National Occupational Standards For Operating Engineers

April 2005

DITCHER/TRENCHER 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 co-ordination. 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 or 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: • principles of work ethic and expectations, such as be punctual, prepared for work, co-operative, honest, productive, and respectful Ability to: • follow principles of work ethic in all situations	
1.02	Is aware of factors affecting personal health	Knowledge of: • 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: • 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	Speaks and listens effectively	Knowledge of: • importance of effective communication • industry terms • roles of individuals on job site, such as supervisor, inspector, other tradespeople Ability to: • 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	Uses documentation	Knowledge of: • 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 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: • 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: • locate relevant sections in legislation • read legislation • seek clarification of legislation	
3.02	Interprets permits, licences, and insurance requirements	Knowledge of: • applicable permits, licences, and insurance requirements • authorities having jurisdiction Ability to: • 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	*Permits, licences, insurance documentation*

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)	Knowledge of: • 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 Ability to: • 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	*Steel-toed footwear, hard hat, safety gloves, appropriate safety glasses, high visibility vest, hearing protection, breathing apparatus, fall protection, and other applicable PPE*
4.02	Completes required health and safety training	Knowledge of: • 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	Knowledge of: • 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 Ability to: • take emergency response training, such as emergency response exercises, first aid, CPR	*Site emergency response plan, fire extinguishers, fire blankets, respirators, masks, fire hoses, first aid kits, stretchers, WHMIS book, and other related tools and gear*
5.02	Responds to emergencies	Knowledge of: • 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	*Fire extinguishers, fire blankets, respirators, masks, fire hoses, first aid kits, stretchers, and other related tools and gear*

- 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 and supplies properly and safely
- select correct attachments, tools, and supplies for different working conditions

Trends:

- Equipment is being made so that the chain and wheel attachments can be interchanged.
- More equipment is being made incorporating hydraulic systems.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
6.01	Describes types, sizes, and capabilities of ditcher/trenchers	Knowledge of: • manufacturers' specifications for different types, sizes, and capabilities of ditcher/trenchers	*Manufacturers' manuals and literature*
6.02	Describes components and operating systems of ditcher/trenchers	Knowledge of: • major components, such as engine, counterweights, conveyor, auger, undercarriage • functions of components • operating systems, such as hydraulic, electric, lubrication	*Manufacturers' manuals and literature*
6.03	Describes ditcher/trencher attachments and purposes	Knowledge of: • different attachments (such as wheels, chains, booms, slopers, plough, teeth, cable backs) and purposes	*Manufacturers' manuals and literature*
6.04	Describes basic tools and supplies associated with ditcher/trenchers	Knowledge of: • basic tools and supplies, such as pliers, hammer, flashlight, screwdrivers, variety of wrenches (including adjustable and combination), utility knife, self-locking pliers, scraper, punch, crow bar, sledge hammer • basic supplies, such as rags, window cleaner, grease, oil	*Manufacturers' manuals and literature*

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
- prevent damage to equipment
- reduce unscheduled downtime
- meet manufacturers' specifications, company policies and procedures, and applicable legislation

Trends:
N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
7.01	Inspects and services engine lubrication system	Knowledge of: • manufacturers' specifications, such as correct engine oil • company policies and procedures • applicable legislation • engine lubrication system, 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 • perform basic service, such as add engine oil • use spill kit • perform or arrange for repair or replacement of defective components, such as seals, gaskets, hoses, filler caps	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, engine oil, spill kit*
7.02	Inspects and services electrical system	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • electrical system, components (such as alternator, starters, regulators, wiring, fuses), and functions • normal operating conditions Ability to: • locate components to be inspected • identify service needs, defects, and hazardous conditions through visual inspection	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies*

		• select and use appropriate tools • perform or arrange for service • perform or arrange for repair or replacement of defective components, such as alternator belt	
7.03	Inspects and services hydraulic system	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • hydraulic system, components (such as hydraulic fluid, filters, lines, pumps, fittings), 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 • provide basic service, such as adjust hydraulic fluid levels • use spill kit • perform or arrange for repair or replacement of defective components, such as filters, cartridges, lines, cylinder seals	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, spill kit, hydraulic oil*
7.04	Inspects and services cooling system	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • cooling system, components (such as belts, hoses, radiator, coolant), 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 • perform basic service, such as adjust belt tension, adjust coolant levels, ensure that radiator is clean, check specific gravity of coolant in radiator fluid • use spill kit	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, coolant, coolant tester, spill kit*

