

Pre-engineered Building Erector Level 2

Pre-engineered Building Erector

Unit: B2 Introduction to Pre-engineered Building Erector Drawings

Level: Two

Duration: 60 hours

Theory: 14 hours

Practical: 46 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of drawing interpretation.

Objectives and Content:	Percent of Unit Mark (%)
1. Identify erection drawings and structural steel drawings.	30%
a. Erection drawings	
b. Marking system	
c. Erection pre-planning	
d. Erection tolerances	
e. Fabrication drawings	
f. Gauge, pitch and edge distances	
g. Running dimensions	
h. Fabrication practices	
i. Structural steel placing drawings	
j. Anchor bolt layouts	
k. Structural steel components from a drawing	
l. Components from open web steel joists	
m. Various types of bracing and its use	
n. Structural steel fabrication details	
o. Other drawings:	
• Architectural	
• Mechanical	
• Structural	
• Electrical	
2. Identify anchor bolt layout.	10%
a. Orientation	
b. Grid lines	
c. Anchor bolt patterns	
d. Anchor bolt projection	
e. Shims and grouting	
f. Base plate elevations	

- g. Anchor bolt plan
- 3. Identify structures. 15%**
- a. Single frame buildings
 - b. Beams and columns
 - c. Multi frame buildings
 - d. Bracing
- 4. Identify building components. 20%**
- a. Girts
 - b. Purlins
 - c. Bracing
 - d. Bays and bents
 - e. Columns
 - f. Trusses
 - g. Girders
 - h. Beams
 - i. Roof and wall sheets
 - j. Fasteners
 - Types of bolts
 - Bolt diameters
 - Bolt grip and length
 - Methods of installation
 - Precautions for use
 - Fasteners to other types of materials
 - k. Sealants
 - l. Insulation
- 5. Identify specialty components. 10%**
- a. Canopies
 - b. Mezzanines
 - c. Bays & bents/portals frames
 - d. Specialty finishes
 - Masonary
 - Stucco
 - e. Miscellaneous metals
 - Stairs
 - Roof access
 - Ladders
 - Roof hatches
 - Roof top units
 - f. Roof top unit framing
 - g. Roof curbs
 - h. Walls
 - Fire rated walls
 - Mechanical units openings
 - Mechanical openings wall
- 6. Calculate the weights and prepare material take-offs of structural steel drawings. 15%**

Pre-engineered Building Erector

Unit: B3 Trade Related Mathematics

Level: Two

Duration: 24 hours

Theory: 24 hours

Practical: 0 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of trade related mathematics and estimating. Topics will include: imperial and metric linear measurement, ratio and proportion, similar triangles, slopes, percentages, perimeter and area, area measurement problems, volume measurement problems, quantities related to study of plans and drawings, and triangulation.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Solve trade related math problems. A. Fractions B. Decimals C. Dimension (metric and imperial)	25%
2. Describe layout slopes.	25%
3. Solve trade related math problems between distance and angles. a. Sin functions b. Cos functions c. Tan functions	25%
4. Solve problems with suitable formulas. a. Perimeters b. Areas c. Volumes d. Triangulation	25%

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Unit: D1 Primary Structure Erection (Levelling and Squaring Buildings)

Level: Two

Duration: 30 hours

Theory: 10 hours

Practical: 20 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of primary structure erection.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Pre-plan for a Pre-engineered building.	10%
2. Determine size and weight of building materials.	10%
3. Determine sequence for erecting structural steel.	10%
4. Determine size of mobile crane needed and the location of crane on site.	10%
5. Determine levels of base and anchor of bolt patterns.	10%
6. Erect a Pre-engineered metal building.	40%
7. Dismantle a Pre-engineered metal building.	10%

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Unit: D2 Secondary Structure Erection (Purlins, Girts and Base Angle)

Level: Two

Duration: 30 hours

Theory: 10 hours

Practical: 20 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of secondary structure erection.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Hoist all secondary structural and bracing in the correct position.	30%
2. Erect all secondary structural and bracing in the correct position.	30%
3. Bolt all secondary structural and bracing in the correct position.	10%
4. Torque bolts to proper specifications.	10%
5. Use recognized safety procedures.	20%

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Unit: D3 Specialty Structures

