National Occupational Skill Standard (NOSS)

Occupational Title : Pile Rigger

Level : 2

Sector : Construction

Sub - Sector : Pile Foundation

NOSS ID/NSCO ID :

ISCO NO :



Council for Technical Education and Vocational Training

NATIONAL SKILL TESTING BOARD

Madhyapur Thimi-17, Sanothimi, Bhaktapur, Nepal

Developed: 05-10-2021 (19-06-2078)



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3.	Mr. Shyam Kumar Thapa	Member	Imperial Construction Pvt. Ltd. Tinkune, Kathmandu
4.	Mr. Rajendra Ghimire	Member	Delly Piping Solution Gwarko, Lalitpur
5.	Mr. Pramod Chaudhary	Member	Freelancer Balara, Sarlahi
6.	Mr. Hosh Narayan Raut	Member	Kabita Piping and Drilling Construction Dakshinkali, Kathmandu
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DACUM Coordinator / Facilitator:

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DACUM Workshop on 16 and 17 December 2020





The National Occupational Skill Standard Developed by:

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Recommended by Construction Technical Sub Committee: 05 October 2021 (19 Asoj 2078)





1	Occupational Title: Pile Level: 2	Rigger				
2	Job Description:					
	Pile Rigger, L-2, prep	pares and concretes borehole for pile	e foundation.			
3	UNITS OF COMPETENCY	/ :				
	Prepare Rig Mac	hine bored piling				
	2. Prepare Truck/T	ractor mounted bored piling				
	3. Perform Direct N	Mud Circulation (DMC) bored piling				
	4. Perform concret	ing on borehole				
	5. Perform commu	nication				
	6. Develop professi	ionalism				
	*Note: Units 5 and 6 a	are not for testing purpose.				
4	Qualifying Notes/Prere	quisites:				
•		ments: Sound health				
	Entry Requirement	ents: As per NSTB rules				
	Additional Information	tion:				
	Assessment Type	es: Performance test only				
	Assessment Dura	ation: 4 to 5 hours (Single Competer				
	• Pacammandad (8 to 10 hours (All Competenc	:y)			
	7	Group Size: 4 to 6 candidates				CIEVA
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5	Unit No:1 Unit Title: Prepare Rig Machine bo	red piling		Unit code:				
	Elements of competer	ncy	Performance standards					
		1.1.1 1.1.2	•	• •	ent (PPE) used in accordance with ntial site hazards.	n task requirement.		
		1.1.3	Safety symbol	placed at visib	le place surrounding boring area.			
		1.1.4	Pre-start insp	<i>ection</i> perform	ed as per manufacture's instructi	on.		
	1.1 Prepare Rig machine and wo	orking platform 1.1.5	Machine posit	ioned and aligr	ned on working platform.			
		1.1.6	Rigging gears,	pulley and cab	le/wire installed to drilling mast a	and locked securely.		
		1.1.7	Rigging gears	checked for sm	ooth operation and adjusted as p	er manufacturer's		
			instruction.					
		1.1.8	Required mat	<i>erials</i> shifted a	nd stacked at specified location a	s per instruction.		
		1.2.1	. Working cond	Working condition of <i>drilling tools/accessories</i> checked.				
	4.2. Catalellian tank	1.2.2	Drilling tools v	Drilling tools with the diameter less than or equal to pile diameter assembled as per				
	1.2 Set drilling tools		manufacturer's instruction.					
		1.2.3	Alignment of	drilling tools ch	ecked and adjusted.			
		1.3.1	. Machine mov	ed to position o	of pile to be installed.			
	1.3 Perform positioning of drillir	ng tools 1.3.2	Center point of	of drilling tool p	ositioned to perpendicular at the	e center point of the pile.		
		1.3.3	Machine secured and locked into its location.					
		1.4.1	. Hole of requir	ed diameter dr	illed as per soil strata in previous	sly marked point on		
			working platfo	orm.				
	4.4. Landall and a	1.4.2	Pre-fabricated	l casing lifted, s	hifted and positioned vertically a	bove borehole.		
	1.4 Install casing	1.4.3	Casing having	internal diame	ter same as pile diameter inserte	d vertically into drilled		
			hole up to gro	und level.				
		1.4.4	Verticality of casing checked and adjusted.					
		1.5.1			<u> </u>			
	1.5 Drill pile borehole	1.5.2	Drilling fluid	irculated in dri	lled borehole and drilling fluid ma	aintained all the times in		
\wedge			case of fully u	ncased drilling.				
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	1.5.3 Drilling tool changed as per <i>soil strata</i> .
	1.5.4 When drilling tool filled with boring muck, it is removed and unloaded on ground at
	specified location.
	1.5.5 Borehole drilled vertically to required depth as per drawing.
	1.5.6 Verticality of borehole checked periodically during pile boring.
	1.5.7 Depth of borehole measured, recorded and submitted to concerned authority.
	1.6.1 Approval took from concerned authority for flushing of borehole.
4.C. Deafers flooring of the breakele	1.6.2 Tremie pipe extended to base of borehole.
1.6 Perform flushing of pile borehole	1.6.3 Hose pipe attached to the head of tremie pipe.
	1.6.4 Bore flushed by bentonite drilling fluid till approval from concerned authority.
	1.7.1 Physical and working condition of rigging gears checked prior to lifting work.
1.7 Place reinforcement cage	1.7.2 Pre-fabricated reinforcement cage lifted, shifted and positioned above borehole.
	1.7.3 Pre-fabricated reinforcement cage lowered into the borehole vertically.
	1.8.1 Drilling tools/accessories removed and cleaned.
1.8 Perform worksite clearance	1.8.2 Drilling accessories greased evenly and stored at designated location.
	1.8.3 Operating hours recorded and submitted.