		• perform or arrange for repair or replacement of defective components, such as hoses, belts, thermostats	
7.05	Inspects and services air intake system	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • air intake system, components (such as pre-cleaner, air intake hoses, air filter indicator), and functions • normal operating conditions Ability to: • locate components to be inspected • identify service needs, defects, and hazardous conditions through visual inspection • perform basic service, such as empty pre-cleaner, change air filters • perform or arrange for repair or replacement of defective components, such as pre-cleaner, intake hoses	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, air filters*
7.06	Inspects and services fuel system	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • fuel systems, components (such as fuel pump, injector, lines, fuel filters, water separators), 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 • provide basic service, such as fuel equipment • use spill kit • perform or arrange for repair or replacement of defective components, such as filters, lines	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, fuel, filters, fuel conditioner, spill kit*

7.07	Inspects and services drive train	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • drive train (i.e., [JS1]wheels or tracks), components (such as engine, undercarriage, universal joints, idlers), 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 • provide basic service, such as adjust track tension or air pressure in tires • use spill kit • perform or arrange for repair or replacement of defective components, such as universal joint, idlers, rollers, chain drives, undercarriage frame	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, hub oil, spill kit, broom, grease gun*
7.08	Inspects load-bearing structure	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • load-bearing structure, components, and functions • normal operating conditions Ability to: • locate components to be inspected • identify service needs, defects, and hazardous conditions through visual inspection • arrange for repair or replacement of defective components, such as replace and re-paint portion of I-beam, plate steel, or square tubing	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, grease gun*
7.09	Inspects and services operator station	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • operator station, components (such as instrument panels, operating controls, mirrors), and functions	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, whisk broom*

		• importance of clean windows for visibility • importance of housekeeping for efficiency and safety • normal operating conditions Ability to: • locate components to be inspected • identify service needs, defects, and hazardous conditions through visual inspection • provide basic service, such as clean windows and mirrors, adjust mirrors • perform or arrange for repair or replacement of defective components, such as controls, mirrors	
7.10	Inspects safety equipment	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • required safety equipment, such as reflectors, fire extinguisher, pylons, decals • caution, warning, and hazard decals, lights, and symbols • normal operating conditions Ability to: • ensure that safety equipment is on board and securely mounted • identify service needs, defects, and hazardous conditions through visual inspection • respond to caution, warning, and hazard decals, lights, and symbols • arrange for repair or replacement of defective components, such as fire extinguisher	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, safety equipment*
7.11	Inspects and services boom system	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • boom system, components, and functions • 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	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies,* g*rease gun*

		• provide basic service, such as grease and tighten loose pins in sheave • perform or arrange for repair or replacement of defective components, such as wire rope, chain, grab hooks	
7.12	Inspects and services hoisting system	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • hoisting system, components, and functions • 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 • provide basic service, such as grease lubrication points • perform or arrange for repair or replacement of defective components, such as bearings, wire ropes, sheaves, hydraulic lines	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, grease gun, grease*
7.13	Inspects and services counterweight system	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • counterweight system, components, and functions • 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 • provide basic service, such as grease slides • perform or arrange for repair or replacement of defective components, such as support frame	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, grease gun, grease*

7.14	Inspects and services attachments	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • attachments (such as wheel, chain, boom, sloper, teeth, cable back), components, and functions • safe operating conditions of wheel • normal operating conditions • hand signals Ability to: • locate components to be inspected • identify service needs, defects, and hazardous conditions through visual inspection • select and use appropriate tools • provide basic service, such as clean wheel, put oil on edges of conveyor belt under flashing, tighten loose bolts, adjust chain tension • perform or arrange for repair or replacement of defective components, such as wheel drive pinions and hubs, teeth, safety guards, bolts, links • use and respond to hand signals	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, track shovels*

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
- identify defects and hazardous conditions
- ensure that equipment is ready to operate
- prolong equipment life
- meet manufacturers' specifications, company policies and procedures, and appropriate legislation

Trends:
N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
8.01	Starts and warms up engine	Knowledge of: • manufacturers' specifications • company policies and procedures • monitoring and warning systems, components, and functions • normal operating conditions • impact of weather and seasonal conditions on start-up procedures, equipment functions, and fluids • battery-boosting procedures Ability to: • adjust start up according to weather conditions, such as use block or fuel heater • boost batteries • warm up engine according to manufacturers' specifications • interpret information from gauges, lights, and sensors • arrange for repair or replacement of defective components, such as light bulbs, fuses	*Manufacturers' manuals and literature, PPE, basic tools and supplies, starting aids*
8.02	Cycles equipment functions	Knowledge of: • manufacturers' specifications • company policies and procedures • equipment controls • normal operating characteristics • impact of weather and seasonal conditions on equipment functions and fluids • hand signals	*Manufacturers' manuals and literature, PPE*