Level: Two

Duration: 40 hours

Theory: 7 hours

Practical: 33 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of specialty structures.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Frames openings.	20%
a. Types of openings	
b. Framing procedures	
c. Portal frames	
d. Jambs/frames, plumb, level and square	
2. Installs miscellaneous metals.	20%
a. Ladders	
b. Railings	
c. Stairs	
3. Installs canopies and facades.	20%
a. Secondary members	
b. Framing canopies and facades	
c. Placement and attachment location	
d. Canopies and facades	
4. Installs mezzanines.	20%
a. Secondary members	
b. Framing mezzanines	
c. Placement and location	
5. Installs partition walls.	20%
a. Secondary members	
b. Framing partition walls	
c. Placement and attachment location	

Pre-engineered Building Erector

Unit: D4 Wall Systems

Level: Two

Duration: 40 hours

Theory: 7 hours

Practical: 33 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of wall systems.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe the terminology of wall systems.	10%
a. Interior/exterior	
• Warehouse pitched wall system	
• Cavity filled system	
• Thermal wall system	
• Freezer panel system	
• Sandwich panel system	
2. Describe panel profile, gage number and panel coatings.	5%
3. Describe exposed fastener panels and concealed fastener panels.	5%
4. Discuss the field storage and handling of wall panels.	5%
5. Describe types of factory-assembled wall panels.	5%
6. Describe layout and installation of walls.	5%
a. Insulation and vapour barrier	
7. Describe sheeting safety considerations.	5%
8. Describe installation of a base angle using masonry fasteners.	5%
9. Describe tools required for installing wall coverings.	5%
10. Describe the shakeout, rigging and handling of wall coverings.	5%
11. Describe the process used to align girts with blocking.	5%
12. Describe the modularity prior to installing wall coverings.	5%

13. Describe how the direction of sheeting is determined. 5%
14. Describe the procedure used to pre-drill a stack of wall panels. 5%
15. Discuss the procedures used to install exposed wall fastener wall panels. 5%
16. Describe correct scaffolding practices common to wall installation practices. 5%
17. Describe how to cut an opening in an exposed fastener wall panel including framing and flashing. 5%
18. Describe consideration when sheeting end walls. 5%
19. Describe the cutting and installation of factory-assembled wall panels. 5%

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Unit: D5 Roof Systems

Level: Two

Duration: 40 hours

Theory: 7 hours

Practical: 33 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of roof systems.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe panel types and different systems design.	4%
A. Standing seam	
B. Screw down	
C. Roof	
D. Retrofit insulated roof panels	
2. Describe the various loads to which a metal roof is subjected.	4%
3. Describe the components of lap seam metal roofs.	4%
4. Describe the field storage and handling of roof panels.	4%
5. Describe common characteristics shared by standing seam metal roof systems.	4%
6. Describe advantages and limitations of standing and lap seam metal roofs.	4%
7. Describe types of coatings used on standing and lap seam metal roof panels.	4%
8. Describe sealant requirements for standing and lap seam systems.	4%
9. Perform sealant requirements for standing and lap seam systems.	4%
10. Describe safety considerations when working off the ground.	5%
11. Describe the potential panel dangers during metal roofing:	5%
A. Collapse	
B. Slippery	
C. Loose panels	
D. Wind	

E. Lightening

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| 12. Describe material handling dangers. | 5% |
| 13. Install metal roof with lap seams, standing seams and sandwich systems. | 5% |
| 14. Describe factors considered in pre-erection planning. | 5% |
| 15. Perform general sequence of erection for standing seam roof systems. | 5% |
| 16. Perform simulation of roof installation with eave conditions, ridge conditions and rake conditions. | 5% |
| 17. Perform simulation of roof installation with skylights, curbs and walkway systems. | 5% |
| 18. Perform the procedures used to block purlins according to manufacturer's specifications. | 5% |
| 19. Describe insulation placement in conformance with the requirements of the specified roof system.
a. vapour barrier | 4% |
| 20. Perform procedure used to lay out panel modularity. | 5% |
| 21. Perform installation of roof and ridge panels in conformance with the roof system. | 5% |
| 22. Perform proper splicing of gutter sections. | 5% |

