

National Occupational Standards For Operating Engineers

Copyright © 2005 Construction Sector Council

All rights reserved. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without written permission.

Every effort has been made to make this manual complete and as accurate as possible. The authors shall have neither liability nor responsibility to any person or entity with respect to any loss or damages in connection with or arising from the information contained in this manual.

April 2005

ASPHALT SCREED OPERATOR

Table of Contents

INTRODUCTION	2
FOREWORD	3
DEVELOPMENT OF THE OCCUPATIONAL ANALYSIS	4
SCOPE OF THE OCCUPATIONAL ANALYSIS	5
STRUCTURE OF THE OCCUPATIONAL ANALYSIS	6
A. PROFESSIONALISM	
1. Acts Professionally	7
2. Uses Communication Skills	10
B. SAFETY	
3. Interprets Applicable Legislation and Policies	12
4. Works Safely	14
5. Complies with Site Emergency Plan	16
C. EQUIPMENT	
6. Describes Equipment and Attachments	18
D. MAINTENANCE	
7. Performs Pre-operational Inspection and Daily Service with Engine Off	20
8. Performs Pre-operational Inspection and Daily Service with Engine Running	22
E. OPERATING PROCEDURES	
9. Describes Basics of Paving	24
10. Plans Work Procedures	25
11. Complies with Markers, Grades, and Stakes	27
12. Operates Asphalt Screed	29
13. Follows Shut-down Procedures	33
DACUM CHART	35
ACKNOWLEDGEMENTS	38

Introduction

The Construction Sector Council (CSC) is one of 40 sector councils in Canada. Sector councils are industry-led, labour/management partnership organizations designed to address human resource development issues within specific industries.

The primary objective of the CSC is the development of a highly-skilled workforce and a safe workplace environment, contributing to the organizational productivity and individual prosperity of the members of the construction industry. The development of national occupational standards for operating engineer occupations is one of the many ways the CSC is meeting this objective.

The CSC acknowledges all of the subject matter experts who provided their valuable time and efforts toward the definition and validation of these national occupational standards. Without their combined contributions, the development of these occupational analyses (OAs) would not have been possible. A complete list of the subject matter experts can be found at the back of this document.

An OA has the following objectives:

- to identify and group the tasks performed by skilled workers in particular occupations
- to identify those tasks that are performed by skilled workers in every province and territory
- to develop instruments for use in the assessment and training leading to the certification of skilled workers
- to facilitate the mobility, in Canada, of trainees and skilled workers
- to supply employers and employees, and their associations, industries, training institutions, and governments with analysis of the tasks performed in particular occupations

Therefore, the standards define the skills, knowledge, and abilities required for an occupation and against which the qualifications of an individual in that occupation can be assessed.

The vision of the Construction Sector Council is to reach a point where operators who demonstrate the skills, knowledge, and abilities in the national occupational standards will possess the nationally recognized credentials and those credentials will assist the operator in obtaining employment anywhere in Canada.

Foreword

Operating engineer occupations can be grouped into three broad areas—hoist and crane operators, construction heavy equipment operators, and industrial equipment operators. Within each of these broad categories, there are several operating engineer occupations.

1. *Hoist and Crane Operators*

Crane operators' work tends to be centred in the construction industry. Operators work on a broad range of building sites including high-rise residential, institutional, and commercial structures, as well as most large industrial sites and many types of heavy engineering projects. The Statistics Canada Labour Force Survey (LFS) identifies around 4,000 crane operators in the construction industry across Canada. There are cyclical variations in employment, with low levels below 3,000 jobs in the mid-1990s and peak levels near 5,000.

2. *Construction Heavy Equipment Operators*

Heavy equipment operators are largely concentrated in the construction industry. Operators work on a variety of jobs from residential, institutional, and commercial structures to most large industrial sites and most types of heavy engineering. The LFS identifies around 37,000 equipment operators employed in the construction industry across Canada. This occupation is one of the larger trades in the industry, comparable in size to the workforce for electricians, pipe trades, and masonry trades. There are cyclical variations in employment, with low levels below 27,000 jobs in the early 1990s and peak levels near 40,000.

3. *Industrial Equipment Operators*

Industrial equipment operators encompass a variety of occupations ranging from forklift operators and environmental workers to tractor trailer drivers. The demand for environmental workers is increasing as knowledge, awareness, and regulations proliferate. Forklift training has taken on added importance due to safety regulations that require trained or certified forklift operators.

The mobility and accessibility of operating engineers is difficult if not impossible if there are no jurisdictional agreements on national occupational standards. The project to develop occupational analyses for national occupational standards for 29 operating engineer occupations began in January 2004 and was completed in March 2005.

Development of the Occupational Analysis

A draft analysis was developed by a knowledgeable team of consultants (process experts) who, with the assistance of a committee of subject matter experts in the field, identified all the tasks performed in the occupation. In order to facilitate an efficient and effective process, the 29 occupations were grouped according to commonalities. Profile meetings, with both process and subject matter experts, were held for each grouping between January and March 2004 in:

- Edmonton, Alberta
 - Excavating, Feb 5 & 6
 - Paving, Feb 9 & 10
- Morrisburg, Ontario
 - Grading, Feb 24 & 25
 - Crane and Hoisting, Mar 1 & 2
 - HAZMAT, Mar 3 & 4
 - Plant Operations, Mar 23 & 24
 - Concrete Pumping, Mar 25 & 26
- Montreal, Quebec
 - Hauling, Feb 26 & 27
- Vancouver, British Columbia
 - Utilities, Mar 16 & 17
 - Material Handling, Mar 18 & 19
- Quebec City, Quebec
 - Profile Completion Forum, Mar 29 – 31

The draft OAs were then distributed to more subject matter experts and stakeholders across Canada for review and input between June and September 2004. They were also posted on a website where subject matter experts were invited to provide feedback.

