's personal tools/equipment or employer-supplied
- Select tools/equipment for own use (e.g., budget, arrangements with employer, etc.)

e. General considerations re: maintenance of tools and equipment
- Maintenance and safety issues (e.g., repair of frayed electrical cords)
- Common sites, symptoms and consequences of bad maintenance practices
- Routine and scheduled maintenance requirements (e.g., manufacturer and/or

employer expectations)
- Costs/benefits of maintenance options (e.g., commercial sharpening)

f. Special considerations re: use of on-deck roofing equipment

2. Describe personal protective equipment (PPE) and safety equipment. 20%

a. Cuffless pants
b. Hearing protection
c. Eye-wash bottle
d. Face-shield
e. Fire extinguishers
f. First Aid kit
g. Gloves
h. Guard-rails
i. Hard-hat
j. Heat sensors
k. High visibility jackets and vests
l. Lanyard (rope)
m Long sleeves
n. Mask
o. Respirator
p. Safety boots
q. Safety fence
r. Safety glasses
Safety harness
s. Other (specified by Instructor)

3. Describe hand tools and demonstrate selection, use and maintenance. 10%

a. Adhesive spreader, air and material hoses, aviation snips, axe, bucket/pail, caulking gun, chalkline, chisels, drying mop
b. Flashlight, folding pliers, grub-hoe, hacksaw, hammer, hammer-stapler, handsaw(s), hand-spudder, hand-roller, hatchet, infrared heat gun
c. Manual gravel spreader, manual insulation-carrier, measuring tapes (Imperial/Metric), mechanical tape-applicator, mop, pipe-wrench, plane, pop riveter, prybar
d. Ramrod, rake, roof-jack, roof-lifter, roofer knife, scanners, scissors, scoop-shovel, scraper, screwdrivers, seam rollers, shovels, slater punch, sliding T-bevel, staple gun, squeegee
e. Thermometer, tin-snips, trowel, wheelbarrow, sawhorse, water extractor, wrenches and socket sets
f. Other (specified by Instructor)

4. Describe power tools/equipment (inc. pneumatic, explosive activated, propane fuelled) and demonstrate selection, use and maintenance. 10%

a. Air compressor, backpack blower, concrete saw, electrical cords, generator
b. Hammer drill, hot-air gun, hot-air welder, industrial vacuum, nibbler
c. Pneumatic spray gun, powder-activated tool, power mixer, power saws (chain, quick-cut, circular), power vac, pressure washer, primer machine, propane tank, pump
d. Roll carrier, roller, screw-gun, spray gun and nozzle, tile cutter, torch, unishear
e. Other (specified by Instructor)

5. Describe electrical power supply considerations. 5%

a. Hazards and precautions re: electricity
b. Jobsite power-supply (inc. generators)
c. Inspect cords and connections
d. Inspect jobsite conditions (e.g., damp areas)

e. Requirements for grounding
f. Power ratings and rating significance (e.g., “developed power” underload)
g. Legal and regulatory requirements
h. Other (specified by Instructor)

6. Describe hot-process and motorized roofing equipment and demonstrate selection, use and maintenance. **15%**

a. Agitator kettle, asphalt spreader, automated seamer, bitumen kettle, bitumen mop, bitumen pipe/piping, bitumen tanker, chainsaw, degranulater, dipper
b. Felt-laying machine, forklift, hot tanker/carrier, mechanical broom, mechanical scraper, mechanical spudder, mini-mop, mop cart
c. Power broom, power buggy, power gravel-spreader, power insulation carrier, power scraper/spudder, power spreader, rocker, roof cutter, roof-cutting machine
d. Scissor lift, skid-steer loader, snowblower, tear-off machine, truck tanker, wheeled asphalt bucket
e. Roll roofing installed with blow torch (“torch down” roofing)
f. Other (specified by Instructor)

