SKILLEDTRADES BC

# PROGRAM OUTLINE

## Asphalt Paving/Laydown Technician

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# ASPHALT PAVING/LAYDOWN TECHNICIAN PROGRAM OUTLINE

**APPROVED**

**FEBRUARY 2012**

**Developed by**
**SkilledTradesBC**
**Province of British Columbia**

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# Section 1

# INTRODUCTION

# ASPHALT PAVING/LAYDOWN TECHNICIAN

# Foreword

A Program Outline is a SkilledTradesBC Program Standards communication tool. It reflects the full scope of knowledge and skills required to competently perform an occupation anywhere in B.C.

The Program Outline must guide development of curriculum and learning resources because all SkilledTradesBC assessment tools are designed to measure achievement of the competencies and learning tasks it describes for an occupation (e.g., level exams, certification exams, practical assessments).

The Program Outline informs industry, training providers, instructors, the public, apprentices, and sponsors of the occupation's requirements for certification, including:

- The program Credentialing Model
- General Areas of Competence (GACs) and specific competencies required by individuals to perform proficiently in this occupation
- Learning tasks and content that must be mastered in order for an individual to be deemed competent
- Achievement Criteria for demonstrating practical competencies

It further informs technical training delivery regarding:

- Levels at which competence mastery is required
- Suggested time allocation for each topic
- Facility requirements
- Required tools and equipment
- Reference materials
- Instructor qualifications
- Assessment guidelines

Practical demonstration and student participation should always be integrated with classroom sessions. The training program features practical demonstrations of the following:

- Raker
- Asphalt Paver
- Compaction Roller
- Screed
- Milling Machine

Safe working practices, though not always specified in each of the competencies and learning tasks, are an implied part of the program and should be stressed throughout the training.

# Acknowledgements

The Program Outline was prepared with the advice and direction of an industry steering committee convened initially by the BC Road Builders and Heavy Construction Association.

- Jack Davidson, BC Road Builders and Heavy Construction Association (BCRBHCA)
- Kent Orrock, BCRBHCA
- Ken Day, Interoute Construction (Chair, HR Committee)
- Tom Johnson, JJM Group
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Industry Subject Matter Experts retained to assist in the development of Program Outline content:

- Harry Fast, Columbia Bitulithic
- Bill Denault, Imperial Paving
- Kim Percy, BA Blacktop
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- Steve Carter, International Union of Operating Engineers, local 115
- Skip Stothert, RW Blacktop
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- Robin Smith, Columbia Bitulithic

Facilitators:

- Kent Orrock, BCRBHCA
- Lee Middleton, Fulford Harbour Consulting Ltd.
- Bob McConkey, Douglas College
- Dan Wood, Stonecoast Group/Douglas College
- Miriam Mari, Stonecoast Group/Douglas College

SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Asphalt Paving/Laydown Technician occupation.

# How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

| Section | Training Providers | Employers/ Sponsors | Apprentices | Challengers |
|---|---|---|---|---|
| **Program Credentialing Model** | Level 1 Technical Training consists of 120 hours or 4 weeks. Generally the course is 2 weeks of theory followed by 2 weeks of practical.<br><br>During the practical the apprentice is required to learn basic skills for all five endorsable positions of the asphalt team. | Understand the length and structure of the program.<br><br>Work-Based Training requires a minimum of 100% of all the competencies listed for any one endorsement position (i.e., Asphalt Paver, Screed, etc.).<br><br>Work-Based Training also requires the minimum hours listed for the endorsement. These are intended to be the minimum hours required before full competence is considered. Many apprentices may require additional hours before achieving full competence. | Level 1 Technical Training consists of 120 hours or 4 weeks. Generally the course is 2 weeks of theory followed by 2 weeks of practical.<br><br>Upon completion of the In-School Technical Training the apprentice is required to work within the industry, gaining hours and competencies for any of the endorsements (i.e., Raker, Compaction Roller, etc.). The apprentice may be required to achieve additional hours before being considered fully competent for an endorsement. This is due to the fact that not all apprentices will progress at the same pace. | To challenge the Asphalt Paving/Laydown Technician Program an individual must achieve 150% of the required apprentice able hours plus all required practical competencies for the endorsement being challenged. |
| **Program Assessment** | Practical Assessment is completed using the Practical Assessment Form Located in Appendix C of the Asphalt Paving/Laydown Technician Program Instructors Guide. An overall percentage grade must be assessed to each apprentice and sent to the SkilledTradesBC. | Understand the various assessment requirements for the program<br><br>An optional logbook has been developed and is available through Crown Publications BC. It lists and helps track both hours and required competence for each endorsement. | In-School Assessment of a minimum of 70%.<br><br>Certificate of Qualification – SkilledTradesBC invigilated Exam – Minimum 70%<br><br>An optional logbook has been developed and is available through Crown Publications BC. It lists and helps track both hours and required competence for each endorsement. | 150% Documented hours and competencies listed for the endorsement(s) being challenged.<br><br>Certificate of Qualification – SkilledTradesBC invigilated Exam – Minimum 70% |

| Section | Training Providers | Employers/ Sponsors | Apprentices | Challengers |
|---|---|---|---|---|
| **OAC** | Communicate the competencies that industry has defined as representing the scope of the occupation (see OAC) | Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification | View the competencies they will achieve as a result of program completion | Understand the competencies they must demonstrate in order to challenge the program |
| **Training Topics and Suggested Time Allocation** | Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application | Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application | Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application | Understand the relative weightings of various competencies of the occupation on which assessment is based |
| **Program Content** | Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component | Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice | Provides detailed information on program content and performance expectations for demonstrating competency | Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels |
| **Training Provider Standards** | Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program | Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own | Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors | Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment |

# Section 2

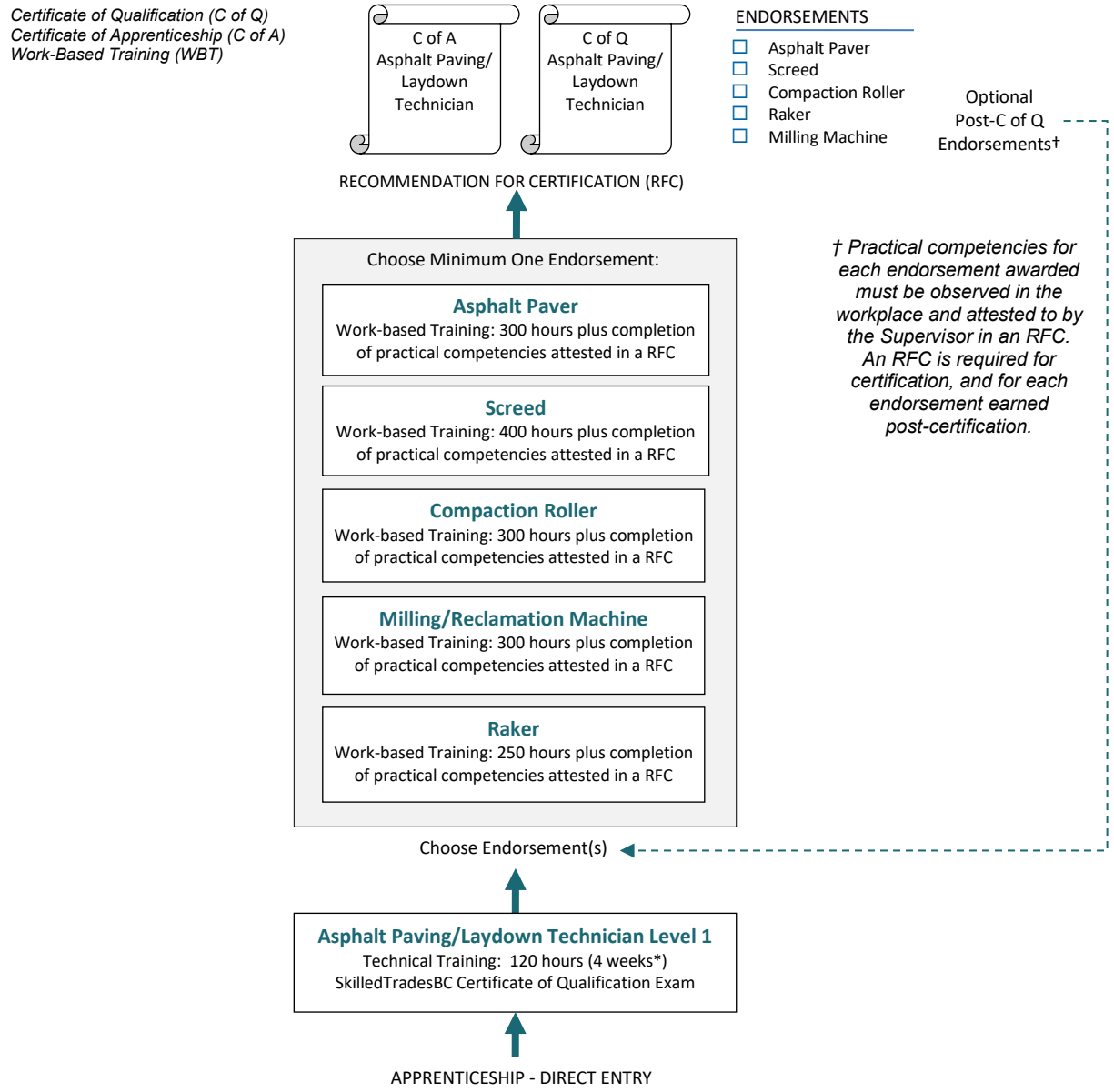
# PROGRAM OVERVIEW

# Asphalt Paving/Laydown Technician

## Program Credentialing Model

## Apprenticeship Pathway

This graphic provides an overview of the Asphalt Paving/Laydown Technician apprenticeship pathway.




**Suggested duration based on 30-hour week*

CROSS-PROGRAM CREDITS

*Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program*

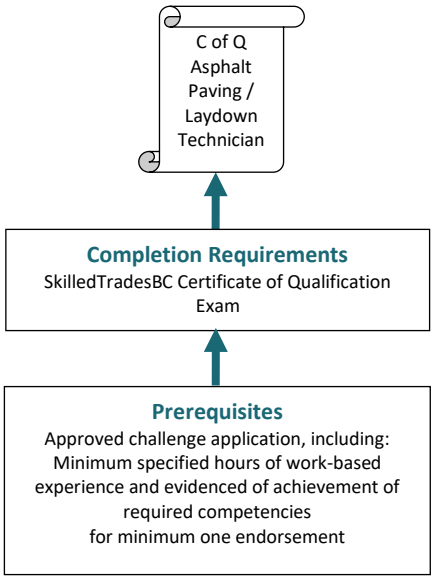
*None*

# Program Credentialing Model

## Challenge Pathway

This graphic provides an overview of the Asphalt Paving/Laydown Technician challenge pathway.

*Certificate of Qualification (C of Q)*




CREDIT FOR PRIOR LEARNING

*Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program*

*None*

# Program Assessment

Apprentices will be assessed fairly and accurately throughout the program on the various skills required to be a professional tradesperson. Assessment activities are designed to provide feedback and allow for further development of skills that have been identified as essential for on-the-job performance.

