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1.0 Persons Affected

This Standard Operating Procedure (SOP) affects all Transmission & Distribution Services employees and contractors who operate, or assist in the operation of, a Digger Derrick.

2.0 Purpose

This SOP provides the standard for installing a power-installed screw anchor (PISA) with a Digger Derrick.

The purpose of this procedure is:

- To establish a standard for installing a PISA within the Transmission and Distribution Services.
- To provide a detailed job process for employees and contractors who perform this procedure within the course of their job.

3.0 Rationale

This SOP will support the safety of our personnel by ensuring safe working methods are consistently used for installing a PISA with a Digger Derrick. This SOP will also ensure optimal use of equipment for the purpose of minimizing wear and tear.

This SOP requires that work performed by Transmission and Distribution Services employees and contractors satisfies all applicable policies and regulations.

4.0 Scope

In-the-Scope of the Procedure

- The procedure includes the following:
 - Set up equipment
 - Assemble anchor installing equipment
 - Install the PISA
 - Disassemble anchor installing equipment
 - Complete post operations

Out-of-the-Scope of the Procedure

- The procedure does not include the following:
 - Install a log (slug) anchor
 - Selection of Helix size

5.0 Policies and Regulatory Requirements

This SOP is a result of the following:

Policies:

- SaskPower Hazard Control Policy, 2008

Regulatory Requirement(s)

Saskatchewan Occupational Health and Safety Regulations, 1996

- Part XI: Powered Mobile Equipment
 - Section 155: Visual Inspection
 - Section 156: Inspection and Maintenance
 - Section 164: Dangerous Movements
- Part XIII: Hoists, Cranes and Lifting Devices
 - Section 199: Interpretation
 - Section 201(1): General Requirements
 - Section 204: Designated Operator
 - Section 210(1)(4): Designated Signaler
 - Section 212(1) (4): Hoists, Cranes with Outriggers, etc.
 - Section 215: Log book
 - Section 216: Inspections
- Part XVII: Excavations, Trenches, Tunnels and Excavated Shafts
 - Section 260(6): Excavating and Trenching
- Part XXX: Additional Protection for Electrical Workers
 - Section 465(2): Proximity to exposed energized high voltage Electrical Conductors
- Table 22: Minimum Distances from Exposed Energized High Voltage Electrical Conductors
- Exemptions:
 - Section 208(1)(2)(3): Load Gauge
 - Section 211(3): Anti-Two Block

Other

American National Standard

- ANSI A10.31 - 2006

Manufacturer's Specifications

SaskPower Procedures

- SaskPower Bonding and Grounding Procedures
- SaskPower Limits of Approach
- SaskPower Standard Protection Code

SaskPower Safety Rulebook

6.0 Roles, Responsibilities and Prerequisites

In-the-Scope of the Procedure Role(s)	Quantity Required	Responsibilities	Prerequisites
Digger Derrick Operator	1	1. Operate the equipment as per guidelines established in the following procedure.	1. An employee must be designated as a qualified Digger Derrick Operator, or to be under the supervision of a qualified Digger Derrick operator.



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Digger Derrick Operator Assistant	1 or more	1. Assist the Digger Derrick Operator in installing a PISA.	1. Under the supervision of a qualified Digger Derrick Operator.
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7.0 Tools and Equipment

Tools and Equipment and Quantity Required:

- Digger Derrick
- Anchor rod(s)
- Helix
- Anchor installing tool
- Anchor drive wrench
- Anchor drive wrench extension(s)
- Anchor rod coupling(s)
- Ground lead
- Ground electrode
- Digger Derrick Operating Manual
- Construction Standards Manual
- IPT's Crane and Rigging Handbook