7. Describe aids for roof project rigging, lifting/hoisting and waste disposal. **20%**

a. A-frame hoist, bottle cages, conveyors, cranes, disposal bin, disposal chute
b. Garbage bags, garbage chute, garbage tray, gravel-bucket, gravel-hopper, hand-hoist, hydraulic hoist
c. Ladder, ladder-hoist, ladder-jack, ladder-pulley, lifting fork
d. Mechanical hoist, monorail hoist, swing hoist, wheelbarrow
e. Other (specified by Instructor)

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Apprenticeship Manitoba

Sloped Roofer

Unit: C2 Roofing Materials and Products

Level: One

Duration: 14 hours

Theory: 14 hours

Practical: 0 hours

Overview:

This unit describes traditional and current roofing products and materials, the preferred use of products and materials, and industry trends.

Topics include: rolled roofing materials, aggregates and roof coatings for flat/low slope roofs, materials for flat/low/steep roof construction, fasteners and adhesives, and miscellaneous roofing materials.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Describe types of roofing materials and products. a. History and current trends re: social, architectural and technology factors. b. Major types of materials, physical properties and characteristics c. Building codes d. Manufacturer/industry specifications, classification systems and standards e. Recent innovations in engineering and manufacture of roofing materials f. Other (specified by Instructor)	**15%**
2. Describe use of rolled roofing materials and explain preferred use. a. Roofing materials (e.g., asphalt saturated, fibreglass, reinforced, synthetic underlayment, tar) b. Mineral surface c. Split sheet d. Salvage edge e. Rosin sheathing f. Determine rolled material requirements for a specific roof area g. Other (specified by Instructor)	**15%**
3. Describe aggregates and roof coatings for flat/low slope roofs and explain preferred use. a. Aggregates (crushed gravel, marble chips, pea gravel, round quarried gravel, slag) b. Roof coatings • Aluminum paint • Asphalt flood coat • Cutback • Decorative • Emulsion • Fibrated, non-fibrated	**15%**

- Synthetic rubber
- Vinyl

c. Other (specified by Instructor)

4. Describe materials in flat/low slope roof construction and explain preferred use. 15%

a. Built-up roofing (BUR) membrane
b. Hot rubberized roofing
c. Cold process roofing
d. Modified bituminous membrane roofing
e. Single ply roofing
   - Polyvinyl chloride (PVC)
   - Chlorinated polyethylene (CPE)
   - Chlorosulphinated polyethylene (CSPE) “Hypalon”
   - Thermoplastic Olefin (TPO)
   - Ethylene Propylene Diene Monomer (EPDM)
   - Neoprene (CR)
f. Thermoplastics
g. Thermoset membranes
h. Hot process applied varieties (felt paper, fiberglass, sanded modified sheets)
i. Heat welded varieties
   - Polyvinyl chloride (PVC)
   - Thermoplastic Olefin (TPO)
   - Chlorosulphinated polyethylene (CSPE) “Hypalon”
j. Metal flashings (e.g., aluminum, copper, stainless steel)
k. Other (specified by Instructor)

5. Describe materials for steep roof construction and explain preferred use. 10%

a. Shingle roof materials:
   - Shingles: asphalt, fiberglass, laminate, styrene-butadiene-styrene (SBS)
   - Asphalt shingles (standard, T-Lock, low slope)
   - Wood shingles/shakes
   - Underlayment (e.g., felt, ice/water shield, mineral-surfaced, modified bitumen, peel and stick, polyethylene, synthetic)
   - Mastics
   - Flashings (aluminum, copper, stainless steel, mastic)
   - Fasteners (nails, staples, screws)
b. Tiled-roof materials:
   - Tiles: clay, composite, concrete, slate, metal
   - Underlayment (e.g., felt, ice/water shield, mineral-surfaced, modified bitumen, peel and stick, polyethylene, synthetic)
   - Closure strips
   - Flashings
   - Mortars and dyes
c. Metal roof materials:
   - Pre-formed metal
   - Strapping (inc. Z-bar, wooden, and hat channels)
   - Underlayment (e.g., felt, ice/water shield, mineral-surfaced, modified bitumen, peel and stick, polyethylene, synthetic)
   - Closure strips (metal, foam)
   - Flashings (inc. drip edge, rake edge, through wall, backpan)
   - Fasteners (clips; pop rivets, screws, self-tapping, etc.)
   - Ridge vents (pre-formed, hood)
   - Snow guards (metal, plastic)
d. Other (specified by Instructor)

