

# **National Occupational Standards For Operating Engineers**

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## **EXCAVATOR OPERATOR**



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

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

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

Ability to:

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

*Communication devices*

**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"> <li>• applicable federal, provincial/territorial, and municipal legislation, such as Highway Traffic Act, Occupational Health and Safety Act</li> <li>• where relevant legislation can be located</li> </ul> Ability to: <ul style="list-style-type: none"> <li>• locate relevant sections in legislation</li> <li>• read legislation</li> <li>• seek clarification of legislation</li> </ul>	
3.02 Interprets permits, licences, and insurance requirements	Knowledge of: <ul style="list-style-type: none"> <li>• applicable permits, licences, and insurance requirements</li> <li>• authorities having jurisdiction</li> </ul> Ability to: <ul style="list-style-type: none"> <li>• locate permits, licences, and insurance documentation, such as over-dimensional permits, ground disturbance permits, air emissions permits, water use permits</li> <li>• read permits, licences, and insurance documentation</li> <li>• seek clarification on permits, licences, and insurance documentation</li> </ul>	<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"> <li>• company policies and procedures</li> <li>• applicable legislation</li> <li>• PPE required/recommended by manufacturers' manuals</li> <li>• PPE required for construction sites, such as footwear, hard hats, safety vests, safety glasses</li> <li>• PPE required for specific conditions, such as breathing apparatus for hazardous breathing conditions, dielectric boots and gloves for protection from electrical shock</li> <li>• inspection, care, and use of PPE</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• identify PPE required for job site and situation</li> <li>• ensure PPE meets safety standard requirements, such as Canadian Standards Association (CSA)</li> <li>• inspect PPE for damage, and repair or replace as necessary</li> <li>• ensure PPE fits correctly</li> </ul>	<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"> <li>• manufacturers' specifications, such as recommended operating procedures</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> </ul>	



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"> <li>• manufacturers' specifications, such as equipment emergency shut-down procedure</li> <li>• company policies and procedures</li> <li>• site emergency response plan, such as evacuation routes, procedures, contact protocol</li> <li>• types of fires, i.e., Class A, B, C, and D</li> <li>• types of extinguishers</li> <li>• potential and actual hazards on work site</li> <li>• location of fire extinguishers and first aid stations (on equipment and site) and how to use them</li> <li>• inspection requirements for safety equipment and supplies, such as fire extinguisher, first aid kit</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• take emergency response training, such as emergency response exercises, first aid, CPR</li> </ul>	<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"> <li>• manufacturers' specifications, such as equipment emergency shut-down procedure</li> <li>• company policies and procedures</li> <li>• site emergency response plan, such as evacuation routes, procedures, contact protocol</li> <li>• types of fires, i.e., Class A, B, C, and D</li> <li>• types of extinguishers</li> <li>• potential and actual hazards on work site</li> <li>• location of fire extinguishers and first aid stations (on equipment and site) and how to use them</li> </ul>	<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:

- use equipment properly and safely
- select correct equipment and attachments for materials and working conditions

Trends:

- Increasingly, excavators are being used for different types of work because the equipment is so adaptable. For example, the quick coupler and/or quick change easily allows the use of a multitude of attachments.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
6.01	Describes types and sizes of excavators	Knowledge of: <ul style="list-style-type: none"> <li>• manufacturers' specifications for different types and sizes of excavators, such as track, rubber tire</li> </ul>	<i>Manufacturers' manuals and literature</i>
6.02	Describes components and functions	Knowledge of: <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• operating systems, such as hydraulic, electrical, lubrication</li> <li>• major components, such as bucket, counterweight, operator station</li> <li>• functions of major components, such as that counterweight stabilizes excavator</li> </ul>	<i>Manufacturers' manuals and literature</i>
6.03	Describes capacities/capabilities of excavators	Knowledge of: <ul style="list-style-type: none"> <li>• manufacturers' specifications for capacities and/or capabilities of common types and sizes of excavators</li> </ul>	<i>Manufacturers' manuals and literature</i>
6.04	Describes attachments and purposes	Knowledge of: <ul style="list-style-type: none"> <li>• manufacturers' specifications for common attachments, such as hammer, scissors, rake, root rake, ripper, grapple, swivel</li> <li>• purposes of attachments, such as that hammer is used to break rock, grapple is used to secure loads</li> </ul>	<i>Manufacturers' manuals and literature for equipment and attachments</i>

6.05 Describes basic tools and supplies associated with excavators

Knowledge of:

- manufacturers' specifications for tools and supplies
- basic tools, such as grease gun, hammer, screwdrivers, pliers, self-locking pliers, adjustable wrench, assorted other wrenches, tape measure
- basic supplies, such as grease, oil, window cleaner, rags, ice scraper, 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.