The forms of assessment used in this program as described below.

| Completion Requirement | Evidence of Achievement | Level of Achievement Required |
|---|---|---|
| Level 1 Technical Training | In school testing and practical assessment | Minimum 70% |
| Work-based training hours | Work-based training report completed by sponsor or employer | Hours plus competencies for any one endorsement.<br><br>Endorsements include:<br>**Asphalt Paver**: 300 hours plus completion of practical competencies<br>**Screed**: 400 hours plus completion of practical competencies<br>**Compaction Roller**: 300 hours plus completion of practical competencies<br>**Raker**: 250 hours plus completion of practical competencies<br>**Milling Machine**: 300 hours plus completion of practical competencies |
| Certificate of Qualification Exam | SkilledTradesBC-administered exam | Minimum 70% |
| Recommendation for Certification | Approval or sign-off by Sponsor, Employer, or other individual with sign-off authority | Declared Competent |

# Occupational Analysis Chart

## ASPHALT PAVING/LAYDOWN TECHNICIAN

**Occupation Description:** Asphalt Paving/Laydown Technicians operate machines that lay, screed, compact or mill surface materials in highway and road construction. They may also operate trucks equipped with road sanding, road oiling and other similar apparatus.

| | | | | | |
|---|---|---|---|---|---|
| **ROAD BUILDING PRINCIPLES AND INTRODUCTION TO PAVING** **A** | Introduction to the paving industry and paving equipment A1 | Describe history of asphalt pavement A2 | Describe paving technology A3 | Describe industry expectations of/for workers A4 | Describe basic road and highway profiles A5 | Describe future paving/ construction trends A6 |
| **ASPHALT PAVING SAFETY** **B** | Safety orientation B1 | Describe safety working around haul trucks B2 | Describe safety working around and operating power brooms B3 | Describe safety working around and operating air hammers B4 | Describe safety working around and operating propane tanks B5 | Describe weather effects and precautions B6 |
| | Describe safety and traffic control procedures B7 | Describe plant site and gravel pit safety B8 | Describe light vehicle transporting procedures B9 | Complete fatigue awareness training B10 | | |
| **ASPHALT PRODUCTION AND PRODUCTS** **C** | Describe crushing process and paving aggregate production C1 | Describe types and specifications of aggregates C2 | Describe asphalt plant operation C3 | Describe asphalt products and uses C4 | | |
| **ASPHALT ENVIRONMENTAL CONSIDERATIONS** **D** | Describe environmentally friendly properties D1 | Describe use of storage areas D2 | Describe asphalt plant and placement emissions D3 | | | |
| **ASPHALT TESTS AND QUALITY CONTROL** **E** | Determine asphalt mix design E1 | Confirm that samples match mix design E2 | Determine haul truck samples E3 | Determine compaction levels E4 | | |

**ROAD STRUCTURES** — F

- Describe drainage, grade and base — F1
- Verify slopes, crowns and grades — F2
- Describe final grade preparation — F3

**END PRODUCT SPECIFICATIONS** — G

- Describe gradation — G1
- Describe oil content — G2
- Describe application — G3
- Describe segregation — G4
- Describe density — G5
- Describe smoothness — G6

**OPERATE MILLING AND RECLAIMING EQUIPMENT** — H

- Describe milling and reclaiming equipment — H1
- Identify milling and reclaiming safety procedures — H2
- Describe milling and reclaiming operator roles and responsibilities — H3
- Perform milling and reclaiming equipment maintenance — H4
- Comply with markers, grades and stakes — H5
- Operate milling and reclaiming equipment — H6
- Follow shut down procedures — H7
- Transport milling and reclaiming equipment — H8

**ASPHALT PAVER OPERATION** — I

- Describe asphalt placement process — I1
- Describe paving machine equipment and attachments — I2
- Apply paver work safety procedures — I3
- Describe asphalt paver operator roles and responsibilities — I4
- Perform paving machine maintenance — I5
- Comply with markers, grades and stakes — I6
- Operate asphalt paver — I7
- Follow shut down procedures — I8
- Transport paver — I9

**ASPHALT SCREED OPERATION** — J

- Describe paving screed and attachments — J1
- Apply screed work safety procedures — J2
- Describe asphalt screed operator roles and responsibilities — J3
- Perform screed maintenance — J4
- Operate asphalt screed — J5
- Follow shut down procedures — J6

| | | | |
|---|---|---|---|
| **RAKING OPERATION** **K** | Describe raker roles and responsibilities K1 | Apply raking safety procedures K2 | Place asphalt hot mix K3 |
| **COMPACTOR OPERATION** **L** | Describe compaction equipment L1 | Apply compaction work safety procedures L2 | Describe asphalt Compaction Roller operator roles and responsibilities L3 |

| | | |
|---|---|---|
| Perform Compaction Roller maintenance L4 | Operate Compaction Roller L5 | Follow shut down procedures L6 |

# Training Topics and Suggested Time Allocation

## ASPHALT PAVING/LAYDOWN TECHNICIAN

| | | | % of Time Allocated to: | | |
|---|---|---|---|---|---|
| | | % of Time | Theory | Practical | Total |
| **Line A** | **ROAD BUILDING PRINCIPLES AND INTRODUCTION TO PAVING** | **3%** | **100%** | **0%** | **100%** |
| A1 | Introduction to the paving industry and paving equipment | | ✓ | | |
| A2 | Describe history of asphalt pavement | | ✓ | | |
| A3 | Describe paving technology | | ✓ | | |
| A4 | Describe industry expectations of/for workers | | ✓ | | |
| A5 | Describe basic road and highway profiles | | ✓ | | |
| A6 | Describe future paving/ construction trends | | ✓ | | |
| **Line B** | **ASPHALT PAVING SAFETY** | **9%** | **90%** | **10%** | **100%** |
| B1 | Safety orientation | | ✓ | | |
| B2 | Describe safety working around haul trucks | | ✓ | ✓ | |
| B3 | Describe safety working around and operating power brooms | | ✓ | ✓ | |
| B4 | Describe safety working around and operating air hammers | | ✓ | | |
| B5 | Describe safety working around and operating propane tanks | | ✓ | ✓ | |
| B6 | Describe weather effects and precautions | | ✓ | | |
| B7 | Describe safety and traffic control procedures | | ✓ | | |
| B8 | Describe plant site and gravel pit safety | | ✓ | | |
| B9 | Describe light vehicle transporting procedures | | ✓ | | |
| B10 | Complete fatigue awareness training | | ✓ | | |
| **Line C** | **ASPHALT PRODUCTION AND PRODUCTS** | **7%** | **100%** | **0%** | **100%** |
| C1 | Describe crushing process and paving aggregate production | | ✓ | | |
| C2 | Describe types and specifications of aggregates | | ✓ | | |
| C3 | Describe asphalt plant operation | | ✓ | | |
| C4 | Describe asphalt products and uses | | ✓ | | |
| **Line D** | **ASPHALT ENVIRONMENTAL CONSIDERATIONS** | **5%** | **100%** | **0%** | **100%** |
| D1 | Describe environmentally friendly properties | | ✓ | | |
| D2 | Describe use of storage areas | | ✓ | | |
| D3 | Describe asphalt plant and placement emissions | | ✓ | | |
| **Line E** | **ASPHALT TESTS AND QUALITY CONTROL** | **6%** | **80%** | **20%** | **100%** |
| E1 | Determine asphalt mix design | | ✓ | | |
| E2 | Confirm that samples match mix design | | ✓ | | |
| E3 | Determine haul truck samples | | ✓ | ✓ | |
| E4 | Determine compaction levels | | ✓ | | |

| | | | % of Time Allocated to: | | |
|---|---|---|---|---|---|
| | | % of Time | Theory | Practical | Total |
| **Line F** | **ROAD STRUCTURES** | **6%** | **60%** | **40%** | **100%** |
| F1 | Describe drainage, grade and base | | ✓ | | |
| F2 | Verify slopes, crowns and grades | | ✓ | ✓ | |
| F3 | Describe final grade preparation | | ✓ | | |
| **Line G** | **END PRODUCT SPECIFICATIONS** | **8%** | **100%** | **0%** | **100%** |
| G1 | Describe gradation | | ✓ | | |
| G2 | Describe oil content | | ✓ | | |
| G3 | Describe application | | ✓ | | |
| G4 | Describe segregation | | ✓ | | |
| G5 | Describe density | | ✓ | | |
| G6 | Describe smoothness | | ✓ | | |
| **Line H** | **OPERATE MILLING AND RECLAIMING EQUIPMENT** | **10%** | **20%** | **80%** | **100%** |
| H1 | Describe milling and reclaiming equipment | | ✓ | | |
| H2 | Identify milling and reclaiming safety procedures | | ✓ | | |
| H3 | Describe milling and reclaiming operator roles and responsibilities | | ✓ | | |
| H4 | Perform milling and reclaiming equipment maintenance | | ✓ | ✓ | |
| H5 | Comply with markers, grades and stakes | | ✓ | ✓ | |
| H6 | Operate milling and reclaiming equipment | | ✓ | ✓ | |
| H7 | Follow shut down procedures | | ✓ | ✓ | |
| H8 | Transport milling and reclaiming equipment | | ✓ | ✓ | |
| **Line I** | **ASPHALT PAVER OPERATION** | **10%** | **20%** | **80%** | **100%** |
| I1 | Describe asphalt placement process | | ✓ | | |
| I2 | Describe paving machine equipment and attachments | | ✓ | | |
| I3 | Apply paver work safety procedures | | ✓ | ✓ | |
| I4 | Describe asphalt paver operator roles and responsibilities | | ✓ | | |
| I5 | Perform paving machine maintenance | | ✓ | ✓ | |
| I6 | Comply with markers, grades and stakes | | ✓ | ✓ | |
| I7 | Operate asphalt paver | | | ✓ | |
| I8 | Follow shut down procedures | | ✓ | ✓ | |
| I9 | Transport paver | | ✓ | ✓ | |
| **Line J** | **ASPHALT SCREED OPERATION** | **10%** | **20%** | **80%** | **100%** |
| J1 | Describe paving screed and attachments | | ✓ | | |
| J2 | Apply screed work safety procedures | | ✓ | ✓ | |
| J3 | Describe asphalt screed operator roles and responsibilities | | ✓ | | |
| J4 | Perform screed maintenance | | ✓ | ✓ | |
| J5 | Operate asphalt screed | | ✓ | ✓ | |
| J6 | Follow shut down procedures | | ✓ | ✓ | |
| **Line K** | **RAKING OPERATION** | **10%** | **20%** | **80%** | **100%** |
| K1 | Describe raker roles and responsibilities | | ✓ | | |
| K2 | Apply raking safety procedures | | ✓ | ✓ | |

| | | | % of Time Allocated to: | | |
|---|---|---|---|---|---|
| | | % of Time | Theory | Practical | Total |
| K3 | Place asphalt hot mix | | ✓ | ✓ | |
| **Line L** | **COMPACTOR OPERATION** | **16%** | **20%** | **80%** | **100%** |
| L1 | Describe compaction equipment | | ✓ | | |
| L2 | Apply compaction work safety procedures | | ✓ | ✓ | |
| L3 | Describe asphalt Compaction Roller operator roles and responsibilities | | ✓ | | |
| L4 | Perform Compaction Roller maintenance | | ✓ | ✓ | |
| L5 | Operate Compaction Roller | | ✓ | ✓ | |
| L6 | Follow shut down procedures | | ✓ | ✓ | |
| | **Total Percentage for Asphalt Paving/Laydown Technician** | **100%** | | | |

# Section 3

# PROGRAM CONTENT

# Asphalt Paving/Laydown Technician

# Level 1

# Asphalt Paving/Laydown Technician

## Line (GAC): A ROAD BUILDING PRINCIPLES AND INTRODUCTION TO PAVING

**Competency: A1 Introduction to the paving industry and paving equipment**

### Objectives

To be competent in this area, the individual must be able to understand roads construction history and the relationship between governing bodies and the contractors.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe paving and what types of equipment are used | • Basic process from pit to finished product |
| 2. Describe how roads were originally created | • Basic overview of history |
| 3. Describe the importance of roads | • Infrastructure |
| 4. Describe provincial road paving resources | • Gravel, aggregates |
| 5. Explain who uses paving | • Recreation, trade, we all rely on it |
| 6. Demonstrate understanding of relevant statistics | • Size of industry<br>• Economics<br>• Number of employers |
| 7. Describe other types of roads | • Ice roads, etc. |
| 8. Review relevant regulations and funding | • Government regulations like EPS, MMCD, etc. |
| 9. Discuss environmentally friendly | • Asphalt vs. concrete |