The combined input from the review was collated in October 2004. Recommendations were assessed and incorporated into the final draft, which included the identification of common core tasks performed in all occupations. Validation meetings were held for each grouping, with process and subject matter experts, between October 2004 and January 2005 in:

2004:

- Saskatoon, Saskatchewan
 - Utilities, Oct 20 – 22
 - Material Handling (including HAZMAT), Oct 26 – 29
- Halifax, Nova Scotia
 - Grading, Nov 2 – 5
- St John's, Newfoundland
 - Crane and Hoisting (including Concrete Pump), Nov 15 – 19
- Winnipeg, Manitoba
 - Excavating, Nov 23 – 25
 - Hauling, Nov 30 – Dec 3

2005:

- Vancouver, British Columbia
 - Paving, Jan 5 – 7
 - Plant Operations, Jan 10 – 12
- Victoria, British Columbia
 - Validation Forum, Feb 21 – 23

The OAs were then edited, translated, and published in both official languages.

Scope of the Occupational Analysis

This occupational analysis identifies all of the tasks that a qualified operator must be able to perform. The performance of these tasks is dependent on a range of related activities, described in the body of the analysis as subtasks. The analysis is composed mainly of tasks that operators perform frequently, including such tasks as cleaning, driving, and maintenance.

Most operators have a range of experience on different types of equipment. Regardless of the type of equipment, the duties of the operator remain relatively constant. Accomplishment of the operator's tasks depends largely on knowledge of the equipment and its components, experience in a wide variety of situations, and an ability to determine the most appropriate means of proceeding with the work.

Though not described in the analysis, other important attributes of operators include mechanical aptitude, mathematical ability, excellent vision, and a high degree of physical coordination. Operators are also often called upon to perform their jobs in extremely difficult conditions.

Although this analysis is not a training document, it is worthwhile noting that aspiring operators may find it useful to reflect on their own abilities to deal with lengthy periods of physical restriction and isolation coupled with frequent subjection to pressures of time and productivity. Operators are often required to demonstrate the ability to concentrate for long periods of time while enduring physical discomfort and inclement weather conditions.

Heavy equipment is used in virtually every facet of the construction sector. In some cases, an operator may work for years on a single site, such as a plant, and may, during that time, operate only one type of equipment and therefore perform similar and relatively constant tasks. Operators who work for contractors may rarely work on the same site more than once and may perform a tremendous variety of tasks using a wide range of equipment types and sizes. The work of an operator often overlaps with that of other equipment operators.

Structure of the Occupational Analysis

To facilitate the understanding of the nature of the occupation, the work performed is divided into the following divisions:

- A. BLOCK** the largest division within the analysis and reflects a distinct operation relevant to the occupation
- B. TASK** the distinct activity that, combined with others, makes up the logical and necessary steps the operator is required to perform to complete a specific assignment within a BLOCK
- C. SUBTASK** the smallest distinct, measurable, and observable activities into which it is practical to divide any work activity; combined with other SUBTASKS, these fully describe the logical steps required to complete a TASK

The importance of a task describes the benefits that operators, employers, and the public receive as a result of an operator's ability to perform the task.

Trends are any shifts or changes that are occurring in the industry and affect the task.

Supporting Knowledge and Abilities are the elements of skill and knowledge that an individual must acquire to perform the task adequately.

Tools and Supplies are those items that are needed to perform the skill.

BLOCK A PROFESSIONALISM
Task 1 Acts Professionally

This task is important because it helps to:

- present positive image of industry
- demonstrate personal integrity and competence
- instill confidence and maintain relations with general public, site personnel, owners/clients, and their clients
- maintain employment and advance in industry

Trends:

- Employers and employees are placing more emphasis on company/personnel fit in relation to attitudes and values.
- There is less tolerance for unprofessional behaviour, including workplace violence, substance abuse, and harassment.
- There is increased awareness of the importance of a balanced lifestyle.
- There is an increasing demand for knowledgeable and experienced operators that have the interpersonal skills and desire to advance to supervisory and management levels.
- Individuals need to continually upgrade their knowledge and skills because of technological advances and new methodologies.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
1.01 Demonstrates work ethic	Knowledge of: <ul style="list-style-type: none"> • principles of work ethic and expectations, such as be punctual, prepared for work, co-operative, honest, productive, and respectful Ability to: <ul style="list-style-type: none"> • follow principles of work ethic in all situations 	
1.02 Is aware of factors affecting personal health	Knowledge of: <ul style="list-style-type: none"> • factors affecting personal health • own current mental, emotional, and physical state • own limitations • factors/situations/conditions that cause stress in professional and personal life • working conditions on construction site • impact of fatigue on job performance 	
1.03 Resolves problems or disagreements with others	Knowledge of: <ul style="list-style-type: none"> • company policies and procedures • applicable legislation, such as harassment • conflict resolution techniques 	

Ability to:

- communicate effectively
- use calm approach
- be open-minded and flexible
- determine cause of problem or disagreement
- discuss and resolve issues
- walk away from conflict if necessary

1.04 Participates in professional development

Knowledge of:

- industry trends
- areas requiring ongoing learning, such as new equipment, technologies, techniques, and industry practices

Ability to:

- assess own knowledge and skills
- acquire information about training opportunities
- learn through various methods, such as on-the-job training, reading, courses, co-workers

1.05 Works with others

Knowledge of:

- own role and responsibilities
- roles and responsibilities of others in industry

Ability to:

- work as team member to achieve common goals
- keep open mind
- participate in workplace meetings
- communicate clearly and accurately
- co-ordinate job-related activities
- co-operate with others

1.06 Works independently

Knowledge of:

- company policies and procedures, such as work-alone plan
- applicable legislation, such as responsibilities of supervisor/owner and site personnel
- own role and responsibilities
- own capabilities and limitations
- work assignment, location, and working conditions

Ability to:

- confirm and clarify assignment
- take initiative, such as anticipate and prepare for next steps in job
- identify and resolve potential and actual problems
- communicate with other site personnel
- co-ordinate work with others
- complete assignment

BLOCK A PROFESSIONALISM
Task 2 Uses Communication Skills

This task is important because it helps to:

- work safely and efficiently
- reduce errors and miscommunication
- comply with applicable legislation and insurance requirements
- represent company and industry in professional manner
- summon help in emergency
- prevent injury, save lives, and limit damage to equipment and property

Trends:

- There is an increased use of communication devices to increase productivity and improve safety.
- There is an increasing legislative requirement for documentation and participation in job site meetings.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
2.01	<p>Speaks and listens effectively</p> <p>Knowledge of:</p> <ul style="list-style-type: none"> • importance of effective communication • industry terms • roles of individuals on job site, such as supervisor, inspector, other tradespeople <p>Ability to:</p> <ul style="list-style-type: none"> • listen carefully to what is said • confirm understanding, such as repeat or paraphrase instructions • communicate message clearly and accurately to others • exchange information with others, such as supervisor, signaller, general public, inspectors, other operators and tradespeople 	
2.02	<p>Uses documentation</p> <p>Knowledge of:</p> <ul style="list-style-type: none"> • company policies and procedures • applicable legislation, such as Access to Information Act • own role and responsibilities • types of documentation required, such as log books, safety reports, maintenance reports, inspection reports, time cards • importance of complete, legible, and accurate documentation • where documentation is stored • industry terms 	

Ability to:

- access and store documents as required
- provide complete, legible, and accurate information in documents in timely manner
- read and interpret equipment inspection documentation from previous shifts before conducting pre-operational inspection

2.03 Communicates using signals

Knowledge of:

- company policies and procedures
- applicable legislation
- role and responsibilities of signallers
- signallers on job site
- audible and warning signals used on job site
- hand signals

Ability to:

- identify and work with signallers
- communicate using audible signals, such as back-up alarm, site emergency horn
- communicate using hand signals

2.04 Uses electronic communication equipment

Knowledge of:

- manufacturers' specifications and operating instructions
- company policies and procedures
- applicable legislation
- types of communication equipment used on job site

Communication devices

Ability to:

- check communication devices to verify operating condition, such as complete radio check
- deliver and receive messages using communication equipment
- follow communication protocol

BLOCK B SAFETY
Task 3 Interprets Applicable Legislation and Policies

This task is important because it helps to:

- ensure health and safety of workers and public
- comply with applicable legislation
- prevent damage to property and environment
- decrease potential of litigation

Trends:

- There is an increasing amount of training and documentation required by amended and new legislation.
- There is an increasing demand for standardized national legislation to reduce confusion and duplication caused by differences between jurisdictions. Lack of standardized legislation may lead to fatalities and accidents, and to damage of equipment, property, and the environment.
- There is an increasing expectation that operators will be knowledgeable about relevant legislation.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
3.01 Interprets federal, provincial/territorial, and municipal legislation	Knowledge of: <ul style="list-style-type: none"> • applicable federal, provincial/territorial, and municipal legislation, such as Highway Traffic Act, Occupational Health and Safety Act • where relevant legislation can be located Ability to: <ul style="list-style-type: none"> • locate relevant sections in legislation • read legislation • seek clarification of legislation 	
3.02 Interprets permits, licences, and insurance requirements	Knowledge of: <ul style="list-style-type: none"> • applicable permits, licences, and insurance requirements • authorities having jurisdiction Ability to: <ul style="list-style-type: none"> • locate permits, licences, and insurance documentation, such as over-dimensional permits, ground disturbance permits, air emissions permits, water use permits • read permits, licences, and insurance documentation • seek clarification on permits, licences, and insurance documentation 	<i>Permits, licences, insurance documentation</i>

3.03 Interprets environmental legislation

Knowledge of:

- relevant environmental legislation
- authorities having jurisdiction, such as department of fisheries, ministry of environment, municipality
- potential environmental damage caused by construction activities

Ability to:

- locate applicable permits on job site
- read environmental legislation
- seek clarification of environmental legislation

3.04 Interprets company policies and procedures

Knowledge of:

- where copies of company policies and procedures can be located

Ability to:

- read company policies and procedures
- stay current with company policies and procedures
- seek clarification on company policies and procedures