6 Task Performance Requirements (Tools, Equipment and Materials):

• Rig machine, Auger, drilling bucket, core barrel, kelly bar, continuous flight auger (CFA), diamond bullet, casing, mud pump, generator, Bentonite/red mud slurry, hose pipe and its connection, spirit level, wrench, plier, screwdriver, multimeter, hammer, shovel, spade, wheel barrow, bailer, meter rod, meter rod lock, Trieme pipe, Trieme pipe lock, sliding plug or barrier, hopper, center gate, steel wire, locking clamp, lubricants, grease, electric wire, PVC tape, slurry tank, reinforcement cage, cleaning cloth, measuring tape, calculator, pen, paper, register, safety signs/symbols, bucket, first aid kit and personal protective equipment (PPE).





7 Safety and Hygiene (Occupational Health and Safety):

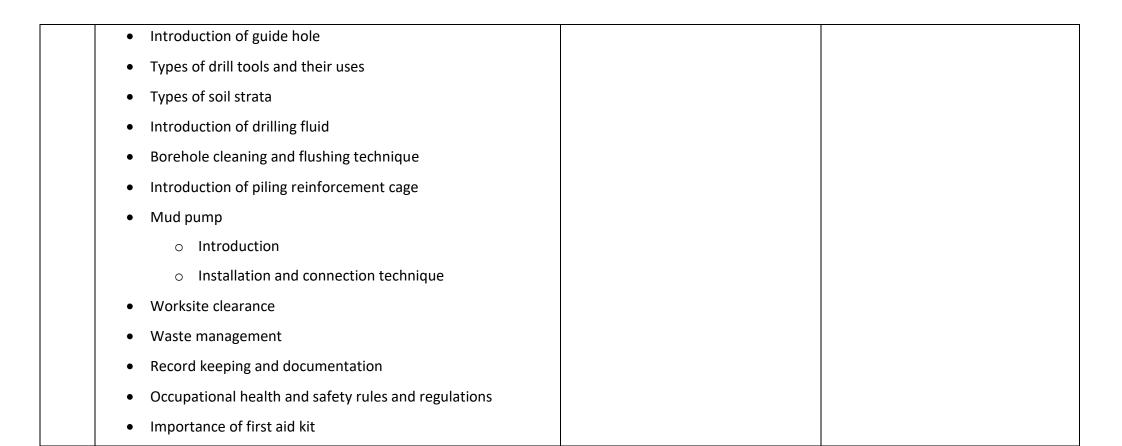
- Use personal protective equipment.
- Safe handling of materials, tools and equipment.
- Hazards involved in lifting tools, equipment and materials.
- Prevent from electrical hazards.
- Cover mud tank/pit and incomplete borehole.





	Required Knowledge											
8	Technical Knowledge		Applied	Calculation		Graphical Information	n					
8	Technical Knowledge Tools and equipment: Types Uses Safe handling Introduction of piling Types of piling machine Borehole Introduction Method Dimension Layout Drilling sequence and technique Rig machine Introduction Types Main components and their functions Installation technique	Requi		Calculation	•	Graphical Information Read and interpret pill drawing Read and interpret ap drilling sequence Read and interpret da information Read and interpret inclinometer reading	e proved					
	 Operational and warning sign 											
	Pre start and post start inspection						CTEV					
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9	Assessment of Competency						
	Unit: 1						
	Unit Title: Prepare Rig	Machir	ne bored piling				
			Candidate Details		As	ssessors De	tail
	Candidate's Name:			Assessors'	Name		ID/License No:
	Registration Number:			1.			
	Symbol No:			2.			
	Test Centre:		Test Date:	3.			
Ele	ment of competency		Performance Standards	Standard Met	Standard Not Met	Evidence Type	Comments
1.1	Prepare Rig machine and working platform	1.1.1 1.1.2 1.1.3 1.1.4 1.1.5 1.1.6 1.1.7	Personal protective equipment (PPE) used in accordance with task requirement. Worksite inspected for potential site hazards. Safety symbol placed at visible place surrounding boring area. Pre-start inspection performed as per manufacture's instruction. Machine positioned and aligned on working platform. Rigging gears, pulley and cable/wire installed to drilling mast and locked securely. Rigging gears checked for smooth operation and adjusted as per manufacturer's instruction. Required materials shifted and stacked at specified location as per instruction.				
1.2	Set drilling tools	1.2.1	Working condition of <i>drilling tools/accessories</i> checked.				