## Line (GAC): A ROAD BUILDING PRINCIPLES AND INTRODUCTION TO PAVING

**Competency: A2 Describe history of asphalt pavement**

### Objectives

To be competent in this area, the individual must be able to understand the progress and evolution of road construction techniques.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe evolution of roads | • Ancient roads e.g., Appian Way and their evolution |
| 2. Describe products used | • Original paving materials<br>• Methods of application<br>• Evolution as asphalt |
| 3. Describe logging roads | • “Corduroy” roads<br>• Logging roads |
| 4. Explain methods of placement | • Modern methods |
| 5. Rationale for more roads | • WWII and Cold War<br>• Movement of goods |

## Line (GAC): A ROAD BUILDING PRINCIPLES AND INTRODUCTION TO PAVING

**Competency: A3 Describe paving technology**

### Objectives

To be competent in this area, the individual must be able to understand the process of paving technology from the plant to the train.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe two types of asphalt plants | • Drum<br>• Batch |
| 2. Describe asphalt ingredients | • Processed gravel<br>• Asphalt cement<br>• Oil and additives |
| 3. Discuss required resources | • Quarries<br>• Pits |
| 4. Describe liquids used in asphalt production | • Group A / C – 85-100 Pen – typical PG 72-22 – altered oil |
| 5. Describe asphalt recycling technology | • Conventional<br>• Green Technologies |
| 6. Describe the asphalt “Train” | • Hot in place |

## Line (GAC): A ROAD BUILDING PRINCIPLES AND INTRODUCTION TO PAVING

**Competency: A4 Describe industry expectations of/for workers**

### Objectives

To be competent in this area, the individual must be able to:

- Understand the roles of each person in a paving team.
- Understand the professional expectations of this team.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Explain the importance of Health and Safety | • Content |
| 2. Define types of paving jobs | • Raker<br>• Screed<br>• Asphalt Paver<br>• Compaction Roller<br>• Milling machine, etc. |
| 3. Explain license requirements for paving equipment operators | • BC class 5 required to operate vehicles |
| 4. Demonstrate professionalism | • Pride in the projects |
| 5. Explain employer's responsibility to provide a safe environment | • To help maintain safe environment |
| 6. Describe advancement opportunities | • Progression from labourer |
| 7. Describe job security | • Job security based on high demand for skilled operators |
| 8. Explain role of organized Labour | • Role of unions in the industry – collective bargaining process overview |
| 9. Review working conditions | • Long hours (nights, weekends), seasonal work<br>• Environment (outdoor/ weather conditions, dust/ fumes) |

## Line (GAC): A ROAD BUILDING PRINCIPLES AND INTRODUCTION TO PAVING

**Competency: A5 Describe basic road and highway profiles**

**Objectives**

To be competent in this area, the individual must be able to:

- Understand the categories of road construction projects.
- Understand basic specifications for roads as defined by MOT, MMCD and local government.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Review categories of projects | • Commercial<br>• Industrial<br>• Residential<br>• Provincial |
| 2. Describe types of owners | • Provincial<br>• Federal<br>• Municipal<br>• Private |
| 3. Describe common types of asphalt work | • Open ditch road/shoulder<br>• Sidewalk<br>• Curb and gutter (contained)<br>• Crowns<br>• Graders<br>• Runoff<br>• Super elevations |
| 4. Review specifications for different types of roads | • MOT, MMCD, Local Government, Architectural (building specific) |
| 5. Describe cross section of road | • Elements to consider<br>  ○ Civil work<br>  ○ Prep for paving |

## Line (GAC): A ROAD BUILDING PRINCIPLES AND INTRODUCTION TO PAVING

**Competency: A6 Describe future paving/construction trends**

**Objectives**

To be competent in this area, the individual must be able to understand the paving trends for the future.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe green roads | • Pave stones<br>• Porous asphalt<br>• Recycling |
| 2. Describe new paving materials | • Epoxy, coloured, modified asphalt |
| 3. Describe new sub-bases | • Pumice |
| 4. Describe floating roads | • Styrofoam |
| 5. Describe added value enhancements | • Street print |

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B1 Safety orientation**

### Objectives

To be competent in this area, the individual must be able to understand and demonstrate safe working practices.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe PPE | • Workers are responsible to provide general purpose gloves, safety footwear, hard hat<br>• Employers are responsible for providing all other safety items<br>• Employers must ensure that PPE is properly worn when required, and is cleaned, inspected, maintained<br>• Employers must ensure that workers are adequately trained: correct use, limitations, maintenance |
| 2. Describe hazard assessment | • Chemical: inhalation (e.g. carbon monoxide, hydrogen sulphide, welding fumes, asbestos), ingestion, absorption, injection (i.e. high pressure fluids)<br>• Sensory: noise, vibration, heat, cold<br>• Environmental: bacteria, micro organisms, viruses<br>• Physical: repetitive stain, strains and sprains, back injuries, trauma, etc. |
| 3. Describe key elements of safety policy | • Safety orientation (company manuals) |
| 4. Describe required certifications | • WHMIS, First Aid |
| 5. Describe safe rigging practices | • WorkSafeBC rigging requirements (Part 15) |
| 6. Describe industry/site and equipment specific risks | • The most common cause of injury (slips and falls)<br>• Hearing loss: gradual exposure (long term) or traumatic injury (explosion, impact noises) crushing/ impact<br>• Underground and overhead services and hazards (BC hydro 7 steps, BC 1Call)<br>• Motor vehicle accidents are common in the workplace<br>• Burns from hot substances or objects |

| LEARNING TASKS | CONTENT |
|---|---|
| | • Batteries, tires, pressurized hydraulic and fuel systems<br>• Inexperience and lack of training – working beyond your limits<br>• Complacency, boredom, inattention, lack of focus on safety<br>• Drugs and alcohol |
| 7. Describe how to secure site and equipment for public safety | • Vandal proof take ancillary parts off<br>• Park safely block elevated equipment, use parking brakes and chocks |

## Line (GAC) B ASPHALT PAVING SAFETY

**Competency: B2 Describe working safely around haul trucks**

**Objectives:**

To be competent in this area, the individual must be able to understand and demonstrate safe working practices while working around haul trucks.

| LEARNING TASKS | CONTENT |
|---|---|
| 1 Describe consequences of lapses in communication | • Maintain eye contact |
| 2 Identify equipment specific hazards | • Pinch points<br>• Blind spots<br>• Machine cleanliness |

**Achievement Criteria**

Performance — Learner will demonstrate safe working practices while working with and around haul trucks.

Conditions — This competency will be measured both in technical training and within the workplace. Learners will use suitable communication skills with the haul truck operator.

- direct eye contact
- appropriate hand signals
- radio communication

The learner will demonstrate awareness general safety issues while working with or near halt trucks

- blind spots,
- pinch points
- turning radius
- overhead clearances.

Criteria — Ground workers will position themselves so that they remain in a safe location during the process of directing the truck to the work area.

Paver operators will ensure that the area between the haul truck and the paver remain clear of workers and/or equipment.

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B3 Describe safety working around and operating power brooms**

### Objectives

To be competent in this area, the individual must be able to understand and demonstrate safe working practices while working around power brooms.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe effects of noise and dust | • Use proper PPE including Hi-Vis and dust mask |
| 2. Describe dangers associated with vehicle movement | • Power brooms move quickly, collision hazard |
| 3. Describe dangers associated with moving parts | • Spinning brushes and attachments can cause injury |

### Achievement Criteria

| | |
|---|---|
| Performance | Learner will demonstrate safe working practices while working with and around power brooms.<br>This competency will be measured both in technical training and within the workplace. |
| Conditions | The learner will use proper PPE and position themselves in a safe area during sweeping procedures. |
| Criteria | The learner will consistently demonstrate the correct use of PPE's and choice of safe location during sweeping procedures. |

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B4 Describe safety working around and operating air hammers**

### Objectives

To be competent in this area, the individual must be able to understand and demonstrate safe working practices while working with air hammers.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe noise and vibration hazards | • Use proper PPE including hearing protection |
| 2. Describe hazards of flying debris | • Keep clear to avoid being hit by flying debris |
| 3. Describe ergonomics and safe equipment handling | • Air hammers are heavy, care must be taken to avoid strain while operating or stowing |

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B5 Describe safety working around and operating propane tanks**

### Objectives

To be competent in this area, the individual must be able to understand and demonstrate safe working practices while operating propane tanks.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Identify potential fire hazards while working around propane tanks | • Discuss properties of compressed gas including explosion/fire |
| 2. Demonstrate proper storage and handling | • Secure for transport<br>• Stow attachments e.g., Tiger Torch |
| 3. Demonstrate proper connection procedures and check for leaks | • Use of soapy solution to check for leaks<br>• Proper connection of threaded fittings |

### Achievement Criteria

| | |
|---|---|
| Performance | Learner will demonstrate safe working practices while working with propane bottles and attachments.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will demonstrate correct connection procedures (bottle to attachment), check for leaks and demonstrate correct securing procedures for stowing and transport of bottles and attachments. |
| Criteria | The learner will demonstrate the proper connection, securement and storage procedures.<br>The learner will check for leaks at fittings. |

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B6 Describe weather effects and precautions**

### Objectives

To be competent in this area, the individual must be able to understand the effects of weather with regard to safety and will know how to take safety precautions to protect ones self.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe the effects of temperature on the body | • Excess heat can cause exhaustion<br>• Radiant heat from pavement |
| 2. Describe the importance of proper hydration | • Drink plenty of fluids, especially during asphalt laydown<br>• Recognize signs and treatment of heat exhaustion and heat stroke |
| 3. Define effects of exposure to direct sun | • Risk of skin cancer<br>• Use proper protective clothing, hats, etc<br>• Use sunscreen |

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B7 Describe safety and traffic control procedures**

### Objectives

To be competent in this area, the individual must be able to understand traffic control signage and safety procedures.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe traffic control procedures (TCP) Certification | • Certification process Radiant heat from pavement |
| 2. Review TCP training content | • Summary of TCP course content |
| 3. Review TCP regulations | • Number of TCPs required<br>• Signage<br>• Signals<br>• Communication |

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B8 Describe plant site and gravel pit safety**

### Objectives

To be competent in this area, the individual must be able to understand the hazards associated to an asphalt plant and gravel pit.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Define noise hazards and precautions | • Hearing protection |
| 2. Describe site specific hazards | • Crushing<br>• Moving equipment<br>• Flying debris<br>• Dust |

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B9 Describe light vehicle transporting procedures**

### Objectives

To be competent in this area, the individual must be able to understand general company and provincial rules regarding vehicular transportation.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe procedures for transportation of vehicles under 5000 kg | • Follow company safety rules |
| 2. Describe procedures for transportation of vehicles over 5000 kg | • Transport Canada rules apply |

## Line (GAC): B ASPHALT PAVING SAFETY

**Competency: B10 Complete fatigue awareness training**

### Objectives

To be competent in this area, the individual must be able to understand and complete fatigue awareness training.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Define mental fatigue | • Combination of cumulative sleep debt and the time of day circadian rhythms |
| 2. Define a work schedule that helps reduce fatigue | • Work schedules need to be designed properly to reduce the risk of creating cumulative or acute sleep debt |
| 3. Discuss available training | • Examine sources of fatigue awareness training e.g., www.Shiftwork.ca |

