Training Standard

Crawler – Tractor/Dozer (novice)

Learning outcomes Including additional guidance to support training delivery and final assessment *The learner will be able to:*
explain the factors that help maintain a safe working environment in the construction industry, and their responsibilities as a crawler – tractor/ dozer operator *Delivery to include*: • why the industry has many hazards and why safe working practices must be adopted and maintained • why personal health and safety is not just physical injury and can include the effects of noise and vibration. All of which can lead to lost time, lost income, expense for the employer, fines, custodial sentences • Health & Safety at Work Act 1974, Provision and Use of Work Equipment Regulations (PUWER), Management of Health and Safety of Work (MHSW) Regulations, Construction (Design & Management) Regulations (CDM), Vibration at Work Regulations, Road Traffic Act, HSG144, LOLER, HSG47 in accordance with risk assessments, method statements, codes of practice and other relevant legislation, regulations, and industry best practice • HSE Safety Bulletin FOD 2 – 2017 Track tensioning safety • operators' duty of care to others, legal obligations, and environmental obligations • reporting structures, the importance of good communication on site (colleagues, management, and other workers on site) • previous incidents involving relevant plant and pedestrians • working with other related roles for example, marshallers, supervisors, other plant operatives, other occupations, and support workers • awareness of the limits to their personal knowledge, skills, and experience and when situations exceed these limits the need to stop and seek further advice from supervisors *Assessment criteria:* • identify common hazards on a construction site • explain safe working practices relevant to the role of the crawler - tractor/dozer operator • explain personal health and safety relevant to the role of crawler - tractor/dozer operator • identify aspects of legislation, regulations, and industry good practice relevant to the role of crawler - tractor/dozer operator • describe reporting structures and the importance of good communication on site • explain the responsibilities of a crawler - tractor/dozer operator
identify and extract information from the manufacturers' handbook/operator's manual, and other information sources including digital *Delivery to include:* • use of the operator's manual (for the specific machine) during the practical elements of training to identify key preparation, operational and safety aspects of the machine • types of information sources including machine control systems

Assessment criteria:

- identify and extract key elements for the preparation and safe use of the machine using various sources

locate and identify the major components, signs and decals and all controls of the crawler - tractor/dozer and explain their functions

Delivery to include:

- the purpose of principal components, the basic construction, controls, and terminology
- how correct and sympathetic use of the controls can ensure efficiency and safety of the machine and help prolong machine life by reducing wear and tear
- purposes of Roll–over Protective Structure (ROPS) and Falling Objects Protective Structure (FOPS) and other protection systems
- machine control systems – efficiencies, GPS
- purpose/function of hydrostatic and powershift transmissions
- types of blades and functional capabilities
- other attachments/accessories that may be used, e.g. rear mounted rippers and drawbar/towed equipment

Assessment criteria:

- identify and explain the function of all controls and warning systems
- explain why the correct and sympathetic use of controls aids efficiency, longevity, and safety
- state the purposes of ROPS and FOPS and other protection structures
- locate and identify the major components, signs, decals, and controls of the machine
- identify all track components and explain what checks are to be carried out and why
- identify cutting edges/end bits and explain what checks are to be carried out and why
- outline the purpose, types and function of machine control systems and electronic aids
- outline the purpose, function and application of various blade types
- outline typical accessories and other equipment that may be used and their function

conduct all pre-operational checks in accordance with manufacturers and legislative requirements

Delivery to include:

- complete all pre-start and running checks before any activity takes place, including visual checks for damage, functionality, and effectiveness
- check all oil levels for powertrain, engine and hydraulic systems and maintain oils at required levels
- checking all componentry systems are fully functional, including mechanical, hydraulic, pneumatic, electrical, and electronic
- replenish fuels, fluids, and lubricants, and undertake grease-based lubrication activities
- types of fuel additives e.g. Adblue and replenishment procedures
- manufacturers periodic checks and operator level maintenance requirements
- defect reporting requirements