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

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		<ul style="list-style-type: none"><li>• perform or arrange for service</li><li>• perform or arrange for repair or replacement of defective components, such as batteries</li></ul>	
7.03	Inspects and services hydraulic system	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications, such as position of attachment to check hydraulic oil levels</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• hydraulic systems, components, and functions</li><li>• spill kit procedures</li><li>• normal operating conditions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• locate components to be inspected</li><li>• identify service needs, defects, and hazardous conditions through visual inspection</li><li>• select and use appropriate tools</li><li>• perform basic maintenance, such as check hydraulic oil levels</li><li>• use spill kit</li><li>• perform or arrange for repair or replacement of defective components, such as hoses</li></ul>	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools, and supplies, spill kit</i>
7.04	Inspects and services cooling system	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• cooling system, components, and functions</li><li>• spill kit procedures</li><li>• normal operating conditions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• locate components to be inspected</li><li>• identify service needs, defects, and hazardous conditions through visual inspection, such as ensure unobstructed air flow through radiator</li><li>• select and use appropriate tools</li><li>• perform basic service, such as adjust coolant level</li><li>• use spill kit</li><li>• perform or arrange for repair or replacement of defective components, such as hoses, belts</li></ul>	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, spill kit, coolant</i>
7.05	Inspects and services air intake system	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li></ul>	<i>Manufacturers' manuals and literature,</i>

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		<ul style="list-style-type: none"><li>• applicable legislation</li><li>• air intake system, components, and functions</li><li>• normal operating conditions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• locate components to be inspected</li><li>• identify service needs, defects, and hazardous conditions through visual inspection, such as check air service indicator</li><li>• select and use appropriate tools</li><li>• perform basic maintenance, such as clean primary air filter</li><li>• perform or arrange for repair or replacement of defective components, such as intake hoses, clamps</li></ul>	<i>equipment maintenance documentation, PPE, basic tools and supplies</i>
7.06	Inspects and services fuel system	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• fuel system, components, and functions</li><li>• normal operating conditions</li><li>• spill kit procedures</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• locate components to be inspected</li><li>• identify and read gauges and level indicators</li><li>• identify service needs, defects, and hazardous conditions through visual inspection</li><li>• select and use appropriate tools</li><li>• perform basic maintenance, such as refuel tank</li><li>• use spill kit</li><li>• perform or arrange for repair or replacement of defective components, such as fuel lines, injector lines</li></ul>	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, spill kit, fuel, fuel conditioner</i>
7.07	Inspects and services suspension system	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• suspension system, components, and functions</li><li>• normal operating conditions</li></ul>	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i>



Ability to:

- locate components to be inspected
- identify service needs, defects, and hazardous conditions through visual inspection, such as check for gashes or bulges in tires
- select and use appropriate tools
- perform basic maintenance, such as grease bushings, bearings, and pins
- perform or arrange for repair or replacement of defective components, such as change grease fittings

7.08 Inspects and services drive train

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- applicable legislation
- drive train, components, and functions
- spill kit procedures
- normal operating conditions

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 for wear, leaks, and damage to components
- use spill kit
- perform or arrange for repair or replacement of defective components, such as sprocket segments

*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, spill kit, flashlight*

7.09 Inspects and services braking system

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- applicable legislation
- type of braking systems (such as electrical, mechanical, hydraulic, pneumatic), components, and functions
- normal operating conditions
- spill kit procedures

Ability to:

- locate components to be inspected
- identify service needs, defects, and hazardous conditions through visual inspection
- select and use appropriate tools

*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight, brake fluid, air line conditioner, spill kit*

		<ul style="list-style-type: none"><li>• perform basic maintenance, such as top up fluid reservoirs</li><li>• use spill kit</li><li>• perform or arrange for repair or replacement of defective components, such as linkage arm</li></ul>	
7.10	Inspects and services load-bearing structure	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications of structure and components</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• load-bearing structure, components, and functions</li><li>• normal operating conditions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• locate components to be inspected</li><li>• identify service needs, defects, and hazardous conditions through visual inspection</li><li>• select and use appropriate tools</li><li>• perform basic maintenance, such as grease bushings, bearings, and pins</li><li>• perform or arrange for repair or replacement of defective components, such as cracked frame</li></ul>	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i>
7.11	Inspects and services operator station	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• operator station and components, such as seat, instrument panel, communication devices</li><li>• normal operating conditions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• locate and identify controls inside operator station</li><li>• identify missing or defective components or controls</li><li>• clean windows and mirrors</li><li>• adjust mirrors</li><li>• perform or arrange for repair or replacement of defective components, such as broken mirror</li></ul>	<i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies</i>