		1.2.2	Drilling tools with the diameter less than or equal to pile		
			diameter assembled as per manufacturer's instruction.		
		1.2.3	Alignment of drilling tools checked and adjusted.		
		1.3.1	Machine moved to position of pile to be installed.		
1.3	Perform positioning of	1.3.2	Center point of drilling tool positioned to perpendicular at		
	drilling tools		the center point of the pile.		
		1.3.3	Machine secured and locked into its location.		
		1.4.1	Hole of required diameter drilled as per soil strata in		
			previously marked point on working platform.		
		1.4.2	Pre-fabricated casing lifted, shifted and positioned		
1.4	Install casing		vertically above borehole.		
		1.4.3	Casing having internal diameter same as pile diameter		
			inserted vertically into drilled hole up to ground level.		
		1.4.4	Verticality of casing checked and adjusted.		
		1.5.1	Borehole excavated using appropriate drilling		
			tools/accessories.		
		1.5.2	Drilling fluid circulated in drilled borehole and drilling fluid		
			maintained all the times in case of fully uncased drilling.		
		1.5.3	Drilling tool changed as per soil strata.		
		1.5.4	When drilling tool filled with boring muck, it is removed		
1.5	Drill pile borehole		and unloaded on ground at specified location.		
		1.5.5	Borehole drilled vertically to required depth as per		
			drawing.		
		1.5.6	Verticality of borehole checked periodically during pile		
			boring.		
		1.5.7	Depth of borehole measured, recorded and submitted to		
			concerned authority.		





		1.6.1	Approval took from concerned authority for flushing of		
			borehole.		
1.6	Perform flushing of	1.6.2	Tremie pipe extended to base of borehole.		
	pile borehole	1.6.3	Hose pipe attached to the head of tremie pipe.		
		1.6.4	Bore flushed by bentonite drilling fluid till approval from		
			concerned authority.		
		1.7.1	Physical and working condition of rigging gears checked		
			prior to lifting work.		
1.7	Place reinforcement	1.7.2	Pre-fabricated reinforcement cage lifted, shifted and		
	cage		positioned above borehole.		
		1.7.3	Pre-fabricated reinforcement cage lowered into the		
			borehole vertically.		
		1.8.1	Drilling tools/accessories removed and cleaned.		
1.8	Perform worksite	1.8.2	Drilling accessories greased evenly and stored at		
	clearance		designated location.		
		1.8.3	Operating hours recorded and submitted.		

WT- Written Test

OQ- Oral Question

PT- Practical Test

DO – Direct Observation

SR- Supervisor's report

SN–Simulation

RP- Role Play

PG –Photographs

VD- Video

CT – Certificates

TS – Testimonials (Reward)

Revised Date: dd/mm/yy

PP – Product Produced

CS – Case Study





Range Statement

Variable	Range							
Personal protective equipment	May include but not limited to: Helmet Hat Mask Apron Goggles Gloves Safety shoes Ear plug							
Potential site hazard	May include but not limited to: Overhead transmis Underground lines Land stability Retaining structure Water crossing							
Pre-start inspection NOSS ID: # Developed Date: 2021-10-	May include but not limited to: Engine oil level Hydraulic oil level Gear oil level Fuel level Battery voltage	Revised Date: dd/mm/yy	Page:13					

	Grease and lubricants
	• Leakage
Required materials	May include but not limited to:
·	Drilling fluid
	Tremie pipe and accessories
	 Drilling tools/accessories
	Reinforcement cage
Drilling tools/accessories	May include but not limited to:
	• Auger
	Continuous Flight Auger (CFA)
	Core barrel
	Drilling bucket
	Kelly bar
	Diamond bullet
	• Casing
Soil strata	May include but not limited to:
	• Clay
	• Sandy
	• Gravel
	• Rock
	Boulder mixed soil (BMS)
Drilling fluid	May include but not limited to:
	Bentonite slurry
\wedge	Red mud slurry
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Unit No:2 Unit Title: Prepare Truck/Tractor bored piling	Unit code:
Elements of competency	Performance standards
	 2.1.1 Personal protective equipment (PPE) used in accordance with task requirement. 2.1.2 Worksite inspected for potential site hazards.
	2.1.3 Safety symbol placed at visible place surrounding boring area.
	2.1.4 <i>Pre-start inspection</i> performed as per manufacture's instruction.
2.1 Prepare drilling machine and working	2.1.5 Machine placed, positioned and aligned on working platform.
platform	2.1.6 Rigging gears, pulley and cable/wire installed to drilling mast and locked securely.
	2.1.7 Rigging gears checked for smooth operation and adjusted as per manufacturer's instruction.
	2.1.8 Air hose pipe connected to rotary of machine from air compressor
	2.1.9 <i>Required materials</i> shifted and stacked at specified location as per instruction.
	2.2.1 Working condition of <i>drilling tools/accessories</i> checked.
2.2 Cat deilliag table	2.2.2 Drilling tools with the diameter less than or equal to pile diameter assembled as per
2.2 Set drilling tools	manufacturer's instruction.
	2.2.3 Alignment of drilling tools checked and adjusted.
	2.3.1 Machine moved to position of pile to be installed.
2.3 Perform positioning of drilling tools	2.3.2 Center point of drilling tool positioned to perpendicular at the center point of the pile
	2.3.3 Machine secured and locked into its location.
	2.4.1 Hole of required diameter drilled as per <i>soil strata</i> in previously marked point on
	working platform.
2.4 Install casing	2.4.2 Pre-fabricated casing lifted, shifted and positioned vertically above borehole.
2.4 Install casing	2.4.3 Casing having internal diameter same as pile diameter inserted vertically into drilled
	hole up to ground level.
	2.4.4 Verticality of casing checked and adjusted.