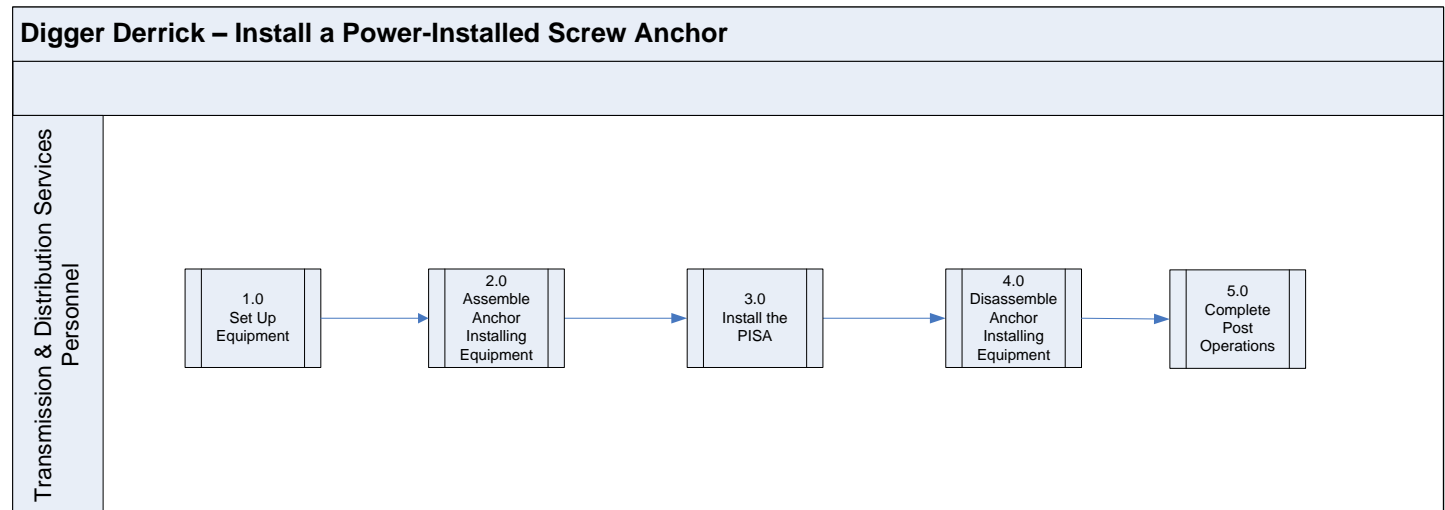
8.0 Planning and Preparation Checklist

Things to Check before Starting the Procedure:

- Complete Hazard and Risk Assessment and Job Plan
- Complete Fleet Services' Digger Daily Inspection Checklist
- Complete OH&S Compliance - Perform Pre-Operational Equipment Checks SOP
- Complete TRNSP Compliance - Perform Pre-Trip Air Inspections SOP
- Complete TRNSP Compliance - Perform Pre-Trip Chassis Inspections SOP
- Applicable Personal Protective Equipment (PPE) is available and in good condition
- Confirm locations of underground facilities

9.0 Procedure

High Level Flowchart



The Procedure

This Standard Operating Procedure (SOP) covers the method of installing a power-installed screw anchor (PISA).

1.0 Set Up Equipment

1.1 Set Up Digger Derrick

1.1.1 The Digger Derrick Operator shall position the Digger Derrick as outlined within the job plan.

- *Ensure the area is clear*
- *Position the Digger Derrick so that the boom is in line with the PISA to be installed whenever possible*

Note: Installing PISA's off to the side of the boom may put undue stress on the rotational gears.

- *Apply the parking brake*
- *Engage the Power Take Off (PTO) as per manufacturer's specifications*

1.1.2 The Digger Derrick Operator and/or Digger Derrick Operator Assistant(s) shall extend all outriggers.

- *As per manufacturer's specifications*
- *Ensure the area is clear*
- *Lay out outrigger pads as specified for the Digger Derrick*

Note: The use of outrigger pads is **mandatory** at all times.

- *Ensure outriggers are fully visible while extending*

- *Dig out surface area as required if outriggers cannot be fully extended*
 - *Block the outriggers as required to stabilize the Digger Derrick*
- 1.1.3 The Digger Derrick Operator shall level the Digger Derrick.
- *As per manufacturer's specifications*
- 1.1.4 The Digger Derrick Operator and/or the Digger Derrick Operator Assistant(s) shall ground the Digger Derrick if identified within the Hazard and Risk Assessment.

2.0 Assemble Anchor Installing Equipment

2.1 Unstow the Auger

- 2.1.1 The Digger Derrick Operator shall elevate the boom.
- *Ensure the area is clear*
 - *Consider the potential swing area of the auger in the event of sudden release*
 - *The boom must be positioned for the Auger to clear the Digger Derrick utility body and operator*
- 2.1.2 The Digger Derrick Operator shall fully retract all boom extensions.
- 2.1.3 The Digger Derrick Operator shall shift the digger speed into Low.
- *Winding and unwinding the auger at low speed gives the Operator more control*
- 2.1.4 The Digger Derrick Operator shall remove any slack in the stow cable either by using the Dig or Clean control lever.
- 2.1.5 The Digger Derrick Operator shall lower the auger.
- *The auger should be lowered to a position where the auger would strike the ground if the wind-up cable should break*
 - *Activate the auger storage release*
 - *The auger must be lowered until it is in the vertical position and the stow cable swings clear*
 - *Do not change auger speeds while lowering the auger as it may freewheel and control of the auger may be lost*

Note: If the ground is frozen, it may be necessary to dig a starter hole for the helix with the auger.