## Excavator Operator Occupational Analysis

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7.12	Inspects safety equipment	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li></ul> <p>• required safety equipment, such as reflectors, fire extinguisher, pylons, decals</p> <ul style="list-style-type: none"><li>• normal operating conditions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• ensure safety equipment is present and securely mounted</li><li>• identify service needs, defects, and hazardous conditions through visual inspection</li><li>• arrange for repair or replacement of defective components, such as fire extinguisher</li></ul>	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, safety equipment</i></p>
7.13	Inspects and services attachments	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• attachments, components, and functions</li><li>• normal operating conditions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• identify service needs, defects, and hazardous conditions through visual inspection</li><li>• select and use appropriate tools</li><li>• perform basic maintenance, such as grease bearings, bushings, and pins</li><li>• perform or arrange for repair or replacement of defective components, such as cracked bucket, worn teeth, broken weld on thumb bracket</li></ul>	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies</i></p>
7.14	Inspects and services auxiliary pneumatic system	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• auxiliary pneumatic systems, components, and functions</li><li>• normal operating conditions</li></ul>	<p><i>Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, flashlight</i></p>

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 close drain valves, top up alcohol injectors
- perform or arrange for repair or replacement of defective components, such as air lines

**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
- prevent unscheduled downtime
- prevent damage to equipment and property
- prevent injury

Trends:

- Computer-monitored systems are found on newer excavators. These systems can control warm-up procedures and monitor operating systems.
- There is increased awareness of the consequences of not complying with environmental and Occupational Health and Safety legislation.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
8.01 Starts engine and checks monitoring and warning systems	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> <li>• monitoring and warning systems and components</li> <li>• impact of weather and seasonal conditions on start-up procedures</li> <li>• battery-boosting procedures</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• identify service needs, defects, and hazardous conditions (such as leaks, burnt out lights) through visual inspection</li> <li>• select and use appropriate tools</li> <li>• perform basic service, such as replace fuse, tighten fitting</li> <li>• perform or arrange for repair or replacement of defective components, such as seals, gaskets, lines</li> <li>• assist mechanic with battery boosting if necessary</li> </ul>	<i>Manufacturers' manuals and literature, PPE</i>
8.02 Warms up engine	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• impact of weather and seasonal conditions on equipment functions and fluids</li> </ul>	<i>Manufacturers' manual and literature, PPE</i>

Ability to:

- monitor instrument panel
- warm up engine according to manufacturers' instructions

8.03 Cycles equipment functions

Knowledge of:

- manufacturers' specifications
- company policies and procedures
- equipment controls
- normal operating characteristics of equipment
- impact of weather and seasonal conditions on equipment functions and fluids

*Manufacturers' manual and literature, equipment maintenance documentation, PPE*

Ability to:

- activate all functions, such as brakes, steering, lights, wipers, hydraulic functions
- identify problems with functions
- arrange for or perform required service

**BLOCK D MAINTENANCE**

**Task 9 Complies with Scheduled Maintenance Requirements**

This task is important because it helps to:

- ensure continuous and safe operation of equipment
- validate manufacturers' equipment warranties
- prevent damage to equipment
- reduce unscheduled downtime

Trends:

- Computer-monitored systems are found on newer excavators. These systems can indicate the need for scheduled maintenance.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
9.01 Arranges for or performs scheduled maintenance	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> <li>• factors that affect scheduled maintenance, such as where equipment is being used, weather, seasonal conditions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• comply with safety requirements</li> <li>• read indicators that signal need for replacement</li> <li>• read maintenance records and documentation relating to service, such as log books</li> <li>• arrange for or perform scheduled maintenance</li> </ul>	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, filters</i>

**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

Trends:  
 N/A

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



- actual and potential hazards, such as overhead wires, underground utilities
- site and weather conditions
- roles of personnel on site, such as foreman, inspector, first aid responder, other tradespeople
- job- or site-specific PPE or training

Ability to:

- communicate with site personnel to confirm job specifications and identify safety concerns, such as location of utilities

10.04 Determines work procedures

Knowledge of:

- manufacturers' specifications
- job specifications
- requirements to complete job tasks
- types of materials, such as rock, clay, sand, topsoil

*PPE*

Ability to:

- identify equipment and attachments needed to do job
- determine appropriate starting point
- identify access and exit points on site
- plan work procedures for efficiency, effectiveness, and safety
- sequence job tasks to co-ordinate activities with others

**BLOCK E      OPERATING PROCEDURES**  
**Task 11      Complies with Grades and Stakes**

This task is important because it helps to:

- ensure that job specifications are met
- allow operator to work safely, productively, and with minimal supervision

Trends:

- Global Positioning System (GPS) technology and construction lasers make 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"> <li>• symbols and markings, such as colour-coded ribbons, surface paint marks</li> <li>• job site colour coding for grades and stakes</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• recognize symbols and markings used on job site</li> </ul>	<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"> <li>• types and uses of survey markers, construction grades, and stakes, such as that permanent legal survey markers are used to indicate property lines</li> <li>• job site colour coding for grades and stakes</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• differentiate between types of survey markers, construction grades, and stakes</li> <li>• identify what is indicated by different types of survey markers, construction grades, and stakes</li> </ul>	<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"> <li>• site prints and grade templates</li> <li>• types and uses of survey markers, construction grades, and stakes</li> <li>• job site colour coding for grades and stakes</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• interpret symbols and markings on stakes</li> <li>• mark stakes/surface with appropriate symbols or markings, such as coloured paint, ribbons</li> </ul>	<i>PPE, spray paint, coloured ribbons, coloured markers, site plans</i>

