SKILLED TRADES BC

Program Outline

Road Builder & Heavy Construction Foundation

SKILLED TRADES BC

To order additional copies please contact:
Government Publications Services
PO Box 9452 Stn Prov Govt
Victoria, BC V8W 9V7
Phone: 250 387-6409 or
Toll Free: 1 800 663-6105
Fax: 250 387-1120
https://www.crownpub.bc.ca/

SKILLED TRADES BC

ROAD BUILDER & HEAVY EQUIPMENT FOUNDATION PROGRAM

PROGRAM OUTLINE

October, 2006

Developed By
SkilledTradesBC
Province of British Columbia

SKILLED TRADES BC

TABLE OF CONTENTS

SKILLED TRADES BC

FOREWORD

This Program Outline for the Road Building and Heavy Construction Foundation Program is issued by SkilledTradesBC in partnership with the BC Road Builders and Heavy Construction Association for use in industry training sponsored by the SkilledTradesBC.

It is intended as a guide for instructors. Practical instruction by demonstration and trainee participation should be integrated with classroom sessions. Safe working practices, even though not always specified in each operation or topic, are an implied part of the program and should be stressed throughout the program. It is the responsibility of employers to ensure safety training for trainees working on their worksites after successful completion of the program

The Program Outline was prepared with the advice and assistance members of the BC Road Builders and Heavy Construction Joint Adjustment Committee and the BC Road Builders and Heavy Construction Association's Human Resources Committee.

SAFETY ADVISORY
Be advised that references to the WorkSafe BC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: http://www.worksafebc.com. Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.

SKILLED TRADES BC

ACKNOWLEDGEMENTS

The Program Outline was prepared with the advice and direction from an industry Steering Committee convened by the BC Road Builders and Heavy Construction Association with funding support from Service Canada and SkilledTradesBC.

We would like to acknowledge the dedication and hard work of those who actively participated in the design and development of the Road Building and Heavy Construction Foundation Program:

Industry Representatives

- *Jack Davidson, BCRBHCA*
- *Ken Day, Interoute Construction*
- *Tom Johnson, JJM Group*
- *Scott Jacob, JJM Group*
- *Paul Wearmouth, Peter Kiewit Sons*
- *Doug Bjornson, Mainroad Holdings Ltd.*
- *Joe Wroebel, AEL Paving/HMC Services*
- *Robert Schmidt, Christian Labour Association of Canada*
- *Greg Tolliday, Greg Tolliday Consulting*
- *Richard Debeck, Service Canada*

Facilitators

- *Kent Orrock, BCRBHCA*
- *Kerry Jothen, Human Capital Strategies*

Associations

- *BC Road Builders and Heavy Construction Association*
- *Alberta Road Builders and Heavy Construction Association*
- *Saskatchewan Road Builders and Heavy Construction Association*
- *Manitoba Heavy Construction Association*
- *Ontario Road Builders Association*

Special thanks to the Operating Engineers and the Construction Sector Council for providing us with program examples which greatly aided in the creation of the Heavy Equipment Operator Technician Program.

SECTION 1

OCCUPATION ANALYSIS CHART

SKILLED TRADES BC

Road Builder & Heavy Equipment Foundation Program
Occupation Analysis Chart

Total Instructional Duration: 120 hours/20 days/4 weeks

MODULE A – INDUSTRY ORIENTATION AND OVERVIEW (46 hours/7.67 days

Orientation to Road Construction and Heavy Construction (3 hours) A1	Use Road Building & Heavy Construction Terminology A1.1	Describe Types of Road Building and Heavy Construction A1.2	Describe Types of Road Building and Heavy Construction Equipment A1.3	Describe the Road Building and Heavy Construction Industry Culture A1.4	Describe Road Building and Heavy Construction Careers A1.5	Describe Road Building and Heavy Construction Technology and Innovation A1.6
Worksite Health and Safety Practices (40 hours) A2-	Identify Health and Safety Excellence A2.1	Describe Occupational Diseases and Injuries A2.2	Complete the Road Building Safety Training System (RSTS) Course A2.3	Obtain Level One First Aid Certification A2.4	Obtain Construction Safety Network Flagperson Certification A2.5	
Environmental Requirements (3 hours) A3	Describe Environmental Hazards A3.1	Describe Sediment and Drainage Management A3.2	Describe Fuel and Special Procedures A3.3	Describe Handling Spills A3.4	Describe Proper Disposal Methods of Fuels, Oils, Lubricants, Antifreeze, Waste Oil A3.5	Describe Special Protection Methods A3.6

SKILLED TRADES BC

Road Builder & Heavy Equipment Foundation Program
Occupation Analysis Chart

Total Instructional Duration: 120 hours/20 days/4 weeks

MODULE B – TOOLS & EQUIPMENT OPERATIONS AND MAINTENANCE (36 hours/6 days)

Hand and Power Tools (8 hours) B1	Demonstrate Safe Use of Basic Hand Tools B1.1	Demonstrate Safe Use of Basic Power Tools B1.2			
Ladders and Scaffolds (3 hours) B2	Describe WCB Regulations and Scaffold Erection Procedures B2.1	Describe WCB Regulations for Portable and Fixed Ladders B2.2	Describe Swing Staging Operations and Safety B2.3	Describe Scissor-Lift and Zoom Boom Operations and Safety B2.4	
Rigging and Material Handling (6 hours) B3	Describe WCB Regulations and Procedures for Rigging B3.1	Identify Signals for Crane and Hoisting Operations B3.2	Describe Safe Use of Ropes, Chains and Slings, and Blocking Equipment B3.3		
Basic Road Building and Heavy Construction Equipment Operation and Maintenance (16 hours) B4	Describe Types and Functions of Common Large Pieces of Equipment B4.1	Describe Large Equipment Operation Safety Procedures B4.2	Describe Walk Around Procedures B4.3	Describe Common Engine Parts and Functions B4.4	Perform Checks and Maintain an Engine Lubrication Systems B4.5	Perform Checks and Maintain Engine Cooling Systems B4.6
	Perform Checks and Maintain Engine Induction Systems B4.7	Describe Basics of Drive Systems B4.8	Describe Basics of Electrical Systems B4.9	Describe Basics of Air Brakes and Air Systems B4.10	Describe Basics of Hydraulic Systems B4.11	Describe Basics of Hitches and Mechanical Linkages B4.12
Small Road Building & Construction Equipment (3 hours) B5	Describe Types and Functions of Common Small Pieces of Equipment B5.1	Describe Small Equipment Operation Safety Procedures B5.2			

SKILLED TRADES BC

Road Builder & Heavy Equipment Foundation Program
Occupation Analysis Chart

Total Instructional Duration: 120 hours/20 days/4 weeks

MODULE C – CIVIL ENGINEERING PRINCIPLES (26 hours/4.33 days)

Surveying and Construction (8 hours) C1	Introduction to Plans and Drawings C1.1	Describe Differential Leveling C1.2	Describe Distance and Angular Measurement C1.3	Describe Slope Staking C1.4	Describe Grade Staking From Survey Stakes, Hub Stakes and Offset Stakes C1.5	Describe Use of Hand Levels and Lasers C1.6
	Describe GPS Principles C1.7					
Drainage (3 hours) C2	Describe the Importance of Drainage C2.1	Describe Drainage Systems C2.2				
Basic Soil Mechanics/Geology (3 hours) C3	Describe Types of Soils C3.1	Describe Soil Compaction C3.2	Describe Soil Density Testing C3.3			
Principles of Excavation and Shoring (3 hours) C4	Describe Principles of Excavation and Shoring C4.1	Describe Principles of Dewatering C4.2	Describe Principles of Utilities C4.3			

SKILLED TRADES BC

Aggregates (3 hours) C5	Describe Use of Aggregates in Asphalt and Concrete C5.1	Describe Use of Base Course C5.2	Describe Aggregate Standard Specifications and Quality Control Systems C5.3		
Asphalt Pavement (3 hours) C6	Describe Asphalt Technology C6.1	Describe Hot Mix Asphalt Concrete Laydown (HMAC) C6.2	Describe HMAC Testing C6.3	Describe Asphalt Plant Operations C6.4	Describe the Effects of Transporting Aggregates C6.5
Concrete (3 hours) C7	Describe Concrete Properties and Technology C7.1	Describe Concrete Formwork C7.2	Describe Concrete Placement and Curing C7.3	Describe Quality Control and Testing C7.4	Describe Production and Supply of Concrete C7.5	Describe Reinforcement of Concrete C7.6
	Describe Soil Cement and Roller Compacted Concrete C7.7				

SKILLED TRADES BC

Road Builder & Heavy Equipment Foundation Program
Occupation Analysis Chart

Total Instructional Duration: 120 hours/20 days/4 weeks

MODULE D – WORKSITE PREPARATION (12 hours/2 days)

Employment Skills (6 hours) D1	Set Personal Career Goals D1.1	Prepare a Resume D1.2	Use Job Search Skills D1.3	Use Interviewing Skills D1.4	Use Road Builder Internet Job Board D1.5
Worksite Employee Roles (2 hours) D2	Employee Responsibilities D2.1	Project Management D2.2	Quality Management D2.3	Demonstrate Job-Site Clean-Up and Housekeeping Procedures D2.4	
Construction Worksite Team Skills (2 hours) D3	Describe Positive Worksite Attitudes D3.1	Describe Conflict Resolution Principles D3.2	Describe Teamwork Practices D3.2		
Communication Skills (2 hours) D4	Speak and Listen Effectively D4.1	Use Documentation D4.2			

SECTION 2

ROAD BUILDER & HEAVY CONSTRUCTION FOUNDATION PROGRAM

PROGRAM OUTLINE

SKILLED TRADES BC

SUGGESTED SCHEDULE OF TIME ALLOTMENT FOR MODULE A

Module A		38.33% of Time	Theory	Practical	Page
Line A1	**Industry Orientation & Overview**				
A1.1	Use Road Building and Heavy Construction Terminology				14
A1.2	Describe Types of Road Building and Heavy Construction				17
A1.3	Describe Types of Road Building and Heavy Construction Equipment				18
A1.4	Describe Road Building and Heavy Construction Industry Culture				20
A1.5	Describe Road Building and Heavy Construction Careers				21
A1.6	Describe Road Building and Heavy Construction Technology and Innovation				22
Line A2	**Tools & Equipment Operations & Maintenance**				
A2.1	Identify Health and Safety Excellence				23
A2.2	Describe Occupational Diseases and Injuries				24
A2.3	Complete Road Builders Safety Training System		✓		25
A2.4	Obtain First Aid- Level 1 Certification		✓		26
A2.5	Obtain Construction Safety Network Flagperson Certification		✓		27
Line A3	**Tools & Equipment Operations & Maintenance**				
A3.1	Describe Environmental Hazards				29
A3.2	Describe Sediment and Drainage Management				30
A3.3	Describe Fuel and Special Procedures				31
A3.4	Describe Handling Spills				32
A3.5	Describe Proper Disposal Methods of Fuels, Oils, Lubricants, Antifreeze, Waste Oil				33
A3.6	Describe Special Protection Methods				34
A3.7	Describe Excavation and Disposal of Contaminated Soil				35