2.2 Remove the Auger

- 2.2.1 The Digger Derrick Operator shall remove the auger.
- *Position the boom so the auger is not in the work area*
 - *Screw the auger into the ground*

Note: If underground facilities are present, the auger may be removed from the Kelly bar with the winch and placed on the ground.

2.3 Assemble Anchor Installing Equipment

2.3.1 The Digger Derrick Operator and/or the Digger Derrick Operator Assistant(s) shall assemble the anchor installing tool.

- *Attach the anchor installing tool to the end of the Kelly bar*
- *Move the locking dogs in and out of the anchor installing tool to ensure both locking dogs operate smoothly*
- *Pull and lock both locking dogs on the anchor installing tool in the Out position*
- *Assemble rod and helix*
- *Insert rod and helix into the drive wrench*

2.3.2 The Digger Derrick Operator shall raise the boom.

- *Ensure the area is clear*
- *There must be enough room for the anchor rod and anchor drive wrench to fit underneath the anchor installing tool*

2.3.3 The Digger Derrick Operator Assistant(s) shall position the anchor rod and drive wrench, vertically, beneath the anchor installing tool.

2.3.4 The Digger Derrick Operator shall lower the boom until the anchor installing tool is fully inserted over the drive wrench.

Caution: Ensure hands are clear as there is an identified crushing hazard located where the anchor installing tool and the drive wrench meet.

2.3.5 The Digger Derrick Operator Assistant(s) shall fully lock both locking dogs.

3.0 Install the PISA

3.1 Screw in the PISA

3.1.1 The Digger Derrick Operator shall raise the boom.

- *Ensure the area is clear*

3.1.2 The Digger Derrick Operator Assistant(s) shall position the helix point where the PISA is to be installed.

CAUTION Ensure feet are clear when positioning helix on the ground.

3.1.3 The Digger Derrick Operator shall extend the extension cylinder until the drive wrench is at the appropriate angle in line with the top of the pole as per Construction Standards.

- *Keep pressure on the PISA when extending the boom or the tip of the PISA will move*

3.1.4 The Digger Derrick Operator shall use slight downwards pressure to slowly start turning the PISA into the ground

Note: If the PISA stalls in the hole while digging, do not retract or extend the extension cylinder with the digger head at full pressure as this may damage the hydraulic extension tube.

- *Maintain the correct angle while installing the PISA as per Construction Standards*
- *Screw the PISA into the ground until the anchor installing tool reaches the ground level or other desired height*
- *Maintain steady pressure on the boom. If the PISA is pushed in too hard, or not hard enough, the soil becomes over-disturbed, which results in decreased holding power*

Note: Where a job plan dictates installing a PISA off the side of the boom, follow the PISA with the boom to maintain the correct angle. Do not allow PISA's to screw the boom down. This causes undue stress on the boom and turret and could cause component failure.

3.2 Does the Anchor Hold?

3.2.1 The Digger Derrick Operator shall determine if the anchor holds by slowly pulling upwards on the PISA with the boom.

- *Yes, (The anchor holds), proceed to step 4.1 Disassemble Anchor Installing Equipment*
- *No, (The anchor does not hold), proceed to step 3.3 Install a Larger Helix*

3.3 Install a Larger Helix

3.3.1 The Digger Derrick Operator shall retrieve the Anchor Drive Wrench and helix.

- *Ensure the area is clear*
- *Release the drive wrench from the anchor installing tool*
- *Unscrew the anchor rod and drive wrench from the helix*

3.3.2 The Digger Derrick Operator Assistant(s) shall assemble a larger helix on the anchor rod.

3.3.3 The Digger Derrick Operator shall screw in the larger helix.

- *Ensure the area is clear*

3.4 Does the Larger Helix Hold?

3.4.1 The Digger Derrick Operator shall determine if the larger helix holds by slowly pulling upwards on the larger helix with the boom.

- *Yes, (The larger helix holds), proceed to step 4.1 Disassemble Anchor Installing Equipment*
- *No, (The larger helix does not hold), proceed to step 3.5 Install Anchor Rod Extension and Equipment*

3.5 Install Anchor Rod Extension and Equipment

3.5.1 The Digger Derrick Operator Assistant(s) shall assemble Anchor Rod Extension.

Note: The anchor drive wrench must remain in the ground.