6. Describe roofing fasteners and adhesives, and explain preferred use. 15%

a. Fasteners
   - Nails
   - Mechanical fasteners
   - Screws
   - Bolts
   - Hollow-wall
   - Clips
   - Plates
   - Bars
   - Compatibility of fasteners with types of flashings (e.g., metal combinations)
   - Significance of fastener standards, selection, and schedules/pattern

b. Adhesives (contact cements, primer, seam tape, peel and stick)

c. Other (specified by Instructor)

7. Describe miscellaneous roofing materials, explain preferred use. 15%

a. Ballast (roofing stone, pavers, cement top insulation)

b. Caulking (silicone, polyurethane, latex)

c. Insulation (rigid, foam, fiberglass, other)

d. Gypsum board

e. Vapour retarders
   - Polyethylene
   - Peel and stick
   - Torched-on (SBS)
   - Laminate
   - Two ply felt
   - Retarder adhesives

f. Primers (solvent-based, water-based)

g. Paints (inc. rust inhibiting)

h. Protection boards
   - Insulation, corrugated, drain-mat
   - Wood fibre
   - Fibreglass
   - SBS boards
   - Asphalt impregnated

i. Surfacing products

j. Waterproofing membranes (peel and stick, hot rubber compound torch on)

k. Other (specified by Instructor)

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Apprenticeship Manitoba

Sloped Roofer

Unit: E1 Steep Roof Construction and Products

Level: One

Duration: 42 hours

Theory: 35 hours

Practical: 7 hours

Overview:

This unit identifies the construction of sloped roof systems used mainly in residential roofing.

Topics include: types of roof structures and features, a comparison of steep roof systems, and installation procedures for asphalt shingles, tile shingles and pre-formed metal systems.

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

1. Describe types of roof structures, designs, construction features and slopes. **10%**

a. Types of roof structures and designs (inc. hip, gable, gambrel, A-frame, mansard, shed, dormer, flat, vaulted, saw-toothed, domed, serpentine, barrel, conical, vaulted cathedral)
b. Roof construction features (inc. trusses/rafters, beams, ridges, valleys, eaves, hips, guttering, gables/rakes/barge, cornice, decking/substrate, open lath/strapping, insulation, sandwich system, skylight, brackets, eaves troughs)
c. Roof slopes (inc. rise, run, slope, pitch)
d. Residential trends (e.g., skylights, insulation, environmental “green” roofs, roof gardens)

2. Compare steep roof systems and their construction. **20%**

a. Types of steep roof systems and components
   - Asphalt shingles (e.g., standard, composition, fiberglass, architectural singles)
   - Tile roofs (e.g., clay, concrete, faux, slate)
   - Pre-formed metal roofing (e.g., vertical metal roofing, exposed/non exposed fastener systems)
   - Other (e.g., cedar shakes/shingles, roll roofing, metal tiles, modified bitumen)
b. Loading, drainage and substrate requirements
c. Other (specified by Instructor)

3. Describe installation procedures: shingled roof systems. **40%**

a. Installation phases: general considerations/techniques
b. Flashings: selection, forming/fitting, secure and caulk, including:
   - Assess project requirements for flashings
   - Locate/select flashing (e.g., rake-edge, drip edge, back-pan, etc.) and specifications (e.g., plumbing vents, goose-neck exhausts, etc.)
   - Selection/compatibility of fasteners (e.g., metallurgical) re: flashing and substrate
   - Techniques for cutting, forming/jointing (e.g., mitres) and caulking of flashings

c. Saddles/crickets: design, build and install, including:
   - Assess project requirements for saddles/crickets
   - Design, locate and lay-out saddles/crickets (e.g., behind chimneys, other roof-openings)
   - Basic techniques to fabricate saddles and crickets