SKILLED TRADES BC

SUGGESTED SCHEDULE OF TIME ALLOTMENT FOR MODULE B

Module B		30% of Time	Theory	Practical	Page
Line B1	**Tools & Equipment Operations & Maintenance**				
B1.1	Demonstrate Safe Use of Basic Hand Tools		✓		38
B1.1	Demonstrate Safe Use of Basic Power Tools		✓		39
Line B2	**Ladders and Scaffolds**				
B2.1	Describe WCB Regulations and Scaffold Erection Procedures				40
B2.2	Describe WCB Regulations for Portable and Fixed Ladders				41
B2.3	Describe Swing Staging Operations and Safety				42
B2.4	Describe Scissor Lift and Zoom Boom Operations and Safety				43
Line B3	**Rigging and Material Handling**				
B3.1	Describe WCB Regulations and Procedures for Rigging				44
B3.2	Identify Signals for Crane and Hoisting Operations		✓		45
B3.3	Describe Safe Use of Ropes, Chains, Slings and Blocking Equipment				46
Line B4	**Basic Road Building and Heavy Construction Equipment Operation and Maintenance**				
B4.1	Describe Types and Functions of Common Large Pieces of Equipment				47
B4.2	Describe Large Equipment Operation Safety Procedures				49
B4.3	Describe Walk Around Procedures				50
B4.4	Describe Common Engine Parts and Functions				51
B4.5	Perform Checks and Maintain and Engine Lubrication Systems				52
B4.6	Perform Checks and Maintain and Engine Cooling Systems				53
B4.7	Perform Checks and Maintain and Engine Induction Systems				65
B4.8	Describe Basics of Drive Systems and Brakes				55
B4.9	Describe Basics of Electrical Systems				56
B4.10	Describe Basics of Air Breaks and Air Systems				57
B4.11	Describe Basics of Hydraulic Systems				58
B4.12	Describe Basics of Hitches and Mechanical Linkages				59
Line B5	**Small Road Building and Constriction Equipment**				
B5.1	Describe Types and Functions of Common Small Pieces of Equipment				60
B5.2	Describe Small Equipment Operation Safety Procedures				61

SKILLED TRADES BC

SUGGESTED SCHEDULE OF TIME ALLOTMENT FOR MODULE C

SKILLED TRADES BC

Module C	21.66% of Time	Theory	Practical	Page
Line C7	**Concrete**			
C7.1	Describe Concrete Properties and Technology			89
C7.2	Describe Concrete Formwork			90
C7.3	Describe Concrete Placement and Curing			91
C7.4	Describe Quality Control and Testing			92
C7.5	Describe Production and Supply of Concrete			93
C7.6	Describe Reinforcement of Concrete			94
C7.7	Describe Soil Cement and Roller Compacted Concrete			95

SKILLED TRADES BC

SUGGESTED SCHEDULE OF TIME ALLOTMENT FOR MODULE D

Module D		10% of Time	Theory	Practical	Page
Line D1	**Employment Skills**				
D1.1	Set Personal Career Goals				97
D1.2	Prepare a Resume				98
D1.3	Use Job Search Skills				100
D1.4	Use Interviewing Skills				101
D1.5	Use Road Builder Internet Job Board				103
Line D2	**Worksite Employee Roles**				
D2.1	Employee Responsibilities				104
D2.2	Project Management				105
D2.3	Quality Management				107
D2.4	Demonstrate Job Site Clean Up and Housekeeping Procedures				108
Line D3	**Construction Worksite Team Skills**				
D3.1	Describe Positive Worksite Attitudes				109
D3.2	Describe Conflict Resolution Principles				110
D3.3	Describe Teamwork Practices				111
Line D4	**Construction Worksite Team Skills**				
D4.1	Speak and Listen Effectively				112
D4.2	Use Documentation				113

PROGRAM OUTLINE
FOR
MODULE A

SKILLED TRADES BC

LINE A1: ORIENTATION TO ROAD CONSTRUCTION AND HEAVY CONSTRUCTION

Competency: A1.1 **Use Road Building and Heavy Construction Terminology**

Learning Objectives:

1 Given a list of road building terms, the learner must identify the correct definition in multiple-choice test.

LEARNING TASKS	CONTENT
1 Describe road building and heavy construction terminology.	• Aggregate • Aggregate Base Course • Air Pollution • Archeological Salvage Plan • Backfill • Back slope • BAM • Berm • Bitumen • Borrow Pit • Bridge Deck Scarification • Bridge Pier • Bypass Routes • Cement • Channel • Cofferdam • Concrete • Contract Specifications • Crushed Rock • Cul-de-sac • Culvert • Dead End • Decibel • Deck Slab Repair • Design Life • Design Speed • Detour • Dikes • Divided Highway • Drain Tile

LEARNING TASKS	CONTENT
	• Drainage Structures (catch basins, bulkheads, spill ways, pipe outlets) • Earth Excavation • Easement • Ecosystem • Egress • Emulsified Asphalt • Environmental Impact • Erosion control Measures • Flager • Foreslope • Grading • Grade Separation • Granular sub-base • Gravel • Ground Cover • Groundwater Table • Guard Rail • Habitat • Hydrology • Impact Attenuators • Ingress • Island • Median • Mulch • Native Grasses • Neoprene Expansion Joint • Noise • Operating Speed • Overburden • Overpass • Pavement • Pavement Life • Pavement Marking • Pavement Pothole Patching • Pedestrian • Pre-cast Concrete • Pit • Project

LEARNING TASKS	CONTENT
	• Ready mixed Concrete • Retainer Wall • Right of Way • Recycled Aggregates • Rip Rap • Roadway • Sawing Concrete Pavement • Seal Coat • Shoulder • Sight Distance • Specifications • Trench Backfill • Underpass • Zone

Achievement Criteria:
The learner must be able to identify with 70% accuracy the correct Road Building and Heavy Construction definitions from the list above. The test will consist of multiple choice type questions.

LINE A1: ORIENTATION TO ROAD CONSTRUCTION AND HEAVY CONSTRUCTION

Competency: A1.2 **Describe Types of Road Building and Heavy Construction**

Learning Objectives:

1 Given information on British Columbia's road building and heavy construction sectors, the learner must identify and classify the different sectors.

	LEARNING TASKS	CONTENT
1	Describe highway construction.	
2	Describe bridge construction and repair.	
3	Describe sewer and water line construction	
4	Describe gravel pit operations	
5	Describe asphalt paving	
6	Describe concrete placement construction.	

Achievement Criteria:

The learner must be able to identify with 70% accuracy the correct Road Building and Heavy Construction sectors. The test will consist of multiple choice type questions. Criteria include roads, highways, street construction, bridge construction, sewer and water line construction, gravel pit/quarry operations, asphalt paving and concrete placement construction.

SKILLED TRADES BC

LINE A1: ORIENTATION TO ROAD CONSTRUCTION AND HEAVY CONSTRUCTION

Competency: A1.3 **Describe Types of Road Building and Heavy Construction Equipment**

Learning Objectives:

1 Given information on road building and heavy equipment, the learner must identify and classify different pieces of equipment.

	LEARNING TASKS	CONTENT
1	Describe Compaction Equipment.	• Rubber Tire Packer (Wobbly Wheel) • Sheepsfoot Packer • Smooth Drum Roller
2	Describe Tractors	• 2 & 4 Wheel Drive • Used for Discing • Used for Towing Various Packers
3	Describe Skid Steer Loaders.	• Miniature Loaders • Attachments: Blades, Buckets, Post Hole Augers
4	Describe Trucks	• Pickups • Single Axle & Tandem – sand, gravel, asphalt • Belly & End Dumps – sand, gravel, asphalt • Tankers – water & fuel • Tractor Trailers – move equipment from site to site • Articulated Trucks – 10 – 50 ton • Rock Haulers – 10 – 400 ton
5	Describe Loaders	• Rubber Tire • Track • Single & Twin Engine
6	Describe Earthmovers (Scrapers).	• Heavy earth moving
7	Describe Crawler Tractors (Dozers)	• Bush Clearing • Pushing • Pulling • Leveling • Ripping
8	Describe Hydraulic Excavators (Backhoes) & Shovels	• Rubber Tired • Track Type

	LEARNING TASKS	CONTENT
9	Describe Motor Graders (Graders).	• Boom Type – 'Gradalls' • Various makes, models and sizes • Fine/Finish Grading • Most complicated piece of equipment to operate
10	Describe Concrete & Asphalt Pavers	• Asphalt Paver • Slipform Machine
11	Describe Specialized Equipment	• Concrete Extruders • Asphalt Grinders

Achievement Criteria:
The learner must be able to identify with 70% accuracy the correct Road Building and Heavy Construction sectors. The test will consist of multiple choice type questions. Criteria include compaction equipment, tractors, loaders, trucks, excavators, scrapers, graders, pavers and grinders. Pass mark 70%.

SKILLED TRADES BC

LINE A1: ORIENTATION TO ROAD CONSTRUCTION AND HEAVY CONSTRUCTION

Competency: A1.4 **Describe Road Building and Heavy Construction Industry Culture**

Learning Objectives:

1 Given information about British Columbia's road building and heavy equipment culture the learner will distinguish different aspects of the culture.

LEARNING TASKS	CONTENT
1 Explain the history of the B.C. Road Builders & Heavy Construction Association and its objectives.	• Formation • Membership • Mission Statement • Structure • Responsible for Canada's infrastructure and transportation routes • Interaction with municipal, provincial and federal governments • Interaction with civil engineers • Interaction with suppliers: asphalt, concrete, petroleum and lubricants, equipment, trucks, bridge materials, culverts • Interaction with the public • Camp life • Working in all weather conditions • Working away from home • Good salaries
2 Explain road construction culture.	

Achievement Criteria:

The learner must be able to identify with 70% accuracy the correct Road Building and Heavy Construction sectors. The test will consist of multiple choice type questions. Criteria include history and objectives of the B.C. Road Builders & Heavy Construction Association and road construction culture.

LINE A1: ORIENTATION TO ROAD CONSTRUCTION AND HEAVY CONSTRUCTION

Competency: A1.5 **Describe Road Building and Heavy Construction Careers**

Learning Objectives:

1 Given a list of careers in the road building and heavy construction industry, the learner will identify and describe a career in multiple-choice tests and on the job site, when employed.

LEARNING TASKS	CONTENT
1 Identify various careers available in the road building and heavy construction industry	• How many people work in the industry? • Succession Planning • Flagperson • Timekeeper • Construction Labourer • Surveyor's Helper • Bridge Building Technician • Truck Driver • Equipment Operator • Equipment Technician • Foreperson • Safety Officer • Estimator • Superintendent • Project Manager

Achievement Criteria:

The learner must be able to identify with 70% accuracy the correct Road Building and Heavy Construction careers from the list above. The test will consist of multiple choice type questions.

SKILLED TRADES BC

LINE A1: ORIENTATION TO ROAD CONSTRUCTION AND HEAVY CONSTRUCTION

Competency: A1.6 **Describe Road Building and Heavy Construction Technology and Information**

Learning Objectives:

1 Given information about road and heavy construction technology and innovation, the learner will identify and describe aspects of technology in multiple-choice tests.

	LEARNING TASKS	CONTENT
1	Describe technology and information Innovation	• Blueprints by 3D CAD • Estimating • Other computer programs
2	Describe chemical innovation	• Snow and ice control • Equipment lubricants
3	Describe asphalt recycling	
4	Describe road construction material Innovation	• Aggregate recycling • Material selection
5	Explain compaction innovation	
6	Describe grading innovation	
7	Describe road maintenance innovations	• Pavement stabilization • Crack sealing • Reinforced concrete pavement
8	Describe safety innovation	
9	Describe education and training innovations	

Achievement Criteria:

The learner must be able to identify with 70% accuracy aspects of Road Building and Heavy Construction technology in multiple-choice tests.