- carry out routine adjustments
- safety systems functions including emergency stop
- health and safety requirements when undertaking basic maintenance activities including Personal Protection Equipment (PPE)
- check condition and function of seatbelt and any other restraining equipment
- check condition and function of any lighting and warning systems
- requirements for dealing with fluid spills including prevention and clean-up methods
- relevant hazards that may occur

Assessment criteria:

- conduct all pre-operational checks as above in accordance with manufacturer guidance and legislative requirements (note: verbal description to the instructor of specific pre-start checks will be acceptable if the machine is hot where they cannot be done safely for example, engine fluids) - *this should be observed during practical assessment*
- cycle the blade through full functions as per manufacturer's instructions.
- explain the procedure for reporting defects and leaks and why this is important

identify and maintain Personal Protective Equipment (PPE) and appropriate safety control equipment for crawler - tractor/dozer use

Delivery to include:

- what safety control equipment/PPE should be worn/used for machine operations and include the following: suitable safety footwear, ear defenders, face/eye protection, dust mask, suitable gloves, overalls, hard hat, Respiratory Protective Equipment (RPE), protective clothing and other related safety equipment
- method of seat adjustment and safety belt restraint
- appropriate use of Local Exhaust Ventilation (LEV), such as in confined spaces
- why weather conditions, including heat and cold, can determine what PPE is worn when using specific machine and the personal effects of incorrect equipment

Assessment criteria:

- describe what forms of PPE and RPE must be worn for site operations
- explain why seat belt should be worn when operating the dozer
- explain why PPE and RPE must be worn for site operations
- give an example of when use of LEV would be appropriate and why
- state how severe weather can affect safety and health with insufficient equipment

locate and identify the major components of the crawler tractor dozer's track frame and track assembly and explain their functions

Delivery to include:

- purpose and function of crawler tractor dozer track and chassis assemblies.

- function of drive sprocket/segments (teeth)
- locate and identify track chain individual components and how to spot/measure bushing wear
- purpose of front idler and recoil spring
- purpose of track pads/shoes/grousers and their differing types to match varying soil conditions
- locate and identify access to track tensioning adjustment and safety critical issues
- the importance of the operator maintaining clear access to drive sprockets, track assembly, carrier rollers, front idler, track frame and bottom rollers.
- purpose of dozer chassis equaliser bar and function
- elevated drive sprockets

Assessment criteria:

- identify checks for continuous track chain surrounding the track frame and drive sprockets
- explain how the drive sprockets locate with the track pin bushes and propel the dozer along the track assembly
- identify track master pin, master bushing, track bushings, track pins and any associated spacers/washers
- explain how the front idlers are able to move back and forth within the track frame to absorb shock loading
- describe the difference between standard and extreme service pads/shoes/grousers and how wear might be measured
- using the machine operator's manual and HSE guidance explain how the track tensioning/slackening is achieved and the safety critical factors to consider
- explain the importance of operator's need to keep the track undercarriage free of debris and material
- identify equaliser bar and explain its function
- outline advantages of elevated drive sprockets on dozers

safe access and egress for the crawler - tractor/dozer

Delivery to include:

- working at height requirements
- all failsafe procedures for access and egress in accordance with manufacturer’s instructions
- safe use of all hand holds and steps and awareness of correct methods of getting access and egress
- effects of bad weather and potential hazards when accessing and egressing the machine
- facing the machine when accessing and egressing the crawler - tractor/dozer cab for operational and maintenance purposes
- effects of continually getting in to and out of the crawler - tractor/dozer for example, fatigue, increased risk of falling and other related risks
- safe areas to get into and out of the crawler - tractor/dozer for example, ground location, other vehicle movements and other related hazards

- procedures for accessing the crawler - tractor/dozer when carrying out adjustment and maintenance activities

Assessment criteria:

- explain the effects of not using correct procedures to get in and out of the crawler - tractor/dozer cab including when carrying out adjustment and maintenance activities
- explain safety failsafe's as per manufacturer's instructions
- demonstrate the correct procedures as listed above – *this should be observed during practical activities*
- explain the areas for safely getting in and out the crawler - tractor/dozer cab and how they can save injury downtime and operational time

prepare and configure the crawler - tractor/dozer for site travel

Delivery to include:

- use of seatbelts and other restraining equipment
- adjustment of seating position and mirrors
- establish both available effective visibility from the operator station and areas of limited visibility
- isolation controls
- starting and stopping procedures including cold starting and those for turbochargers
- procedural requirements for exhaust particulate filter cleansing activities
- types of visibility aids and what factors can affect vision
- where and why effective vision is very important
- where issues can arise where vision is limited during operation, especially during reversing
- ensuring warning and safety systems are operable
- legislative requirements and restrictions for being on the public highway
- crawler - tractor/dozer configuration for site travel
- carrying of passengers/non-authorised personnel
- use of steering, braking, and transmission controls and speed modes
- use of steering modes

Assessment criteria:

- explain why the use of seatbelts and other restraining equipment should be worn at all times subject to risk assessment
- explain the safety features that indicate that the seat belt is not being worn by the operator
- describe the types and function of isolation systems
- explain the importance of carrying out chassis-based checks
- explain the impact of not following starting and stopping procedures of turbocharged engines
- describe the reasons for exhaust particulate filter cleansing activities
- describe types of visibility aids and what factors can affect effective vision
- explain where and why effective vision is extremely important, particularly when reversing

- give examples of where poor or limited visibility can arise, the issues this can cause and methods to reduce limited visibility
- explain why the warning, and other safety systems, are important
- state the function of selectable steering modes and when they should be used
- ensure the seatbelt is worn correctly prior to any machine movement – *this should be observed during practical assessment*
- identify and confirm that functional checks for all warning and safety systems have been carried out – *this should be observed during practical assessment*
- ensure that vision systems are in place, clear and functional – *this should be observed during practical assessment*
- conduct all-round visibility checks before moving away – *this should be observed during practical assessment*

travel and manoeuvre the crawler - tractor/dozer safely across varying terrain and inclines

Delivery to include:

- how travel speeds affect crawler - tractor/dozer stability, safety, and emissions
- issues which can occur if departing from designated travel routes and work areas/restricted zones
- application and function of deceleration and inching pedal
- types of underground services and the effects of travelling near to/over services
- effects of travelling close to edges, embankments, structures, and trenches
- travelling over various types of terrain with correct positioning of the blade whilst traveling
- travelling up, down, across inclines and across batters
- how certain types of surfaces can affect steering and traction, particularly on inclines
- how uncompacted surfaces and inclines affect machine stability
- precautions when working on stockpiled materials
- effects due to changes of centre of gravity when travelling across and up and down inclines
- machine configuration when travelling on and across steep inclines
- direction of travel
- precautions and obstructions on travel routes including overhead utilities
- regulative requirements for travelling near to or under overhead power lines
- understand the definition of balance point at the crest of steep inclines and its importance

Assessment criteria:

- explain how uncompacted surfaces affect crawler - tractor/dozer stability
- describe what a stockpile is and why precautions should be taken when travelling and working on them
- explain how the deceleration and inching pedal enable greater control and safety
- explain how and when the centre of gravity alters on a machine and the effects on its stability
- describe how certain types of surfaces can affect steering and traction, particularly on inclines
- state how travel speeds affect crawler - tractor/dozer stability, safety, and emissions

- describe issues which can occur if departing from designated travel routes and work areas/restricted zones
- describe types of underground services and the effects of travelling near to/over services
- explain the effects of travelling close to edges, embankments, structures, and trenches
- demonstrate safe travel over rough, undulating ground, inclines, batters, and level surfaces – *this should be observed during practical assessment*
- demonstrate balance point of the dozer and in a controlled manner
- demonstrate safe travel speeds in accordance with terrain and environment – *this should be observed during practical assessment*
- face the direction of travel – *this should be observed during practical assessment*
- travel up and down a gradient – *this should be observed during practical assessment*
- travel through a chicane which requires left- and right-hand turns in both *forwards and reverse – this should be observed during practical assessment*
- travel over rough, undulating ground, inclines, level surfaces with correct positioning of the blade whilst traveling – *this should be observed during practical assessment*
- maintain full visibility and look at or face direction of travel – *this should be observed during practical assessment*
- avoiding contact with structures and objects - *this should be observed during practical assessment*