11.04 Demonstrates use of grade-checking devices

Knowledge of:

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

Ability to:

- check grades using information on stakes and site plans
- use grade-checking devices, such as laser levels, line (also known as string) levels, sight levels

*PPE, site plan, grade-checking devices*

**BLOCK E      OPERATING PROCEDURES**  
**Task 12      Operates Excavator**

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:

- There is increasing litigation against owners and operators, who are legally responsible for the safe operation of equipment.
- Computer-monitored systems are being installed as standard equipment on excavators. These systems can track information over time, such as maintenance done, and abuses of equipment that will invalidate a warranty.

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
12.01    Complies with safety requirements	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> <li>• safety controls and equipment, such as travel alarms</li> <li>• caution, warning, and hazard decals, lights, and symbols</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• use safety controls and equipment</li> <li>• respond to caution, warning, and hazard decals, lights, and symbols</li> </ul>	<p><i>Manufacturers' manuals and literature, PPE, basic tools and supplies, first aid kit, fire extinguisher</i></p>
12.02    Sets up equipment	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• job specifications and activities</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> <li>• factors affecting safe operation of equipment, such as weather, ground conditions, utilities</li> <li>• correct positioning of equipment</li> <li>• stability characteristics of equipment</li> <li>• hand signals</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• adjust to factors affecting safe operation of equipment</li> <li>• maintain stability of equipment</li> <li>• position equipment correctly</li> </ul>	<p><i>Manufacturers' manuals and literature, PPE</i></p>

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		<ul style="list-style-type: none"><li>• communicate with traffic control person/signaller</li></ul>	
12.03	Installs attachments	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• job specifications</li><li>• attachments and specifications</li><li>• procedures and mechanisms for installation of attachments</li><li>• hand signals</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• select and use appropriate tools</li><li>• position equipment and attachments for installation</li><li>• install attachments safely</li><li>• use and respond to hand signals</li></ul>	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies</i>
12.04	Uses operating controls	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• operating controls and functions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• use operating controls smoothly and safely</li><li>• use different operating controls simultaneously as required</li><li>• react to changing conditions/situations</li></ul>	<i>Manufacturers' manuals and literature, PPE</i>
12.05	Monitors performance of equipment	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• normal operating characteristics</li><li>• instrument panel, such as gauges, symbols</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• read and interpret information from gauges and symbols</li><li>• use own senses to monitor performance</li><li>• identify equipment problems</li></ul>	<i>Manufacturers' manuals and literature, PPE</i>

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12.06	Troubleshoots equipment problems	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• normal operating characteristics</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• identify problems and possible solutions</li><li>• communicate problems accurately to others, such as maintenance personnel</li></ul>	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, communication devices, flashlight</i>
12.07	Monitors activities of people, vehicles, and other equipment in area	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• applicable legislation, such as when to use signaller or traffic control person</li><li>• potential safety hazards</li><li>• site traffic patterns</li><li>• equipment blind spots</li><li>• hand signals</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• observe and respond to movement of others in work area while performing tasks</li><li>• avoid collisions</li><li>• respond to signaller or traffic control person</li><li>• communicate with others, such as site personnel</li></ul>	<i>PPE</i>
12.08	Optimizes equipment capabilities	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications, such as capabilities and limitations of equipment</li><li>• job specifications</li><li>• site and seasonal conditions that affect performance of equipment</li><li>• stability characteristics, such as centre of gravity, leverage, tipping axis</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• adjust operation to accommodate weather conditions, materials being handled, limitations of attachments and equipment, ground conditions, seasonal conditions, and stability characteristics</li><li>• adjust work procedures as necessary</li></ul>	<i>Manufacturers' manuals and literature, PPE</i>