Ability to:

- activate functions according to weather conditions and manufacturers' instructions
- inspect pressured systems[JS2]
- identify problems with functions
- select and use appropriate tools
- perform or arrange for required maintenance
- use and respond to hand signals

BLOCK D MAINTENANCE
Task 9 Complies with Scheduled Maintenance Requirements

This task is important because it helps to:

- validate manufacturers' equipment warranties
- ensure continuous and safe operation of equipment
- prevent damage to equipment
- prevent unscheduled downtime
- meet manufacturers' specifications, company policies and procedures, and appropriate legislation

Trends:

- There is increased awareness of the consequences of not complying with scheduled maintenance requirements.

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
9.01	Arranges for or performs scheduled maintenance	Knowledge of: • manufacturers' specifications for scheduled maintenance and service • company policies and procedures • applicable legislation • factors that affect scheduled maintenance and service, such as where equipment is being used, type of soil Ability to: • comply with safety requirements • read indicators that signal need for replacement of components, such as air filter, air cleaner • read equipment maintenance documentation • select and use appropriate tools • arrange for or perform scheduled maintenance and service, such as change oil; change air, oil, and fuel filters	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, other required tools for maintenance work, such as torque wrench*

BLOCK E OPERATING PROCEDURES
Task 10 Plans Work Procedures

This task is important because it helps to:

- ensure proper installation of product
- increase work productivity and safety
- ensure that work is done to specifications
- prevent unscheduled downtime

Trends:
N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
10.01	Assesses site hazards	Knowledge of: • job specifications • company policies and procedures • legislation, such as Occupational Health and Safety • authorities having jurisdiction • impact of terrain on operations • actual and potential hazards, such as utilities, buried tanks, other equipment, personnel, vehicular traffic • indicators of presence of utilities • hot-line locations • hand signals Ability to: • inspect site visually • determine appropriate PPE required • communicate with site personnel and authorities having jurisdiction	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, site plan*
10.02	Discusses environmental concerns of site with site personnel	Knowledge of: • company policies and procedures • applicable legislation, such as transportation of dangerous goods, spill reporting • environmental concerns • site characteristics and boundaries Ability to: • identify actual and potential environmental concerns, such as proximity to water courses, allowable noise levels, fuel leaks, hazardous materials	*PPE*

		• communicate with employer, site personnel, or authorities having jurisdiction about questions and concerns	
10.03	Assesses soil conditions	Knowledge of: • soil types (such as rock, clay, sand, muskeg), characteristics, and indicators • effect of soil conditions on productivity, traction, mobility, and stability • cave-in factors • techniques used to adapt to different soil conditions, such as use slopers Ability to: • identify soil type at site • select appropriate trenching technique for conditions	*PPE, soil reports*
10.04	Reviews job specifications and safety considerations with site personnel	Knowledge of: • job specifications • applicable legislation • trenching procedures • lower-in procedures • industry terms • actual and potential site hazards • job- or site-specific PPE and training • other construction equipment on site • roles of personnel on site, such as foreman, inspector, other tradespeople • hand signals Ability to: • sequence job tasks to co-ordinate activities with other site personnel • follow directions of traffic control person • communicate with site personnel to confirm job specifications, traffic patterns, and procedures	*PPE, site plan, utility locate document*

BLOCK E OPERATING PROCEDURES
Task 11 Operates Ditcher/Trencher

This task is important because it helps to:
- prevent damage to products, property, and equipment
- fulfill job specifications

Trends:
N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
11.01	Complies with equipment safety requirements	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • safety controls, functions, and safety equipment, such as fire extinguisher • caution, warning, and hazard decals, lights, and symbols • hand signals Ability to: • use safety controls and safety equipment • respond to caution, warning, and hazard decals, lights, and symbols • use and respond to hand signals	*Manufacturers' manuals and literature, PPE, fire extinguisher, first aid kit*
11.02	Positions equipment on centre line at starting point	Knowledge of: • manufacturers' specifications • job specifications • company policies and procedures • obstructions and hazards, including markers for utilities • hand signals Ability to: • position equipment according to job specifications • work around obstructions and hazards • use and respond to hand signals	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, sight rods*