		2.5.1	Borehole excavated using appropriate drilling tools/accessories.
		2.5.2	Drilling tool changed as per soil strata.
2.5	D. W. Wallander	2.5.3	Borehole drilled vertically to required depth as per drawing with continuous supply of
2.5	5 Drill pile borehole		compressed air.
		2.5.4	Verticality of borehole checked periodically during pile boring.
		2.5.5	Depth of borehole measured, recorded and submitted to concerned authority.
		2.6.1	Approval took from concerned authority for flushing of borehole.
2.6	Perform flushing of pile borehole	2.6.2	Borehole flushed by compressed air at least twice.
		2.6.3	Flushing completed after approval from concerned authority.
		2.7.1	Physical and working condition of rigging gears checked prior to lifting work.
2.7	Place reinforcement cage	2.7.2	Pre-fabricated reinforcement cage lifted, shifted and positioned above borehole.
		2.7.3	Pre-fabricated reinforcement cage lowered into the borehole vertically.
		2.8.1	Drilling tools/accessories removed and cleaned.
2.8	Perform worksite clearance	2.8.2	Drilling accessories greased evenly and stored at designated location.
		2.8.3	Operating hours recorded and submitted.

6 Task Performance Requirements (Tools, Equipment and Materials):

• Truck/tractor mounted drilling machine, air compressor, continuous flight auger(CFA), drill rods, drill bits, diamond bullet, Down the hole Hammer (DTH), casing, hose pipe and its connection, spirit level, wrench, plier, screwdriver, multimeter, hammer, shovel, spade, wheel barrow, Trieme pipe, Trieme pipe lock, sliding plug or barrier, hopper, steel wire rope, locking clamp, lubricants, grease, reinforcement cage, cleaning cloth, measuring tape, calculator, pen, paper, register, safety signs/symbols, bucket, first aid kit and personal protective equipment (PPE).

7 Safety and Hygiene (Occupational Health and Safety):

- Use personal protective equipment.
- Safe handling of materials, tools and equipment.
- Hazards involved in lifting tools, equipment and materials.





•	Prevent from	electrical	hazards.
•	I I C V C I I C I I O I I I	CICCLITCAL	Hazarus.

• Cover mud tank/pit and incomplete borehole.





8	Technical Knowledge		Applied	Calculation	G	raphical Informatio	n
8	Technical Knowledge • Tools and equipment:	Requi	Applied Applied	Calculation	Re dr Re dr Re	raphical Information ead and interpret pirawing ead and interpret apprilling sequence ead and interpret date formation	le oproved
	 Main components and their functions 						
	o Installation technique						
	 Operational and warning sign 						
	Pre start and post start inspection						CTEV
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	Introduction of guide hole	
	 Types of drilling tools and their uses 	
	Types of soil strata	
	Introduction of air compressor	
	Borehole cleaning and flushing technique	
	Introduction of piling reinforcement cage	
	Worksite clearance	
	Waste management	
	Record keeping and documentation	
	Occupational health and safety rules and regulations	
	Importance of first aid kit	
1		





9			Candidate Details Assessors Name 1. 2. 3. Performance Standards Personal protective equipment (PPE) used in accordance with task requirement. Norksite inspected for potential site hazards. Safety symbol placed at visible place surrounding boring area. Pere-start inspection Machine placed, positioned and aligned on working olatform. Rigging gears, pulley and cable/wire installed to drilling mast and locked securely. Rigging gears checked for smooth operation and adjusted					
	Unit: 2							
	Unit Title: Prepare Tru							
			Candidate Details		A	ssessors De	tail	
	Candidate's Name:			Assessors'	Name		ID/License No:	
	Registration Number:			1.				
	Symbol No:			2.				
	Test Centre:		Test Date:	3.				
Eler	ment of competency		Performance Standards				Comments	
2.1	Prepare drilling machine and working platform	2.1.1 2.1.2 2.1.3 2.1.4 2.1.5 2.1.6 2.1.7 2.1.8	Personal protective equipment (PPE) used in accordance with task requirement. Worksite inspected for potential site hazards. Safety symbol placed at visible place surrounding boring area. Pre-start inspection performed as per manufacture's instruction. Machine placed, positioned and aligned on working platform. Rigging gears, pulley and cable/wire installed to drilling mast and locked securely. Rigging gears checked for smooth operation and adjusted as per manufacturer's instruction. Air hose pipe connected to rotary of machine from air compressor					