d. Underlayment: materials, selection, fitting and placement, including:
   - Selecting underlayment product (e.g., felt, inorganic, ice/water shield, mineral-surfaced, modified bitumen, peel and stick, polyethylene, synthetic) and compatibility with shingles
   - Anticipate/contain potential ice-damming or condensation, roof slope characteristics
   - Roll preparation ("relaxing"), measure and cut underlayment (inc. overlap allowances)
   - Special consideration re: peel-and-stick underlayment application

e. Shingles: cut, placement, fasten and tabbing, including:
   - Layout (inc. patterns brick, random), starter course, allowance for roof-slope/shape characteristics, exposure/overlaps and course matching at dormers
   - Cutting techniques (inc. asphalt, wood shingles/shakes), special requirements for transitions with flashings, projections, edges, valleys, capping, ridge-caps
   - Fastening techniques (inc. selecting fasteners), adjust nailing guns, maintaining patterns/overlap allowances, considerations for hip/ridge-caps, etc.
   - Tabbing methods (inc. windproofing), apply adhesive, caulking

f. Vents: location, lay-out, clearance-cutting, installation, including:
   - Rationale to install vents, advantages/disadvantages (inc. placement)
   - Types of vents and vent flashings (e.g., turbine, attic, ridge)
   - Calculate number of vents and location
   - Procedures and precautions when cutting roof decks
   - Standards and techniques to seal roof projections with mastics and caulking

g. Other (specified by Instructor)

4. Describe installation procedures: tiled roofing systems. 10%

a. Installation phases: general considerations/techniques (e.g., plumbing vents, gooseneck exhausts)
   - Selection/use specialized tools/fixtures and fasteners (inc. tile-cutters, diamond-bit blades, straight-line jigs/templates, etc.)
   - Lay-outs and manufacturer specifications to execute patterns, associated materials (e.g., interlocking tiles)

b. Underlayment: materials, selection, fitting and placement, including:
   - Precautions for ice and water back-up
   - Choice of underlayment material (e.g., metal, roll roofing, mineral-surfaced)
   - Fitting, placement (inc. overlap allowances) and securement

c. Vents: selection, forming/fitting, securement and caulking**,** including:
   - Determine number and location of vents
   - Sealing vents to underlayment

d. Flashings: location, lay-out, clearance-cutting and installation, including:
   - Assess project requirements for flashings
   - Locate/select flashing (e.g., rake-edge, drip edge, back-pan, etc.) and specifications
   - Selection/compatibility of fasteners (e.g., metallurgical) re: flashing and substrate
   - Techniques for cutting, forming/jointing (e.g., mitre), caulking flashings

e. Tiled roof strapping: selection, fitting and placement, including:
   - Locate rafters and establish nailing/fastener pattern
   - Lay-outs for strapping

f. Tiled roof starter strips and closure strips: lay-outs, location and securement, including:
   - Establish height, location and start-line

- Stagger starter-strip butt joints
- Select closure-strip material(s) (e.g., bird stops, screens, foam closures)
- Place and secure closure-strips

g. Roof tiles: fasten and cut, including:
- Special tips and techniques to cut/fit tiles around flashings, valleys, capping, projects and vents
- Establish and maintain pattern for tile/fastener placement
- Fasten ridge/hip caps

h. Mortar: prepare and apply to tiled roof capping and valleys
- Select, mix and colour match mortar
- Consideration for mortar placement (inc. environmental/atmospheric conditions)

i. Other (specified by Instructor)

5. Describe installation procedures: pre-formed metal (PFM) roofing systems. 20%

a. Installation phases: general considerations/techniques

b. Basic sheet-metal work (e.g., cutting) and carpentry method/tools (e.g., strapping):
- Select/use aviation snips, tin-snips, saws, nibblers, chalkline, sliding T-bevel, squares, pop-riveters, staplers, and other wood/metal fastening tools (e.g., angle lay-outs, mitre-cuts, overlap corners, fabrication of crickets)
- Review flashing/strapping, fasteners and other materials (e.g., Z-Bar, wooden, other channels).