12.09	Excavates trenches	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• job specifications, such as drainage direction, width, depth</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• types of trenches, such as shallow, sloped, benched, utility</li><li>• grades and stakes</li><li>• shoring systems, such as trench box/cage, hydraulic shoring, timber shoring</li><li>• procedures for exposing (also known as daylighting) underground utilities</li><li>• obstructions and hazards, such as utilities</li><li>• materials to be handled</li><li>• stability characteristics of equipment</li><li>• stability accessories for equipment, such as work mats</li><li>• hand signals</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• work around obstructions and hazards</li><li>• maintain equipment in stable position and correct location for job</li><li>• place and relocate shoring systems as required</li><li>• use grade-checking devices</li><li>• excavate trenches in accordance with job specifications</li><li>• use and respond to hand signals</li></ul>	<p><i>Manufacturers' manuals and literature, PPE, shoring system components, grades and stakes, grade-checking devices, work mats</i></p>
12.10	Excavates ditches	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• job specifications, such as spoil and re-usable material placement</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• types of ditches, such as v-ditches, flat-bottom, swale (also known as round bottom)</li><li>• grades and stakes</li><li>• site obstructions and hazards, such as underground utilities</li><li>• weather and surface conditions</li><li>• procedures for exposing underground utilities</li><li>• materials to be moved, such as muskeg, topsoil, clay, silt, rock</li><li>• stability characteristics of equipment</li></ul>	<p><i>Manufacturers' manuals and literature, PPE, grades and stakes, grade-checking devices, work mats</i></p>

- stability accessories for equipment, such as work mats
- hand signals

Ability to:

- work around site obstructions and hazards
- maintain equipment in stable position and correct location for job
- use grade-checking devices
- excavate ditches in accordance with job specifications
- use and respond to hand signals

12.11 Loads transport vehicles

Knowledge of:

- manufacturers' specifications
- job specifications, such as position of equipment, surface conditions
- company policies and procedures
- applicable legislation, such as load restrictions
- obstructions and hazards, such as utilities
- materials to be handled
- grades and stakes
- capacities of transport vehicles
- site plan
- hand signals

*Manufacturers' manuals and literature, PPE, site plan*

Ability to:

- work around obstructions and hazards
- direct transport vehicle operators
- load transport vehicles in accordance with job specifications
- use and respond to hand signals

12.12 Builds, excavates, and maintains haul roads and ramps

Knowledge of:

- manufacturers' specifications
- job specifications, such as slope ratio, type of equipment using haul road/ramp, location of haul road/ramp, installation/removal of culverts
- company policies and procedures
- applicable legislation
- procedures for exposing underground utilities
- obstructions and hazards
- existing structures or utilities to be backfilled prior to building haul road/ramp
- materials to be handled
- grades and stakes

*Manufacturers' manuals and literature, site plan, grade-checking devices, PPE*



Ability to:

- work around obstructions and hazards
- use grade-checking devices
- protect existing structures and utilities
- build, excavate, or maintain haul roads and ramps in accordance with job specifications

12.13 Stockpiles materials

Knowledge of:

- manufacturers' specifications
- job specifications, such as slope, volume of material, available space
- company policies and procedures
- applicable legislation
- obstructions and hazards, such as utilities
- materials to be handled
- property-boundary stakes
- site plan

*Manufacturers' manuals and literature, PPE, site plan*

Ability to:

- work around obstructions and hazards
- stockpile materials in accordance with job specifications

12.14 Backfills trenches/ excavations

Knowledge of:

- manufacturers' specifications
- job specifications, such as compaction and material requirements, requirements for utility identification
- company policies and procedures
- applicable legislation
- obstructions and hazards, such as utilities
- materials to be handled
- grades and stakes
- effects of backfilling on structures, such as pipes, walls
- hand signals

*Manufacturers' manuals and literature, PPE, grade-checking devices*

Ability to:

- work around obstructions and hazards
- ensure that structures or utility lines are not damaged during backfilling
- maintain stability of equipment
- level/layer materials
- use grade-checking devices
- backfill trenches/excavations in accordance with job specifications
- use and respond to hand signals

12.15 Hoists objects

Knowledge of:

- manufacturers' specifications, such as capacity charts
- job specifications
- company policies and procedures
- applicable legislation, such as condition of rigging hardware
- dimensions, weight, attachment points, and centre of gravity of load
- safe rigging techniques, such as basket, choke, choke-hitch
- types, capacities, and uses of slings and rigging hardware
- obstructions and hazards, such as utilities
- hand signals

Ability to:

- inspect rigging components visually
- identify and discard worn or damaged rigging components
- communicate with appropriate personnel to replace worn or damaged components
- work around obstructions and hazards
- set up equipment in stable position and correct location for job
- hoist materials in accordance with manufacturers' specifications, job specifications, and legislation
- use and respond to hand signals

*Manufacturers' manuals and literature, PPE*

12.16 Clears land

Knowledge of:

- manufacturers' specifications
- job specifications, such as boundary lines, placement of grub, transport vehicle routes
- company policies and procedures
- applicable legislation, such as environmental regulations and concerns
- attachments, such as chipper, mower, root rake
- tree, stump, and rock removal techniques
- procedures for exposing underground utilities
- obstructions and hazards, such as utilities
- falling object protection
- site plan

Ability to:

- work around obstructions and hazards
- install attachments

*Manufacturers' manuals and literature, PPE, basic tools and supplies, site plan*

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- maintain haul road if required
- clear land in accordance with job specifications

12.17 Demolishes buildings and other structures

Knowledge of:

- manufacturers' specifications
- job specifications, such as amount and type of material to be demolished, sorting and placement of demolished materials, sequence of tasks for demolition
- company policies and procedures
- applicable legislation
- materials, such as brick rubble, concrete, wood
- design of structure
- fall patterns
- procedures for exposing underground utilities
- special safety devices, such as falling object protection
- site plan
- obstructions and hazards, such as utilities
- hand signals

*Manufacturers' manuals and literature, PPE, site plan, special safety devices*

Ability to:

- work around obstructions and hazards
- position equipment safely while demolishing, i.e., always have means of exit
- demolish structures and remove demolition materials in accordance with job specifications
- use and respond to hand signals

12.18 Cuts and fills materials

Knowledge of:

- manufacturers' specifications
- job specifications
- company policies and procedures
- applicable legislation
- grades and stakes
- obstructions and hazards, such as utilities
- procedures for exposing underground utilities
- materials to be handled
- hand signals

*Manufacturers' manuals and literature, PPE, grade-checking devices, site plan*

Ability to:

- work around obstructions and hazards
- position equipment correctly
- use grade-checking devices

- cut and fill materials in accordance with job specifications
- use and respond to hand signals

12.19 Excavates water channels

Knowledge of:

- manufacturers' specifications
- job specifications, such as type of barge, ballast, operating environment
- company policies and procedures
- applicable legislation, such as environmental regulations and concerns
- special attachments, such as grapple hook, clam bucket, extended boom
- dredging techniques, such as removal of large rocks and/or of mud, location mapping
- barges and characteristics, such as capacity, stability
- procedures for exposing underground utilities
- special safety devices, such as tie-downs, life boat
- obstructions and hazards, such as utilities
- hand signals

*Manufacturers' manuals and literature, PPE, GPS*

Ability to:

- work around obstructions and hazards
- direct haul barge into position for loading out of material
- load haul barge to ensure even distribution of weight
- maintain ballast when moving on and off barge
- excavate water channels in accordance with job specifications
- use and respond to hand signals

12.20 Loads materials on barges/scows

Knowledge of:

- manufacturers' specifications
- job specifications
- company policies and procedures
- applicable legislation, such as environmental regulations and concerns
- special attachments, such as forks, blade, clam bucket
- barges/scows and characteristics, such as capacity, stability
- special safety devices, such as tie-downs, life boat, personal flotation device (PFD)
- obstructions and hazards, such as utilities
- hand signals

*Manufacturers' manuals and literature, PPE, special safety devices*

Ability to:

- work around obstructions and hazards
- direct barge/scow into position for loading out of material
- maintain ballast when travelling equipment on and off barge
- load barge/scow to ensure even distribution of weight and to comply with job specifications
- use and respond to hand signals

12.21 Feeds material  
hoppers

Knowledge of:

- manufacturers' specifications
- job specifications, such as type of material, aggregate size
- company policies and procedures
- materials to be handled, such as asphalt, gravel
- obstructions and hazards, such as utilities
- hand signals

*Manufacturers' manuals and literature, PPE*

Ability to:

- work around obstructions and hazards
- feed material hoppers in accordance with job specifications
- use and respond to hand signals

12.22 Installs and  
removes culverts

Knowledge of:

- manufacturers' specifications
- job specifications, such as size of culvert, elevation, bedding
- company policies and procedures
- applicable legislation
- materials to be handled, such as asphalt, clay, gravel
- obstructions and hazards, such as utilities
- site plan
- hand signals

*Manufacturers' manuals and literature, PPE, site plan*

Ability to:

- work around obstructions and hazards
- avoid culvert damage
- install and remove culverts in accordance with job specifications
- use and respond to hand signals

12.23 Handles mats

Knowledge of:

- manufacturers' specifications
- job specifications, such as amount of matting, placement of matting
- company policies and procedures
- applicable legislation
- mats to be handled, such as blasting, swamp
- weight and dimensions of mats to be handled
- obstructions and hazards, such as utilities
- site plan
- hand signals

*Manufacturers' manuals and literature, PPE, site plan*

Ability to:

- work around obstructions and hazards
- hook and unhook mats to equipment
- maintain stability of equipment while handling mats
- handle mats in accordance with job specifications
- use and respond to hand signals

**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
- prevent unscheduled downtime
- prevent vandalism and unauthorized movement of equipment

Trends:

N/A

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
13.01 Cleans undercarriage and attachments before parking	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• importance of cleaning tracks, wheels, rollers, and attachments</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• clean tracks, wheels, rollers, and attachments according to manufacturers' specifications and company policies and procedures</li> </ul>	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies</i>
13.02 Parks equipment in appropriate location	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> <li>• suitable and safe parking locations, such as dry and clean surface, level, away from fuel storage or water courses, secure area</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• identify appropriate parking location</li> <li>• park equipment according to company policies and procedures</li> <li>• lower attachments</li> </ul>	<i>Manufacturers' manuals and literature, PPE</i>
13.03 Shuts down and secures equipment	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• shut down equipment according to manufacturers' specifications</li> </ul>	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies, locks</i>