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		2.1.9	Required materials shifted a	and stacked at specified					
			location as per instruction.						
		2.2.1	Working condition of <i>drilling</i>	g tools/accessories checked.					
2.2	Cat dellina ta ala	2.2.2	Drilling tools with the diame	ter less than or equal to pile					
2.2	Set drilling tools		diameter assembled as per r	manufacturer's instruction.					
		2.2.3	Alignment of drilling tools ch	necked and adjusted.					
		2.3.1	Machine moved to position	of pile to be installed.					
2.3	Perform positioning of	2.3.2	Center point of drilling tool p	positioned to perpendicular at					
	drilling tools		the center point of the pile.						
		2.3.3	Machine secured and locked	l into its location.					
		2.4.1	Hole of required diameter di	rilled as per <i>soil strata</i> in					
			previously marked point on	working platform.					
		2.4.2	Pre-fabricated casing lifted,	shifted and positioned					
2.4	Install casing		vertically above borehole.						
		2.4.3	Casing having internal diame	eter same as pile diameter					
			inserted vertically into drille	d hole up to ground level.					
		2.4.4	Verticality of casing checked	and adjusted.					
		2.5.1	Borehole excavated using ap	propriate drilling					
			tools/accessories.						
		2.5.2	Drilling tool changed as per s	soil strata.					
		2.5.3	Borehole drilled vertically to	required depth as per drawing	g				
2.5	Drill pile borehole		with continuous supply of co	ompressed air.					
		2.5.4	Verticality of borehole check	red periodically during pile					
			boring.						
		2.5.5	Depth of borehole measured	d, recorded and submitted to					
			concerned authority.						
2.6	Perform flushing of	2.6.1	Approval took from concern	ed authority for flushing of					
$ \longrightarrow $	pile borehole								CTEV
	NOSS ID: #	Develo	ped Date: 2021-10-05	Revision Number: ##	Revised Date	: dd/mm/yy	P	age:21	

			borehole.			
		2.6.2	Borehole flushed by compressed air at least twice.			
		2.6.3	Flushing completed after approval from concerned			
			authority.			
		2.7.1	Physical and working condition of rigging gears checked			1
			prior to lifting work.			
2.7	Place reinforcement	2.7.2	Pre-fabricated reinforcement cage lifted, shifted and			
	cage		positioned above borehole.			
		2.7.3	Pre-fabricated reinforcement cage lowered into the			
			borehole vertically.			
		2.8.1	Drilling tools/accessories removed and cleaned.			
2.8	Perform worksite	2.8.2	Drilling accessories greased evenly and stored at			
	clearance		designated location.			
		2.8.3	Operating hours recorded and submitted.			





Range Statement

Variable			Range		
Personal protective equipment	Мо	 Helmet Hat Mask Apron Goggles Gloves Safety shoes Ear plug 			
Potential site hazard	М	 Overhead transmiss Underground lines Land stability Retaining structure Water crossing 	ion lines		
Pre-start inspection		 Engine oil level Hydraulic oil level Gear oil level Fuel level Battery voltage 			
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	Grease and lubricants
	• Leakage
Required materials	May include but not limited to:
	Air compressor
	Tremie pipe and accessories
	 Drilling tools/accessories
	Reinforcement cage
Drilling tools/accessories	May include but not limited to:
	Drill bit
	Drill rod
	Diamond bullet
	Continuous Flight Auger (CFA)
	Down the hole Hammer (DTH)
	Casing
Soil strata	May include but not limited to:
	• Clay
	 Sandy
	• Gravel
	• Rock
	Boulder mixed soil (BMS)