## Line (GAC): C ASPHALT PRODUCTION AND PRODUCTS

**Competency: C1 Describe crushing process and paving aggregate production**

### Objectives

To be competent in this area, the individual must be able to understand the processes of crushing and aggregate plants.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe gravel pits, quarries | • Types of pits |
| 2. Describe crushing equipment | • Jaw, cone, impact |
| 3. Describe the screen | • Description and purpose |
| 4. Describe conveyors | • Types of conveyors |
| 5. Describe feeders | • Description and purpose |
| 6. Explain stockpiling and handling | • How materials is stored prior to use |
| 7. Describe washing procedures | • Methods and purpose |
| 8. Describe types of aggregate transportation | • Barge and trucking and rail cars |

## Line (GAC): C ASPHALT PRODUCTION AND PRODUCTS

**Competency: C2 Describe types and specifications of aggregates**

### Objectives

To be competent in this area, the individual must be able to understand the basic characteristics of asphalt construction products.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe aggregate processing | • Screening<br>• Crushing<br>• Washing |
| 2. Describe characteristics | • Permeability<br>• Load bearing<br>• Resistance to shearing<br>• Gradation<br>• Plastic limit<br>• Liquid limit |
| 3. Describe common products | • Describe characteristics and most common uses for each<br>  ○ Pit run<br>  ○ Screened road base 3” minus<br>  ○ Bedding sand<br>  ○ Crushed road mulch<br>  ○ Asphalt aggregates<br>  ○ Drain rock<br>  ○ Chips, driveway chips<br>  ○ Recyled asphalt<br>  ○ Concrete sand, C33<br>  ○ Stucco sand |

## Line (GAC): C ASPHALT PRODUCTION AND PRODUCTS

**Competency: C3 Describe asphalt plant operation**

### Objectives

To be competent in this area, the individual must be able to understand the basic processing functions between a drum plant and a batch plant.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe the operation of a drum plant | • Cold feeds<br>• Conveyor systems<br>• Mixing process<br>• Storage silo<br>• Load out |
| 2. Describe the operation of a batch plant | • Cold feeds<br>• Hot stone elevator<br>• Screen deck<br>• Hot bins<br>• Weigh bins<br>• Pug mill<br>• Slat conveyor |

## Line (GAC): C ASPHALT PRODUCTION AND PRODUCTS

**Competency: C4 Describe asphalt products and uses**

### Objectives

To be competent in this area, the individual must be able to understand where and how to find product information as described in the appropriate ministry regulations.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe the key elements of the MMCD | • Master Municipal Contract Documents |
| 2. Describe the role of the MOT | • Ministry of Transport<br>• Quality control<br>• Quality assurance<br>• Quality audit |
| 3. Describe the role of the DOT | • Department of Transport<br>• Design build standards for highways contruction |
| 4. Describe Engineer Specs | • Apply to private property |
| 5. Describe role of Architect | • Variety of publications |
| 6. Describe other asphalt and paving materials | • Paving blocks/stones<br>• Green roads<br>• Concrete |

## Line (GAC): D ASPHALT ENVIRONMENTAL CONSIDERATIONS

**Competency: D1 Describe environmentally friendly properties**

### Objectives

To be competent in this area, the individual must be able to understand the environmentally friendly properties of asphalt.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Define Green properties of asphalt | • Not toxic when laid<br>• Does not leach<br>• Can be recycled<br>• Can be used with other materials and used again: RAP [Recycled Asphalt Products] |

## Line (GAC): D ASPHALT ENVIRONMENTAL CONSIDERATIONS

**Competency: D2 Describe use of storage areas**

### Objectives

To be competent in this area, the individual must be able to understand the appropriate storage considerations for asphalt products.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe Type 1 storage | • Spill contained areas – dangerous goods (tank and containment pool)<br>• Fuels (diesel bunker)<br>• Waste<br>• Primer and SS1<br>• Natural gas<br>• Asphalt oils |
| 2. Describe Type 2 storage | • Self contained<br>• Liquid asphalt<br>• Fuels (bio diesel) |
| 3. Describe use of recycled materials in hot mix asphalt | • Cost savings<br>• Mobile recycling |
| 4. Describe use of recycled materials in asphalt plant burners | • Temperature<br>• Handling precautions |

## Line (GAC): D ASPHALT ENVIRONMENTAL CONSIDERATIONS

**Competency: D3 Describe asphalt plant and placement emissions**

### Objectives

To be competent in this area, the individual must be able to understand emissions regulations and control systems for asphalt plants and placement.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Discuss role of Metro Vancouver (formerly GVRD) in enforcement and regulation of emissions | • 21 communities |
| 2. Describe role of MOE in establishing regulations | • Provincial regulations |
| 3. Describe use of Bag house | • Dust collection technologies |
| 4. Describe emission controls | • Heating asphalt |

## Line (GAC): E ASPHALT TESTS AND QUALITY CONTROL

**Competency: E1 Determine asphalt mix design**

**Objectives**

To be competent in this area, the individual must be able to understand mix design.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe asphalt/aggregate composition | • Marshall method<br>• Super pave method |
| 2. Describe types of mix designs | • Mix |
| 3. Describe mix temperature characteristics | • Hot mix asphalt HMA – upper and lower<br>• Warm mix asphalt (WMA)<br>• Cold mix aspalt |

## Line (GAC): E ASPHALT TESTS AND QUALITY CONTROL

**Competency: E2 Confirm that samples match mix design**

### Objectives

To be competent in this area, the individual must be able to understand how to confirm and match mix design at plant.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe aggregate sampling | • Weigh bins |
| 2. Describe belt sampling | • Drum mixer |
| 3. Describe lab tests | • Sample of mix to lab |
| 4. Describe the process of taking mix temperature readings | • Temperature measurement tools and recording equipment |

## Line (GAC): E ASPHALT TESTS AND QUALITY CONTROL

**Competency: E3 Determine haul truck samples**

### Objectives

To be competent in this area, the individual must be able to understand how to confirm and match mix design at truck.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe mix sampling | • Confirmation<br>  ○ Of an asphalt sample<br>  ○ Temperature test<br>  ○ Extraction/gradation test |
| 2. Describe quality control | • Requirement: truck sample randomly taken at job site (by testing agency or company of certified) |
| 3. Describe how to bag samples | • For backup |

### Achievement Criteria

| | |
|---|---|
| Performance | Learner will demonstrate how to accurately take a representative sample at the jobsite.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will demonstrate correct sampling procedures. |
| Criteria | The learner will demonstrate the ability to take a representative samples at the jobsite using various sampling locations.<br>The learner will demonstrate correct bagging procedures. |

## Line (GAC): E ASPHALT TESTS AND QUALITY CONTROL

**Competency: E4 Determine compaction levels**

### Objectives

To be competent in this area, the individual must be able to understand two methods to determine compaction levels.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe two methods to determine compaction | • Nuclear densometer<br>• In situ coring sample |

### Achievement Criteria

| | |
|---|---|
| Performance | Learner will achieve a minimum grade of 70% on a quiz including questions covering content from each learning task. |
| Conditions | N/A |
| Criteria | N/A |

## Line (GAC): F ROAD STRUCTURES

**Competency: F1 Describe drainage, grade and base**

**Objectives**

To be competent in this area, the individual must be able to understand basic pre-asphalt road construction.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe proper road drainage | • Environmental considerations |
| 2. Describe sub grade | • Existing soil conditions<br>• Geo-textiles |
| 3. Describe sub-base | • Aggregation and alternative materials |
| 4. Describe base | • Virgin product<br>• Quary, pit or dredge or river extraction/material<br>• Recycled products |

## Line (GAC): F ROAD STRUCTURES

**Competency: F2 Verify slopes, crowns and grades**

### Objectives

To be competent in this area, the individual must be able to understand how to verify basic road grade, crown and slope.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Confirm plans/blueprints | • Metric and Imperial measurement<br>• Scale<br>• Abbreviations, symbols common to civil drawings<br>• Distinguish horizontal distance from slope distance |
| 2. Define role of Surveyor | • Determine cuts and fills of road construction at specified centerline points on profile<br>• Determine depth of pipe at specified points<br>• Calculate the volume of aggregate types allowing for settlement i.e. road base or pipe bedding<br>• Create material lists i.e. pipe, valves, etc. |
| 3. Define role of Grade Person | • Transfers info to offset stakes |
| 4. Perform typical calculations | • Use 'real world' examples of plan sets to describe drawings<br>• Plan view: drawing with the view from overhead<br>• Profile view: drawing of side view with the vertical scale exaggerated, usually 10x the horizontal scale; showing original ground and design grades of roads, pipe, manholes, culverts, bridges; cuts and fills shown are at the centerline only; often on the same page as a plan view aligned on the same horizontal scale<br>• Section: drawing of a 'slice' of works at right angle to the centerline with the same horizontal and vertical scale<br>• Additional features of drawings: scale, north orientation, legends, creation and revision dates, "created by" info, detail drawing insertions |

**Achievement Criteria**

| | |
|---|---|
| Performance | Learner will demonstrate basic knowledge and use of various grade-measuring instruments.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will demonstrate the use of:<br>• Spirit levels<br>• Builders levels<br>• Laser level<br>• Automatic slope control |
| Criteria | The learner will maintain specified grade and slope. |

## Line (GAC): F ROAD STRUCTURES

**Competency: F3 Describe final grade preparation**

### Objectives

To be competent in this area, the individual must be able to understand final grade preparations to road structures.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe how to check and raise utilities | • Describe methods of raising castings and related traffic control issues |
| 2. Describe fine grading | • Discuss fine grading, soil compaction and surface preparation |
| 3. Describe boning crown/cross-fall | • Ensure crown and cross-fall specifications are understood and proper calibrations made to equipment |
| 4. Describe limit of asphalt layout | • Determine width of finished mat |

## Line (GAC): G END PRODUCT SPECIFICATIONS

**Competency: G1 Describe gradation**

### Objectives

To be competent in this area, the individual must be able to understand the quality control plan as it relates to MOT and the general ministry audit process.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe MOT Specs | • Review Part A General including definitions<br>• Preparing a Quality Control Plan for evaluation before commencing the Work and providing at the production site a testing facility to provide the data needed to implement that plan<br>• Supplying, screening, crushing, processing and improving aggregate to produce asphalt mix aggregate<br>• Supplying and delivering asphalt cement and spray primer meeting the requirements of Section 952<br>• Preparing mix designs which, once verified by the Ministry Representative, become the basis for the accepted Job Mix Formula<br>• Heating the asphalt mix aggregate and mixing it with asphalt cement to produce asphalt mix that meets the Job Mix Formula<br>• Hauling, placing, compacting and finishing the asphalt mix |
| 2. Describe the audit process | • Quality control plan requirements |
| 3. Describe penalty/bonus | • Ensure crown and cross-fall specifications are understood and proper calibrations made to equipment |
| 4. Describe limit of asphalt layout | • Discuss payment adjustment form Part B of section 502<br>• Review Table 502-G |

## Line (GAC): G END PRODUCT SPECIFICATIONS

**Competency: G2 Describe oil content**

### Objectives

To be competent in this area, the individual must be able to understand Section 502 of the MOT Design Build Specifications for Highway Construction regulations as it relates to oil content.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Define Section 502 | • Oil content requirements |

## Line (GAC): G END PRODUCT SPECIFICATIONS

**Competency: G3 Describe application**

### Objectives

To be competent in this area, the individual must be able to understand Section 502 of the MOT Design Build Specifications for Highway Construction regulations as it relates to asphalt applications.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Define Section 502 | • Asphalt application standards |

## Line (GAC): G END PRODUCT SPECIFICATIONS

**Competency: G4 Describe segregation**

### Objectives

To be competent in this area, the individual must be able to understand Section 502 of the MOT Design Build Specifications for Highway Construction regulations as it relates to segregation of product.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Define Section 502 | • Segregation of asphalt |