## Excavator Operator Occupational Analysis

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		<ul style="list-style-type: none"><li>• secure equipment against movement, theft, and vandalism</li></ul>	
13.04	Performs housekeeping tasks	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• clean items, such as windshields, rails, steps, instrument panel</li><li>• sweep floor</li><li>• remove garbage</li><li>• apply glass shields</li></ul>	<i>Manufacturers' manuals and literature, PPE, basic tools and supplies</i>
13.05	Performs visual inspection	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• check parked equipment visually</li><li>• identify existing or potential problems</li><li>• communicate concerns to appropriate personnel, such as supervisor, mechanic</li></ul>	<i>Manufacturers' manuals and literature, PPE</i>



**BLOCK F      TRANSPORTATION**  
**Task 14      Transports Excavator**

This task is important because it helps to:

- prevent injury
- prevent damage to equipment and property
- transport equipment safely and efficiently
- comply with transportation legislation

Trends:  
 N/A

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
14.01    Prepares to load excavator and attachments	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications of excavator and attachments</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> <li>• how to load excavators onto different types of transport vehicles, such as beavertail, folding gooseneck</li> <li>• impact of weather conditions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• assess hazards, such as uneven ground, utility lines</li> <li>• prepare excavator and attachments for transport, such as clean tracks or wheels, disassemble for transport</li> </ul>	<i>Manufacturers' manuals and literature, PPE</i>
14.02    Loads or assists with loading excavator and attachments	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>• manufacturers' specifications of excavator and attachments, such as weight and dimensions</li> <li>• company policies and procedures</li> <li>• applicable legislation</li> <li>• loading techniques</li> <li>• carrying capacities of transport vehicles</li> <li>• weather conditions</li> <li>• deck conditions</li> <li>• hazards</li> <li>• blocking</li> <li>• how to position excavator and attachments on transport vehicle</li> <li>• hand signals</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>• avoid hazards, such as uneven ground, utility lines</li> </ul>	<i>Manufacturers' manuals and literature, PPE</i>

## Excavator Operator Occupational Analysis

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		<ul style="list-style-type: none"><li>• load or assist with loading of excavator and attachments</li><li>• use and respond to hand signals</li></ul>	
14.03	Assists with securing excavator and attachments	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications</li><li>• company policies and procedures</li><li>• applicable legislation</li><li>• tie-down points</li><li>• weather conditions</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• protect equipment from damage, such as cover windshield and exhaust pipe</li><li>• secure attachments, such as bucket</li><li>• assist transport vehicle driver as required, such as secure excavator, attach warning flags and reflectors</li></ul>	<i>Manufacturers' manuals and literature, PPE</i>
14.04	Unloads or assists with unloading excavator and attachments	<p>Knowledge of:</p> <ul style="list-style-type: none"><li>• manufacturers' specifications of excavator and attachments</li><li>• company policies and procedures</li><li>• hazards</li><li>• unloading techniques</li><li>• weather conditions</li><li>• deck conditions</li><li>• ground conditions</li><li>• blocking</li><li>• hand signals</li></ul> <p>Ability to:</p> <ul style="list-style-type: none"><li>• assess and adjust to hazards, such as overhead obstructions, narrow landing areas</li><li>• unload or assist with unloading excavator and attachments</li><li>• assist transport vehicle driver as required, such as remove tie-downs, warning flags, and reflectors</li><li>• use and respond to hand signals</li></ul>	<i>Manufacturers' manuals and literature, PPE</i>

**BLOCK F      TRANSPORTATION**  
**Task 15      Drives Rubber-tired Excavator on Public Roads**

This task is important because it helps to:

- ensure that equipment arrives safely
- prevent injury
- prevent damage to equipment and property
- comply with transportation legislation

Trends:  
 N/A

Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
15.01    Prepares rubber-tired excavator for road travel	Knowledge of: <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• applicable legislation, such as traffic laws</li> <li>• route and destination</li> <li>• proper positioning of attachments for road travel</li> </ul> Ability to: <ul style="list-style-type: none"> <li>• secure attachments in proper positions for road travel</li> <li>• complete inspection, such as check brakes, steering, lights, tires, and back-up warnings</li> <li>• clean equipment</li> </ul>	<i>Manufacturers' manuals and literature, PPE</i>
15.02    Drives rubber-tired excavator on public roads	Knowledge of: <ul style="list-style-type: none"> <li>• manufacturers' specifications</li> <li>• company policies and procedures</li> <li>• applicable legislation, such as traffic laws</li> <li>• road and weather conditions</li> <li>• limitations on public roads, such as speed, blind spots</li> </ul> Ability to: <ul style="list-style-type: none"> <li>• comply with legislation, such as traffic laws</li> <li>• possess appropriate and valid driver's licence</li> <li>• read maps</li> <li>• follow route to destination</li> <li>• adjust to road and weather conditions, such as adjust speed</li> <li>• recognize and avoid potential hazards</li> </ul>	<i>Manufacturers' manuals and literature, PPE</i>