3.1 Setup DMC machine 3.2 Perform electric connection	3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 3.1.6 3.1.7	Vorksite inspected for potention afety symbol placed at visible placed at visible placed at visible placed at visible placed and on working assembled, setup and enterest and the courely. The content is a steel wire and the content in the conte	place surrounding boring area. orking platform. rected to desired height at speci	·		
·	3.1.3 3.1.4 3.1.5 3.1.6 3.1.7	afety symbol placed at visible positioned on working positioned on working and erecurely. The booked to steel wire and the booked to steel wire wire and the booked to steel wire wire wire wire wire wire wire wire	place surrounding boring area. orking platform. rected to desired height at speci	fied location and locke		
·	3.1.4 3.1.5 3.1.6 3.1.7	MC machine positioned on wo ripod assembled, setup and er ecurely. hisel hooked to steel wire and	orking platform. rected to desired height at specif	fied location and locke		
·	3.1.5 3.1.6 3.1.7	ripod assembled, setup and er ecurely. hisel hooked to steel wire and	rected to desired height at speci	fied location and locke		
·	3.1.6 3.1.7	ecurely. hisel hooked to steel wire and	- ,	fied location and locke		
3.2 Perform electric connection	3.1.7	hisel hooked to steel wire and				
3.2 Perform electric connection	3.1.7					
3.2 Perform electric connection			l positioned perpendicular at the	e center point of the pi		
3.2 Perform electric connection	2 2 1	nother end of steel wire conne	ected to DMC machine.			
3.2 Perform electric connection	5.2.1	unctionality of generator chec	ked and positioned on working p	platform.		
3.2 Ferrorm electric connection	3.2.2	1 0 0				
2 Perform electric connection	3.2.3	3 phase line of generator connected to starter of DMC machine.				
	3.2.4	Starter connected to DMC motor.				
	3.3.1	Iud pump installed in a pit/tan	nk prepared previously.			
3.3 Perform mud pump operation	3.3.2	ipe from mud pump connected	d to nozzle fixed on chisel.			
3.3 Ferrorm mad pamp operation	3.3.3	lud pump operated after verif	fication of <i>drilling fluid</i> on pit/ta	nk.		
	3.3.4	irculation of drilling fluid checl	ked and adjusted.			
	3.4.1	ole of required diameter drille	ed as per <i>soil strata</i> in previously	y marked point on		
		orking platform.				
3.4 Install casing	3.4.2	re-fabricated casing lifted, shif	fted and positioned vertically ab	ove borehole.		
J.4 mstan casing	3.4.3	asing having internal diameter	r same as pile diameter inserted	vertically into drilled		
		ole up to ground level.				
	3.4.4	Verticality of casing checked and adjusted.				
	3.5.1	=	d borehole and drilling fluid mair	ntained all the times ir		
3.5 Drill pile borehole		ase of fully uncased drilling.				
7	3.5.2	rill pipe added gradually as the	e depth of borehole increases.	<u> </u>		
NOSS ID: # Developed Date: 2021-10-05	3.3.2					

	3.5.3	Borehole drilled vertically to required depth as per drawing.
	3.5.4	Verticality of borehole checked periodically during pile boring.
	3.5.5	Depth of borehole measured, recorded and submitted to concerned authority.
	3.6.1	Approval took from concerned authority for flushing of borehole.
3.6 Perform flushin	g of pile borehole 3.6.2	Borehole flushed by circulating drilling fluid.
	3.6.3	Flushing completed after approval from concerned authority.
	3.7.1	Physical and working condition of rigging gears checked prior to lifting work.
3.7 Place reinforcer	ment cage 3.7.2	Pre-fabricated reinforcement cage lifted, shifted and positioned above borehole.
	3.7.3	Pre-fabricated reinforcement cage lowered into the borehole vertically.
	3.8.1	Drilling tools/accessories removed and cleaned.
2.0 Partana alai	3.8.2	Grease evenly applied on greasing parts of DMC machine.
3.8 Perform worksi	te clearance 3.8.3	Operating hours recorded and submitted.
	3.8.4	Machine and drilling tools/accessories stored at designated location.

DMC machine, tripod with pulley, winch machine, steel wire, chisel, casing, drill pipe, mud pump, generator, Bentonite/red mud slurry, DMC rod, hose pipe and its connection, spirit level, wrench, chain wrench, plier, phase tester, screwdriver, multimeter, hammer, shovel, spade, wheel barrow, locking clamp, grease, electric wire, PVC tape, slurry tank, reinforcement cage, drilling tools/accessories, cleaning cloth, measuring tape, calculator, pen, paper, register, safety signs/symbols, bucket, first aid kit and personal protective equipment (PPE).

7 Safety and Hygiene (Occupational Health and Safety):

- Use personal protective equipment.
- Safe handling of materials, tools and equipment.
- Hazards involved in lifting tools, equipment and materials.
- Prevent from electrical hazards.
- Cover mud tank/pit and incomplete borehole.





	Required Knowledge											
8	Technical Knowledge		Applied (Calculation	Gra	aphical Informatio	n					
8	 Tools and equipment: Types Uses Safe handling Introduction of piling Borehole Introduction Method Dimension Layout Drilling sequence and technique Direct Mud Circulation (DMC) Machine Introduction Types Main components and their functions Installation technique 	Requi	Applied (otal length of drill	ReadraReadradriReadrama	aphical Information and and interpret picturing and and interpret applications and and interpret and and interpret and and interpret anufacturer's operation	ile					
	 Operational and warning sign Introduction of wash boring system 											
	Introduction of guide hole						CTEV					
	NOSS ID: # Developed Date: 2021-10-05	Revision N	Number: ##	Revised Date: dd/mm	п/уу	Page:27	TRADE 4 DE SE					





 Types of drilling tools and their uses 	
Types of soil strata	
Introduction of drilling fluid	
Borehole cleaning and flushing technique	
Introduction of piling reinforcement cage	
Mud pump	
 Introduction 	
 Installation and connection technique 	
Introduction of generator	
Worksite clearance	
Waste management	
Record keeping and documentation	
Occupational health and safety rules and regulations	
Importance of first aid kit	