## Line (GAC): G END PRODUCT SPECIFICATIONS

**Competency: G5 Describe density**

### Objectives

To be competent in this area, the individual must be able to understand Section 502 of the MOT Design Build Specifications for Highway Construction regulations as it relates density.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Define Section 502 | • Density specifications |

## Line (GAC): G END PRODUCT SPECIFICATIONS

**Competency: G6 Describe smoothness**

### Objectives

To be competent in this area, the individual must be able to understand Section 502 of the MOT Design Build Specifications for Highway Construction regulations as it relates asphalt smoothness.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Define Section 502 | • Smoothness standards |

## Line (GAC): H OPERATE MILLING AND RECLAIMING EQUIPMENT

**Competency: H1 Describe milling and reclaiming equipment**

### Objectives

To be competent in this area, the individual must be able to understand the functions, mechanical components and systems of the milling machine.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe milling equipment | • Reference manufacturers and equipment available<br>• Reference brochures, videos, etc. |
| 2. Describe the function of milling equipment | • Milling: Profiling<br>• Reclaiming: total reclaiming of existing materials<br>• Material injection<br>• Stabilized base<br>• Foamed asphalt<br>• Reclaim, grade, pave |
| 3. Describe major mechanical components | • Major components checklist<br>• Identify and describe function from list of major components |
| 4. Describe potential failures, symptoms and indicators of failure | • Symptoms: noise, vibration, smell, leaks, cracks<br>• Respond appropriately: service required, immediate repair required, immediate removal from service |

## Line (GAC): H OPERATE MILLING AND RECLAIMING EQUIPMENT

**Competency: H2 Identify milling and reclaiming safety procedures**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe how to work safely while working on and around a milling machine. This will include understanding key regulations, machine limitations, operating procedures and tasks and the use of PPE's.
- Comply with safety requirements at all times during this course.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Interpret and follow job plan | • Communication of plan<br>  ○ Path<br>  ○ Pattern<br>  ○ Depth<br>  ○ Passes |
| 2. Demonstrate awareness of machine-specific safety | • Dust, pressure (machine malfunctions/ kickbacks) blind spots, fumes, hydraulic line, noise<br>• Block outs |
| 3. Describe Traffic Control requirements | • Number of TCP's required<br>• Signage<br>• Signals<br>• Communication |
| 4. Describe proper PPE | • Workers are responsible to provide general purpose gloves, safety footwear, hard hat - employers are responsible for providing all other safety items<br>• Employers must ensure that PPE is properly worn when required, and is cleaned, inspected, maintained<br>• Employers must ensure that workers are adequately trained: correct use, limitations, maintenance |
| 5. Describe lockout procedures | • Fuel supply<br>• Battery lockout, etc. |
| 6. Describe how to secure equipment for safety | • Vandal proof take ancillary parts off<br>• Park safety block elevated equipment, use parking brakes and chocks |

## Line (GAC): H OPERATE MILLING AND RECLAIMING EQUIPMENT

**Competency: H3 Describe milling and reclaiming operator roles and responsibilities**

### Objectives

To be competent in this area, the individual must be able to understand the roles and responsibilities of each of the team members of a milling crew.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe the role of Milling Machine Operator | • Top end |
| 2. Describe the role of ground men | • Operating depth of drum<br>• Assume profile depth, quality of job<br>• Keep trucks in line, laser guided controls, set controls<br>• Team contolling function<br>• Cooperation is key |
| 3. Demonstrate hand signals communication | • Not standardized |

## Line (GAC): H OPERATE MILLING AND RECLAIMING EQUIPMENT

**Competency: H4 Perform milling and reclaiming equipment maintenance**

### Objectives

To be competent in this area, the individual must be able to perform regular daily maintenance on the milling machine.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Service lubrication system (greasing) | • Identify and lube all points<br>• Load grease gun<br>• Note: point out all that employers differ, but the following guidelines are reasonable<br>• 2-3 shots for small areas: fan bearings, small U joints, linkages, hinges, etc.<br>• 8-10 shots for common pins and bushings<br>• 20 shots where one nipple feeds large areas<br>• Every pin must be showing excess grease<br>• Daily for most points/weekly for some<br>• Wipe off nipples before greasing to reduce abrasive particles entering pin/bushing |
| 2. Service air intake system as required (air filters / pre cleaners) | • Restriction indicators<br>• Pre cleaner service<br>• Cleaning vs. replacement, check policy<br>• Use air only with reduced pressure |
| 3. Drain fuel tank sump, water separator fuel filters if equipped | • Drain, assess<br>• Water, debris, scale, etc. |
| 4. Add fluids as required | • Indetify correct fluids for each components<br>• Add fluids as required<br>• Avoid contamination with dirt, water<br>• Describe 2 sided dipsticks with levels for stopped/idling (CAT engines, transmissions) |
| 5. Inspect and clean components as required | • Radiation and oil cooler<br>• Filter plugs, dipstick<br>• Battery terminals |
| 6. Perform housekeeping tasks | • Garbage<br>• Excess grease<br>• General cleanliness |

### Achievement Criteria

| | |
|---|---|
| Performance | The learner will perform regular daily maintenance on the milling machine.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will demonstrate all elements of daily maintenance. |
| Criteria | The learner will demonstrate a minimum of 80% efficiency using a checklist. |

## Line (GAC): H OPERATE MILLING AND RECLAIMING EQUIPMENT

**Competency: H5 Comply with markers, grades and stakes**

### Objectives

To be competent in this area, the individual must be able to describe and apply job control and basic engineering knowledge.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe abbreviations used on stakes | • Abbreviations commonly used on stakes<br>  ○ B/M - bench mark<br>  ○ C - cut<br>  ○ C/B - catch basin<br>  ○ SMH - sanitary manhole<br>  ○ Elv or EL - elevator<br>  ○ F/G - finish grade<br>  ○ P/L - property line<br>  ○ R/W - right of way<br>  ○ SAN or S - sanitary<br>  ○ Mon - monument<br>  ○ G - gas<br>  ○ PVC - poly vinyl chloride |
| 2. Interpret stakes | • Interpret common types of staking<br>  ○ Property line, iron pins<br>  ○ Centre line, stationing<br>  ○ Offset<br>  ○ Cut, fill<br>  ○ Grade<br>  ○ Slope<br>  ○ Reference point<br>  ○ Bench marks, temporary bench marks: geodetic and referenced to assumed elevations<br>  ○ Survey menument: geodetic, precise, permanent, protected by law<br>  ○ Cross-heads<br>  ○ Location of work, e.g., manholes, catch, basins, headwalls, etc. |

### Achievement Criteria

Performance — Learner will demonstrate job control and basic engineering knowledge.
Learner will demonstrate safe practices during practical training and on the job.

Conditions — The learner will apply information from the stakes to determine

- C - cut
- C/B - catch basin
- SMH - sanitary manhole
- Elv or EL - elevator
- F/G - finish grade
- G - gas
- Centre line, stationing
- Offset
- Cut, fill
- Grade
- Slope

Criteria — The learner will be capable of maintaining

- C - cut
- C/B - catch basin
- SMH - sanitary manhole
- Elv or EL - elevator
- F/G - finish grade
- G - gas
- Centre line, stationing
- Offset
- Cut, fill
- Grade
- Slope

## Line (GAC): H OPERATE MILLING AND RECLAIMING EQUIPMENT

**Competency: H6 Operate milling and reclaiming equipment**

### Objectives

To be competent in this area, the individual must be able to perform basic operating functions during practical training.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Plan job | • Discuss the importance of proper planning<br>• Follow plan for practical in-school training |
| 2. Position the machine | • Manoeuvre machine into position to begin milling<br>• Position haul truck for material collection |
| 3. Engage teeth | • Lower cutting wheel |
| 4. Move forward | • Follow the line (could be a string, paint, or previous cut) |
| 5. Make adjustments | • Avoid adjustments if possible – when necessary do not make dramatic adjustments |
| 6. Control depth | • Proper use of depth controls, set according to job requirements |
| 7. Set Controls | • Proper speed, depth and angle for job requirements |

### Achievement Criteria

Performance: The learner will demonstrate basic operating functions.
Learner will demonstrate safe practices during practical training and on the job.

Conditions: To complete the in school practical and jobsite requirement for the milling machine, the learner must be able to demonstrate the following practical skills:

- Demonstrate the safe operation of equipment including observation of surroundings
- Perform pre-start checks, start-up/shut-down procedures and monitor performance of the equipment
- Perform daily maintenance tasks

Criteria

Perform basic moves with equipment including

- Move forward, stop, back up, stop (flat elevation)
- Apply park brake, lock out
- Raise, lower and swing conveyor (making sure to observe for wires)
- Set controls for proper depth of cut
- Mill a reasonable section of asphalt or compacted gravel to give trainee a “feel” for the equipment – site conditions will dictate actual extent of simulated milling
- Demonstrate effective communication, teamwork
- Follow the line (painted line or previous cut)

Communicate with haul truck driver (note: some training sites set up milling machine for side discharge with no haul truck present)

## Line (GAC): H OPERATE MILLING AND RECLAIMING EQUIPMENT

**Competency: H7 Follow shut down procedures**

### Objectives

To be competent in this area, the individual must be able to perform correct shut down procedures for the milling machine.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Perform shut down procedures | • Position that allows access in case of mechanical trouble at start up<br>• Safe parking position, set parking brake<br>• Level position for checking of fluids<br>• Cool down before shut down<br>• Walk around, look for leaks, general check secure manchine, locks, etc. |

### Achievement Criteria

| | |
|---|---|
| Performance | The learner will demonstrate correct shut down procedures for the milling machine. |
| Conditions | The learner will follow shutdown procedure as listed by the manufacturers guidelines. |
| Criteria | The learner will demonstrate a minimum of 80% efficiency using a checklist |

## Line (GAC): H OPERATE MILLING AND RECLAIMING EQUIPMENT

**Competency: H8 Transport milling and reclaiming equipment**

### Objectives

To be competent in this area, the individual must be able to understand the correct transport procedures for the milling machine.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe roles and responsibilities | • Truck driver is usually responsible for transporting equipment |
| 2. Prepare machine for transport | • Remove attachments<br>• Secure equipment<br>• Ensure all guards are in place |
| 3. Describe loading and unloading procedures | • Operator is usually involved in loading/unloading<br>• Use of tie-downs<br>• Safe movement of machine on/off trailer |

### Achievement Criteria

| | |
|---|---|
| Performance | The learner will demonstrate safe practices while preparing machine for transport. Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will prepare the machine for transport using appropriate tools and equipment to manufactures specification. |
| Criteria | The learner will be able to secure and prepare a machine for transport within a given time frame. |

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I1 Describe asphalt placement process**

### Objectives

To be competent in this area, the individual must be able to describe the processes of asphalt laydown from pre-laydown to compaction.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe how to place prime and tack coats | • When placing asphalt over existing asphalt, a tack coat is required |
| 2. Describe where to position the Paver | • Asphalt train |
| 3. Describe how to ready the Paving Machine | • Hydrostatic transmission and hydraulic systems require full power |
| 4. Describe how to lower Screed on to blocks | • Proper thickness<br>• Do not remove blocks until machine has moved forward<br>• Safe movement of machine on/off trailer<br>• Allow approx 20% for compaction |
| 5. Describe how to place Haul Truck Loads in Hopper | • Communnicate with proper hand/horn signals<br>• Open hopper wings |
| 6. Describe how to place the asphalt product | • Joints, affective joints and overlaps<br>• Maintain proper head of material on screed<br>• Ensure appropriate speed |
| 7. Describe how to compact asphalt | • Explain breakdown, vibration, compaction and the effects of temperature, etc. |