## Excavator Operator DACUM Chart

Block	Task	Subtask					
<b>A. PROFESSIONALISM</b>	<b>1. Acts Professionally</b>	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
	<b>2. Uses Communication Skills</b>	2.01 Speaks and listens effectively	2.02 Uses documentation	2.03 Communicates using signals	2.04 Uses electronic communication equipment		
<b>B. SAFETY</b>	<b>3. Interprets Applicable Legislation and Policies</b>	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		
	<b>4. Works Safely</b>	4.01 Uses personal protective equipment (PPE)	4.02 Completes required health and safety training				
	<b>5. Complies with Site Emergency Plan</b>	5.01 Prepares for emergencies	5.02 Responds to emergencies				

### Excavator Operator DACUM Chart

Block	Task	Subtask					
<b>C. EQUIPMENT</b>	<b>6. Describes Equipment and Attachments</b>	6.01 Describes types and sizes of excavators	6.02 Describes components and functions	6.03 Describes capacities/capabilities of excavators	6.04 Describes attachments and purposes	6.05 Describes basic tools and supplies associated with excavators	
<b>D. MAINTENANCE</b>	<b>7. Performs Pre-operational Inspection and Daily Service with Engine Off</b>	7.01 Inspects and services lubrication system	7.02 Inspects and services electrical system	7.03 Inspects and services hydraulic system	7.04 Inspects and services cooling system	7.05 Inspects and services air intake system	7.06 Inspects and services fuel system
		7.07 Inspects and services suspension system	7.08 Inspects and services drive train	7.09 Inspects and services braking system	7.10 Inspects and services load-bearing structure	7.11 Inspects and services operator station	7.12 Inspects safety equipment
		7.13 Inspects and services attachments	7.14 Inspects and services auxiliary pneumatic system				
	<b>8. Performs Pre-operational Inspection and Daily Service with Engine Running</b>	8.01 Starts engine and checks monitoring and warning systems	8.02 Warms up engine	8.03 Cycles equipment functions			
<b>9. Complies with Scheduled Maintenance Requirements</b>	9.01 Arranges for or performs scheduled maintenance						

### Excavator Operator DACUM Chart

Block	Task	Subtask					
<b>E. OPERATING PROCEDURES</b>	<b>10. Plans Work Procedures</b>	10.01 Assesses site hazards	10.02 Discusses environmental concerns with site personnel	10.03 Reviews job specifications and safety considerations with site personnel	10.04 Determines work procedures		
		11.01 Interprets symbols and markings	11.02 Interprets survey markers, construction grades, and stakes	11.03 Demonstrates use of grades and stakes	11.04 Demonstrates use of grade-checking devices		
	<b>12. Operates Excavator</b>	12.01 Complies with safety requirements	12.02 Sets up equipment	12.03 Installs attachments	12.04 Uses operating controls	12.05 Monitors performance of equipment	12.06 Trouble-shoots equipment problems
		12.07 Monitors activities of people, vehicles, and other equipment in area	12.08 Optimizes equipment capabilities	12.09 Excavates trenches	12.10 Excavates ditches	12.11 Loads transport vehicles	12.12 Builds, excavates, and maintains haul roads and ramps
		12.13 Stockpiles materials	12.14 Backfills trenches/ excavations	12.15 Hoists objects	12.16 Clears land	12.17 Demolishes buildings and other structures	12.18 Cuts and fills materials

### Excavator Operator DACUM Chart

Block	Task	Subtask				
<b>E. OPERATING PROCEDURES, cont'd</b>	<b>12. Operates Excavators, cont'd</b>	12.19 Excavates water channels	12.20 Loads materials on barges/scows	12.21 Feeds material hoppers	12.22 Installs and removes culverts	12.23 Handles mats
	<b>13. Follows Shut-down Procedures</b>	13.01 Cleans undercarriage and attachments before parking	13.02 Parks equipment in appropriate location	13.03 Shuts down and secures equipment	13.04 Performs housekeeping tasks	13.05 Performs visual inspection
<b>F. TRANSPORTATION</b>	<b>14. Transports Excavator</b>	14.01 Prepares to load excavator and attachments	14.02 Loads or assists with loading excavator and attachments	14.03 Assists with securing excavator and attachments	14.04 Unloads or assists with unloading excavator and attachments	
	<b>15. Drives Rubber-tired Excavator on Public Roads</b>	15.01 Prepares rubber-tired excavator for road travel	15.02 Drives rubber-tired excavator on public roads			



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