11.03	Lowers wheel or chain at starting hole or point	Knowledge of: • manufacturers' specifications • job specifications • company policies and procedures • control functions • hand signals Ability to: • position equipment at edge of starting hole or point • set wheel or chain in place • use multiple controls simultaneously, such as steering, wheel, conveyor • use and respond to hand signals	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies*
11.04	Creates trench	Knowledge of: • manufacturers' specifications • job specifications • company policies and procedures • control functions • hand signals Ability to: • operate equipment to make trench according to job specifications • operate equipment effectively and efficiently • steer equipment using sight lines • adjust grade • adjust trenching technique to suit soil conditions • use and respond to hand signals	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies*
11.05	Optimizes equipment capabilities	Knowledge of: • manufacturers' specifications • job specifications • company policies and procedures • location, style, and patterns of controls • capabilities and limitations • factors that affect operating techniques, such as soil conditions, terrain, proximity of top soil piles, seasonal and weather conditions • equipment performance indicators, such as engine load	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies*

		Ability to: • optimize equipment's capabilities, such as balancing speed of travel with speed and cutting capacity of wheel or chain • change or add attachments • use operating controls smoothly and simultaneously	
11.06	Monitors equipment performance	Knowledge of: • manufacturers' specifications • company policies and procedures • normal operating characteristics • operator aid devices • monitoring and warning systems Ability to: • read and interpret information from gauges, symbols, and operator aid devices • use senses to monitor equipment performance • troubleshoot problems • communicate with site personnel	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies*
11.07	Troubleshoots equipment problems	Knowledge of: • manufacturers' specifications • company policies and procedures • previous problems and solutions • problem-solving process • mechanical operation of equipment • equipment systems, such as lubrication, electric, hydraulic • normal operating conditions Ability to: • identify possible sources of problems and solutions • implement solutions, such as replace broken teeth • communicate problems accurately to others, such as mechanic, foreman	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies, communication devices*

11.08	Monitors activities of site personnel, equipment, and traffic	Knowledge of: • manufacturers' specifications • company policies and procedures • actual and potential hazards, such as limited visibility • hand signals Ability to: • be aware of movement of other site personnel and equipment • avoid collisions • use and respond to hand signals	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies*
11.09	Completes trench	Knowledge of: • manufacturers' specifications • job specifications • company policies and procedures • control functions • hand signals Ability to: • raise wheel or chain to transport position • use and respond to hand signals	*Manufacturers' manuals and literature, equipment maintenance documentation, PPE, basic tools and supplies*

BLOCK E OPERATING PROCEDURES
Task 12 Follows Shut-down Procedures

This task is important because it helps to:

- 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
12.01	Performs housekeeping tasks	Knowledge of: • manufacturers' specifications • company policies and procedures • housekeeping practices, such as return items to proper storage place, pick up debris Ability to: • follow housekeeping practices • clean wheels or tracks	*Manufacturers' manuals and literature, basic tools and supplies, PPE*
12.02	Parks equipment in appropriate location	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • suitable and safe parking locations, such as dry and clean surface, level, away from fuel storage and water courses, secure area • hand signals Ability to: • identify appropriate parking location • park equipment according to company policies and procedures • use and respond to hand signals	*Manufacturers' manuals and literature, PPE, basic tools and supplies, blocking*
12.03	Shuts down and secures equipment	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • hand signals	*Manufacturers' manuals and literature, PPE, basic tools and supplies*

		Ability to: • shut down equipment according to manufacturers' specifications, such as turn off master switch, remove key, idle before shutting off engine, turn on winter mode • secure equipment against movement, theft, and vandalism • use and respond to hand signals	
12.04	Performs post-operational inspection	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • normal operating conditions • hand signals Ability to: • perform circle check • identify existing or potential problems, such as broken pads, missing teeth • make track adjustments or check tire pressure • communicate concerns to appropriate personnel, such as supervisor, mechanic • use and respond to hand signals	*Manufacturers' manuals and literature, PPE, basic tools and supplies, tire pressure gauge*

BLOCK F TRANSPORTATION
Task 13 Transports Ditcher/Trencher

This task is important because it helps to:
- arrive safely at work site
- ensure public safety
- prevent property damage

Trends:
N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
13.01	Prepares ditcher/trencher for transport	Knowledge of: • manufacturers' specifications • company policies and procedures • transport vehicles, such as beavertail, folding or power gooseneck • weather conditions • ground conditions and hazards in loading area • hand signals Ability to: • assess hazards in area, such as uneven ground, utilities • clean equipment • assist with disassembly • reduce track width • assist with attaching warning flags, reflectors, and beacon/clearance lights • use and respond to hand signals	*Manufacturers' manuals and literature, PPE, basic tools and supplies, blocking*
13.02	Loads or assists with loading ditcher/trencher and attachments	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation, such as pilot truck requirements, sign requirements • loading techniques • transport vehicles, such as carrying capacity, deck conditions • blocking • hand signals Ability to: • assist with loading and placing of equipment and attachments in correct position • attach oversize load signs, flags, and lights for transporting	*Manufacturers' manuals and literature, PPE, basic tools and supplies, oversize load signs, flags, lights*