BLOCK B SAFETY
Task 4 Works Safely

This task is important because it helps to:

- protect self and others from injury or death
- comply with applicable legislation
- prevent damage to equipment and environment
- reduce unscheduled downtime

Trends:

- Legislation relating to PPE and training is frequently being amended to protect employees, employers, the environment, and the general public.
- The industry is involved in improving safety on job sites to reduce accidents.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
4.01 Uses personal protective equipment (PPE)	<p>Knowledge of:</p> <ul style="list-style-type: none"> • company policies and procedures • applicable legislation • PPE required/recommended by manufacturers' manuals • PPE required for construction sites, such as footwear, hard hats, safety vests, safety glasses • PPE required for specific conditions, such as breathing apparatus for hazardous breathing conditions, dielectric boots and gloves for protection from electrical shock • inspection, care, and use of PPE <p>Ability to:</p> <ul style="list-style-type: none"> • identify PPE required for job site and situation • ensure PPE meets safety standard requirements, such as Canadian Standards Association (CSA) • inspect PPE for damage, and repair or replace as necessary • ensure PPE fits correctly 	<p><i>Steel-toed footwear, hard hat, safety gloves, appropriate safety glasses, high visibility vest, hearing protection, breathing apparatus, fall protection, and other applicable PPE</i></p>
4.02 Completes required health and safety training	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications, such as recommended operating procedures • company policies and procedures • applicable legislation 	

Ability to:

- take required health and safety training, such as confined space entry, Workplace Hazardous Materials Information System (WHMIS), first aid, cardiopulmonary resuscitation (CPR)

BLOCK B SAFETY
Task 5 Complies with Site Emergency Plan

This task is important because it helps to:

- protect self
- prevent property damage
- ensure safety of public and job site personnel
- evacuate and secure area efficiently and effectively

Trends:

- Emergency exercises and preparedness activities are becoming more common.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
5.01 Prepares for emergencies	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications, such as equipment emergency shut-down procedure • company policies and procedures • site emergency response plan, such as evacuation routes, procedures, contact protocol • types of fires, i.e., Class A, B, C, and D • types of extinguishers • potential and actual hazards on work site • location of fire extinguishers and first aid stations (on equipment and site) and how to use them • inspection requirements for safety equipment and supplies, such as fire extinguisher, first aid kit <p>Ability to:</p> <ul style="list-style-type: none"> • take emergency response training, such as emergency response exercises, first aid, CPR 	<p><i>Site emergency response plan, fire extinguishers, fire blankets, respirators, masks, fire hoses, first aid kits, stretchers, WHMIS book, and other related tools and gear</i></p>
5.02 Responds to emergencies	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications, such as equipment emergency shut-down procedure • company policies and procedures • site emergency response plan, such as evacuation routes, procedures, contact protocol • types of fires, i.e., Class A, B, C, and D • types of extinguishers • potential and actual hazards on work site • location of fire extinguishers and first aid stations (on equipment and site) and how to use them 	<p><i>Fire extinguishers, fire blankets, respirators, masks, fire hoses, first aid kits, stretchers, and other related tools and gear</i></p>

- inspection requirements for safety equipment and supplies, such as fire extinguisher, first aid kit

Ability to:

- follow emergency plan
- communicate or follow instructions
- assess risks and determine course of action
- operate emergency equipment and supplies

BLOCK C EQUIPMENT
Task 6 Describes Equipment and Attachments

This task is important because it helps to:

- operate equipment properly and safely
- identify correct equipment for handling different materials and working conditions
- encourage communication about equipment with site personnel, mechanics, and others

Trends:

- Technology routinely causes updates to equipment, such as the addition of automatics and satellite systems.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
6.01	Describes types and sizes of pavers and screeds Knowledge of: <ul style="list-style-type: none"> • manufacturers' specifications for different makes, models, types, and sizes of pavers and screeds, such as rubber-tire paver, track paver, 10-foot main, different extensions for screed 	<i>Manufacturers' manuals and literature</i>
6.02	Identifies components of pavers and screeds Knowledge of: <ul style="list-style-type: none"> • manufacturers' specifications • operating systems, such as electrical, hydraulic, lubrication • major components of pavers, such as truck hooks, hopper • major components of screeds, such as burners, extensions, slope, crown, match-height • functions of major components, such as that truck hooks on paver are used to secure trucks for unloading, that burners on screed are used to heat screed 	<i>Manufacturers' manuals and literature</i>
6.03	Describes attachments Knowledge of: <ul style="list-style-type: none"> • manufacturers' specifications for different attachments, such as reference ski, cut-off plates, screed and auger extensions, night lights, automatics • purposes of different attachments, such as that reference ski is used to set grade profile for automatics 	<i>Manufacturers' manuals and literature</i>
6.04	Describes specialized asphalt paving equipment Knowledge of: <ul style="list-style-type: none"> • manufacturers' specifications, such as pick-up equipment, material transfer vehicle (MTV) 	<i>Manufacturers' manuals and literature</i>

6.05 Describes basic tools and supplies associated with pavers and screeds

Knowledge of:

- manufacturers' specifications for tools
- basic tools required by screed operators, such as hammer, screwdrivers, pliers, self-locking pliers, assorted wrenches, grease gun, tape measure, smart level, hand scraper, asphalt poker
- basic supplies required by screed operators, such as rags, oil, grease, whisk broom