c. Underlayment materials: selection, fitting and placement, including:
- End/side-lap allowances
- Adapt techniques for underlayment material (e.g., peel-and-stick, mineral-surfaced)

d. PFM roof starter strips and strapping: lay-outs, location, fitting and securement, including:
- Chalkline lay-out pattern for strapping
- Compatibility/choice of wood/metal re: strapping installation
- Fastening/anchoring strapping
- Cut, place, fasten and caulk foam, metal and other closure strips

e. Fasten PFM roofing panels and related products: lay-outs, seam-forming and securement, including:
- Standards (e.g., manufacturer specifications), selection and application of fasteners and hardware (e.g., screws, washers, panels, clips), compliance with predetermined lay-outs
- Types of PFM panels and related seams (e.g., single-/double-standing, S-Lock, batten)
- Selection/use of seamers (hand/power), adjustable-torque drivers and other tools/equipment
- Special requirements (e.g., adjustment of driver torque to protect materials, clean-up of filings, shavings and other installation related metal debris).

f. Roof flashings: location, lay-out, clearance-cutting and installation, including:
- Lay-out for flashings, crickets, saddles, etc.
- Cutting, fitting and mitre-jointing
- Use of screws, rivets and butyl tape to fasten and seal flashings

g. Ridge-vents and snowguards: calculation, placement and securement, including:
- Assess general requirements and precautions
- Considerations in selection (e.g., hood or pre-formed), capacity/requirements, placement and purpose of vents and snowguards
- Techniques to apply ridge vents
- Techniques/standards to install snowguards (e.g., welds, screws, bolts, fastener schedules/patterns)

h. Other (specified by Instructor)

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Apprenticeship Manitoba

Sloped Roofer

Unit: E2 Practicum: Shingled Roofwork

Level: One
Duration: 28 hours
Theory: 0 hours
Practical: 28 hours

Overview:

This unit reviews installation techniques for shingled roofwork and provides practical experience. Topics include: safety hazards and precautions, flashings, saddles/crickets, underlayment, shingle layouts and vents.

Objectives and Content:	Percent of Unit Mark (%)
1. Review safety hazards and precautions for shingled roofwork installation.	**5%**
2. Demonstrate installation techniques re: flashings for shingled roofwork.	**15%**
a. Assess project requirements for flashings	
• Interpret standards, manufacturer and job specifications	
• Select flashing to suit project type and job specifications	
• Perform layout(s) for installation of flashings	
b. Forming, jointing and fitting flashings	
c. Securement and caulking flashings	
d. Other (specified by Instructor)	
3. Demonstrate installation techniques re: saddles/crickets for shingled roofwork.	**15%**
a. Assess project requirements for saddles/crickets	
b. Design, locating and lay-out of saddles/crickets	
c. Fabrication of saddles/crickets	
d. Install and secure	
e. Other (specified by Instructor)	
4. Demonstrate installation techniques re: underlayment(s) for shingled roofwork.	**15%**
a. Select underlayment material(s) for project specifications	
b. Relaxing underlayment and placement	
c. Special techniques re: peel and stick underlayment	
d. Other (specified by Instructor)	
5. Demonstrate techniques re: shingle layouts, fitting and securement.	**30%**
a. 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	
b. Cutting and fitting shingles	

- Adapting techniques to products (e.g., asphalt, wood, other shingling products)
- Fitting for transitions with ridge-caps, capping, edges, projects, and flashings, etc.
- Other (specified by Instructor)

c. Fastening
- Selection/adjustment of nailing guns and air compressors
- Practical design and layout (inc. patterns)
- Select fasteners and fastener patterns to suit project materials and fastener pattern
- Maintain/verify patterns and overlap allowances
- Special considerations and fastening practices re: hips, ridge-caps, etc.

d. Tabbing
- Windproofing methods
- Apply adhesive(s)
- Caulking the work

e. Other (specified by Instructor)