SKILLED TRADES BC

LINE A2: WORKSITE HEALTH AND SAFETY PRACTICES

Competency: A2.1 **Identify Health and Safety Excellence**

Learning Objectives:

1 Demonstrate an understanding of health & safety in the workplace.

	LEARNING TASKS	CONTENT
1	Describe elements of a safety program	• Purpose of a Health and Safety Program – Key definitions and terms • Workplace Hazard Assessment and Control • Safe Work Practices • Safe Job Procedures • Company Rules • Personal Protective Equipment • Maintenance Program • Training and Communication • Inspections • Investigation • Emergency Preparedness • Statistics and Records • Legislation • Safety Meetings and Planning • Joint OH&S Committee • Worker
2	Describe responsibilities/legislation	• Overview of Supervisor • Overview of Employer
3	Describe hazard assessment	
4	Describe safety culture	

Achievement Criteria:

Given the elements of safety programs that promote health and safety excellent, the learner must choose correct safety elements and practices in multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE A2: **WORKSITE HEALTH AND SAFETY PRACTICES**

Competency: A2.2 Describe **Occupational Diseases and Injuries**

Learning Objectives:

1 To demonstrate a basic understanding of occupational diseases and their causes.

	LEARNING TASKS	CONTENT
1	What are occupational diseases?	
2	Describe noise-induced hearing loss.	• Causes • Hazards and risks • Prevention
3	Describe asbestosis/silicosis.	• Causes • Hazards and risks • Prevention
4	Describe repetitive strain injuries.	• Causes • Hazards and risks • Prevention
5	Describe cancer risk.	• Causes • Hazards and risks • Prevention
6	Describe vibration.	• Hazards • Risks • Prevention
7	Describe environmental hazards.	• Animal control • West Nile • Hanta virus

Achievement Criteria:
Given information on occupational diseases, the learner must identify and classify the correct answers to a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE A2: WORKSITE HEALTH AND SAFETY PRACTICES

Competency: **A2.3** Complete Road Builders Safety Training System

Learning Objectives:

1 To develop an understanding of how to approach common road construction procedures in a safe manner.

LEARNING TASKS	CONTENT
1 Describe RSTS	• The law at work • General job site awareness • Traffic control; • Utilities • Excavation and shoring safety network working with hazardous products • Earthmoving • Sewers and water • Base work/hauling and placing materials • Crushing and washing • Concrete plants • Concrete in construction • Redi Mix drivers • Asphalt plants • Paving • Highway maintenance • Snow plow

Achievement Criteria:
Complete the Alberta Road Building Safety Training System Course or equivalent.

SKILLED TRADES BC

LINE A2: **WORKSITE HEALTH AND SAFETY PRACTICES**

Competency: A2.4 **Obtain First Aid – Level 1 Certification**

Learning Objectives:

1 Obtain First Aid – Level 1 Certification

LEARNING TASKS	CONTENT
1 Obtain Level 1 St. John's Ambulance or equivalent First Aid Certification.	• Identify and perform appropriate interventions for minor soft tissue injuries • Demonstrate priority action approach for conscious patients • Identify and manage critical interventions of the airway • Identify respiratory emergencies and manage critical interventions • Identify circulatory emergencies and manage critical interventions. • Describe how to identify and manage stroke, diabetic conditions, seizures and fainting.

Achievement Criteria:
Obtain First Aid – Level 1 Certification

SKILLED TRADES BC

LINE A2: **WORKSITE HEALTH AND SAFETY PRACTICES**

Competency: A2.5 **Obtain Construction Safety Network Flagperson Certification**

Learning Objectives:

1 Obtain Construction Safety Network Flagperson Certification

	LEARNING TASKS	CONTENT
1	Describe roles and responsibilities	• Responsibilities of a traffic control person • Job locations and conditions • Responsibilities of a traffic control supervisor • Provision of Health and Safety information for the job site
2	Describe complying with regulations and standards	• WCB authority and jurisdiction • Traffic control standards • Motor Vehicle Act and Regulations
3	Describe using traffic control equipment.	• Using personal protective equipment • What the employer must provide • Maintaining personal protective equipment • Traffic control equipment and devices • Maintaining personal traffic control equipment • Traffic control equipment • Maintaining traffic control devices
4	Describe setting up, maintaining and removing work zones.	• Parts of a work zone • Work zone layouts • Setting up a work zone • Inspecting and maintaining a traffic control zone • Removing the work zone
5	Describe working around equipment.	• Recognizing construction equipment •
6	Describe basic control skills.	• Using and interpreting signals • Controlling traffic • Practical skills evaluation •

LEARNING TASKS	CONTENT
7 Describe building on basic traffic control skills.	• Dangerous goods and other hazards • Controlling uncommon traffic • Intermittent moving work • Controlling traffic in an intersection • Using two-way radios • Practical skills evaluation
8 Review course and exam.	

Achievement Criteria:
Obtain Construction Safety Network Flagperson Certification

SKILLED TRADES BC

LINE A3: ENVIRONMENTAL REQUIREMENTS

Competency: A3.1 **Describe Environmental Hazards**

Learning Objectives:

1 Given information about environment hazards associated with road and heavy construction, the learner will explain, predict and control circumstances to prevent environmental hazards by correctly answering a series of multiple-choice tests

	LEARNING TASKS	CONTENT
1	Describe water pollution.	• Wetlands, rivers, oceans • Water quality • Detrimental to aquatic ecosystems
2	Describe soil erosion.	• Increased turbidity • Property damage • Influencing factors (soil types, vegetation, slope, snowmelt)
3	Describe impact of dust.	• Health problems • Reduced visibility • Increased cost of vehicle and road maintenance.
4	Describe chemical contamination.	• Surface runoff • Landfills • Spills • Tanks and pipelines • Septic tanks • Agriculture • Urban runoff • Illegal dumping
5	Describe mitigation of loss of habitat.	
6	Describe impact on historical properties.	• Archeological sites • Reporting process

Achievement Criteria:
Given information on environment hazards associated with road and heavy construction, the learner must correctly answers to a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE A3: ENVIRONMENTAL REQUIREMENTS

Competency: A3.2 **Describe Sediment and Drainage Management**

Learning Objectives:

1 Given information about sediment and drainage management, the learner will explain, predict and control sediment contamination through a sediment and drainage control plan by correctly answering multiple-choice tests

LEARNING TASKS	CONTENT
1 Describe drainage management.	• Erosion control methods • Site management (planning, preparation) • Soil stabilization (planting vegetation, erosion control blankets/nets) • Structural measures (sediment fences, sedimentation ponds, dykes)

Achievement Criteria:
Given information about sediment and drainage management, the learner must correctly answers to a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE A3: ENVIRONMENTAL REQUIREMENTS

Competency: A3.3 **Describe Fuel and Special Procedures**

Learning Objectives:

1 Given information about the handling and storage of fuels and the fueling of machinery, the learners will identify the elements of a company fueling plan

	LEARNING TASKS	CONTENT
1	Describe a company-fueling plan.	• Necessary when on-site fueling • Spills onto the ground • Spills into waterways
2	Describe environmental concerns.	• Spill pad • Containment berms • Use secondary containment (drain pan) to catch spills
3	Describe fueling areas.	• Funnels, pumps, spill pad
4	Describe fueling equipment.	• Plastic sheeting, tarps, containers, kitty litter, shovels
5	Describe spill response kit.	• Inspect fueling areas routinely for leaks and spills
6	Describe site inspections.	

Achievement Criteria:
Given information about handling and storage of fuels and the fueling of machinery, the learner must correctly answer a series of multiple-choice tests with 70% accuracy. Criteria include a company fuel plan, environmental concerns, fueling areas, fueling equipment, spill response kits and fueling site inspections.

SKILLED TRADES BC

LINE A3: ENVIRONMENTAL REQUIREMENTS

Competency: A3.4 **Describe Handling Spills**

Learning Objectives:

1 Given information regarding the handling of hazardous spills, the learner must identify proper spill handling procedures

	LEARNING TASKS	CONTENT
1	Define a spill.	• A release, leakage or spillage of a contaminant into the environment • Where the situation creates or may create a hazard to human life or health to other living organisms, or to the physical environment
2	Describe training required by spill response personnel	• Only by trained personnel
3	Describe spill response plan	• Access hazard • Critical response time • Proper protective equipment • Contain and eliminate spill source (prevent entry to catch basins, storm drains, ditches, creeks and rivers) • Well identified reporting procedures •
4	Describe handling spills onto the ground.	• Clean up immediately • Process involved o Notify Ministry of Environment o Process involved
5	1. Describe handling spills into waterways.	•
6	Describe onsite spill response equipment.	• Spill response kit – equipment and maintenance, fueling, hazardous waste storage area – contaminated soil stockpile • Spill response equipment
7		

Achievement Criteria:
Given information about the handling of hazardous spills, the learner must correctly answer a series of multiple-choice tests with 70% accuracy. Criteria include the definition of a spill, spill response training, a spill response plan, spill prevention and containment methods, reporting spills, clean-up of minor spills.

SKILLED TRADES BC

LINE A3: ENVIRONMENTAL REQUIREMENTS

Competency: A3.5 Describe Proper Disposal Methods of Fuels, Oils, Lubricants, Antifreeze, Waste Oil

Learning Objectives:

1 Given information regarding the proper disposal of fuels, oils, lubricants, antifreeze and waste oil, the learner must identify proper disposal procedures

LEARNING TASKS	CONTENT
1 Describe proper storage methods	• Segregate wastes by waste type • Minimum quantity of waste stored on site • Documentation • Dispose of waste at approved waste disposal facility • Train employees in proper hazardous material and waste management

Achievement Criteria:
Given information regarding the proper disposal of fuels, oils, lubricants, antifreeze and waste oil, the learner must correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE A3: ENVIRONMENTAL REQUIREMENTS

Competency: A3.6 Describe Special Protection Methods

Learning Objectives:

1 Given information on special protection methods for the environment, the learner will identify such methods on multiple-choice tests

LEARNING TASKS	CONTENT
1 Describe equipment staging and maintenance	• Store and maintain equipment in designated areas • Reduce amount of hazardous material by substituting non-hazardous or less hazardous materials • Use proper equipment pumps, funnels to transfer fluids • Keep spill kit readily accessible • Check incoming vehicles and equipment for leaking oil and fluids • Transfer used fluids and oil filters to waste or recycling drums • Inspect equipment regularly for leaks and spills • Repair equipment immediately if necessary • Implement preventative maintenance schedule for equipment and vehicles
2 Describe hazardous materials staging area.	• Minimize quantity of hazardous materials brought on site • Store hazardous materials in designated area away from storm drains and waterways • Store hazardous materials in covered containers

Achievement Criteria:
Given information on special protection methods for the environment, the learner must correctly answer a series of multiple-choice tests with 70% accuracy. Criteria include pollutants other than sediment and petroleum products, special environmental protection methods, staging areas, landscaping sites, runoff water, pesticides, petroleum products, nutrients, solid wastes and construction chemicals.

LINE A3: ENVIRONMENTAL REQUIREMENTS

Competency: A3.7 Describe Excavation and Disposal of Contaminated Soil

Learning Objectives:

1 Given information on contaminated soils, the learner will predict, explain or control circumstances related to contaminated soils

LEARNING TASKS	CONTENT
1 **Describe the types of contaminated soil that may be found during road construction.**	• Sediment – Soil or rock containing high acid or alkali levels (slides, mines, etc.) • Nutrients – Agricultural fertilizer deposits caused by runoff – Other sources • Trash/garbage • Metals – Mercury – Lead – Other • Mould and bacteria • Gasoline, oil, grease, asphalt • Concrete • Organic materials – Trees – Shrubs
2 **Describe reclaiming contaminated soil sites.**	• Excavation • Soil analysis • Ground water analysis • On-site treatment • Off-site treatment (disposal) – Transportation • Ground water cleanup • Regarding • Other options – Vegetation – Wetlands – Parks – Landscaping

– Roads

Achievement Criteria:
Given information on contaminated soils, the learner must correctly answer a series of multiple-choice tests with 70% accuracy. Criteria include types of contaminated soils, natural contaminants, sediment, nutrients, metals, moulds, petroleum products, concrete, organic material, reclaiming procedures, soil and water analysis, excavation, on-site treatment, off-site treatment and water reclaiming.