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Unit: D6 Windows and Doors

Level: Two

Duration: 7 hours

Theory: 0 hours

Practical: 7 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of the installation of windows and doors.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Perform simulation of installing insulation backings used as vapour barriers.	10%
2. Perform simulation of installation with other types of air barriers.	20%
A. Polyurethane	
B. Liner panels (caulked and sealed)	
3. Perform simulation of cutting rough openings for windows and doors.	20%
A. While sheeting	
B. After building is sheeted	
C. Rough openings	
4. Perform simulation of finishing of openings.	20%
A. Sealants required	
B. Flashings	
C. Insulation	
D. Finish openings	

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Unit: D7 Pre-engineered Building Maintenance and Repair

Level: Two

Duration: 16 hours

Theory: 7 hours

Practical: 9 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of Pre-engineered building maintenance and repair.

Objectives and Content:

**Percent of
Unit Mark (%)**

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| 1. Describe repair of damaged components. | 25% |
| A. Types of damaged components | |
| B. Repair techniques | |
| C. Building systems | |
| D. Visual inspection | |
| E. Cause of fault | |
| F. Removal of damaged components | |
| G. Replacement components | |
| H. Modification of available components if product is obsolete | |
| 2. Perform repair of damaged components. | 25% |
| 3. Describe the method strengthening existing structures. | 25% |
| A. Damaged components | |
| B. Repair techniques | |
| C. Building systems | |
| D. Replacement components | |
| E. Interpretation of engineers' drawings | |
| 4. Perform method of strengthening existing structures. | 25% |

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Unit: D8 Pre-engineered Site Inspection

Level: Two

Duration: 7 hours

Theory: 7 hours

Practical: 0 hours

Overview:

This unit is designed to provide the Pre-engineered Building Erector apprentice with an overview of pre-erection site inspection.

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
1. Describe assessment of site for access to site and building.	50%
A. Ground conditions	
B. Hoisting equipment and required clearances	
C. Erection procedures	
D. Hazards and obstructions	
E. Improvisations to suit site conditions	
2. Describe the method of layout/elevation of foundation.	50%
A. Drawings	
B. Measuring devices and layout tools	
C. Marking and layout techniques	
• Anchor bolts, etc.	
D. Visualization of finished product	

Pre-engineered Building Erector

Unit: A10 Orientation II: The Job of Journeywork

Level: Two

Duration: 21 hours

Theory: 14 hours

Practical: 7 hours

Overview:

Pre-engineered Building Erector technical training offers an entry-level orientation to the challenges of apprenticeship learning. The present unit introduces senior apprentices to the responsibilities of workplace *teaching* that they will assume as supervising journeypersons. Tradeworkers have a particularly rich tradition of refreshing and sharing their skills from one generation of practitioners to the next. This unit orients senior apprentices to some of the practical and conceptual tools that can enable them to contribute to this trade heritage when they themselves become certified journeypersons. The journeyperson's obligation to assist trade learners to develop skills and knowledge is complex and challenging. It involves safety considerations, employer expectations, provincial regulations, as well as the tradition of skills stewardship that links modern practice with the long history of workplace teaching and learning that defines the apprenticeable trades. The ability to offer timely, appropriate support to apprentices is itself an important area of trade learning. This unit presents material intended to help refine this ability through reflection and discussion by senior apprentices, and dialogue with their instructor. The detailed descriptors under each unit objective reflect Manitoba and Canadian standards prescribed for journey-level supervisory capabilities, as well as key topics in current research on the importance of workplace teaching and learning in trades-apprenticeship systems. Thus, descriptors represent suggested focal points or guidelines for potentially-worthwhile exploration. Delivery of this content will vary with the discretion of individual instructors, and with the experiences senior apprentices bring forward for group/individual reflection on the skills-stewardship dimension of their own future practice as journeypersons.