6. Demonstrate installation techniques re: vents for shingled roofwork. 20%

a. Vent layouts and clearances
- Interpret specifications/standards re: required type, number and location of vents
- Cutting clearances for different kinds of vent, including precautions to avoid damage to deck
- Calculate number of vents and location

b. Install and secure vents
- Attic type
- Turbine type
- Ridge type
- Other (specified by Instructor)

c. Sealing roof projections
- Application of mastic
- Caulking
- Ridge type

d. Other (specified by Instructor

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Apprenticeship Manitoba

Sloped Roofer

Unit: E3 Practicum: Tiled Roofwork

Level: One

Duration: 14 hours

Theory: 0 hours

Practical: 14 hours

Overview:

This unit reviews installation techniques for tiled roofwork and provides practical experience. Topics include: safety hazards and precautions, flashing, strapping, tile cutting, placement and securement, and applying mortar.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Review safety hazards and precautions for tiled roofwork installation.	**5%**
2. Demonstrate general techniques re: tiled roofwork projects.	**10%**
a. Select/special application of tools, equipment, and accessories • Specialty cutters, blades, bits • Jigs, fixtures, templates • Fasteners • Tips and preferred methods of working with tiled products • Other (specified by Instructor)	
b. Interpreting tiled roofwork manufacturer and project specifications • Patterns • Layouts	
c. Other (specified by Instructor)	
3. Demonstrate installation techniques re: underlayment(s) for tiled roofwork.	**10%**
a. Select, fit and placement of underlayment material(s)	
b. Practical precautions against ice and water back-up	
c. Fitting and placement of underlayment materials • Securement • Overlap allowances	
d. Other (specified by Instructor)	
4. Demonstrate general techniques re: vents for tiled roofwork.	**15%**
a. Interpret project specifications and standards re: tiled roofwork vent requirements • Determine vent type(s) • Calculate number of vents and location	
b. Forming/fitting of tiled roofwork components re: vents and exhausts	
c. Place and secure tiled roof vents, exhausts and accessories	
d. Caulking, including sealing of vents to underlayment	

e. Other (specified by Instructor)

5. Demonstrate installation techniques re: flashings for tiled roofwork. 15%

a. Selection, lay-out and location of tiled roof flashings
   - Assess project requirements
   - Locate/select flashing to suit job (e.g., rake-edge, drip edge, back-pan, etc.) and specifications
   - Selection/compatibility (e.g., metallurgical) of fasteners re: flashing and substrate

b. Cutting clearances (inc. special precautions)

c. Installation practices
   - Techniques for cutting tiled roof flashings
   - Fitting and jointing tiled roof flashings
   - Caulk tiled roof flashings

d. Other (specified by Instructor)

6. Demonstrate installation techniques re: strapping for tiled roofwork. 10%

a. Interpret the project requirements for strapping
   - Interpret specifications re: strapping material(s)
   - Locate rafters
   - Execute lay-out for tiled roof strapping
   - Establish nailing/fastener pattern

b. Fit and secure strapping
   - Cut strapping
   - Place and fasten strapping (inc. starter and closure strips)
   - Lay-outs for tiled roof strapping

7. Demonstrate installation techniques re: roof tile cutting, placement, securement. 20%

a. Lay-out, locate and secure starter/closure strips
   - Establish height, location and start-line re: tiled roof starter strips
   - Stagger starter-strip butt joints
   - Select closure-strip material(s)
   - Place and secure closure strips

b. Fasten and cut roof tiles
   - Special tips and techniques for cutting/fitting tiles re: transitions with flashings, valleys, capping, projects and vents
   - Establish/maintain pattern for tile/fastener placement
   - Fasten ridge/hip-caps

c. Other (specified by Instructor)

8. Demonstrate installation techniques re: applying mortar to tiled roofwork. 15%

a. Select, mix and colour matching mortar(s)

b. Preferred practices re: mortar application (inc. adaptations to anticipate environmental/atmospheric impacts)

c. Prepare and apply mortar to tiled roof valleys and caps

d. Other (specified by Instructor)

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Apprenticeship Manitoba

Sloped Roofer

Unit: E4 Practicum: Pre-Formed Metal Roofwork

Level: One

Duration: 21 hours

Theory: 0 hours

Practical: 21 hours

Overview:

This unit reviews installation techniques for pre-formed metal roofwork and provides practical experience. Topics include: safety hazards and precautions, use of metalworking/woodworking tools, underlayment, panels and related products, flashing, vents and snowguards.