Manufacturers' manuals and literature for tools and supplies

BLOCK D MAINTENANCE

Task 7 Performs Pre-operational Inspection and Daily Service with Engine Off

This task is important because it helps to:

- ensure continuous and safe operation of equipment
- meet manufacturers' specifications, company policies and procedures, and applicable legislation
- prevent damage to equipment and property
- prevent injury
- reduce unscheduled downtime

Trends:

- There is increased awareness of the consequences of not complying with environmental and Occupational Health and Safety legislation.
- Increasingly, computer-controlled operating systems are standard on new equipment.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
7.01 Inspects and services electrical system	Knowledge of: <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • electrical system, components, and functions • normal operating conditions Ability to: <ul style="list-style-type: none"> • locate components to be inspected • identify service needs, defects, and hazardous conditions through visual inspection • select and use appropriate tools • perform or arrange for service • perform or arrange for repair or replacement of defective components, such as wiring, switches 	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies</i>
7.02 Inspects and services hydraulic system	Knowledge of: <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • hydraulic system, components, and functions • normal operating conditions • spill kit procedures 	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, rags, hoses, hydraulic oil, spill kit</i>

Ability to:

- locate components to be inspected
- identify service needs, defects, and hazardous conditions through visual inspection
- select and use appropriate tools
- perform basic maintenance, such as check hoses and fittings
- use spill kit
- perform or arrange for repair or replacement of defective components, such as hoses

7.03 Inspects and services screed settings

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- applicable legislation

Ability to:

- locate control panels to be inspected
- select and use appropriate tools
- check and adjust settings on screed, such as match-height, crown on main

Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, string line

BLOCK D MAINTENANCE

Task 8 Performs Pre-operational Inspection and Daily Service with Engine Running

This task is important because it helps to:

- identify problems not evident when engine is off
- ensure that equipment is safe and ready to operate
- prolong equipment life
- reduce unscheduled downtime
- prevent damage to equipment and property
- prevent injury

Trends:

- There is increased awareness of the consequences of not complying with environmental and Occupational Health and Safety legislation.
- Increasingly, computer-controlled operating systems are standard on new equipment.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
8.01 Heats screed	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • monitoring and warning systems and components • impact of weather and seasonal conditions on start-up procedures • different methods of heating screed • correct temperatures for heating screed • effects of underheating/overheating screed • when to turn heat source on and off <p>Ability to:</p> <ul style="list-style-type: none"> • identify service needs, defects (such as leaks, burned out lights, screed plate thickness), and hazardous conditions through visual inspection • select and use appropriate tools • perform or arrange for repair or replacement of defective components, such as seals, gaskets, lines • use heating method to achieve correct temperature of screed • turn off heat source • communicate concerns with other site personnel 	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies</i></p>

8.02	Installs and inspects attachments	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• applicable legislation• attachments, components, and functions• procedures and mechanisms for installation of attachments• normal operating conditions <p>Ability to:</p> <ul style="list-style-type: none">• assist in positioning equipment and attachments for installation• install attachments safely• locate components to be inspected, such as auger and screed extensions, reference ski, automatics• identify service needs, defects, and hazardous conditions through visual inspection• select and use appropriate tools• perform or arrange for repair or replacement of defective components, such as bearings, screed plates	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies</i>
8.03	Cycles equipment functions	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• equipment controls• normal operating characteristics• impact of weather and seasonal conditions on equipment functions and fluids <p>Ability to:</p> <ul style="list-style-type: none">• activate all functions (such as lights, hydraulic functions, automatics) according to weather conditions• select and use appropriate tools• identify problems with functions• arrange for repair or replacement of defective components	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies</i>

BLOCK E OPERATING PROCEDURES
Task 9 Describes Basics of Paving

This task is important because it helps to:

- produce quality product with appropriate aesthetics
- improve efficiency

Trends:

- Compaction is an increasingly important part of the paving process due to higher quality control standards.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
9.01 Describes types and properties of mixes	Knowledge of: <ul style="list-style-type: none"> • materials, such as aggregate sizes, type of binder • properties of materials, such as hot/cold, rich/lean, texture • different mixes by aggregate size and asphalt cement (AC) grade • differences between high density mix, Superpave, and other specialty mixes • different mixes by colour and texture • additives, such as glass, rubber, ground shingles • temperature and impacts on mix 	
9.02 Describes types of paving projects	Knowledge of: <ul style="list-style-type: none"> • characteristics of highway, city, and specialty (such as race tracks, runway) paving projects • co-ordination of production, delivery, and lay-down • seams/joints, curves, crowns, and swales 	
9.03 Describes principles of compaction	Knowledge of: <ul style="list-style-type: none"> • factors that impact compaction, such as speed of paver and roller, temperature of mix and environment, weather, lift thickness, sub-grade conditions • types of compaction, such as screed, roller • seams/joints, curves, crowns, and swales 	

BLOCK E OPERATING PROCEDURES
Task 10 Plans Work Procedures

This task is important because it helps to:

- ensure that work is done according to job specifications
- prevent damage to equipment and property
- prevent injury
- increase safety and production

Trends:

- A job safety analysis (also known as site analysis) is often used, which may be in a checklist format, and require signatures of different site personnel.
- Daily safety and planning meetings are being implemented by more companies.
- Awareness of environmental sensitivity is increasing in the industry, and with the government and the public.
- There are increased requirements for site-specific training and orientation.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
10.01 Assesses site hazards	<p>Knowledge of:</p> <ul style="list-style-type: none"> • company policies and procedures • applicable legislation, such as Occupational Health and Safety • authorities having jurisdiction • locations of utilities • locations of other equipment, personnel, and vehicular traffic • how ground and other supporting conditions impact operation of equipment <p>Ability to:</p> <ul style="list-style-type: none"> • inspect site visually • communicate with site personnel • identify actual and potential hazards 	<i>PPE</i>
10.02 Discusses environmental concerns of site with site personnel	<p>Knowledge of:</p> <ul style="list-style-type: none"> • applicable legislation • environmental concerns • site characteristics and boundaries <p>Ability to:</p> <ul style="list-style-type: none"> • identify actual and potential environmental concerns, such as proximity to water courses, noise levels, fuel leaks, hazardous materials • communicate with employer or site personnel 	<i>PPE</i>

Asphalt Screed Operator Occupational Analysis

10.03	Reviews job specifications and safety considerations with site personnel	<p>Knowledge of:</p> <ul style="list-style-type: none">• job specifications• applicable legislation, such as Occupational Health and Safety, required permits• site plan• other construction equipment on site• actual and potential hazards, such as overhead wires, underground utilities• site and weather conditions• roles of personnel on site, such as foreman, inspector, other tradespeople• job- or site-specific PPE and training <p>Ability to:</p> <ul style="list-style-type: none">• communicate with site personnel to confirm job specifications and identify safety concerns, such as location of utilities	<i>PPE, site plan, utility locate document</i>
10.04	Determines work procedures	<p>Knowledge of:</p> <ul style="list-style-type: none">• manufacturers' specifications• job specifications• requirements to complete job tasks <p>Ability to:</p> <ul style="list-style-type: none">• identify equipment and attachments needed to do job• identify access and exit points on site• plan work procedures for safety, efficiency, and effectiveness• sequence job tasks to co-ordinate activities with other site personnel	<i>PPE</i>

BLOCK E OPERATING PROCEDURES
Task 11 Complies with Markers, Grades, and Stakes

This task is important because it helps to:

- ensure that job specifications are met
- increase safety and productivity

Trends:

- Global Positioning System (GPS) technology and construction lasers are making this task more precise and less labour-intensive.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
11.01 Interprets symbols and markings	<p>Knowledge of:</p> <ul style="list-style-type: none"> • symbols and markings, such as elevations, grades • job site colour coding for utilities <p>Ability to:</p> <ul style="list-style-type: none"> • recognize symbols and markings used on job site 	<i>PPE, colour-code cards, utility documentation</i>
11.02 Interprets survey markers, construction grades, and stakes	<p>Knowledge of:</p> <ul style="list-style-type: none"> • types and uses of survey markers, construction grades, and stakes • job site colour coding for utilities <p>Ability to:</p> <ul style="list-style-type: none"> • differentiate between different types of survey markers, construction grades, and stakes • identify what is indicated by different types of survey markers, construction grades, and stakes 	<i>PPE, colour-code cards, utility documentation</i>
11.03 Demonstrates use of grades and stakes	<p>Knowledge of:</p> <ul style="list-style-type: none"> • site plan and grade templates • types and uses of survey markers, construction grades, and stakes • job-site colour coding for utilities <p>Ability to:</p> <ul style="list-style-type: none"> • interpret symbols and markings on stakes • mark stakes/surface with appropriate symbols or markings, such as location of crown, edge of road 	<i>PPE, spray paint, markers, site plan</i>

11.04 Demonstrates use of grade-checking devices

Knowledge of:

- site plan and grade templates
- types and uses of survey markers, construction grades, and stakes
- job-site colour coding for utilities

Ability to:

- check grades using information on stakes and plans
- use grade-checking devices, such as automatic, reference ski, smart level, string line level

PPE, grade-checking devices

BLOCK E OPERATING PROCEDURES
Task 12 Operates Asphalt Screed

This task is important because it helps to:

- ensure safety of public
- prevent injury
- prevent damage to property and equipment
- fulfill job specifications
- co-ordinate operations with other construction activities on site

Trends:

N/A

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
12.01 Complies with equipment safety requirements	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • safety controls and equipment, such as travel alarms • caution, warning, and hazard decals and symbols <p>Ability to:</p> <ul style="list-style-type: none"> • use safety controls and equipment • respond to caution, warning, and hazard decals and symbols 	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, first aid kit, fire extinguisher</i>
12.02 Follows procedures for equipment set-up	<p>Knowledge of:</p> <ul style="list-style-type: none"> • job specifications and activities • factors affecting safe operation, such as weather, ground conditions, utilities • correct positioning of equipment • stability characteristics of equipment <p>Ability to:</p> <ul style="list-style-type: none"> • adjust to factors affecting safe operation • maintain stability of equipment • position equipment correctly • communicate with paver operator and traffic control person/signaller 	<i>PPE, stake line, pylons, delineators</i>
12.03 Demonstrates safe procedures for material handling	<p>Knowledge of:</p> <ul style="list-style-type: none"> • job specifications • characteristics of materials being handled 	<i>Manufacturers' manuals and literature, PPE</i>