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I2 Describe paving machine equipment and attachments**

### Objectives

To be competent in this area, the individual must be able to describe the functions of each piece of equipment and attachment used in the paving process.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe types of paving machines | • 8 and 10ft paver (standard)<br>• Light duty<br>• Sidewalks, pathways, shoulders<br>• Medium duty<br>• Highway class<br>• Specialty pavers |
| 2. Describe major components | • Two parts<br>  ○ Tractor<br>  ○ Rubber tire, rubber tracked or steel tracked<br>  ○ Hopper handles material, pulls the screed<br>  ○ Screed (attachment)<br>  ○ Different widths, uses, etc.<br>  ○ Variable and fixed |
| 3. Describe attachments | • Pick up machine<br>• Picks up asphalt<br>• Hopper system<br>• Remixes it for consistent output<br>• Alleviates segregation<br>• Uses belly dump instead of end dump (more efficient) |

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I3 Apply paver work safety procedures**

### Objectives

To be competent in this area, the individual must be able to:

- Describe how to work safely while working on and around a paver. This will include understanding key regulations, machine limitations, operating procedures and tasks and the use of PPE's.
- Comply with safety requirements at all times during this program.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Interpret job plan | • Communicate job plan<br>• Path<br>• Pattern<br>• Asphalt thickness<br>• Crown<br>• Obstacles |
| 2. Demonstrate awareness of machine-specific safety | • Dust, pressure (machine malfunctions/kickbacks) blind spots, fumes, hydraulic lines, noise<br>• Block outs<br>• Pinch point hazard<br>• Maintain safe distance from other equipment – e.g., Compaction Rollers |
| 3. Describe traffic control requirements | • Signage<br>• Signals<br>• Communication |
| 4. Use proper PPE | • Workers are responsible to provide general purpose gloves, safety footwear, hard hat - employers are responsible for providing all other safety items<br>• Employers must ensure that PPE is properly worn when required, and is cleaned, inspected, maintained<br>• Employers must ensure that workers are adequately trained: correct use, limitations, maintenance |
| 5. Perform lockout procedures | • Fuel supply<br>• Battery lockout, etc. |

| LEARNING TASKS | CONTENT |
|---|---|
| 6. Secure machine for safety | • Vandal proof take ancillary parts off<br>• Park safety block elevated equipment, use parking brakes and chocks |

**Achievement Criteria**

| | |
|---|---|
| Performance | The learner will demonstrate safe work practices while working with and operating the asphalt paver.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will:<br>• Use correct PPE<br>• Demonstrate machine specific safety awareness |
| Criteria | The learner will demonstrate correct lock-out procedures.<br>Secure the machine for safety, including:<br>• Chalks and blocks<br>• Using night switch |

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I4 Asphalt paver operator roles and responsibilities**

### Objectives

To be competent in this area, the individual must be able to understand the roles and responsibilities of the asphalt paver crew team member.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe how to position Paver | • Efficient movement and alignment |
| 2. Describe how to ready the Paver | • Heating the screed and on blocks |
| 3. Describe how to follow the line | • Laser or string line guidance system |
| 4. Describe the transition process | • Efficient loading of hopper |
| 5. Describe how to maintain consistent “head” | • Keep hopper full<br>• Material pushed by screed |
| 6. Describe positioning of haul trucks | • Flow of mix from truck into hopper and hopper to the screed |
| 7. Describe signals/communication | • Hand signals should be slow and controlled<br>• Operator hand signals through truck mirrors and horn |
| 8. Identify obstacles and overhead hazards | • Paver operator should be aware of obstacles (overhead and on path) |

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I5 Perform paving machine maintenance**

### Objectives

To be competent in this area, the individual must be able to perform regular daily maintenance on the paving machine.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Service lubrication system (greasing) | • Identify and lube all points<br>• Load grease gun |
| 2. Service air intake system as required (air filters/pre cleaners) | • Restriction indicators<br>• Pre cleaner service<br>• Cleaning vs. replacement, check employer policy (some insist on never using air – replace only)<br>• Use air only with reduced pressure |
| 3. Drain fuel tank sump, water separator fuel filters if equipped | • Drain, assess<br>• Water, debris, scale, etc. |
| 4. Add fluids as required | • Identify correct fluids for each component<br>• Add fluids as required<br>• Avoid contamination with dirt, water<br>• Describe two-sided dipsticks with levels for stopped/idling (Cat engines, transmissions) |
| 5. Inspect and clean components as required | • Radiator and oil cooler<br>• Filter plugs, dipsticks<br>• Battery terminals |
| 6. Perform housekeeping tasks | • Garbage<br>• Excess grease<br>• General clean of screed, hoppers, augers, screed decks, extensions, top of pavers, etc.<br>• Methods<br>• Scraping<br>• Release agents<br>• Environmental concerns<br>• Biodegradable solvents<br>• Commonly missed spots |

**Achievement Criteria**

| | |
|---|---|
| Performance | The learner will perform regular daily maintenance on the asphalt paver.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will demonstrate all elements of daily maintenance. |
| Criteria | The learner will demonstrate a minimum of 80% efficiency using a checklist. |

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I6 Comply with markers, grades and stakes**

### Objectives

To be competent in this area, the individual must be able to describe and apply job control and basic engineering knowledge during practical training.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe abbreviations used on stakes | • B/M - bench mark<br>• C - cut<br>• C/B - catch basin<br>• SMH - sanitary manhole<br>• Elv or EL - elevation<br>• F/G - finish grade<br>• P/L - property line<br>• R/W - right of way<br>• San or S - sanitary<br>• Mon - monument<br>• G - gas<br>• PVC - poly vinyl chloride |
| 2. Interpret stakes | • Property line, iron pins<br>• Centre line, stationinng<br>• Offset<br>• Cut, fill<br>• Grade<br>• Slope<br>• Reference points<br>• Bench mark, temporary bench marks: geodetic and referenced to assumed elevations<br>• Survey monuments: geodetic, precise, permanent, protected by law<br>• Cross-heads<br>• Location of works, e.g., manholes, catch basins, headwalls, etc. |
| 3. Describe fundamentals of paver operation | • Follow the line<br>• Precision developed through expereince<br>• Aim vs. steering – set sight ahead<br>• Pay attention!<br>• Trucks come in straight |

- Keep it smooth

**Achievement Criteria**

Performance — Learner will demonstrate job control and basic engineering knowledge.
Learner will demonstrate safe practices during practical training and on the job.

Conditions — The learner will apply information from the stakes to determine:

- C - cut
- C/B - catch basin
- SMH - sanitary manhole
- Elv or EL - elevator
- F/G - finish grade
- G - gas
- Centre line, stationing
- Offset
- Cut, fill
- Grade
- Slope

Criteria — The learner will be capable of maintaining:

- C - cut
- C/B - catch basin
- SMH - sanitary manhole
- Elv or EL - elevator
- F/G - finish grade
- G - gas
- Centre line, stationing
- Offset
- Cut, fill
- Grade
- Slope

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I7 Operate asphalt paver**

**Objectives**

To be competent in this area, the individual must be able to perform standard operating functions.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Perform standard moves | • Move forward, stop, back up, stop<br>• Apply park brake, lockout transmission |
| 2. Maneuvering the paver | • Hills and slopes<br>• Forwards and backwards |
| 3. Position paver | • Efficient positioning of paver pre-operational<br>• Move into appropriate position for several scenarios |
| 4. Simulate paving laying down a mat using 5mm crush and sand mixture or similar compact quality material or asphalt | • Move over varied conditions, choose speeds appropriate, choose pattern |

**Achievement Criteria**

| | |
|---|---|
| Performance | The learner will demonstrate standard operating functions of the asphalt paver.<br>Learner will demonstrate safe operating functions during practical training and on the job. |
| Conditions | The learner will work with the haul truck operator, ground crew and screed operator to safely operate the paver. Learners within the in-school technical training will be expected to complete tasks on flat surfaces only.<br>Learners on the job will be required to operate the asphalt paver on various grades, slopes and in various conditions. |
| Criteria | To complete the in-school practical lab requirement for the paver, the learner must be able to demonstrate the following practical skills: |

- Demonstrate the safe operation of equipment including observation of surroundings
- Perform pre-start checks, start-up/shut-down procedures and monitor performance of the equipment
- Perform daily maintenance tasks
- Perform standard operating procedures with paver including:
    - Move forward, stop, back up, stop (flat elevation)
    - Apply park brake, lock out transmission
    - Shift transmission
    - Open and close hopper
    - Set controls for rate of asphalt flow
    - Position paver into appropriate position to start paving
    - Guide haul truck into position to offload
    - Lay asphalt determined by site, equipment and conditions
    - Follow the line
    - Demonstrate proper hand signals to haul truck operator
    - Communicate with screed operator and ground crew
    - Demonstrate proper cleaning techniques for hopper, conveyor, etc.
- To complete the job-site practical requirement for the paver, the learner must be able to demonstrate all of the above practical skills on various grades, slopes and in various conditions.
- Observe learners performing learning tasks and assess competency using a rating scale.
- Time and quantity as instructor deems appropriate visual checks, constant awareness of space, position, clearance, safe movement.
- Operate with smooth and precise control of functions, appropriate gear and engine speed.
- Enter and exit machine safely (3 point contact, parking position, brake).

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I8 Follow shut down procedures**

### Objectives

To be competent in this area, the individual must be able to perform correct shut-down procedures for the paving machine.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Perform shut-down procedures | • Position that allows access in case of mechanical trouble at start up<br>• Safe parking position, set parking brake<br>• Level position for checking of fluids<br>• Cool down before shut down<br>• Walk around, look for leaks, general check<br>• Secure machine, locks, etc. |

### Achievement Criteria

| | |
|---|---|
| Performance | The learner will demonstrate correct shut down procedures for the asphalt paver. |
| Conditions | The learner will follow shutdown procedure as listed by the manufacturers guidelines. |
| Criteria | The learner will demonstrate a minimum of 80% efficiency using a checklist |

## Line (GAC): I ASPHALT PAVER OPERATION

**Competency: I9 Transport paver**

### Objectives

To be competent in this area, the individual must be able to understand the correct transport procedures for the paving machine.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe compliance with wide load regulations | • Signage<br>• Pilot car if applicable<br>• Removing extension |
| 2. Describe roles and responsibilities | • Truck driver is usually responsible for transporting equipment |
| 3. Describe how to prepare machine for transport | • Remove attachments<br>• Secure equipment<br>• Ensure all guards are in place |
| 4. Describe loading and unloading procedures | • Operator is not usually involved in loading/unloading<br>• Use of tie-downs<br>• Safe movement of maching on/off trailer |

### Achievement Criteria

| | |
|---|---|
| Performance | The learner will demonstrate safe practices while preparing the asphalt paver for transport. Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will prepare the machine for transport using appropriate tools and equipment to manufactures specification. |
| Criteria | The learner will be able to secure and prepare a machine for transport within a given time frame. |

## Line (GAC): J ASPHALT SCREED OPERATION

**Competency: J1 Describe paving screed and attachments**

### Objectives

To be competent in this area, the individual must be able to describe the functions of the screed and the attachments used for the screed process.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe screed categories | • Rigid<br>• Variable |
| 2. Describe common attachments | • Extension, hydraulic wings, automatic grade controls (laser)<br>• String line vs. boom vs. ski boom<br>• Cut off shoe to narrow down joint, curb form |
| 3. Describe principal functions | • Basic mix thickness control<br>• How material gets to screed<br>• Attachments<br>• Different circumstances that require adjustments<br>• Timing |

## Line (GAC): J ASPHALT SCREED OPERATION

**Competency: J2 Apply screed work safety procedures**

### Objectives

To be competent in this area, the individual must be able to:

- Describe how to work safely while working on and around a screed. This will include understanding key regulations, machine limitations, operating procedures and tasks and the use of PPE's.
- Comply with safety requirements at all times during this program.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Interpret job plan | • Communicate job plan<br>• Path<br>• Pattern<br>• Asphalt thickness<br>• Temperature<br>• Crown<br>• Obstacles |
| 2. Describe machine-specific safety hazards | • Dust, pressure (machine malfunctions/ kickbacks) blind spots, fumes, hydraulic lines, noise<br>• Block outs<br>• Heat related injuries<br>• Proper work boots (steel or composite)<br>• Burnt foot has happened (in a day and in cold weather when boots get wet)<br>• Proper hydration |
| 3. Describe traffic-control requirements | • Number of TCP's required<br>• Signage<br>• Signals<br>• Communication |
| 4. Describe proper PPE | • Workers are responsible to provide general purpose gloves, safety footwear, hard hat - employers are responsible for providing all other safety items<br>• Employers must ensure that PPE is properly worn when required, and is cleaned, inspected, maintained<br>• Employers must ensure that workers are adequately trained: correct use, limitations, maintenance |

| LEARNING TASKS | CONTENT |
|---|---|
| 5. Describe lockout procedures | • Fuel supply<br>• Battery lockout, etc. |
| 6. Describe how to secure machine for safety | • Vandal proof take ancillary parts off<br>• Park safely block elevated equipment, use parking brake and chocks |

**Achievement Criteria**

| | |
|---|---|
| Performance | The learner will demonstrate safe work practices while working with and operating the asphalt screed.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will:<br>• Use correct PPE<br>• Demonstrate machine specific safety awareness |
| Criteria | The learner will demonstrate correct lock-out procedures<br>Secure the machine for safety including:<br>• Safety locks<br>• Blocks |

## Line (GAC): J ASPHALT SCREED OPERATION

**Competency: J3 Describe asphalt screed operator roles and responsibilities**

### Objectives

To be competent in this area, the individual must be able to understand the roles and responsibilities of the asphalt screed crew.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe how to plan work procedures | • Requirements for EPS |
| 2. Describe how to maintain mat thickness | • Width and volume control of asphalt mix |
| 3. Describe communication techniques | • Paver operator and raker man |
| 4. Describe problem solving strategies | • Anticipate adjustments and timing effect (several feet) |
| 5. Describe the importance of teamwork | • Paver and screed operator |
| 6. Describe importance of adhering to standards | • Maintain and correct volume – not under or over |

## Line (GAC): J ASPHALT SCREED OPERATION

**Competency: J4 Perform screed maintenance**

### Objectives

To be competent in this area, the individual must be able to perform regular daily screed maintenance.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Service lubrication system (greasing) | • Identify and lube all points<br>• Load grease gun<br>• Lubricate thickness control “screws” |
| 2. Inspect and clean components as required | • Radiator and oil cooler<br>• Filter plugs, dipsticks<br>• Battery terminals |
| 3. Perform housekeeping tasks | • Garbage<br>• Excess grease<br>• Clean windows, sweep out cab, general cleanliness |
| 4. Maintain screed plate | • Maintaining screed plate and adjust<br>• Prolem: scuff mark on finished product<br>• Problem: more wear<br>• Could reveal themselves in a day |

### Achievement Criteria

| | |
|---|---|
| Performance | The student will perform regular daily maintenance on the asphalt screed.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will demonstrate all elements of daily maintenance. |
| Criteria | The learner will demonstrate a minimum of 80% efficiency using a checklist. |

## Line (GAC): J ASPHALT SCREED OPERATION

**Competency: J5 Operate asphalt screed**

### Objectives

To be competent in this area, the individual must be able to perform basic operating functions during practical training.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Set-up screed | • Thickness control – set up screed for thickness<br>• Make proper adjustments |
| 2. Maintain proper thickness | • Maintain and correct volume – not under or over |
| 3. Check depth of mat | • Sing a poker: a stick or piece of metal |

### Achievement Criteria

**Performance**
The learner will safely demonstrate standard operating functions
Learner will demonstrate safe practices during practical training and on the job.

**Conditions**
To complete the practical requirement for the screed, the learner must be able to demonstrate the following practical skills:

- Demonstrate the safe operation of equipment including observation of surroundings.
- Perform pre-operational checks and monitor performance of the equipment.
- Perform daily maintenance tasks

**Criteria**
Perform standard tasks with equipment including:

- Set controls for proper mat thickness
- Lower screed onto blocks, allowing for compaction
- Operate screed heating system (propane/electric/diesel as equipped)
- Coordinate with paver operator to ensure appropriate speed
- Make adjustments to angle of attack, contour, etc.
- Monitor hydraulic systems
- Operate ancillary equipment if practical – e.g., lights

## Line (GAC): J ASPHALT SCREED OPERATION

**Competency: J6 Follow shut down procedures**

### Objectives

To be competent in this area, the individual must be able to perform correct shut down procedures for the screed.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Perform shut down procedures | • Position that allows access in case of mechanical trouble at start up<br>• Level position for checking of fluids<br>• Walk around, look for leaks, general check<br>• Secure machine, locks, etc. |
| 2. Clean screed after use | • Proper cleaning to prevent build up<br>• Coordinate with paver to clean both machines simultaneously<br>• Solvents and scraping (same for paver and in tandem) 20 min |

### Achievement Criteria

| | |
|---|---|
| Performance | The learner will demonstrate correct shut down procedures for the asphalt screed. |
| Conditions | The learner will follow shutdown procedure as listed by the manufacturers guidelines. |
| Criteria | The learner will demonstrate a minimum of 80% efficiency using a checklist |

## Line (GAC): K RAKING OPERATION

**Competency: K1 Describe raker roles and responsibilities**

### Objectives

To be competent in this area, the individual must be able to understand the roles and responsibilities of each of the team members of a asphalt paver crew.

**LEARNING TASKS**

1. Describe typical raker duties

**CONTENT**

- Does prep where machines can't go
- Smaller jobs: manhole levelling asphalt mix to conform to grade appurtenances
- Repair and level mistakes (made by screed or paver)
- Finishing a pass, removing excess and squaring off edges
- Raking joints
- Longitudinal or tranverse centerline joints

## Line (GAC): K RAKING OPERATION

**Competency: K2 Apply raking safety procedures**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe how to work safely while working on and around paving equipment. This will include understanding key regulations, machine and personal limitations and the use of PPEs.
- Comply with safety requirements at all times during this program.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Interpret job planning | • Communicate job plan<br>• Path<br>• Pattern<br>• Asphalt thickness<br>• Temperature<br>• Crown<br>• Obstacles |
| 2. Describe raker-specific safety hazards | • Dust, pressure (machine malfunction/kickback) blind spots, fumes, hydraulic lines, noises<br>• Block outs<br>• Heat related injuries<br>• Proper work boots (steel or composite)<br>• Burnt foot has happened (in a day and in cold weather when boots get wet)<br>• Proper hydration is essential<br>• Main focus is on awareness of other equipment, i.e., Compaction Rollers and vehicle traffic<br>• Rake handles are long – keep handles out of traffic |
| 3. Describe traffic control requirements | • Signage<br>• Signals<br>• Communication |

| LEARNING TASKS | CONTENT |
|---|---|
| 4. Describe proper PPE | • Workers are responsible to provide general purpose gloves, safety footwear, hard hat - employers are responsible for providing all other safety items<br>• Employers must ensure that PPE is properly worn when required, and is cleaned, inspected, maintained<br>• Employers must ensure that workers are adequately trained: correct use, limitations, maintenance |

**Achievement Criteria**

| | |
|---|---|
| Performance | The learner will demonstrate safe work practices while working with and around the machines on site.<br>Learners will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will:<br>• Use correct PPE<br>• Demonstrate machine specific safety awareness<br>• Apply ergonomic safety awareness |
| Criteria | The learner will:<br>• Demonstrate correct use of PPE's<br>• Communicate with the traffic control people<br>• Work safely around equipment<br>• Apply ergonomic safety awareness |

## Line (GAC): K RAKING OPERATION

**Competency: K3 Place asphalt hot mix**

### Objectives

To be competent in this area, the individual must be able to perform basic raking functions and techniques during practical training.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Perform common hand work crew duties | • Raker man on any size crew<br>• Prep road<br>• Intersection<br>• Drive ways<br>• Trench patching<br>• Pothole filling<br>• Grade deviations to minimize differential compaction<br>• Squaring off end of the run/mat |
| 2. Demonstrate common techniques | • Bumping<br>• Ramping<br>• Working around manholes |

### Achievement Criteria

**Performance** The learner will apply raking techniques to produce a quality mat.

**Conditions** The learner will use rake, lute, and tamping equipment to demonstrate the correct placement of hot mix asphalt.
The learner will demonstrate various techniques with regard to the placement of hot mix asphalt.

**Criteria** The learner will perform basic raking and hand work tasks including:

- Apply coals or simulated emulsified asphalt to joints prior to laying asphalt
- Use asphalt shovels to spread asphalt or simulated asphalt mix in preparation for compaction
- Use asphalt lute to spread asphalt – demonstrate proper selection of toother or straight edge
- Use lute or rake to spread asphalt around manholes or other structures
- Use wheel barrow to transfer small amounts of asphalt from haul truck to desired location
- Coordinate movements with other crew members and ensure ongoing communication
- Demonstrate “bumping” the mat and proper techniques for preparing joints
- Demonstrate a variety of other common tasks based on site conditions and available equipment, e.g., tiger torch, etc.

## Line (GAC): L COMPACTOR OPERATION

**Competency: L1 Describe compaction equipment**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe the functions of the compactor and the drum vs. wheel processes of compaction.
- Describe the functions of the compactor and the vibratory vs. static processes of compaction.
- Describe the functions of each phase of a compaction train.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe types of Compaction Rollers | • Manufacturers, e.g., CAT, Amman, Bomag, Dynapac<br>• Sized to match use<br>• Production rate determines size<br>• Type of mix (foreman controlled)<br>• Finished product specs<br>• Experience<br>• Drum widths and weight |
| 2. Describe major components of compaction equipment | • Pneumatic (rubber tire)<br>• Never vibration<br>• Adjust tire pressure to affect depth<br>• Combo rubber on one end, steel on other<br>• Vibration option<br>• Steel – vibration (manual)<br>• Diesel powered |
| 3. Describe basic functions of compaction equipment | • Breakdown – mix, time of year<br>• Intermediate<br>• Finish |
| 4. Describe emerging technology | • New in industry – oscillating (side to side) less impact |

## Line (GAC): L COMPACTOR OPERATION

**Competency: L2 Apply compaction work safety procedures**

**Objectives**

To be competent in this area, the individual must be able to:

- Describe how to work safely while working on and around a compactor. This will include understanding key regulations, machine limitations, operating procedures and tasks and the use of PPEs.
- Comply with safety requirements at all times during this course.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Interpret job planning | • Communicate job plan<br>• Path<br>• Pattern<br>• Asphalt thickness<br>• Temperature<br>• Crown<br>• Coordination of asphalt train<br>• Obstacles |
| 2. Describe machine-specific safety hazards | • Dust, pressure (machine malfunctions/kickbacks) blind spots, fumes, hydraulic line, noise<br>• Block outs<br>• ROPS/seatbelts<br>• Working in proximity to paver and other Compaction Rollers – 3 meters is best practice |
| 3. Describe traffic control requirements | • Signage<br>• Signals<br>• Communication |
| 4. Describe PPE | • Workers are responsible to provide general purpose gloves, safety footwear, hard hat - employers are responsible for providing all other safety items<br>• Employers must ensure that PPE is properly worn when required, and is cleaned, inspected, maintained<br>• Employers must ensure that workers are adequately trained: correct use, limitations, maintenance |

| LEARNING TASKS | CONTENT |
|---|---|
| 5. Describe lockout procedures | • Fuel supply<br>• Battery lockout, etc. |
| 6. Describe how to secure machine for safety | • Vandal proof take ancillary parts off<br>• Park safety block elevated equipment, use parking brakes and shocks |

**Achievement Criteria**

Performance — The learner will demonstrate safe work practices while working with and operating the compaction roller.
Learners will demonstrate safe practices during practical training and on the job.