Objectives and Content:	**Percent of Unit Mark (%)**
1. Review safety hazards and precautions when installing pre-formed metal (PFM) roofing.	**5%**
2. Demonstrate use of metalworking/woodworking tools and basic techniques to install PFM systems and components. a. Select/special application of tools, equipment and accessories for PFM roofwork. b. Interpret PFM roofwork project specifications c. Woodwork tools and techniques d. Metalwork tools and techniques e. Other (specified by Instructor)	**10%**
3. Demonstrate installation techniques re: PFM roofwork underlayment(s) of metal roofwork. a. Install underlayment material(s) • Interpret manufacturer specifications re: selection of materials and system components • Establish allowances for side and end laps • Fit and place underlayment material(s) • Adapting technique(s) to suit underlayment (mineral surfaced, peel and stick) • Other (specified by Instructor) b. Install starter/closure strips and strapping • Preferred practices for lay-out/location, fitting, and securement of these components • Compatibility/choice of wood/metal re: strapping installation • Fasten/anchor strapping • Cut, place, fasten and caulk foam/metal and other closure strips c. Other (specified by Instructor)	**20%**
4. Demonstrate installation techniques for PRM roofwork panels and related products.	**25%**

a. Identify/select pre-formed metal roofwork products, accessories, etc. in general
b. Interpret/apply standards/specifications to select and use of specific products and hardware (e.g., screws, washers, panels, clips, etc.) compliance with predetermined lay-outs
c. Lay-out and verify lay-out(s) re: project specifications
d. Forming seams
   - Select/use seamers
   - Use adjustable torque-drivers (inc. fine adjustment)
   - Use other specialty equipment for seam-forming
e. Fasten and secure pre-formed metal roofwork products
f. Hazards and precautions re: clean-up of metal shavings, filings and other debris
g. Other (specified by Instructor)

5. Demonstrate installation techniques for PFM roofwork flashings. 25%

a. Locate/lay-out the installation
   - Saddles and crickets
   - Flashings
b. Locate/cut clearances
c. Cut, fit/joint of flashing materials (inc. mitre-cuts)
d. Application of screws, rivets and butyl tape to secure/seal flashings
e. Other (specified by Instructor)

6. Demonstrate installation techniques for PFM roofwork vents and snowguards. 15%

a. Identify/select vent and snowguard products, accessories, etc. in general
b. Assess specific project requirements and precautions re: venting and snow guard components
   - Type
   - Layout and placement
   - Calculations
c. Install vents
   - Preferred practices and fastening methods
   - Selection/placement of fasteners
d. Install snowguards
e. Other (specified by Instructor)

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Apprenticeship Manitoba

Sloped Roofer

Unit: G1 Fall Protection, Scaffolding and Roof Access Structures

Level: One

Duration: 14 hours

Theory: 7 hours

Practical: 7 hours

Overview:

This unit provides and overview of fall protection equipment, roof access structures (work platforms) and scaffolding. There is an emphasis on workplace safety and health requirements related to the roofing trades.

Topics include: selection and use of fall protection equipment, ladders, ramps/runways and temporary stairs. Scaffolding procedures will be reviewed with an emphasis on the section, use, maintenance, inspection and hoisting.