Objectives and Content:

Percent of Unit Mark (%)

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| 1. Describe the scope, substance, and significance of journey-level status. | 10% |
| a. Historical background, including trainee experiences | |
| • Origin, definition, and examples of journey-level status | |
| • Obligations to employers, trade clients, and apprentices | |
| • Concept of skills stewardship, and its rationale | |
| • Customary responsibilities of journeyperson as workplace trainer/supervisor | |
| • Overview development of formal systems for regulating/recognizing journey-level competence in designated apprenticeable trades | |
| • Contributions of 'unticketed journeymen' and other informally-qualified Pre-engineered Building Erectors to workplace trade-learning | |
| • Achievements/limitations of informal systems for workplace training | |
| • Trends (e.g., succession planning in the trades; recognition of credentials and prior learning; defined standards for on-the-job trades education and training) | |
| b. Regulatory/legal dimensions of journey-level status in designated trades | |
| • Manitoba provincial requirements [e.g., <i>Apprenticeship and Certification Act</i> ; | |

- General Regulation; the Pre-engineered Building Erector Trade Regulation; relevant policies of the Apprenticeship and Certification Board]*
- Trade-specific requirements re: practical training supervision and documentation; importance of quality assurance and broad-scope coverage of prescribed task-content; ratios, etc.
- c. Other (as may be specified by instructor)

2. Compare/contrast role-options and responsibilities of the supervising journeyperson. 20%

- a. Recognizing the variability of supervision assignments, situations, and roles
- b. Source and specification of the supervision assignment
- c. Formal vs. informal roles (e.g., mandated by an employer's succession plan)
- d. Implicit vs. explicit standards and content: training goals are/are not codified; assessment measures are/are not used,
- e. Accountability for results: subject/not subject to third-party notification; completion of supervision assignment itself is/is not assessed by third party; journeyperson is/is not required to prepare performance evaluation that could affect apprentice's employability or wage-rate, etc.
- f. General vs. task- or job-specific supervision assignments: e.g., scope of expectations re: content of supervisory task(s)
- g. Long-term vs. short-run supervision assignments – e.g., considerable latitude/little latitude for apprentice to learn from mistakes
- h. Formally vs. informally structured – e.g., supervision assignment is part of a prescribed cycle of assignments involving coordination among multiple journeypersons; apprentice is trained according to an individual training plan negotiated with employer
- i. Typology of common supervisory role-options and what is implied by each:
 - Coach role: is often initiated by someone other than apprentice, and limited to a particular skill set, task, or production requirement
 - Mentor role : often initiated by apprentice, and relatively open-ended regarding content, duration, etc.
 - Peer role: typically involves individual upgrading or cross-training of one journeyperson by another; can include senior apprentice assisting less-experienced trade learner
 - Managerial role(s): can shade over into hire/fire issues as lead-hand or site-boss
 - Coordinator role: often a senior-level journeyperson appointed by an organization to assume responsibilities for monitoring progression of groups of apprentices
 - Other roles: may be improvised by journeyperson
- j. Possibilities, perils, and likelihood of role-overlap in 'real-life' trade practice
- k. Importance of clarifying all roles, expectations, and implications involved in accepting a supervision assignment
- l. Role of Apprenticeship Training Coordinator (ATC), Apprenticeship Manitoba
- m. Resources for developing skills and knowledge re: providing journey-level supervision
 - Books and journals (not always trade-specific)
 - Websites
 - Conversation with trade instructors, journeypersons, and peers
 - Workshops
- n. Other (as may be specified by instructor)

3. Describe/demonstrate common requirements re: providing journey-level supervision. 20%

- a. Review Unit A1 content re: challenges/opportunities opportunities of Apprenticeship learning adapted to journey-level supervision assignments and a journey-level standpoint
 - Application of adult education concepts to trades teaching/learning (e.g.,

- responsibilities and expectations of adult learners)
- Practical significance of 'styles' of adult learning and teaching
- Helping apprentices to integrate technical training (in school) and practical training (on-the-job) learning experiences
- Providing help and guidance re: new tasks and skills
- Providing help and guidance re: fixing mistakes
- Learning/teaching "the ropes" – socialization of learner within a community of trade practice (e.g., how to borrow a tool, interrupt a journeyperson, 'recruit' an advisor)
- Coverage/documentation of prescribed tasks and subtasks (Pre-engineered Building Erector POA), including responsibility re: logbook sign-off (where applicable)
- Consultation with Apprenticeship Training Coordinator (ATC), Apprenticeship Manitoba
- Communicating with apprentices and employers about supervision assignments and assignment specifications, including the limits of the trainers' own responsibilities and competence (e.g., substance-abuse intervention)
- Benefits of maintaining a personal record of achievements, ideas, and needs as a workplace trainer
- b. Individual reflection and guided group discussion re: personal experiences of workplace learning as an apprentice
 - Identification of best and worst practices of supervising journeypersons
 - Assessment of personal experiences (if any) to date in supervising, coaching, or guiding other people to learn or improve their skills (e.g., entry-level apprentices, members of athletic team, younger family members, etc.), and how this might compare/contrast with the journey-level support of apprenticeship learning
 - Identification of workplace and other factors that can contribute to good and bad trades teaching/learning experiences
 - Development of personal standards re: responsibility to share one's knowledge and skill with others in the workplace (e.g., use/misuse of humour, rigour, discretion, craft-pride, etc.)
- c. Comparison/contrast of discussion results with current knowledge/resources re: workplace skills coaching methods as applicable to journey-level supervision assignments
 - Qualities of a good workplace coach
 - Components of workplace skills coaching
 - Processes and recommended practices re: workplace coaching
 - Troubleshooting problems re: supervision assignments
- d. Other (as may be specified by instructor)