PROGRAM OUTLINE
FOR
MODULE B

SKILLED TRADES BC

LINE B1: HAND AND POWER TOOLS

Competency: B1.1 Demonstrate Safe Use of Basic Hand Tools

Learning Objectives:

1. Given a list of basic hand tools used for road building and heavy construction, the learner will demonstrate proper tool use

	LEARNING TASKS	CONTENT
1	Use hand held road building and heavy construction tools.	• Hammers, picks, axes, shovels, rakes, spades
2	Use measuring and leveling tools for road building and heavy construction.	• Lasers, levels, total station, measuring tapes, hand levels
3	Use mechanic's tools for road building and heavy construction.	• Metric/imperial sockets • Metric/imperial wrenches • Workers' Compensation Board regulations
4	Describe safe use of tools.	• Personal protective equipment • Proper procedures • Care and maintenance

Achievement Criteria:

Given information on the basic hand tools used for road building and heavy construction, the learner must demonstrate the use of hand held tools and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B1: HAND AND POWER TOOLS

Competency: B1.2 Demonstrate Safe Use of Basic Power Tools

Learning Objectives:

1. Given information on the safe use of power tools used in road building and heavy construction, the learner will explain, demonstrate and control power tools by demonstration, selecting the correct answers on multiple choice

	LEARNING TASKS	CONTENT
1	Describe the use of chain saws.	• Dangers associated with chain saws • Need for training • Working around chain saws
2	Describe the use of electric power tools.	
3	Describe the use of gas power tools.	
4	Describe the use of air/hydraulic power tools.	
5	Describe correct use of drills.	

Achievement Criteria:

Given information on the safe use of power tools used in road building and heavy construction, the learner must demonstrate the use of hand held tools and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B2: LADDERS AND SCAFFOLDS

Competency: B2.1 Describe WCB Regulations and Scaffold Erection Procedures

Learning Objectives:

1. Given information for working on and around scaffolds, the learner will show an understanding of the WCB Regulations

	LEARNING TASKS	CONTENT
1	Describe proper selection and WCB Regulations.	• Site inspection – For electrical issues – For unguarded openings – For other trades working in area – Federal/provincial safety requirements
2	Describe scaffold erection procedures.	• Scaffold foundation • WCB Regulations • Metal components must be in good order – straight, free of dents, etc. • Scaffold bracing, ties to building structure (WCB regulations) • Vertical supports (WCB regulations) • Scaffold planks (WCB regulations) • Maximum loads and heights
3	Describe scaffold dismantling procedures	
4	Describe regular scaffold inspection procedures	

Achievement Criteria:

Given information on the WCB Regulations regarding scaffolding, the learner must correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B2: LADDERS AND SCAFFOLDS

Competency: B2.2 Describe WCB Regulations for Portable and Fixed Ladders

Learning Objectives:

1. Given information for working on and around ladders, the learner will show an understanding of the WCB Regulations

	LEARNING TASKS	CONTENT
1	Describe WCB Regulations.	
2	Describe types.	
3	Describe safety practices and procedures.	• Select ladders • Set up ladders • Climbing and standing on ladders • Use ladders on the job • Care for and store ladders
4	Describe ladder accessories and attachments.	

Achievement Criteria:

Given information on the WCB Regulations regarding ladders, the learner must correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B2: LADDERS AND SCAFFOLDS

Competency: B2.3 Describe Swing Staging Operations and Safety

Learning Objectives:

1. Given information for working on and around swing staging operations, the learner will show an understanding of the WCB Regulations

	LEARNING TASKS	CONTENT
1	Describe WCB Regulations.	
2	Describe swing stage scaffold.	• Safe working load • Minimum width • Guardrails • Lifelines • Suspension supports • Safety • Hoisting devices • Powered platforms

Achievement Criteria:

Given information regarding swing staging operations, the learner must correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B2: LADDERS AND SCAFFOLDS

Competency: B2.4 Describe Scissor Lift and Zoom Boom Operations and Safety

Learning Objectives:

1. Given information for working on and around scissor lifts, zoom booms, manlifts and forklifts, the Learner will show an understanding of the hazards and walk around procedures

	LEARNING TASKS	CONTENT
1	Identify the need for manufacturer training.	
2	Identify hazards.	
3	Describe inspection procedures.	• Walk around procedures

Achievement Criteria:

Given information regarding scissor lifts, zoom booms, manlifts and forklifts, the learner must correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B3: RIGGING AND MATERIAL HANDLING

Competency: B3.1 Describe WCB Regulations and Procedures for Rigging

Learning Objectives:

1. Given information about hoisting and rigging procedures, the learner will show an understanding of the WCB Regulations

	LEARNING TASKS	CONTENT
1	Describe WCB OHS Regulations and proper rigging procedures used in road building and heavy construction.	• Identify and describe the use of slings and common rigging hardware. • Describe the basic inspection techniques and rejection criteria used for slings and hardware including tags • Describe capacity labeling including tags • Describe basic loaDhandling safety practices. • Demonstrate proper use of American National Standards Institute (ANSI) hand signals.

Achievement Criteria:

Given information about hoisting and rigging procedures, the learner must correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B3: RIGGING AND MATERIAL HANDLING

Competency: B3.2 Identify Signals for Crane and Hoisting Operations

Learning Objectives:

1. Given standard crane and hoisting signals, the learner will identify and select and use the correct signals

	LEARNING TASKS	CONTENT
1	Identify the presence of a crane and hoist signal system and WCB Regulations.	• Each job has a designated signal person
2	Identify the need for signal training.	
3	Recognize and understand WCB signal system.	

Achievement Criteria:

Given information about crane and hoisting signals, the learner must demonstrate and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B3: **RIGGING AND MATERIAL HANDLING**

Competency: **B3.3 Describe Safe Use of Ropes, Chains, Slings and Blocking Equipment**

Learning Objectives:

1. Given information on ropes, slings, blocking, jack stands and wheel chocks, the learner will identify, classify and describe the proper use of ropes, slings, blocking, jack stands and wheel chocks

	LEARNING TASKS	CONTENT
1	Describe types of rope.	• Where to use • Safe use • Storage • Cleaning
2	Describe types of chain.	• Where to use • Safe use • Storage • Cleaning
3	Describe types of slings.	• Where to use • Safe use • Storage 1. Cleaning • When to use • Safe use • Working under machinery
4	Describe types of blocking.	2. Storage • When to use • Safe use • Working under machinery
5	Describe jack stands.	3. Storage • When to use • Safe use • Working under machinery
6	Describe jacks.	4. Storage • Describe chain angles
7	Describe spreader bars and ropes	

Achievement Criteria:

Given information about ropes, slings, blocking, jack stands and wheel chocks, the learner must correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE

Competency: B4.1 Describe Types and Functions of Common Large Pieces of Equipment

Learning Objectives:

1. Given information on road building and heavy equipment, the learner must identify and classify different pieces of equipment

	LEARNING TASKS	CONTENT
1	Describe Compaction Equipment.	• Rubber Tire Packer (Wobbly Wheel) • Sheepsfoot Packer 5. Smooth Drum Roller • 2 & 4 Wheel Drive • Used for Discing • Used for Towing Various Packers
2	Describe Tractors and Crawler Tractors	• Bush Clearing • Pushing • Pulling • Leveling 6. Ripping
3	Describe Skid Steer Loaders.	• Miniature Loaders 7. Attachments: Blades, Buckets, Post Hole Augers
4	Describe Trucks.	• Pickups • Single Axle & Tandem – sand, gravel, asphalt • Belly & End Dumps – sand, gravel, asphalt • Tankers – water & fuel • Tractor Trailers – move equipment from site to site • Articulated Trucks – 10 – 50 ton 8. Rock Haulers – 10 – 400 ton • Rubber Tire
5	Describe Loaders.	9. Track • Single & Twin Engine • Heavy earth moving • Rubber Tired • Track Type • Boom Type – ‘Gradalls’
6	Describe Earthmovers (Scrapers).	
7	Describe Hydraulic Excavators (Backhoes) & Shovels.	

LEARNING TASKS		CONTENT
8	Describe Motor Graders (Graders).	• Various makes, models and sizes • Fine/Finish Grading • Most complicated piece of equipment to operate
9	Describe Concrete & Asphalt Pavers	• Asphalt Paver • Slipform Machine
10	Describe Specialized Equipment.	• Concrete Extruders • Asphalt Grinders
11	Describe rock drills.	

Achievement Criteria:
Given information about road building and heavy equipment, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.2 Describe Large Equipment Operation Safety Procedures**

Learning Objectives:

1. Given information on the safe operation of heavy equipment, the learner will show an understanding of the safety procedures while working on or around heavy equipment.

	LEARNING TASKS	CONTENT
1	Describe heavy equipment safety procedures.	• How to avoid carbon monoxide poisoning • Seat belts • Back-up beepers • Night operation • ROPs (roll over protection) • Personal Protective Equipment (boots, hats, vests) • How to test and inspect lifting devices • Report or correct any unsafe conditions (lockout procedures) • Housekeeping • Never tamper with safety devices • Never get on or off a moving machine • Never get under an unblocked machine

Achievement Criteria:

Given information on safety procedures on or around heavy equipment, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.3 Describe Walk Around Procedures**

Learning Objectives:

1. The learner will describe walk-around procedures for most heavy equipment

	LEARNING TASKS	CONTENT
1	Describe maintenance checks before startup.	• Visually check for system fluid leaks • Check fluid levels • Check radiator for airflow restrictions • Check air cleaner restriction indicator for any indication of an air induction system restriction • Check tires or tracks undercarriage systems if it's a track-type tractor, for abnormal wear • Check all tires for: – Unusual tread wear, cuts or missing pieces of sidewalls – Tire wear pattern – Sidewall damage
2	Explain how to diagnose tire wear.	
3	Describe inspection of cutting edges, bucket teeth.	• Cutting edge condition • Bucket teeth condition • Wear limits – Manufacturer's instructions
4	Describe lockout procedures.	• Proper safety procedures for changing teeth/cutting edges • Means to physically neutralize a machine of all its energy – Engine power – Electric power – Hydraulic power – Pneumatic energy – Potential energy (rolling, creeping)

Achievement Criteria:

Given information on walk-around procedures for most heavy equipment, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.4 Describe Common Engine Parts and Functions**

Learning Objectives:

1. Given information on engine parts and functions, the learner will identify, classify and describe the function of basic engine parts

	LEARNING TASKS	CONTENT
1	Identify and describe purpose of basic engine parts.	• Engine block – pistons – connecting rods – crank shaft • Cylinder head – valves – cam shaft • Cooling system • Fuel system • Air induction system • Electrical system
2	Describe engine types	• Gasoline – Two cycle – Four cycle • Diesel
3	Describe how an engine works.	• Fuel and air delivery – clean air and fuel • Ignition system – spark and compression • Combustion • Cooling liquid and air • Lubrication
4	Describe damage preventive systems.	• Lights • Gauges • Horns • Warning systems • Filters • Caps

Achievement Criteria:

Given information on basic engine parts and operation, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.5 Perform Checks and Maintain an Engine Lubrication Systems**

Learning Objectives:

1. Given information on performing checks and maintenance of an engine lubrication system, the learner will identify, classify and describe lubrication systems

	LEARNING TASKS	CONTENT
1	Explain four functions of an engine's lubrication system.	• Lubrication • Cools • Cleans • Seals
2	List lubrication system components.	• Crank case (oil pan) • Oil pump • Oil filter • Oil journals • Engine bearings • Oil return passages
3	Identify and explain 3 types of lubrication systems.	• Splash • Splash/pressure • Pressure
4	Discuss the purpose and types of oil filters.	• Filter types • Filter by-pass valve (cold start-up or plugged filter)
5	Explain oil pressure.	• Low oil pressure – low oil level – faulty gauge – regular or relief valve – worn bearings – thin oil (diluted or wrong viscosity) • High oil pressure – faulty gauge – thick oil (incorrect viscosity) – faulty regulator value • Normal oil pressure