		• use and respond to hand signals	
13.03	Secures ditcher/trencher and attachments for transport	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • tie-down points • weather conditions Ability to: • protect equipment, such as cover exhaust pipe and windows • secure equipment, such as apply brakes • secure equipment and attachments to transport vehicle	*Manufacturers' manuals and literature, PPE, basic tools and supplies, duct tape*
13.04	Unloads or assists with unloading ditcher/trencher and attachments	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • unloading techniques • blocking • weather conditions • ground conditions • hand signals Ability to: • assess area hazards, such as overhead power lines, unstable ground, narrow land areas, underground infrastructure • unload equipment and attachments • assist with removing flags, reflectors, and beacon/clearance lights • use and respond to hand signals	*Manufacturers' manuals and literature, PPE, basic tools and supplies, blocking*

BLOCK F TRANSPORTATION
Task 14 Drives Ditcher/Trencher on Public Roads

This task is important because it helps to:
- ensure that equipment arrives safely
- ensure public safety
- comply with transportation legislation

Trends:
N/A

	Subtasks	Supporting Knowledge and Abilities	Tools and Supplies
14.01	Prepares to drive ditcher/trencher	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation, such as possessing appropriate and valid driver's licence • transport position of attachments • road conditions • potential hazards on route Ability to: • secure attachments in transport position • check brakes, steering, lights, and flashers • clean equipment • read maps • plan route	*Manufacturers' manuals and literature, PPE, basic tools and supplies, maps*
14.02	Drives ditcher/trencher on public roads	Knowledge of: • manufacturers' specifications • company policies and procedures • applicable legislation • road conditions • limitations on public roads, such as speed, size of equipment, blind spots Ability to: • comply with legislation • read maps • follow route to destination • adjust to road and weather conditions	*Manufacturers' manuals and literature, PPE, basic tools and supplies, map*

Ditcher/Trencher 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				

Block	Task	Subtask					
C. EQUIPMENT	**6. Describes Equipment and Attachments**	6.01 Describes types, sizes, and capabilities of ditcher/ trenchers	6.02 Describes components and operating systems of ditcher/ trenchers	6.03 Describes ditcher/ trencher attachments and purposes	6.04 Describes basic tools and supplies associated with ditcher/ trenchers		
D. MAINTENANCE	**7. Performs Pre-operational Inspection and Daily Service with Engine Off**	7.01 Inspects and services engine 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 drive train	7.08 Inspects load-bearing structure	7.09 Inspects and services operator station	7.10 Inspects safety equipment	7.11 Inspects and services boom system	7.12 Inspects and services hoisting system
		7.13 Inspects and services counterweight system	7.14 Inspects and services attachments				
	8. Performs Pre-operational Inspection and Daily Service with Engine Running	8.01 Starts and warms up engine	8.02 Cycles equipment functions				
	9. Complies with Scheduled Maintenance Requirements	9.01 Arranges for or performs scheduled maintenance					

Ditcher/Trencher Operator DACUM Chart

Block	Task	Subtask					
E. OPERATING PROCEDURES	**10. Plans Work Procedures**	10.01 Assesses site hazards	10.02 Discusses environmental concerns of site with site personnel	10.03 Assesses soil conditions	10.04 Reviews job specifications and safety considerations with site personnel		
	11. Operates Ditcher/trencher	11.01 Complies with equipment safety requirements	11.02 Positions equipment on centre line at starting point	11.03 Lowers wheel or chain at starting hole or point	11.04 Creates trench	11.05 Optimizes equipment capabilities	11.06 Monitors equipment performance
		11.07 Troubleshoots equipment problems	11.08 Monitors activities of site personnel, equipment, and traffic	11.09 Completes trench			
	12. Follows Shut-down Procedures	12.01 Performs housekeeping tasks	12.02 Parks equipment in appropriate location	12.03 Shuts down and secures equipment	12.04 Performs post-operational inspection		
F. TRANSPORTATION	**13. Transports Ditcher/trencher**	13.01 Prepares ditcher/ trencher for transport	13.02 Loads or assists with loading ditcher/ trencher and attachments	13.03 Secures ditcher/ trencher and attachments for transport	13.04 Unloads or assists with unloading ditcher/ trencher and attachments		
	14. Drives Ditcher/trencher on Public Roads	14.01 Prepares to drive ditcher/ trencher	14.02 Drives ditcher/ trencher on public roads				

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