4. Complete Modules 1 to 3, *Workplace Coaching Skills* (or equivalent).

25%

- a. Identifying purpose of the lesson
 - Explaining the point of the lesson
 - Role of the coach in specific coaching situation
 - Other (specified by instructor)
- b. Linking the lesson
 - Learner needs
 - Lesson sequence
 - Focus on learner
 - Selection/timing of coaching opportunities
- c. Demonstration of skill/task to be learned
 - Starting the coaching session
 - Demonstration
 - Hands-on trial
 - Recap for learner

5. Complete Modules 4 to 6, *Workplace Coaching Skills* (or equivalent).

25%

- a. Practice of skill/task to be learned
 - Nature and importance of practice
 - Setting up for learner practice
 - Types of practice
 - Recycling and reinforcing skill/task learning
- b. Providing feedback to the learner
 - Value of feedback
 - Kinds of feedback
 - Guidelines and tips
- c. Assessment
 - Value of assessing learner progress
 - Assessing level of skill
 - Planning further steps toward skill/task mastery

Pre-engineered Building Erector

Unit: A11 Pre-Certification Review

Level: Two

Duration: 35 hours

Theory: 35 hours

Practical: 0 hours

Overview:

This unit offers senior Pre-engineered Building Erector apprentices a systematic review of skills and knowledge required to pass the Provincial Examination. It promotes a purposeful personal synthesis between on-the-job learning and the content of in-school technical training. The unit includes information about the significance of Provincial certification and the features of the Provincial Examination. **Note: No percentage-weightings for test purposes are prescribed for this unit's objectives. Instead, a 'Pass/Fail' grade will be recorded for the unit in its entirety.**

Objectives and Content:	<u>Percent of Unit Mark (%)</u>
<p>1. Describe the significance, format and general content of Provincial Examinations for the trade of Pre-engineered Building Erector.</p> <ul style="list-style-type: none"> a. Scope and aims of Inter-Provincial certification; value of certifications b. Obligations of candidates for Provincial certification <ul style="list-style-type: none"> • Relevance of Provincial Examinations to current, accepted trade practices; industry-based provincial validation of test items • Supplemental Policy (retesting) • Confidentiality of examination content c. Multiple-choice format (four-option) item format, Apprenticeship Manitoba standards for acceptable test items d. Government materials relevant to the Certification Examinations for apprentice Pre-engineered Building Erector <ul style="list-style-type: none"> • Provincial Occupational Analysis (POA); prescribed scope of the skills and knowledge which comprise the trade • POA "Pie-chart" and its relationship to content distribution of Provincial Examination items • Apprenticeship Manitoba technical training package. 	n/a
<p>2. Identify resources, strategies and other considerations for maximizing successful completion of written examinations.</p> <ul style="list-style-type: none"> a. Personal preparedness <ul style="list-style-type: none"> • Rest • Nutrition • Personal study regimen • Prior experience in test situations (e.g., Unit Tests) c. Self-assessment, consultation and personal study plan <ul style="list-style-type: none"> • Self-assessment of individual strengths/weaknesses in trade related skills and 	n/a

- knowledge
- Approved textbooks
- Study groups

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| 3. Review program content regarding occupational skills. | n/a |
| 4. Review program content regarding pre-erection. | n/a |
| 5. Review program content regarding structure erection. | n/a |
| 6. Review program content regarding roofing and cladding. | n/a |