Achievement Criteria:

Given information on performing checks and maintenance of an engine lubrication system, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.6 Perform Checks and Maintain Engine Cooling Systems**

Learning Objectives:

1. Given information on the parts and maintenance of engine cooling systems, the learner will identify the parts and maintenance of engine cooling systems

	LEARNING TASKS	CONTENT
1	Describe liquid cooling system principles. State the function of a cooling system.	• Heat transfer by conduction • Remove excess heat of combustion • Regulates engine operating temperature (e.g. 180F to 200F or 82C-95C)
2		• Note: some engines use oil coolers (turbo charger applications) • Discuss antifreeze • Boiling and freezing temperatures • Inhibitors are used to prevent system rust, foaming, cavitation erosion and to protect parts
3	Perform 6 checks required on an engine's cooling system	• Check radiator coolant level • Coolant leaks – Internal (check crank case oil level) – External (water pump, hoses, gaskets) • Radiators (internal and external checks) • Water pump drive belt tension and condition • Antifreeze colour • Exhaust gas leaks into the cooling system

Achievement Criteria:

Given information on the parts and maintenance of engine cooling systems, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.7 Perform Checks and Maintain Engine Induction Systems**

Learning Objectives:

1. Given information on the parts and maintenance of engine induction systems, the learner will identify the parts and maintenance of induction systems

	LEARNING TASKS	CONTENT
1	**State the function of the air induction system.**	• Provide clean air • Air cooler (intercooler) • Supply a sufficient quantity of air
2	**Impact of a dirty air induction system.**	• 1 c (8 oz, 250 ml) of dirt can wear out an engine (amount of dirt stays constant even if the rate of dirt entry into the engine varies)
3	**Perform 3 air induction systems checks.**	• Pre-cleaner • Air restriction indicator • Oil bath air cleaner or air filter • Clean pre-cleaner screen • Clean oil bath air cleaner • Change air filter • Describe fuel delivery system component parts
4	Maintain air induction system.	• Fuel pump • Fuel filter • Water or condensation collector • Fuel injectors • Describe maintenance of fuel delivery system component parts • Change fuel filter • Remove water

Achievement Criteria:

Given information on the parts and maintenance of engine induction systems, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.8 Describe Basics of Drive Systems and Brakes**

Learning Objectives:

1. Given information on heavy equipment basic drive systems, the learner will identify drive train systems and maintenance

	LEARNING TASKS	CONTENT
1	Describe purpose and function.	• Transfers energy produced by an engine to the drive wheels • Gives range of power and speed to a machine
2	Describe rotating joints.	• Slip joints • Universal joints • Power take offs (PTO's)
3	Safety procedures around rotating shafts, gears and pulleys.	– WCB regulations to have guards in place) • Safety locks

Achievement Criteria:

Given information on heavy equipment basic drive systems, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.9 Describe Basics of Electrical Systems**

Learning Objectives:

1. Given information on heavy equipment electrical systems, the learner will identify electrical systems

	LEARNING TASKS	CONTENT
1	Explain a typical alternator/starter electrical circuit.	• Alternator • Load – Lights – Electric motors – Radio – Air conditioning – Heater motor • Switch • Solenoid • Cranking motor • Battery – 6, 12, 24 volt, safety
2	Describe failures that could happen in the circuit.	• Bad switch • Dead battery • Starter/cranking motor failure • Alternator failure • Short circuits • Blown fuses • Blown fusible link

Achievement Criteria:

Given information on heavy equipment electrical systems, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.10 Describe Basics of Air Brakes and Air Systems**

Learning Objectives:

1. Given information on air brakes and air systems, the learner will identify and classify air brake systems

	LEARNING TASKS	CONTENT
1	Describe purpose and function of air systems used on heavy equipment and trucks. adjustments	• Air brakes • Provide mechanical advantage where it would not be available otherwise • Provide high degree of flexibility in making • Start and run the engine at idle rpm • Monitor the air pressure gauge • Observe the pressure when the air compressor governor places the compressor in the unloader phase • Walk around the unit checking for air system leaks • Cycle the brakes ON and OFF until the pressure drops to 105 psi
2	Describe procedure for preventative maintenance of air dryers.	
3	Describe procedures for hooking up trailers	
4	Describe procedures during the loss of air	

Achievement Criteria:

Given information on air brakes and air systems, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.11 Describe Basics of Hydraulic Systems**

Learning Objectives:

1. Given information on basic hydraulic systems, the learner will identify and describe hydraulic operation

	LEARNING TASKS	CONTENT
1	Describe the parts and functions of a hydraulic system.	• Hydraulic hoses • Hose fittings • Hose protectors, clamps and routing • **Reservoir** • Hydraulic Pump: • Relief Valve • Control Valve • Cylinder • Accumulator • Actuators • Filters • Oil Cooler • Hydraulics oils

Achievement Criteria:

Given information on basic hydraulic systems, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B4: **BASIC ROAD BUILDING AND HEAVY CONSTRUCTION EQUIPMENT OPERATION AND MAINTENANCE**

Competency: **B4.12 Basics of Hitches and Mechanical Linkages**

Learning Objectives:

1. Given information on hitches and mechanical linkages, the learner will identify and describe proper hitch use

LEARNING TASKS	CONTENT
1 Describe heavy equipment hitches.	• Ball hitches • Automatic couplers • Pintle hooks • Clevis hitches • Not designed for highway trucks • Safety cables and chains • Lights • Quick connect attachments: excavator and backhoe buckets, etc.

Achievement Criteria:

Given information on hitches and mechanical linkages, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B5: SMALL ROAD BUILDING AND CONSTRUCTION EQUIPMENT

Competency: B5.1 Describe Types and Functions of Common Small Pieces of Equipment

Learning Objectives:

1. Given information on small equipment used for road building and heavy construction, the learner will identify and describe the types of equipment

LEARNING TASKS	CONTENT
1 Describe the safe operation of:	• Pumps • Air compressors • Lighting towers • Generators • Small engines • Walk behind rollers • Plate compactors • Ventilation systems • Aeroboards • Jack hammers • Shoring equipment • Dewatering equipment

Achievement Criteria:

Given information on small equipment used for road building and heavy construction, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE B5: SMALL ROAD BUILDING AND CONSTRUCTION EQUIPMENT

Competency: B5.2 Describe Small Equipment Operation Safety Procedures

Learning Objectives:

1. Given information on safe procedures for small equipment operations, the learner will describe small equipment safety operating procedures

LEARNING TASKS	CONTENT
1 Describe types of pumps.	• Centrifugal Pump – Impeller/volute – Standard pump – High pressure – Trash pump • Diaphragm Pump – Mud hog – Mud hen – Mud suckers • Submersible Pump • Describe when each type of pump is used • Explain pump troubleshooting • Maximum pressure • Oil sump – Check oil daily – Change filter monthly
2 Describe and use air compressors.	• Condensed water – Drain daily • Filters • Air dryers • Safety
3 Describe and use generators and welders.	• Types of generators – Portable – Lighting towers (genset, batteries) • Correct placement (not near metal machinery or buildings) • Safety procedures and operation • Correct ventilation – operate only in open areas – can cause death

LEARNING TASKS		CONTENT
		• Fueling and fuel storage (not near generators) • Grounding • Sparks • Fire • Hot objects • Engine speed – to obtain 60 cycles/second – preset
4	Describe the safe operation of small engines.	•
5	Describe the safe operation of walk behind rollers.	•
6	Describe the safe operation of plate compactors.	•
7	Describe the safe operation of fans and ventilation systems.	•
8	Describe the safe operation of Aeroboards.	•
9	Describe the safe operation of jackhammers.	•
10	Describe safe operation of shoring and dewatering equipment.	•

Achievement Criteria:
Given information on safe procedures for small equipment operations, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

PROGRAM OUTLINE
FOR
MODULE C

SKILLED TRADES BC

LINE C1: SURVEYING AND CONSTRUCTION

Competency: C1.1 Introduction to Plans and Drawings

Learning Objectives:

1. The learner will understand types of road construction plans and drawings, and the elements within those plans and drawings.

	LEARNING TASKS	CONTENT
1	Understand types of drawings.	• Plans • Profiles • Sections • Details •
2	Understand the elements of plans and drawings.	• Scale • Revision dates • North arrow • Reference points • Elevations •
3	Describe formatting of drawings.	•

Achievement Criteria:

Given information on road construction plans and drawings, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C1: **SURVEYING AND CONSTRUCTION**

Competency: C1.2 **Describe Differential Leveling**

Learning Objectives:

1. Given information about differential leveling, the learner will demonstrate how to apply this information

	LEARNING TASKS	CONTENT
1	Describe the principles of differential leveling.	• Differences in elevation • Total station • GPS • Leveling instruments • Water level • Distance above sea level • Bench marks • Carpenter's level • Hand level • Tripod • Rods
2	Define elevation.	
3	Describe types of levels and equipment.	

Achievement Criteria:

Given information about differential leveling, the learner must demonstrate how to apply this information and identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C1: **SURVEYING AND CONSTRUCTION**

Competency: C1.3 Describe **Distance and Angular Measurement**

Learning Objectives:

1. Given information about distance measurement and angle measurement, the learner will demonstrate basic knowledge on the subject

	LEARNING TASKS	CONTENT
1	Describe distance measurement.	• Survey tapes • Metric and imperial • Electronic measurement

Achievement Criteria:

Given information about distance measurement and angle measurement, the learner must demonstrate how to apply this information and identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C1: SURVEYING AND CONSTRUCTION

Competency: C1.4 **Describe Slope Staking**

Learning Objectives:

1. Given information about slope staking, the learner will demonstrate knowledge of the subject

LEARNING TASKS	CONTENT
1 Describe slope staking.	• Indicate the earthwork limits on each side of the road way centre line • Mark the intersection of side slopes with the natural ground surface

Achievement Criteria:

Given information about slope staking, the learner must demonstrate how to apply this information and identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C1: SURVEYING AND CONSTRUCTION

Competency: C1.5 Describe Grade Staking from Survey Stakes, Hub Stakes and Offset Stakes

Learning Objectives:

1. Given information about types of grade stakes, the learner will demonstrate basic knowledge of survey stakes

LEARNING TASKS	CONTENT
1 Describe grade staking.	• Indicate required grade elevations to equipment operators • Indicate cuts and fill to specific design elevations • Used for pre-grading and highway construction
2 Describe hub stakes.	• Used to reference other stakes
3 Describe offset stakes.	• Additional stakes that are offset a known distance from other stakes that will likely be disturbed during construction.