		Ability to: <ul style="list-style-type: none">• recognize material to be used on project• determine safe procedures for working with material for project	
12.04	Monitors drainage/slope according to job specifications	Knowledge of: <ul style="list-style-type: none">• manufacturers' specifications• job specifications• company policies and procedures Ability to: <ul style="list-style-type: none">• operate screed controls to achieve job specifications• monitor and adjust screed and automatics to achieve drainage/slope	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, grade-checking devices</i>
12.05	Monitors boundaries according to job specifications	Knowledge of: <ul style="list-style-type: none">• manufacturers' specifications• job specifications• company policies and procedures Ability to: <ul style="list-style-type: none">• adjust where and how thick asphalt is placed• measure width and thickness of asphalt• determine application rate	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, grade-checking devices</i>
12.06	Finishes all seams/joints	Knowledge of: <ul style="list-style-type: none">• manufacturers' specifications• job specifications• company policies and procedures• effect of screed operations on end product• seam/joint finishing Ability to: <ul style="list-style-type: none">• communicate with other site personnel, such as paver operator• finish all seams/joints	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, rake, shovel, grade-checking devices</i>
12.07	Finishes pass	Knowledge of: <ul style="list-style-type: none">• manufacturers' specifications• job specifications• company policies and procedures• location and timing for end of pass	<i>Manufacturers' manuals and literature, grade-checking devices, PPE, basic tools and supplies, rake, shovel</i>

		Ability to: <ul style="list-style-type: none">• work with paver operator to control material volumes	
12.08	Monitors equipment performance	Knowledge of: <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• normal operating characteristics• instrument panel Ability to: <ul style="list-style-type: none">• monitor instrument panel• monitor screed temperature• use senses to monitor performance• identify equipment and material problems	<i>Manufacturers' manuals and literature, PPE</i>
12.09	Troubleshoots problems	Knowledge of: <ul style="list-style-type: none">• manufacturers' specifications• company policies and procedures• normal operating characteristics Ability to: <ul style="list-style-type: none">• identify problems and possible solutions• communicate problems accurately to others, such as paver operator, maintenance personnel	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, flashlight, communication devices</i>
12.10	Optimizes equipment capabilities	Knowledge of: <ul style="list-style-type: none">• manufacturers' specifications, such as capabilities, limitations• job specifications and activities• company policies and procedures• applicable legislation• site and seasonal conditions that impact performance• stability characteristics, such as centre of gravity, leverage• correct positioning of equipment• grades and stakes• hand signals	<i>Manufacturers' manuals and literature, PPE</i>

Ability to:

- position equipment correctly
- adjust operation of equipment to accommodate weather conditions, materials being handled, limitations of equipment and attachments, ground conditions, seasonal conditions, and stability characteristics of equipment
- adjust work procedures
- communicate with paver operator and traffic control person/signaller

12.11 Performs other duties

Knowledge of:

- tools and uses
- other duties, such as raking/shoveling asphalt

Ability to

- perform other duties

Manufacturers' manuals and literature, PPE, basic tools and supplies, shovel, rake, broom, sledgehammer, pry bars, putty knife

BLOCK E OPERATING PROCEDURES
Task 13 Follows Shut-down Procedures

This task is important because it helps to:

- prevent injury
- prevent damage to equipment and property
- ensure that equipment is ready for next shift
- reduce unscheduled downtime
- prevent vandalism and theft

Trends:

N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
13.01	Removes attachments	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation • attachments, components, and functions <p>Ability to:</p> <ul style="list-style-type: none"> • clean attachments, such as extensions • remove and store attachments 	<i>Manufacturers' manuals and literature, PPE</i>
13.02	Stores tools	<p>Knowledge of:</p> <ul style="list-style-type: none"> • company policies and procedures • basic tools and supplies <p>Ability to:</p> <ul style="list-style-type: none"> • clean tools • store tools in appropriate location 	<i>PPE, basic tools and supplies</i>
13.03	Performs visual inspection	<p>Knowledge of:</p> <ul style="list-style-type: none"> • manufacturers' specifications • company policies and procedures • applicable legislation <p>Ability to:</p> <ul style="list-style-type: none"> • check parked equipment visually • identify existing or potential problems • communicate concerns to appropriate personnel, such as supervisor, mechanic, paver operator 	<i>Manufacturers' manuals and literature, PPE</i>

Asphalt Screed Operator DACUM Chart

Block	Task	Subtask					
A. PROFESSIONALISM	1. Acts Professionally	1.01 Demonstrates work ethic	1.02 Is aware of factors affecting personal health	1.03 Resolves problems or disagreements with others	1.04 Participates in professional development	1.05 Works with others	1.06 Works independently
	2. Uses Communication Skills	2.01 Speaks and listens effectively	2.02 Uses documentation	2.03 Communicates using signals	2.04 Uses electronic communication equipment		
B. SAFETY	3. Interprets Applicable Legislation and Policies	3.01 Interprets federal, provincial/territorial, and municipal legislation	3.02 Interprets permits, licenses, and insurance requirements	3.03 Interprets environmental legislation	3.04 Interprets company policies and procedures		
	4. Works Safely	4.01 Uses personal protective equipment (PPE)	4.02 Completes required health and safety training				
	5. Complies with Site Emergency Plan	5.01 Prepares for emergencies	5.02 Responds to emergencies				