Conditions — The learner will use:

- Use correct PPE
- Compaction roller

Criteria — The learner will secure the machine for safety including:

- Lock-out procedures
- Chalks and blocks
- Using night switch

The learner will demonstrate safe operating techniques including:

- Demonstrate machine specific safety awareness
- Demonstrate operating procedures
- Demonstrate safe parking practices

## Line (GAC): L COMPACTOR OPERATION

**Competency: L3 Describe asphalt Compaction Roller operator roles and responsibilities**

### Objectives

To be competent in this area, the individual must be able to understand the roles and responsibilities of the Compaction Roller crew.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Describe communication techniques | • Coordination and communication among all Compaction Roller operations (two or more) |
| 2. Describe effective rolling pattern | • Compactor and smoothness of asphalt mix |
| 3. Determine pattern to achieve ride planning | • Required ride (cannot adjust after the fact) |
| 4. Describe responsibilities of Compaction Roller operator | • Achieving required density<br>• Finish surface<br>• Asphalt train<br>• Not cutting across the mat too severely<br>• Not stopping with vibrating features<br>• No cut marks, consistency |

## Line (GAC): L COMPACTOR OPERATION

**Competency: L4 Perform Compaction Roller maintenance**

### Objectives

To be competent in this area, the individual must be able to perform regular daily maintenance on the compactor.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Service lubrication systems (greasing) | • Identify and lube all points<br>• Load grease gun |
| 2. Service air intake system as required (air filters/pre cleaners) | • Restriction indicators<br>• Pre cleaner service<br>• Cleaning vs. replacement, check employer policy (some insist on never using air – replace only)<br>• Use air only with reduced pressure |
| 3. Drain fuel tank sump, water separator fuel filters is equipped | • Drain assess<br>• Water, debris, scale, etc. |
| 4. Add fluids as required | • Identify correct fluids for each component<br>• Add fluids as required<br>• Avoid contamination with dirt, water<br>• Describe 2 sided dipsticks with levels for stopped/idling (CAT engines, transmissions) |
| 5. Inspect and clean components as required | • Radiator and oil cooler<br>• Filter plugs, dipsticks<br>• Battery terminals |
| 6. Perform housekeeping tasks | • Garbage<br>• Excess grease<br>• Maintain sprayers<br>• Cleanliness of tires or drums<br>• Winter – drain all water<br>• Replace/maintain scrapers and coco mat (indicated by use) |

**Achievement Criteria**

| | |
|---|---|
| Performance | The learner will perform regular daily maintenance on the compaction roller.<br>Learner will demonstrate safe practices during practical training and on the job. |
| Conditions | The learner will demonstrate all elements of daily maintenance. |
| Criteria | The learner will demonstrate a minimum of 80% efficiency using a checklist. |

## Line (GAC): L COMPACTOR OPERATION

**Competency: L5 Operate Compaction Roller**

### Objectives

To be competent in this area, the individual must be able to understand and perform standard operating functions.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Plan work | • Pre-rolling considerations<br>• Looking over grade for danger, obstructions and limitations<br>• Determine number of Compaction Rollers/ type equipment<br>• Ensure spray tanks are full<br>• Make proper adjustments<br>  ○ Because following factors: weather, site conditions, grade, project densometer readings, vibration frequency<br>  ○ Compaction equipment speed – dictated by production |
| 2. Test temperature | • Mix temperature |
| 3. Test density | • Describe the use and purpose of nuclear densometer – quality control<br>• Describe Troxler (manufacturer)<br>• Understand technician certification<br>• Determine roll pattern<br>• Theoretical density<br>• Frequency is job dependant – sometimes required after each pass |
| 4. Maintain efficient patterns | • Pattern in both direction<br>• Forward and reverse not expected to stop/park<br>• Change direction smoothly and slowly<br>• Breakdown rolling<br>• Intermediate rolling<br>• Finish rolling |

**Achievement Criteria**

Performance
The learner will perform standard operating functions.
Learner will demonstrate safe operating practices during practical training and on the job.

Conditions
To complete the in-school practical lab requirement for the Compaction Roller, the learner must be able to demonstrate the following practical skills:

- Demonstrate the safe operation of equipment including observation of surroundings
- Perform pre-start checks, start-up/shut-down procedures and monitor performance of the equipment
- Perform daily maintenance tasks

Perform basic moves with equipment including:

- Move forward, stop, back up, stop (flat elevation)
- Apply park brake, lock-out transmission
- Shift transmission
- Operate vibratory Compaction Roller system
- Make a number of passes with Compaction Roller, demonstrating typical confined edge rolling pattern
- Make a number of passes with Compaction Roller, demonstrating longitudinal joint compaction pattern

To complete the jobsite requirement for the Compaction Roller, the learner must be able to demonstrate all of the above in-school practical lab requirements plus the following practical skills:

- Coordinate movement with the asphalt train (paver, breakdown Compaction Roller, intermediate Compaction Roller and finish Compaction Roller) to ensure that asphalt is compacted efficiently.
- Coordinate and communicate with other crew members effectively
- Plans work
  - Looks over the grade for dangers, obstructions and limitations
  - Has the ability to determine types of compaction rollers required for the job
  - Can make adjustments based on:
    - Weather
    - Site conditions, and
    - Grade
- Maintains efficient rolling patterns using Breakdown, Intermediate and Finish Rollers
- Able to determine the appropriate rolling pattern for the job.

Note
It is highly recommended that the apprentice complete the interactive training materials (CD's) created by Caterpillar

- Fundamentals of Asphalt Paving ($50)
- Fundamentals of Asphalt Compaction ($50)

Both CD's can be purchased through Caterpillar by email (Paving_Products_Online@cat.com )

## Line (GAC): L COMPACTOR OPERATION

**Competency: L6 Follow shut down procedures**

### Objectives

To be competent in this area, the individual must be able to perform correct shut-down procedures for the compactor.

| LEARNING TASKS | CONTENT |
|---|---|
| 1. Perform shut-down procedures | • Position that allows access in case of mechanical trouble at start-up<br>• Safe parking position, set parking brake<br>• Level position for checking of fluids<br>• Cool down before shut down<br>• Walk around, look for leaks, general check<br>• Night switches/lockouts – batteries<br>• Secure machine, locks, etc. |
| 2. Clean equipment | • Cleaning the drum, etc. |
| 3. Ensure efficient staging | • Foreman staging |
| 4. Prepare for transport | • Transport driver responsible for moving |
| 5. Secure machine for safety | • Public liability<br>• Vandal proof take ancilary parts off<br>• Park safety (can roll away) |

### Achievement Criteria

| | |
|---|---|
| Performance | The learner will demonstrate correct shut-down procedures for the Compaction Roller. |
| Conditions | The learner will follow shutdown procedure as listed by the manufacturers guidelines. |
| Criteria | The learner will demonstrate a minimum of 80% efficiency using a checklist |

# Section 4

# TRAINING PROVIDER STANDARDS

# Facility Requirements

The following recommendations are offered to assist course instructors in establishing the most effective learning environment.

### Classroom Area

- Sufficient space for 12-16 people to work comfortably at desks.

### Shop Area

- N/A

### Lab Requirements

- The facility requirements for the lab/practical portion of this course must allow participants access to an environment where they can view paving equipment at close quarters and to operate that equipment in a controlled setting for a reasonable amount of time. Suggested equipment time can be found within the Suggested Time Allocation Section, pages 14-16 of this document.

- Lab facilities will vary but should permit a simulated asphalt train. While it may not be reasonable or practical to use actual hot mix for training purposes, a simulated mix will give trainees a reasonable simulated experience.

### Student Facilities

- Shall offer a safe and productive learning environment
- Meets applicable zoning bylaws for technical instruction and education
- Has access to sufficient land necessary to operate multiple pieces of equipment at the same time (suggested minimum of 6 acres)
- Conducts a safety review of the program's facility and equipment annually and meets applicable safety standards/regulations
- Suitable for the size of the class
- Temperature, noise, ventilation, light, and particulate control are maintained at appropriate levels

### Instructor's Office Space

- 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 height
- Classroom theory and labs are heavily supported with a PowerPoint presentation for each section of the manuals. Classroom projection equipment with MS PowerPoint capabilities will be required.

# Tools and Equipment

### Shop Equipment

***Required***

- Compaction Roller (one for breakdown work, one for intermediate work, and one for finish work)
- Milling machine
- Paver
- Screed

***Recommended***

- N/A

### Shop (Facility) Tools

***Standard Tools***

- Lutes
- Rakes
- Shovels
- Wheel barrows
- Various hand tools
- Tiger torch
- Measuring devices
- Densometer
- Propane tanks and hoses

***Specialty Tools***

- N/A

### Student Equipment (supplied by school)

***Required***

- Does not apply

***Recommended***

- N/A

### Student Tools (supplied by student)

***Required***

- PPE including Hi-Vis Vest, CSA approved steel toe boots, hard hat, gloves and hearing protection

***Recommended***

- N/A

# Reference Materials

### Required Reference Materials

- Instructor Guide, PowerPoint Slides, along with Common Core, Raker, Compaction Roller, Screed, Paver and Milling Machine manuals.
- 2006 Design Build Specifications
    - http://www2.gov.bc.ca/assets/gov/driving-and-transportation/transportation-infrastructure/engineering-standards-and-guidelines/highway-specifications/design_build_standard_specs_2006.pdf
- The Asphalt Handbook MS-4 7th Edition
- Interactive Training Materials (CD) through Caterpillar
    - Fundamentals of Asphalt Paving
    - Fundamentals of Asphalt Compaction
        - Both CD's can be purchased through Caterpillar by email (Paving_Products_Online@cat.com)
- WorkSafeBC on-line resources
    - http://www.worksafebc.com/

### Recommended Resources

- http://www.asphaltinstitute.org/
- http://www.forconstructionpros.com/print/Pavement/Cover-Story/Buying-Your-First-Paver/3FCP4103
- http://www.paversearch.com/glossary-pavers.htm
- http://www.madehow.com/Volume-3/Asphalt-Paver.html
- http://www.grainger.com/Grainger/items/3YU79
- http://www2.worksafebc.com/Portals/Construction/Prevention-RoadConstruction.asp?ReportID=23946
- http://safety.cat.com/cda/layout?m=128061&x=7
- http://www.hotmix.org/allaboutasphalt.php
- https://www.ec.gc.ca/cov-voc/default.asp?lang=En&n=05CE2B41-1

# Instructor Requirements

### Occupation Qualification

The instructor must possess:

- Asphalt Paving/Laydown Technician Certificate of Qualification with endorsements for the pieces of equipment being taught.

### Work Experience

A minimum of 5 years experience working in the industry as a journeyperson.

### Instructional Experience and Education

- N/A

### Field Training with an Employer

The apprentice is expected to gain further practical skills in the field and both employer and apprentice are expected to keep track of equipment hours and competencies acheived. The apprentice's supervisor will be permitted to sign off on any hours that the apprentice has gained for the program. Competency sign off for equipment skills will require sign off by a person holding a Certificate of Qualification with an endorsement for that machine or Supervision and Sign-Off Authority granted by SkilledTradesBC.