Achievement Criteria:

Given information about types of grade stakes, the learner must demonstrate how to apply this information and identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C1: **SURVEYING AND CONSTRUCTION**

Competency: C1.6 **Describe Use of Hand Levels and Lasers**

Learning Objectives:

1. Given information about engineering hand levels and lasers, the learner will demonstrate basic knowledge

	LEARNING TASKS	CONTENT
1	Describe and use hand levels.	• Pocket version of engineer's level • Not very accurate • Used for rough grading • Used to produce accurate straight lines • Will produce line and grade
2	Describe lasers.	• Used for pipe installation • Not used for curves • Rotating • Dial-a-Grade

Achievement Criteria:

Given information about engineering hand levels and lasers, the learner must demonstrate how to apply this information and identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C1: SURVEYING AND CONSTRUCTION

Competency: C1.7 **Describe GPS Principles**

Learning Objectives:

1. Given information about GPS systems, the learner will describe basic principles

	LEARNING TASKS	CONTENT
1	Describe GPS principles and use.	• Global positioning • Provides 3D line and grade for heavy equipment • Used extensively in road building and heavy construction

Achievement Criteria:

Given information about GPS systems, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C2: DRAINAGE

Competency: C2.1 **Describe the Importance of Drainage**

Learning Objectives:

1. Given information about road construction drainage, the learner will describe basic importance

	LEARNING TASKS	CONTENT
1	Explain the hydrologic cycle and why it is important to road building and heavy construction.	• Precipitation • Evaporation and transpiration • Stream and river sources • Surface runoff • Ground water • Paved roads are part of the overall drainage system
2	Explain drainage basins, water sheds and water courses.	• Drainage basins are the land forms that drain into creeks, streams and rivers (runoff) • Drainage basins are divided from each other by hills, ridges, valleys • Watersheds are larger than drainage basins and usually contain a number of drainage basins • Watercourses are larger land areas that include several watersheds. (The Great Divide is an example).
3	Explain how engineers use drainage basin, Watershed and water course information for road building	• Engineers collect information about waterways and runoff from topographical surveys • Predict flood levels and flow rates • Select culvert sizes • Design size of storm sewers

Achievement Criteria:

Given information about road construction drainage, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C2: **DRAINAGE**

Competency: C2.2 Describe Drainage Systems

Learning Objectives:

1. Given information about road building drainage systems, the learner will demonstrate basic knowledge

	LEARNING TASKS	CONTENT
1	Describe types of culverts.	• Corrugated steel pipe • Corrugated metal pipe • Concrete • Polyvinyl chloride (PVC)
2	Define culvert.	• An enclosed channel that serves as an extension for an open channel (ditch) that meets a barrier such as a highway.
3	Describe culvert installation requirements.	• Handle all flow rates • Cause minimal property damage • Does not affect normal flow • Minimal impact on future developments • Functions properly after soil settlement • Does not cause stagnant pools • Accommodates increased runoff from future developments • Efficient, economical, durable • Does not cause downstream deposits
4	Describe drainage system products.	• Inline drains • Curb drains • Manholes • Drop-in grates • Catch basins • Storm drains • Outlets • Culverts • Culvert entrances/exits • Box culverts • Pipe arch • Flumes

LEARNING TASKS	CONTENT
5 Describe environmental considerations for drainage systems.	• Sediment controls • Flood controls • Erosion controls • Water pollution controls

Achievement Criteria:
Given information about road construction drainage systems, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C3: BASIC SOIL MECHANICS/GEOLOGY

Competency: C3.1 **Describe Types of Soils**

Learning Objectives:

1. Given information about types of soils, the learner will demonstrate basic knowledge

	LEARNING TASKS	CONTENT
1	Describe soil types.	• Non-organic • Organic • Cohesive • Granular
2	Describe the three basic soil groups.	• Organic (not suitable for road construction) • Clay • Silt • Fine to medium gravel • Sand
3	Describe cohesive soils.	
4	Describe granular soils.	
5	Describe why certain types of soils are preferred for road construction.	• Compaction (some soils compact better than others)
6	Describe why soil is compacted.	• Increases load bearing capacity • Prevents soil settlement and frost damage • Reduces water seepage
7	Describe the effect of moisture on soils.	• Too much turns soil into liquid mud • Too little • Acts as a lubricant • Too little • Too much • Highest possible density • The drier the soil, the more resistant it is to compaction.
8	Describe the soil classification system.	• Uses grain size for distribution • Cobbles and boulders • Gravel • Sand • Silt • Clay
9	Describe where different types of soils are found in British Columbia.	

Achievement Criteria:
Given information about types of soils, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C3: **BASIC SOIL MECHANICS/GEOLOGY**

Competency: C3.2 **Describe Soil Compaction**

Learning Objectives:

1. Given information about soil compaction, the learner will describe basic definitions and consepts

	LEARNING TASKS	CONTENT
1	Define compaction.	• Gradation, moisture, compactive effort • Method of mechanically increasing soil density. • Significant part of the road building process. • Improper compaction results in soil settlement, frost heaves, water damage. • Accomplished using mechanical compaction equipment.
2	Describe types of compaction for soil and asphalt.	• Vibratory force (vibration, impact) • Static force (kneading, pressure)
3	Describe compaction procedures.	• Cohesive soils • Granular soils
4	Describe compaction equipment.	•
5	Describe trench compaction.	•

Achievement Criteria:

Given information about soil compaction, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C3: BASIC SOIL MECHANICS/GEOLOGY

Competency: C3.3 **Describe Soil Density Testing**

Learning Objectives:

1. Given information about soil density, the learner will describe basic understanding of specifications and consepts

	LEARNING TASKS	CONTENT
1	Understand the Proctor Density specification.	• To determine if proper soil compaction is achieved
2	Describe soil density tests.	• Proctor determination • Sand cone test • Nuclear density test • Load test

Achievement Criteria:

Given information about soil density, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C4: PRINCIPLES OF EXCAVATION AND SHORING

Competency: C4.1 **Describe Principles of Excavation and Shoring**

Learning Objectives:

1. Given information about excavation and shoring, the learner will describe basic concepts

	LEARNING TASKS	CONTENT
1	Define excavation.	• Man made cut, cavity, trench, depression in the earth formed by earth removal
2	Define trench.	• Narrow excavation made below the surface of the ground
3	Define protective system.	• Sloping and benching • Shield systems • Underpinning
4	Define support system.	• Bracing • Shoring
5	Define surcharge/spoil pile.	• Excessive vertical load or weight caused by: – Spoil pile – Overburden – Vehicles – Equipment – Activities
6	Describe the primary hazard of trenching and excavation.	• Collapse
7	Describe the handling of heavy materials.	• Raising and lowering materials in excavations
8	Describe types of shoring.	• Timber • Hydraulic • Pneumatic • Screw jacks • Underpinning
9	Describe types of shielding.	• Trench boxes
10	Describe sloping and benching.	• WCB OHS Regulations

Achievement Criteria:

Given information about excavation and shoring, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C4: PRINCIPLES OF EXCAVATION AND SHORING

Competency: C4.2 **Describe Principles of Dewatering**

Learning Objectives:

1. Given information about dewatering, the learner will describe basic principles

	LEARNING TASKS	CONTENT
1	Define dewatering.	• Methods for controlling standing water and water accumulation in excavations and trenches. • Water removal equipment • Diversion of surface water • Harness and lifelines • Removal of employees during rain storms • Inspection by a competent person after each rain and before employees reenter an excavation or trench.
2	Describe dewatering methods.	
3	Describe safety procedures specific to dewatering.	

Achievement Criteria:

Given information about dewatering, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C4: PRINCIPLES OF EXCAVATION AND SHORING

Competency: C4.3 **Describe Principles of Utilities**

Learning Objectives:

1. Given information about utilities as it pertains to excavations, the learner will describe basic knowledge of systems and procedures

	LEARNING TASKS	CONTENT
1	Describe types of underground utilities.	• Electric power transmission and distribution lines • Gas and oil transmission and distribution lines • Dangerous product lines • Steam lines • Telephone and communication lines • Police and fire communications • Cable television • Water systems • Slurry systems • Sewer lines
2	Describe excavation procedures around utilities.	• Obtain permission to dig • Check with utility companies • Use of probes

Achievement Criteria:

Given information about utilities, systems and procedures, as it pertains to excavations, the learner must identify and correctly answer a series of multiple-choice tests with 70% accuracy.

SKILLED TRADES BC

LINE C5: AGGREGATES

Competency: C5.1 **Describe Use of Aggregates in Asphalt and Concrete**

Learning Objectives:

1. Given information about aggregates used in asphalt and concrete, the learner will demonstrate a basic knowledge of asphalt and concrete aggregates

	LEARNING TASKS	CONTENT
1	Describe gravel pit processing.	• Crushing • Screening • Washing
2	Describe The Mines Act with reference to gravel pits.	• The Mines Act
3	Describe gravel pit products.	• Pit run • Base gravels • Asphalt aggregates • Concrete aggregates • Sand • rock • Economics: – Readily available – in most parts of the country – Only economically viable material
4	Describe why aggregates are used in asphalt and concrete mixes.	• Structural: • Provides structural strength to mixes • Aggregates: – Are Dense – Are Durable – Are hard to shear • In good mix designs, aggregates will fail first

Achievement Criteria:

Given information about aggregates used in asphalt and concrete, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.
Criteria include gravel pit processes, the B.C.Mines Act, gravel pit products and why aggregates are used in asphalt and concrete mixes.

SKILLED TRADES BC

LINE C5: **AGGREGATES**

Competency: C5.2 **Describe Use of Base Course**

Learning Objectives:

1. Given information on the use of base course in road construction, the learner will demonstrate a basic knowledge of road structures, functions of base course and types of base course.

	LEARNING TASKS	CONTENT
1	Describe road structures.	• Typically built up of Layers of: – Sub-Grade – Compacted Soil – Sands, Clays, Silts – Sub-Base – Pit Run – Non-Crushed, ~3" Aggregates – Base Course(s) - ¾" - 1½" Crushed Aggregates – Finish Course - Concrete and/or Asphalt • May include Geotextiles • Provides a Leveling Course for Finish Course
2	Describe base course.	• Provides additional structural strength to road • Acts as a 'cushion' to traffic loads • Transfers traffic loads to sub-grade • Provides surface/sub-surface drainage
3	Types of base course.	• Water Bound – Required for maximum Density • Cement Stabilized – Cement binder – Reduces Moisture Content - Adds strength • Oil Bound – Low grade Asphalt Cement Binder – Provides water seal

Achievement Criteria:

Given information about the use of base course in road construction, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE C5: AGGREGATES

Competency: C5.3 Describe Aggregate Standard Specifications and Quality Control Systems

Learning Objectives:

1. Given information on soil classification and project specifications, the learner will demonstrate a basic knowledge of soils

LEARNING TASKS	CONTENT
1 Describe quality control systems.	• Typically performed by Contractors to ensure quality products
2 Describe quality assurance systems.	• Generally performed by Engineering Consultant to ensure compliance to specifications.

Achievement Criteria:

Given information about the use of base course in road construction, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE C6: ASPHALT PAVEMENT

Competency: C6.1 **Describe Asphalt Technology**

Learning Objectives:

1. Given information about asphalt technology, the learner will describe the basic technology and principles

LEARNING TASKS	CONTENT
1 Describe asphalt technology.	• Asphalt is a product of crude oil refining that acts as the binder or "glue" in the asphalt pavement mixture. • Asphalted Pavement is a high-quality, thoroughly controlled, engineered material made from aggregates using Asphalt Cement as a Binder. • Asphalted Pavement is a 'Flexible compared to Rigid' Concrete roadway. • Asphalted Pavement is durable, economical, sustainable, recyclable, environmentally friendly, is quieter than concrete, and provides excellent skid resistance.
2 Outline the principles involved in hot mix asphalt concrete (HMAC) design.	• Best blend of aggregates and optimum asphalt content to meet required specifications. • Marshall Mix Design • Cold and Hot in-place recycling of existing pavement • Thickness of asphalt

Achievement Criteria:

Given information about asphalt technology, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE C6: ASPHALT PAVEMENT

Competency: C6.2 **Describe Hot Mix Asphalt Concrete Laydown (HMAC)**

Learning Objectives:

1. Given information about asphalt laydown, the learner will describe basic applications

	LEARNING TASKS	CONTENT
1	Describe applications.	• Overlay • H.I.P. • Mill and fill • New construction
2	Describe RAP (recycled asphalt pavement).	

Achievement Criteria:

Given information about asphalt technology, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy. Criteria include batch plants, transporting asphalt, placing asphalt tact coat, paving machines, screed unit, compaction testing, asphalt overlay, hot-in-place asphalt, mill and fill and recycled asphalt.