9		Assessment of Competency						
	Unit: 3							
	Unit Title: Prepare Direct Mud Circulation (DMC) bored piling							
			Candidate Details			A	tail	
	Candidate's Name:	Candidate's Name:			Assessors'	Name		ID/License No:
	Registration Number:	Registration Number:			1.			
	Symbol No:				2.			
	Test Centre:				3.			
Ele	ment of competency		Performance S	Standards	Standard Met	Standard Not Met	Evidence Type	Comments
3.1	Setup DMC machine	3.1.3 3.1.4 3.1.5	with task requirement. Worksite inspected for pote . Safety symbol placed at visib area. DMC machine positioned on Tripod assembled, setup and specified location and locked Chisel hooked to steel wire a at the center point of the pil	working platform. I erected to desired height at d securely. and positioned perpendicular e.				
3.2	Perform electric connection	3.2.1 3.2.2 3.2.3	working platform. Output voltage of generator	checked and reported.				O'HV.
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			machine.		
		3.2.4	Starter connected to DMC motor.		
		3.3.1	Mud pump installed in a pit/tank prepared previously.		
2.2	5 (3.3.2	Pipe from mud pump connected to nozzle fixed on chisel.		
3.3	Perform mud pump operation	3.3.3	Mud pump operated after verification of <i>drilling fluid</i> on		
	operation		pit/tank.		
		3.3.4	Circulation of drilling fluid checked and adjusted.		
		3.4.1	Hole of required diameter drilled as per soil strata in		
			previously marked point on working platform.		
		3.4.2	Pre-fabricated casing lifted, shifted and positioned		
3.4	Install casing		vertically above borehole.		
		3.4.3	Casing having internal diameter same as pile diameter		
			inserted vertically into drilled hole up to ground level.		
		3.4.4	Verticality of casing checked and adjusted.		
		3.5.1	Drilling fluid circulated in drilled borehole and drilling fluid		
			maintained all the times in case of fully uncased drilling.		
		3.5.2	Drill pipe added gradually as the depth of borehole		
			increases.		
3.5	Drill pile berebele	3.5.3	Borehole drilled vertically to required depth as per		
3.5	Drill pile borehole		drawing.		
		3.5.4	Verticality of borehole checked periodically during pile		
			boring.		
		3.5.5	Depth of borehole measured, recorded and submitted to		
			concerned authority.		
2.0	Doutous fluobing of	3.6.1	Approval took from concerned authority for flushing of		
3.6	Perform flushing of pile borehole		borehole.		
	hire not etitole	3.6.2	Borehole flushed by circulating drilling fluid.		





		3.6.3	Flushing completed after approval from concerned		
			authority.		
		3.7.1	Physical and working condition of rigging gears checked		
			prior to lifting work.		
3.7	Place reinforcement	3.7.2	Pre-fabricated reinforcement cage lifted, shifted and		
	cage		positioned above borehole.		
		3.7.3	Pre-fabricated reinforcement cage lowered into the		
			borehole vertically.		
		3.8.1	Drilling tools/accessories removed and cleaned.		
	5 ()	3.8.2	Grease evenly applied on greasing parts of DMC machine.		
3.8	Perform worksite	3.8.3	Operating hours recorded and submitted.		
	clearance	3.8.4	Machine and drilling tools/accessories stored at		
			designated location.		

WT- Written Test

OQ- Oral Question

PT- Practical Test

DO – Direct Observation

SR- Supervisor's report

SN–Simulation

RP- Role Play

CS – Case Study

PG –Photographs

VD- Video

CT – Certificates

TS – Testimonials (Reward)

PP – Product Produced







Range Statement

Variable	Range
Personal protective equipment	 May include but not limited to: Helmet Hat Mask Apron Goggles Gloves Safety shoes Ear plug
Potential site hazard	 May include but not limited to: Overhead transmission lines Underground lines Land stability Retaining structure Water crossing
Drilling fluid	 May include but not limited to: Bentonite slurry Red mud slurry
Soil strata	May include but not limited to: Clay
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	Sandy
	Gravel
	• Rock
	Boulder mixed soil (BMS)
Drilling tools/accessories	May include but not limited to:
	Drill rod
	• Chisel
	• Tripod
	• Casing
	Drill bit