Assessment requirements:

- when traveling through the chicane and restriction, there must be minimal clearance to ensure accuracy of steering

travel and manoeuvre in areas of restricted space

Delivery to include:

- precautions to be taken when manoeuvring in areas of restricted space
- awareness of decelerator and inching pedal functions if applicable
- requirements when working alongside highways, railways, and public areas
- checking machine size including height, width and working radius relevant to working area
- lighting requirements and issues that may occur due to poor light

Assessment criteria:

- describe typical proximity hazards when in enclosed/restricted areas
- demonstrate use of decelerator for braking, changing gear and direction.
- explain the factors to consider before entering areas of restricted space
- explain the factors to consider when setting up to work next to highways, footpaths, areas of public movement, railways
- describe how poor lighting can affect overall safety

conduct all necessary safety checks at the work area

Delivery to include:

- safety checks that must be carried out to ensure the excavation area is clear of hazards
- communication and relationship requirements and methods with other machine operators and support workers
- requirements for sufficient manoeuvring area for manoeuvring between work areas
- ground conditions for excavating and maintaining stability
- overhead obstructions and nearby proximity hazards
- awareness of other machines and workers
- restricted, segregation and exclusion zoning requirements
- people/plant interface, procedures, and dangers of allowing others near to a working machine
- danger zones of a working crawler - tractor/dozer
- working in hours of darkness and lighting requirements

Assessment criteria:

- explain the need for restricted, exclusion and segregation zones and how they are determined
- describe the safety checks that must be carried out to ensure the excavation/levelling area is clear of hazards
- describe the types of ground conditions including seasonal that can affect safe operations
- describe the methods of identifying safe distances from and preventing contact with overhead lines
- describe the need for having sufficient manoeuvring space within the work area
- explain the importance of being aware of other machines, vehicles, and workers
- explain the procedures and dangers of allowing others near to a working machine
- identify the danger zones around the working machine for others
- ensure ground conditions and batters are suitable for excavating and maintaining stability – *this should be observed during practical assessment*
- identify any overhead obstructions and nearby proximity hazards – *this should be observed during practical assessment*
- ensure the integrity of restricted zones – *this should be observed during practical assessment*
- explain procedures for working in hours of darkness and lighting requirements
- identify and use designated excavation area entry and exit locations – *this should be observed during practical assessment*
- ensure working areas are clear of hazards – *this should be observed during practical assessment*
- establish communication methods with supporting workers – *this should be observed during practical assessment*

configure and set-up for dozing duties

Delivery to include:

- manufacturer's typical and maximum working distances for bulldozing and side by side dozing

- required blade configuration for batter construction, ditching, levelling, spreading, grading, backfilling and dozing
- difficulties that can be encountered when working with wet material
- methods of relaying and interpreting excavation work specification
- visual reference points for excavation work where spoil can and should not be placed
- why segregation of materials should be maintained
- positioning of crawler - tractor/dozer in relation to proximity of unloading vehicles when levelling out earthworks
- use of blade for excavating work
- selection of blade size and type to meet work specification
- construction of benches in sidehill excavation
- use of a dozer when push loading scrapers
- methodology for constructing earthwork embankments
- different methods of trimming batters to set specifications (horizontal and diagonal)
- type of blade/ position when battering slopes.
- assessment of slope and batter ground conditions

Assessment criteria:

- explain how to establish the working range of the machine for differing applications
- describe the types and methods of communication that are used to convey excavation and other work criteria to the operator
- explain types of site markings for excavations, what they mean and how they are interpreted
- explain why successive cuts in wet material should be the full depth of the wet material
- explain where spoil should be placed for different types of excavations and effects of placing spoil in incorrect places
- explain why excavated materials may need to be segregated and where they are placed
- explain how dozing blades aid stability
- explain why it's important to cut the shelf wide enough to provide solid support for equipment on sidehill excavation
- explain the principles of push loading and why it's important to have the dozer blade pusher block alignment with the scraper centralised
- explain the general rules for the construction of an embankment using a dozer,
- explain how horizontal runs with the dozer create batters and why you start from the top of the slot and fold the material downhill/low-side
- explain what happens if the operator allows the lower blade corner to dig in
- explain why it is important to evaluate soil type, moisture content and overall stability
- position and set up the machine for given excavating tasks – *this should be observed during practical assessment*

explain actions required for hazards, underground and overhead services

Delivery to include:

- regulatory requirements for working near to or under overhead services

- types of services, including buried and surface laid, and the various methods on how they are identified
- emergency and reporting procedures if contact is made with services
- minimum clearances when near to services
- permit to break ground requirements

Assessment criteria:

- explain regulative distances that machines should be kept from different types of overhead services
- describe the types of services that may be encountered on site
- explain the emergency and evacuation procedures if contact is made with services on site
- state the minimum distances to be kept from buried and surface laid services
- explain methods and hierarchy of establishing buried services within the work area
- explain how and why contact to services must be reported
- explain why permits to break ground are required, who issues them and on what basis

excavate different types of excavations in various types of ground to given dimensions

Delivery to include:

- typical types of excavations able to be undertaken by crawler - tractor/dozers
- how soil types determine excavation types and methods
- methods of minimising excavation collapse including benching, trench boxes, other shoring, and support methods and other related methods
- causes of excavation collapse
- method statements, job specifications, risk assessments
- placement or disposal of spoil
- segregation of excavated materials
- typical excavation tolerances
- reasons for excavation dimensions and effects of not conforming to given tolerances
- methods of efficient excavation techniques for different types of ground and support requirements
- use of working operational modes
- machine repositioning to meet required excavation lengths and angles
- carrying out a range of excavating activities following given dimensions and tolerances
- working near to edges and deep excavations
- required control methods for open excavations
- methods of establishing excavation dimensions and tolerances
- establishing and maintaining visual contact with dedicated supporting workers
- construction of benches in sidehill excavation
- different methods of trimming batters to set specifications (horizontal and diagonal)

Assessment criteria:

- describe types and purposes of typical construction-based excavation
- explain how excavations should be carried out on differing soil types for example, granular, and cohesive
- describe causes of excavation collapse and effects of environmental conditions – dryness/high moisture
- explain the methods of minimising excavation collapse and dozer solution
- explain what methods are used to transfer excavation specifications and requirements to the operator
- explain the reason for separation of different soil types and how they should be segregated during excavation
- explain the reasons for limiting off-site disposal of spoil
- explain the effects of not conforming to given tolerances
- state how the machine should be repositioned when excavating long cuts
- describe methods of efficient excavation techniques for different types of ground
- explain the importance of maintaining visual contact with dedicated supporting workers
- explain why it's important to cut the shelf wide enough to provide solid support for equipment on sidehill cut
- explain the principles of push loading with motorised and towed scraper equipment and why it's important to have the dozer blade pusher block alignment with the scraper centralised
- explain the general rules for the construction of an embankment using a dozer, (excavation, forming/shaping and compaction)
- explain how horizontal runs with the dozer create batters and why you start from the top of the slot and work down
- explain what happens if the operator allows the lower blade corner to dig in
- explain why it is important to evaluate soil type, moisture content and overall stability
- carry out given earth working activities according to given instructions and dimensions including forming an excavation and forming a stockpile *this should be observed during practical assessments*

Assessment requirements:

- the length of the excavation must be a minimum of 15 metres
- the cut must be 1 & half x the width of the blade
- excavation depths must be a minimum of 1 metre and be within +/- 35mm of the given size
- the excavation must be straight within +/- 100mm
- fold and form sides on each side of the cut to create batters with the foot of the batter to still be within stated tolerances
- before reinstating - form stockpile ensuring both sides are formed and sealed with batters

reinstate excavation – grade, spread and level ground and materials

Delivery to include:

- the importance of ground compaction and settlement
- use a blade for grading and levelling purposes

- methods of grading and spreading various types of soil
- method statements, risk assessments for grading and levelling purposes
- types of attachments for grading and levelling activities
- methods of establishing grading and levelling dimensions and tolerances
- carrying out grading and levelling activities following given dimensions and tolerances
- key terms related to changes in soil volume, swell and shrinkage

Assessment criteria:

- describe how ground compaction, settlement and void elimination is catered for following reinstatement activities
- explain the purposes of levelling and how various material types should be spread
- state the types of blades and explain the use of blades to level surfaces
- state why method statements and risk assessments are required for levelling activities
- state other types of attachments for levelling activities
- explain how levelling tolerances are established
- backfill and reinstate previous excavations back to original level and state according to given tolerances – *this should be observed during practical assessments*
- explain what happens to excavated materials in their bank, loose and compacted states

explain environmental considerations of machine use

Delivery to include:

- health and social reasons to reduce machine emissions
- shutting down engine procedures
- what 'tailpipe' emissions are caused by CI Compression Ignition (diesel) engines
- impacts of idling engine
- air quality and the component gases of air
- how engine emissions, including particulate matter, affect air quality and the effects on human and environmental wellbeing
- measures to reduce emissions during operations including alternative/low emission fuels, fuel treatments and particulate filtration systems
- efficient use of the machine and when and how minimising engine use can aid air quality and fuel savings
- eco-friendly oils, fluids, and lubricants
- fuel-saving techniques for specific item of plant
- appropriate disposal of waste
- spillage procedures

Assessment criteria:

- explain the health and social reasons for reducing machine emissions
- discuss government industry zero emission initiatives
- demonstrate importance of shutdown procedures when equipment not in use

- list two or more effects on human and environmental wellbeing as a result of engine emissions
- identify the risks of excessive idling, including effects on engine performance, fuel efficiency and emissions
- explain appropriate disposal of waste
- explain spillage procedures
- describe the need to keep engine speed and load to a minimum whilst maintaining working efficiency

explain loading/unloading procedures for machine transportation

Delivery to include:

- procedures for preparing the machine for loading onto a transporter
- traction and surface preparation requirements
- transporter type, size and load/axle carrying ability
- purpose and types of anchorage points on transporter and dozer
- types and agreed methods of communication between the plant operator and others
- working at height requirements when driving onto or off a transporter bed
- ramp angle and ramp type and understand how weather conditions can affect the loading and unloading procedures
- compliance requirements for road transport including height and overhang

Assessment criteria:

- describe the preparation required of both machine and transporter for loading and unloading of the machine
- outline how the trailer type, size and load capacity affects the loading procedure
- explain the precautions to be taken when driving the machine onto and off the transporter bed
- explain the configuration of dozer and load restraint for method/s lashings/chains
- state the methods of communication between the plant operator and others
- describe the dangers of and requirements for working at height when on the vehicle bed
- outline what the key road requirements are in relation to dozer dimensions and weight

carry out all end of work and shut down procedures

Delivery to include:

- types of safe locations, areas, and ground/terrain types where a crawler - tractor/dozer and attachments may be parked and should not be parked
- reasons for ensuring safe parking and unintentional movement and ground support requirements
- carrying out parking, shut down and isolation requirements according to manufacturer's instructions and observance of need to run engine on low idle when turbo charger fitted

- reasons for machine isolation including security and non-authorised use by others
- use of anti-vandalism equipment
- reasons the isolator is not disconnected until ad blue purge is complete

Assessment criteria:

- demonstrate and explain safe parking of the machine - machine is parked in a safe, designated location, clear of hazards on level, firm ground - *this should be observed during practical assessment*
- apply any brake systems effectively
- isolate and secure the crawler - tractor/dozer to prevent unauthorised use and explain why this is important - *this should be observed during practical assessment*
- follow engine shutdown procedures, including when a turbo charger is fitted as per manufacturers guidance
- describe the use of anti-vandalism equipment
- ensuring the isolator is not disconnected until ad blue purge is complete