SKILLED TRADES BC

LINE C6: ASPHALT PAVEMENT

Competency: C6.3 **Describe HMAC Testing**

Learning Objectives:

1. Given information about asphalt testing, the learner will describe basic principles

LEARNING TASKS	CONTENT
1 Describe how HMAC is tested.	• Marshall method (briquettes) • Briquettes are tested for density, stability, flow, air voids, VMA, VFA and compared to initial design values.

Achievement Criteria:

Given information about HMAC testing, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE C6: ASPHALT PAVEMENT

Competency: C6.4 **Describe Asphalt Plant Operations**

Learning Objectives:

1. Given information about asphalt plant operations, the learner will describe basic knowledge about asphalt plants

LEARNING TASKS	CONTENT
1 Describe plant products.	• Asphalt products
2 Describe plant set-up/take-down.	• Site layout • Erect plant • Demobilize plant
3 Describe plant maintenance.	• Servicing • Trouble-shooting • Inspect and monitor plant • Calibrate plant
4 Describe plant operations.	• Pre-start checks • Trial run • Plant start-up • Plant shut-down

Achievement Criteria:

Given information about Asphalt plant operations, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE C6: ASPHALT PAVEMENT

Competency: C6.5 **Describe the Effects of Transporting Aggregates**

Learning Objectives:

1. Given information about transporting aggregates, the learner will describe basic handling and storage of asphalt.

	LEARNING TASKS	CONTENT
1	Describe effects of transporting on aggregates.	• Transporting methods • Segregation caused by stockpiling.

Achievement Criteria:

Given information about transporting aggregates, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE C7: **CONCRETE**

Competency: C7.1 Describe Concrete Properties and Technology

Learning Objectives:

1. Given information about concrete properties and technology, the learner will demonstrate a basic knowledge about concrete characteristics, constituents of concrete, concrete as a building material, strength of concrete, durability of concrete, watertightness of concrete, general requirements for good concrete, Portland cement, air entrained cement and aggregates.

	LEARNING TASKS	CONTENT
1	Describe concrete properties and technology.	• Construction material made from a mix of Portland cement, water, aggregates, air. • Can be delivered to job site in a soft state. • Can be moulded to virtually any form or shape. • Ingredients in the mix, other than Portland cement, water and aggregate.
2	Describe concrete admixtures and binders.	• Admixture function (air entrainment, water reduction, plasticizers, accelerators, retarders, hydration controllers, corrosion inhibitors, shrinkage reducers, alkali inhibitors, control workability & bonding)
3	Describe the importance of the water/cement ratio.	• Most important factor in hardened concrete.
4	Describe concrete curing.	

Achievement Criteria:

Given information about transporting aggregates, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE C7: CONCRETE

Competency: C7.2 **Describe Concrete Formwork**

Learning Objectives:

1. Given information about concrete formwork, the learner will describe a basic knowledge about form materials, form design, foam construction, foundation forms, bearing wall footings, columns, walls, construction, bracing and stair forms.

LEARNING TASKS	CONTENT
1 Describe concrete forms.	• Job built – Wall – Column – Slab and beam – Stair • Manufactured – Walls – Columns – Deck and roof slabs – Beams and girders – Culverts – Fly forms – Slip forms – Shoring – Architectural finishes

Achievement Criteria:

Given information about transporting aggregates, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy

SKILLED TRADES BC

LINE C7: CONCRETE

Competency: C7.3 **Describe Concrete Placement and Curing**

Learning Objectives:

1. Given information about placing and curing concrete, the learner will demonstrate a basic knowledge about concrete placement and curing

	LEARNING TASKS	CONTENT
1	Describe concrete placement procedures.	• Concrete pumps • Line pump • Bucket • Direct chute • Trammy
2	Explain the principles and importance of concrete curing.	• Temperature • Moisture • Time • Curing compounds

Achievement Criteria:

Given information about transporting aggregates, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy

SKILLED TRADES BC

LINE C7: **CONCRETE**

Competency: C7.4 **Describe Quality Control and Testing**

Learning Objectives:

1. Given information about concrete testing, the learner will describe concrete testing on aggregates, fresh concrete, and hardened concrete.

LEARNING TASKS	CONTENT
1 Describe tests for aggregates.	• Aggregates • Concrete • Gradation • Slump test
2 Describe testing of fresh concrete.	• Density and yield • Air content • Compressive strength • Coring cylinders • Tensile strength test
3 Describe testing of hardened concrete.	• Flexural strength or modulus of rupture • Durability tests • Permeability • Abrasion

Achievement Criteria:

Given information about transporting aggregates, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy

LINE C7: **CONCRETE**

Competency: C7.5 **Describe Production and Supply of Concrete**

Learning Objectives:

1. Given information about the mixing of concrete, the learner will describe concrete mixing plants, plant safety and truck safety.

LEARNING TASKS	CONTENT
1 Describe concrete plants.	• Concrete plant operation • Asphalt plant operation • Trucking procedures • Portable batch plant • Trucking • Hand mixing

Achievement Criteria:

Given information about transporting aggregates, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy

LINE C7: **CONCRETE**

Competency: C7.6 **Describe Reinforcement of Concrete**

Learning Objectives:

1. Given information about concrete reinforcement, the learner will describe basic knowledge of coefficients of expansion, reinforcement bars, building components using reinforcement, slab reinforcement and wall reinforcement, and bends.

LEARNING TASKS	CONTENT
1 Describe reinforcement of concrete.	• Describe the applications of reinforcing bars, the uses of reinforced structural concrete, and the basic processes involved in placing reinforcing bars.

Achievement Criteria:

Given information about transporting aggregates, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy

SKILLED TRADES BC

LINE C7: CONCRETE

Competency: C7.7 **Describe Soil Cement and Roller Compacted Concrete**

Learning Objectives:

1. Given information about soil cement and roller compacted concrete, the learner will describe basic knowledge of types, materials for soil cement, uses of soil cement and laydown procedures.

	LEARNING TASKS	CONTENT
1	Describe roller compacted concrete and soil cement pavements.	• Combine cement with natural or graded aggregates to create pavement.
2	Describe the uses.	• Suitable for heavy loads moving at low speeds such as airport runways and warehouses. • Cure taking on the colour of the aggregate.
3	Describe the properties.	• Lighter colour keeps pavement cooler which can add to the design life of the pavement
4	Describe laydown procedures.	• Asphalt paving equipment

Achievement Criteria:

Given information about transporting aggregates, the learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy

PROGRAM OUTLINE
FOR
MODULE D

SKILLED TRADES BC

LINE D1: EMPLOYMENT SKILLS

Competency: D1.1 **Set Personal Career Goals**

Learning Objectives:

1. Given information about setting career goals, the learner will draft their own original career goals and answer multiple-choice tests

LEARNING TASKS	CONTENT
1 Develop a goal setting worksheet.	• Consider major career choices. • Choose preferred work functions in a job. • Consider salary needs, housing, lifestyle, geography, loans, transportation, goals. • Develop list of jobs being considered. • Consider geography, city, rural/urban, climate. • Work environment, size of organization, co-workers, physical facilities. • Future career development – Training – Management development – Flexibility to move within a company – Entrepreneurial activity • Develop a career and goal statement.

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy. The criteria includes goal setting guidelines and goal setting worksheets.

SKILLED TRADES BC

LINE D1: EMPLOYMENT SKILLS

Competency: D1.2 **Prepare a Resume**

Learning Objectives:

1. Given information on resume writing, the learner will provide information on where one can go to have a professional resume prepared for them and/or write their own resume.

	LEARNING TASKS	CONTENT
1	Describe the purpose of a resume.	• Written document to market your background to potential employers. • Used to obtain an interview with a prospective employer. • Make a good impression. • Write down your accomplishments
2	Describe pre-writing activities.	– Education – Employment activities – Special projects – Answers to what you actually did in each activity – Answers what you want to do with your accomplishments/interests
3	Describe resume formats	• Chronological resume – used when your most recent experience or education is advantageous to the desired position. – Uses reverse chronological order – Most common type of resume. • Functional resume – Used when your skills and abilities are highlighted rather than where and when your education and experience took place. • Combination resume – Contains the best of the chronological and functional formats. – Usually used by applicants who have a strong background related to their objective.

LEARNING TASKS	CONTENT
4 Explain resume outline.	• Heading/contact information • Objective • Education/Training • Experience • Additional sections (community service, activities, interests)

Achievement Criteria:
The learner will provide an acceptable type written resume to the instructor.

SKILLED TRADES BC

LINE D1: EMPLOYMENT SKILLS

Competency: D1.3 **Use Job Search Skills**

Learning Objectives:

1. Given information on job search skills, the learner will describe how to look for a job in the road building, heavy construction industry.

	LEARNING TASKS	CONTENT
1	Explain how to look for a job in the road building, heavy construction industry.	• Internet road building job board • Industry contacts • Networking • Other internet sites • Newspapers • Always be professional in business like • Be brief – "Ditch" the emotions – don't laugh out loud • no jokes • Avoid using slang • Proofread and spell check all written correspondence
2	Describe the do's and don't of job searches.	

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D1: **EMPLOYMENT SKILLS**

Competency: D1.4 **Use Interviewing Skills**

Learning Objectives:

1. Given information about job interviews, the learner will demonstrate knowledge and skills of interviews appropriate for the road building industry

	LEARNING TASKS	CONTENT
1	Use interviewing skills appropriate for the road building industry.	• Prepare for interview – Know your potential employer – Know what they do – Know company size • Know yourself – Your strengths – Your career objective – Your long and short range goals – Your interests – Turn your strengths and weaknesses into what the employer needs • Communicate effectively – Practice role playing – Strong voice/eye contact • Be on time • Wear clean clothes, dress as others doing the job do • "Breaking the ice" – be ready to actively participate • The interviewer will be looking for the following answers: – is this person using the shotgun approach to finding a job? Or has the candidate spent time on self-appraisal and knows what he/she wants? – What is the candidate's operating style: haphazard, precise, disciplined, undisciplined? – Be honest – don't try to con the interviewer. • The interviewer may ask "stress" questions to test you. – Often problem-solving questions
2	Describe the interview.	

LEARNING TASKS	CONTENT
	– Remember there are usually no right or wrong answers • Salaries – Know what the industry pays for entry-level workers – Let the employer take the lead – Be realistic in your salary expectations – Do not accept too low an offer – Play it safe, give a salary range based on what the industry pays • Do not ask about: – Vacation time – Time off
3 Describe follow up activities.	
4 Conduct practice interviews.	

Achievement Criteria:
The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D1: **EMPLOYMENT SKILLS**

Competency: D1.5 **Use Road Builder Internet Job Board**

Learning Objectives:

1. Given information about the B.C. Road Builders and Heavy Construction Association Job Bank, the learner will learn how to access information related to the Job Bank

	LEARNING TASKS	CONTENT
1	Use the B.C. Road Builder Internet Job Board.	•

Achievement Criteria:

N/A

SKILLED TRADES BC

LINE D2: **WORKSITE EMPLOYEE ROLES**

Competency: D2.1 **Employee Responsibilities**

Learning Objectives:

1. Given information about employee responsibilities on the job, the learner will describe his/her responsibilities.

LEARNING TASKS	CONTENT
1 Describe employee responsibilities.	• Work ethics • Performance – Job performance – Safe use of materials – Housekeeping • Excavation safety • Electrical safety • Working at heights • Personal protective equipment • Consideration of others • Proper and safe use of equipment • Showing up on time • Willingness to learn • Good attitude

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D2: **WORKSITE EMPLOYEE ROLES**

Competency: D2.2 **Project Management**

Learning Objectives:

1. Given information about project management strategies for road construction projects, the learner will describe the basic process and key components of project management.