Asphalt Screed Operator DACUM Chart

Block	Task	Subtask				
C. EQUIPMENT	6. Describes Equipment and Attachments	6.01 Describes types and sizes of pavers and screeds	6.02 Identifies components of pavers and screeds	6.03 Describes attachments	6.04 Describes specialized asphalt paving equipment	6.05 Describes basic tools and supplies associated with pavers and screeds
D. MAINTENANCE	7. Performs Pre-operational Inspection and Daily Service with Engine Off	7.01 Inspects and services electrical system	7.02 Inspects and services hydraulic system	7.03 Inspects and services screed settings		
	8. Performs Pre-operational Inspection and Daily Service with Engine Running	8.01 Heats screed	8.02 Installs and inspects attachments	8.03 Cycles equipment functions		
E. OPERATING PROCEDURES	9. Describes Basics of Paving	9.01 Describes types and properties of mixes	9.02 Describes types of paving projects	9.03 Describes principles of compaction		
	10. Plans Work Procedures	10.01 Assesses site hazard	10.02 Discusses environmental concerns of site with site personnel	10.03 Reviews job specifications and safety considerations with site personnel	10.04 Determines work procedures	

Asphalt Screed Operator DACUM Chart

Block	Task	Subtask					
E. OPERATING PROCEDURES, cont'd	11. Complies with Markers, Grades, and Stakes	11.01 Interprets symbols and markings	11.02 Identifies survey markers, construction grades, and stakes	11.03 Demonstrates use of grades and stakes	11.04 Demonstrates use of grade-checking devices		
	12. Operates Asphalt Screed	12.01 Complies with equipment safety requirements	12.02 Follows procedures for equipment set-up	12.03 Demonstrates safe procedures for material handling	12.04 Monitors drainage/slope according to job specifications	12.05 Monitors boundaries according to job specifications	12.06 Finishes all seams/joints
		12.07 Finishes pass	12.08 Monitors equipment performance	12.09 Troubleshoots problems	12.10 Optimizes equipment capability	12.11 Performs other duties	
	13. Follows Shut-down Procedures	13.01 Removes attachments	13.02 Stores tools	13.03 Performs visual inspection			

Acknowledgements

The CSC acknowledges all of the subject matter experts who provided their valuable time and efforts toward the definition and validation of these national occupational analyses. Without their combined contributions, the development of these OAs would not have been possible.

Utilities:

Dave Jurasek, ON
George Lawrence, ON
Allan MacDonald, ON
Shawn McAdam, NB
Hilford Morrell, AB
Rae Munroe, ON
Dave “Chatter” Prosofsky, AB
Paul Weaver, AB

Material Handling:

Bernie Elliott, ON
Alain Jacques, QC
Frank Jones, BC
Bruno Malbasa, MB
Shawn McAdam, NB
John McIsaac, BC
Rae Munroe, ON
Jim Oleksyn, SK
Bob Raymack, MB
Terry Robichaud, NB
Bob Tytko, ON

Grading:

Guenther Bott, ON
Gerry Chouinard, QC
Alain Jacques, QC
Grant Labrash, BC
Richard Lagace, NB
Blair Lentz, ON
Rae Munroe, ON
Daryl Sweetland, MB
Darrell Tremblay, BC
Ron Ward, ON

Crane:

Harry Boon, NB
Kevin Caines, NL
Steve Deady, ON
John Doherty, MB
Joe Dowdall, ON
Charlie Eddy, NL
Oneil Lapointe, ON
Marty McDonnell, AB

Craig McIntosh, BC
Rae Munroe, ON
Len Phelan, BC
Len Poitras, SK
Gary Snow, NL

Plant Operations:

Reynold Amey, BC
Roger Beck, NS
Mervyn Benson, NS
Vito DeFrancesco, ON
Barry Dupres, MB
Jeff Emino, NS
Nelson Fowler, NB
Rae Munroe, ON
Peter Serrette, MB
Kent Walker, ON

HAZMAT:

Bernie Elliott, ON
Frank Jones, BC
Dan O’Keefe, BC
Bruno Malbasa, MB
John McIsaac, BC
Tom Miller, ON
Rae Munroe, ON
Jim Oleksyn, SK
Bob Raymack, MB
Randy Stegner, ON
Bob Tytko, ON

Concrete Pumping:

Mike Bruce, ON
Kevin Caines, NL
Steve Deady, ON
Joe Dowdall, ON
Charlie Eddy, NL
Stan Fortune, ON
Nelson Fowler, NB
Wayne Hannah, ON
Marty McDonnell, AB
Craig McIntosh, BC
Rae Munroe, ON
Len Phelan, BC

Gary Snow, NL

Excavating:

Archie Fontaine, BC
Dan Johnson, MB
Merv Marcynuk, MB
Harold McBride, ON
Robert Middleton, MB
Rae Munroe, ON
Vance Simpson, MB
Jack Walker, AB
Pat Watson, BC
Gary Snow, NL

Hauling:

Alain Jacques, QC
Archie Fontaine, BC
Bruce Hecht, AB
Dan Henry, MB
Richard Lagace, NB
Robert Middleton, MB
Rae Munroe, ON
Shawn Robertson, ON
Larry Smith, NL
Scott Smith, ON
Ernest Wainio, ON

Paving:

David Alves, ON
Gordon Biegler, AB
Orest Cesmistruk, NS
Frank Cardile, AB
Peter Gamble, ON
Rae Munroe, ON
Greg Paciorka, MB
Brian Parisien, MB
Robert Parisien, MB
Todd Paterson, ON
Rick Spaidal, BC