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

1. Describe scaffolding and roof access structures. 20%

a. Types
   - Ladders
   - Ramps, runways and stairs
   - Scaffolding and scaffold systems
   - Suspended access equipment
   - Scissor lifts
   - Bleachers and stages

b. Applications and preferred uses re: roofing projects

c. General safety precautions and regulatory considerations (Workplace Health and Safety, Canadian Standards Act)

d. Fall protection requirements, apparatus and techniques

e. Dismantling and storage

f. Interplay with rigging/hoisting procedures and equipment

g. Other (specified by Instructor)

2. Describe/demonstrate selection, use and maintenance of fall protection equipment. 20%

a. Types of fall protection
   - Arrest
   - Restraint
   - Prevention

b. Fall arrest equipment and techniques
   - Harness
   - Lanyards
   - Lifeline (horizontal/vertical)
   - Rope-grab

- Shock absorber
- Tie-ins/anchor points

c. Travel arrest equipment and accessories
- Belly-hooks
- Belts
- Harnesses
- Half-harnesses
- Lanyards
- Rope-grabs
- Tie-ins
- Anchor points

d. Fall prevention
- Floor opening protection
- Guardrail systems
- Wall openings (inc. skylight)

3. Describe/demonstrate selection, use and maintenance of ladders, ramps/runways and temporary stairs. 20%

a. Ladders
- Varieties (inc. fixed, job-built, manufactured)
- Base to height ratio, three-point contact
- Electrical and other hazards
- Fall protection, tie-off
- Founding (foundation)
- Ladder cages/jacks
- Minimum extension
- Overlaps
- Rest platform
- Safety feet
- Securement

b. Ramps, runways and stairs
- Relevant regulations
- Varieties and their rationale/use(s)
- Guardrails and handrails
- Slope
- Stepping laths (cleats)
- Tread rise/run
- Widths

c. Design, build and install techniques, including:
- Relevant regulations
- Bearers (transoms/ledgers)
- Braces
- Handrails, guardrails and ice-boards
- Footings
- Loading
- Platform material
- Rails/rungs
- Ribbons
- Sills
- Stringers
- Treads
- Uprights

d. Other (specified by Instructor)

4. Describe/demonstrate selection, use and maintenance of scaffolding. 20%

a. Types of scaffolding/scaffolding systems (inc. preferred applications)
- Birdcage
- Bridging and cantilever scaffolds
- Independent/dependent
- Rolling
- Tube and clamp
- Frame
- Machine scaffolds (inc. articulated booms, mast-climbing scaffolds, scissor-lifts, and zooms)
- Applicable regulations (inc. spans, loading, safety codes, etc.)
- Manufacturer's rating of machine

b. Major components
- Baseplates
- Bearers
- Brackets (end/side)
- Casters
- Clamps
- Connectors/couplers
- Farm wagons
- Frames
- Ledgers
- Outriggers
- Planks (decks, grates)
- Putlogs
- Rails
- Reveal pins
- Ribbons
- Screw-jacks
- Sills
- Standards
- Toeboards
- Transoms
- Trusses
- U-heads
- Uprights

c. Loading and capacities
- Dead/live loads
- Ground loads
- Leg
- Loads
- Rolling loads
- Safe workloads
- Static loads
- Wind loads
- Permissible spans

d. Erect, maintain and disassemble independent scaffolding
- Access, egress
- Base lift
- Base-to-height ratio
- Bracing
- Duty ratings (light/heavy)

- Foundations
- Guardrails
- Single- and double-pole
- Tie-ins (vertical/horizontal)
- Wood and metal

e. Erect, maintain and disassemble suspended scaffolding
- Beam clamps
- Guardrails, toeboards, etc.
- Hoarding
- Moving
- Multipoint suspension
- Platform materials
- Rigging
- Trusses/beams

f. Erect, maintain and disassemble hanging scaffolding.
- Box-ties
- Check clamps
- Guardrails
- Puncheons
- Rakers

g. Erect, maintain and disassemble swing-stages
- Anchors
- Ascenders/descenders
- Balance-point
- Beams/thrust-outs
- Counterweights
- Multipoint suspension
- Rigging
- Tiebacks

h. Other (specified by Instructor)

5. Describe/demonstrate inspection and hoisting procedures re: scaffolding. 20%

a. Safety considerations (inc. regulatory requirements, precautions)
b. Inspection procedure (inc. rationale, critical targets, documentation)
c. Targets for scheduled and periodic maintenance
d. Special considerations re: rigging/hoisting operations

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