	LEARNING TASKS	CONTENT
1	Describe the process of project management.	• Employees should realize that the company management has completed a lot of work prior to project start-up. • Estimated time to complete the job • Risk assessment • Problem areas • Company relies on its workers to complete a project • Step 1: develop the overall project plan – Scope – Schedule – Cost – Problem areas – Work products • Step 2: define stakeholder roles and responsibilities – Vested interests – Conflicting agendas – Project and stakeholder requirements • Step 3: develop a scope of work statement – Project objectives – Key milestones – What is to be delivered • Step 4: develop the project base lines – Work brake down structure – All deliverables – All work to be done – Schedule and costs – Resources for each task – Estimated cost of each task
2	Describe the key components of a project management plan.	

LEARNING TASKS	CONTENT
	– Calendar schedule – Base line costs • Step 5: develop management plans – Safety – Project changes – Hiring – Salaries • Step 6: develop a communication plan – Tool box meetings – Reports

Achievement Criteria:
The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D2: **WORKSITE EMPLOYEE ROLES**

Competency: D2.3 **Quality Management**

Learning Objectives:

1. Given information about quality management, the learner will describe the key components in quality management.

	LEARNING TASKS	CONTENT
1	Describe the key points in quality management.	• Quality planning process • Quality control • Quality improvement • Costs • Benchmarking (best practices) • Quality human resources • Quality training • Quality supplier relationships • Inspections and tests • Customer service

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D2: WORKSITE EMPLOYEE ROLES

Competency: D2.4 **Demonstrate Job Site Clean Up and Housekeeping Procedures**

Learning Objectives:

1. Given information about job-site cleanup and housekeeping procedures, the learner will describe a thorough knowledge of housekeeping principles.

	LEARNING TASKS	CONTENT
1	Describe good housekeeping principles.	• Building materials and supplies • Fuel and lubricants • Rubbish and scrap • Tools and equipment

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D3: **CONSTRUCTION WORKSITE TEAM SKILLS**

Competency: D3.1 **Describe Positive Worksite Attitudes**

Learning Objectives:

1. Given information about positive worksite attitudes, the learner will demonstrate a knowledge of choosing positive behaviours at the work site. Students will answer multiple-choice tests.

	LEARNING TASKS	CONTENT
1	Describe what is necessary for a positive worksite attitude.	• Adaptability • Competence • Experience • Manageability • Interpersonal skills • Good attitude • Initiative • Maturity • Stability • Emotional control • Integrity • Values

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D3: **CONSTRUCTION WORKSITE TEAM SKILLS**

Competency: D3.2 **Describe Conflict Resolution Principles**

Learning Objectives:

1. Given information about conflict resolution principles, the learner will understand how to resolve job site conflict

LEARNING TASKS	CONTENT
1 Describe conflict resolution process.	• Step 1 – talk to the other party – Get ready to talk – Talk to the other party – If conflict is not resolved, move to Step 2. • Step 2 – request mediation services – Company may have conflict resolution officers – If conflict is not resolved, move to Step 3. • Step 3 – company-based arbitration – Company may have a conflict resolution panel. – If conflict is not resolved, move to Step 4. • Step 4 – formal court system

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D3: **CONSTRUCTION WORKSITE TEAM SKILLS**

Competency: D3.3 **Describe Teamwork Practices**

Learning Objectives:

1. Given information on teamwork practices, the learner will describe the use of teamwork practices.

LEARNING TASKS	CONTENT
1 Describe teamwork practices.	• Establish and maintain trust • Communicate vision and values • Respect other employees • Focus on shared goals rather than personal goals • Do what's right • Team communication rather than communication with individuals • Team is responsible for milestones • Shared view of problems • Know the strengths and weaknesses of each team member • Communicate • Support your organization's mission statement

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D4: COMMUNICATION SKILLS

Competency: D4.1 **Speak and Listen Effectively**

Learning Objectives:

1. Given information on speaking and listening effectively, the learner will demonstrate the proper use of speech and listening strategies

LEARNING TASKS	CONTENT
1 Describe oral communication skills.	• Use road construction and heavy equipment terminology • Listen and understand verbal instructions • Communicate problem areas to supervisors and workers • Solve problems using oral and written communication
2 Describe reading skills.	• Understand and use written material • Complex equipment instructions • Blueprints and plans • Product application sheets • WHMIS materials • Health and safety instructions
3 Describe mathematical skills.	• Basic math skills • Interpret drawings and plans • Metric and imperial measurement • Math is a requirement for quality work • Required for personal safety and the safety of others

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SKILLED TRADES BC

LINE D4: COMMUNICATION SKILLS

Competency: D4.2 **Use Documentation**

Learning Objectives:

1. Given information on using documentation, the learner will demonstrate knowledge of documentation use

LEARNING TASKS	CONTENT
1 Use documentation.	• All information about a road project is documented on paper • Reports • Computer printouts and charts • Sketches and drawings • Reference guides • Manuals • Blueprints and plans • Safety and accident reports • Installation descriptions • Maintenance instructions
2 Describe writing skills.	• Writing and drawing sketches on paper • Producing signs and tags • Using computers

Achievement Criteria:

The learner must identify and correctly answer a series of multiple-choice test questions with 70% accuracy.

SECTION 3

TRAINING PROVIDER STANDARDS

SKILLED TRADES BC

TRAINING PROVIDER STANDARDS:

For effective program delivery, minimum standards shall be established for:

Facilities

Facilities shall offer a safe and productive learning environment.

- Meets applicable municipal zoning bylaws for technical instruction and education facilities.
- Conducts a safety review of the program's facility and equipment annually and meets applicable safety standards/regulations.
- Classrooms, labs, shops and work sites are safe, clean, properly maintained, and in good repair.
- Suitable for the size of the class.
- Temperature, noise, ventilation, light, and particulate control are maintained at appropriate levels.

Facilities shall be appropriate for delivery of instruction at each level of training.

- Storage space is functional and sufficient for instructional materials, supplies and equipment.
- Instructor work stations are adequate and appropriately equipped.
- work stations are adequate and appropriately equipped.
- Facilities have adequate floor area and ceiling heights.

Tools and Lab/Shop Equipment

Adequate tools and equipment shall be available for each level of training.

- Tools and equipment meet the standard identified in the SkilledTradesBC Program Outline for each level of technical training.
- Tools are suitable for the task being performed.
- The tools and equipment used in the program reflect the types used in the industry.
- Equipment is suitable for demonstration.
- The tools and equipment exist in sufficient quantity for efficient and effective instruction of the class size.

- have ample time and opportunity to access tools and equipment.

Equipment shall be well maintained and operated in a safe manner.

Equipment is in good repair and maintained regularly.

- Appropriate safety and personal protective equipment is available and in use.
- All shields, guards, and other safety devices are in place, operable and used where required.
- The classroom/lab and its equipment are reasonably set-up within a systematic flow of production.

Supplies and Materials

Trade supplies and materials shall be available in sufficient quantities for each module.

- Trade supplies and materials are available in sufficient quantities to support the program effectively.

Instructional materials shall be adequate to meet the objectives of the program and available to all trainees.

- Instructional materials support SkilledTradesBC approved standards and objectives.
- Instructional materials are available for all trainees through all modules of the program.

Tools and Lab/Shop Equipment:

See section on minimum shop and lab equipment below.
(Note: It is not required to purchase tools and equipment. Many if not all items listed below can be rented and/or produced through worksite visits, tours to industry suppliers, manufacturer etc.)
All training providers will have to produce a training plan showing how and where students will gain access to the necessary tools and equipment.

Instructor Qualifications

The instructor qualifications shall be suitable for the program and level of technical training.

- Appropriate training on equipment has been acquired by the instructor to ensure proper instruction to trainees.
- The instructor demonstrates a broad range of knowledge of the training content.

The instructor experience shall be appropriate for the program and level of technical training.

- The instructor has practical and teaching experience sufficient to deliver the program effectively.
- The instructor demonstrates industry practical experience reflected in the training content.

The instructor shall demonstrate effective educational practice in materials and techniques.	• The instructor prepares well designed instructional materials and lesson plans. • The instructor uses effective instructional techniques. • The instructor uses a variety of methods in delivery of instruction.

As an instructor, you will have considerable experience in the industry and an interest in sharing all aspects of your trade with your trainees. In traditional terms, the role of the instructor is to provide information and the role of the student is to receive information, but in many respects, good instructors go much further than this. They enable learning to take place in many ways; by bringing in guest speakers or arranging for students to visit work sites where they can learn from others in the industry; by finding opportunities for students to work in groups to learn from one another; or by encouraging open discussion so students can explore and direct their own learning. In the pilot of the Road Building and Heavy Construction Foundation Program training providers who incorporated a variety of worksite and/or industry supplier fieldtrips were the most successful in regard to student enjoyment and placement into industry jobs.

As an instructor, you may find yourself acting as an advocate for your trainees to ensure that they are exposed to the practical experiences and the theoretical knowledge necessary to enter the workplace in the road building and heavy construction industry. It is your responsibility to ensure that each of the trainees completing your program is prepared to enter the workplace. You should be confident that you have provided them with the knowledge and practical skills to conduct themselves safely and contribute productively on the worksite.

The success of your trainees should be a source of pride to you.

SKILLED TRADES BC

MINIMUM LIST OF SHOP/LABORATORY EQUIPMENT REQUIRED FOR MODULE A OF THE ROAD BUILDING AND HEAVY CONSTRUCTION PROGRAM

Equipment List is based on the standard class size of 16 participants. The facilities must be in compliance with the appropriate zoning bylaw for instructional use.

Module A

- Access, to heavy equipment including compaction equipment, tractors, skid steer loaders, trucks, excavators, loaders, scrapers, graders, crawler tractors, paving machines, etc.
- Small spill response clean-up kit.

SKILLED TRADES BC

MINIMUM LIST OF SHOP/LABORATORY EQUIPMENT REQUIRED FOR MODULE B OF THE ROAD BUILDING AND HEAVY CONSTRUCTION PROGRAM

Equipment List is based on the standard class size of 16 participants. The facilities must be in compliance with the appropriate zoning bylaw for instructional use.

- Personal Protective Equipment
- Small hand tools ranging from shovels, hammers, picks, axes, rakes, mechanics' tools, etc.
- Access to chain saws, portable power tools, drills, small engines, air power tools, etc.
- Access to ladders and scaffolds.
- Access to scissor lifts, zoom booms, forklifts, etc.
- Access to cranes, hoists and rigging.
- Access to ropes, chains, slings, blocking equipment and wheel chocks.
- Access to engine parts and an operating diesel engine.
- Access to engine lubrication and oils.
- Access to engine cooling and induction systems.
- Access to heavy equipment drive systems.
- Access to heavy equipment electrical systems.
- Access to air brake systems.
- Access to hydraulic systems.
- Access to equipment hitches and quick-change attachments.
- Access to pumps, air compressors, generators and welders.

SKILLED TRADES BC

MINIMUM LIST OF SHOP/LABORATORY EQUIPMENT REQUIRED FOR MODULE C OF THE ROAD BUILDING AND HEAVY CONSTRUCTION PROGRAM

Equipment List is based on the standard class size of 16 participants. The facilities must be in compliance with the appropriate zoning bylaw for instructional use.

- Drafting equipment and paper.
- Access to engineering levels, survey rods, stakes and hammers, markers, etc.
- Access to one transit, survey tapes and other equipment.
- Wooden stakes.
- Access to hand levels and lasers.
- Access to GPS devices.
- Access to culverts and other drainage equipment.
- Access to soil samples.
- Access to compaction equipment; access to laboratory soil equipment (4" Proctor Mold)
- Access to field density systems.
- Access to shoring equipment, trench shields, etc.
- Access to dewatering equipment.
- Access to aggregate samples; access to aggregate sieves.
- Access to asphalt samples, aggregates, asphalt binder;
- Access to an asphalt plant
- Access to asphalt testing equipment.
- Access to concrete aggregates
- Types of Portland Cement
- Access to concrete forms
- Access to a concrete mixing plant
- Access to concrete placement.