	Elements of competency		Performance standards
			sonal protective equipment (PPE) used in accordance with task requirement.
			rksite inspected for <i>potential site hazards.</i>
4.1	Prepare concreting machine and	4.1.3 Sa	ety symbol placed at visible place surrounding concreting area.
	working platform	4.1.4 Pr	-start inspection performed as per manufacture's instruction.
		4.1.5 Gr	ase applied evenly on gear teeth, bucket, chain and pulley.
		4.1.6 M	chine positioned and aligned on working platform.
		4.2.1 Le	gth, diameter and physical condition of tremie pipe checked.
	2 Place tremie pipe	4.2.2 Gr	ase evenly applied on pipe and inserted adequately into the bed of borehole to be
4.2			creted.
			mie pipe connected to hopper and locked securely.
			pper hooked to <i>suitable attachment.</i>
			ehole flushed with fresh <i>drilling fluid</i> before concreting.
		4.3.2 Co	crete poured adequately to the hopper.
4.3	Perform pile concreting	4.3.3 Tr	mie pipe removed gradually from top as the level of concrete rises as per instruction
		4.3.4 Bo	ehole concreted up to the required level.
		4.3.5 Te	nporary casing extracted completely after concreting operation.
		4.4.1 Co	creting tools/accessories removed and cleaned.
4.4	Perform worksite clearance	4.4.2 Gr	ase evenly applied on greasing part and stored at designated location.
		4.4.3 Op	erating hours recorded and submitted.





measuring tape, calculator, pen, paper, register, safety signs/symbols, bucket, first aid kit and personal protective equipment (PPE).

7 **Safety and Hygiene (Occupational Health and Safety):**

- Use personal protective equipment.
- Safe handling of materials, tools and equipment.
- Hazards involved in lifting tools, equipment and materials.
- Cover mud tank/pit and incomplete borehole.





	Requir	ed Knowledge	
8	Technical Knowledge	Applied Calculation	Graphical Information
	Technical Knowledge Tools and equipment: Types Uses Safe handling Mixture machine Introduction Types Main components and their function Prestart and post start inspection Concreting Introduction Mixing ratio Admixture (anti washout chemical, super plasticizer) Method (Mixture machine, Ready mix concrete) Workability of concrete Concreting technique Waste management Record keeping and documentation Occupational health and safety rules and regulations	Applied Calculation	Read and interpret manufacturer's instruction Read and interpret pile drawing
	 Occupational health and safety rules and regulations Importance of first aid kit 		

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6

9			Assessment of Competency				
	Unit: 4						
	Unit Title: Perfor	m conci	reting on borehole				
	Candidate Details Assessors Detail						
	Candidate's Name		Assessors'	Name		ID/License	
	Registration Num	ber:		1.			No:
	Symbol No:			2.			
	Test Centre:		Test Date:	3.			
Eleme	ent of competency		Performance Standards	Standard Met	Standard Not Met	Evidence Type	Comments
		4.1.1	Personal protective equipment (PPE) used in accordance with task				
4.1	Prepare		requirement.				
	concreting	4.1.2	Worksite inspected for <i>potential site hazards</i> .				
	machine and	4.1.3	Safety symbol placed at visible place surrounding concreting area.				
	working	4.1.4	Pre-start inspection performed as per manufacture's instruction.				
	platform	4.1.5	Grease applied evenly on gear teeth, bucket, chain and pulley.				
		4.1.6	Machine positioned and aligned on working platform.				
		4.2.1	Length, diameter and physical condition of tremie pipe checked.				
4.2	Place tremie	4.2.2	Grease evenly applied on pipe and inserted adequately into the bed of				
4.2	pipe		borehole to be concreted.				
	pipe	4.2.3	Tremie pipe connected to hopper and locked securely.				
		4.2.4	Hooper hooked to <i>suitable attachment</i> .				
4.3	Perform pile	4.3.1	Borehole flushed with fresh <i>drilling fluid</i> before concreting.				
4.5	concreting	4.3.2	Concrete poured adequately to the hopper.				
	concreting		Tremie pipe removed gradually from top as the level of concrete rises as				



		per instruction.		
		4.3.4 Borehole concreted up to the required level.		
		4.3.5 Temporary casing extracted completely after concreting operation.		
4.4	Perform	4.4.1 <i>Concreting tools/accessories</i> removed and cleaned.		
	worksite	4.4.2 Grease evenly applied on greasing part and stored at designated location.		
	clearance	4.4.3 Operating hours recorded and submitted.		

WT- Written Test

OQ- Oral Question

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RP- Role Play

PG –Photographs

VD- Video

CT – Certificates

TS – Testimonials (Reward)

PP – Product Produced

CS – Case Study





Range Statement

Variable	Range
Personal protective equipment	May include but not limited to:
	Helmet
	Hat
	 Mask
	• Apron
	 Goggles
	• Gloves
	Safety shoes
	Ear plug
Potential site hazard	May include but not limited to:
	Overhead transmission lines
	Underground lines
	Land stability
	Retaining structure
	Water crossing
Pre-start inspection	May include but not limited to:
	Engine oil level
	Hydraulic oil level
	Gear oil level
	Fuel level
	Battery voltage





	Grease and lubricants
	• Leakage
Physical condition	May include but not limited to:
	• Thread
	• Rupture
	• Damage
	• Crack
	Blockage
Suitable attachment	May include but not limited to:
	• Tripod
	• Excavator
	Truck/tractor mounted machine
	Rig machine
Drilling fluid	May include but not limited to:
	Bentonite slurry
	Red mud slurry
Concreating tools/accessories	May include but not limited to:
	Tremie pipe
	• Hopper
	Mixture machine



Developed Date: 2021-10-05