- *Detach the anchor installing tool from the anchor drive wrench*
- *Pull and lock both locking dogs on the anchor installing tool in the Out position*
- *Select the correct sized anchor rod coupler to fit on the rod extension*
- *Attach the anchor drive wrench extension and anchor rod coupler onto the end of the anchor rod that is screwed into the ground*
- *Attach the anchor drive wrench extension to the anchor drive wrench that is screwed into the ground*
- *Attach the anchor installing tool to the anchor drive wrench*

3.5.2 The Digger Derrick Operator shall screw in the extension.

- *Ensure the area is clear*

3.6 Does the Extension Hold?

3.6.1 The Digger Derrick Operator shall determine if the extension holds by slowly pulling upwards on the extension with the boom.

- *Yes, (The extension holds), proceed to step 4.1 Disassemble Anchor Installing Equipment*
- *No, (The extension does not hold), proceed to step 3.5 Install Anchor Rod Extension and Equipment*

Note: If no combination of extensions and larger helixes is successful, a Log (slug) Anchor may be required as per Construction Standards.

4.0 Disassemble Anchor Installing Equipment

4.1 Disassemble Anchor Installing Equipment

4.1.1 The Digger Derrick Operator Assistant(s) shall pull locking dogs half way out on anchor installing tool to release anchor rod from drive wrench.

4.1.2 The Digger Derrick Operator shall raise the boom.

- *Ensure the area is clear*
- *Raise boom until the drive wrench is vertical and the bottom end is secured on the ground*

4.1.3 The Digger Derrick Operator Assistant(s) shall pull both locking dogs fully into the Out position.

4.1.4 The Digger Derrick Operator Assistant(s) shall securely hold the anchor drive wrench in place so that it does not fall over.

4.1.5 The Digger Derrick Operator shall raise the boom until the anchor drive wrench and anchor installing tool are separated.

- *Ensure the area is clear*

4.1.6 The Digger Derrick Operator Assistant(s) shall stow the anchor drive wrench in its proper mounting place on the Digger Derrick.

4.2 Re-Attach Auger

4.2.1 The Digger Derrick Operator shall lower the boom to a comfortable height for the Digger Derrick Operator Assistant(s) to work at.

4.2.2 The Digger Derrick Operator Assistant(s) shall remove the anchor installing tool.

- *Remove the anchor installing bolt to disconnect the anchor installing tool from the Kelly bar*
- *Store the anchor installing tool in its correct mounting place on the Digger Derrick*

4.2.3 The Digger Derrick Operator shall use the boom to position the Kelly bar over the top of the auger.

- *Ensure the area is clear*
- *Ensure holes are lined up*
- *Lower the Kelly bar completely into the auger*

CAUTION: Ensure hands are clear as there is an identified crushing hazard located where the Kelly bar and auger meet.

4.2.4 The Digger Derrick Operator Assistant(s) shall re-attach the auger to the Kelly bar with a grade 5 - 5/8" bolt.

4.2.5 The Digger Derrick Operator shall unscrew the auger from the ground and clean the auger.

4.3 Stow the Auger

4.3.1 The Digger Derrick Operator Assistant(s) shall attach the stow cable to the auger stow hook.

- *Ensure the area is clear*

4.3.2 The Digger Derrick Operator shall shift the digger speed into Low.

- *Winding and unwinding the auger at low speed gives the Operator more control*

4.3.3 The Digger Derrick Operator shall use the Clean or Dig control to wind up the auger.

- *The boom must be extended or raised up if the stow cable does not stay below the bell on the auger shaft*
- *Once the stow cable has started to wind below the bell properly, fully retract all boom(s)*

- 4.3.4 The Digger Derrick Operator shall ensure the auger stow mechanism is locked in position.

5.0 Complete Post Operations

5.1 Perform Post Operational Duties

- 5.1.1 The Digger Derrick Operator shall completely retract all boom extensions.
- 5.1.2 The Digger Derrick Operator shall place the boom in the boom rest.
- *Ensure the area is clear*
- 5.1.3 The Digger Derrick Operator Assistant(s) shall secure the boom in the boom rest.
- *Using the proper tie-down points as per manufacturer's specifications*
 - *Stowing the boom with the winch line through the third stage is not allowed*
- 5.1.4 The Digger Derrick Operator shall retract outriggers.
- *Ensure the area is clear*
- 5.1.5 The Digger Derrick Operator shall disengage PTO as per manufacturer's specifications.
- 5.1.6 The Digger Derrick Operator shall release the parking brake.
- 5.1.7 End of Procedure.

10.0 Acronyms, Definitions and Symbols

Acronyms and Abbreviations

PISA - Power installed screw anchor

PTO - Power take-off

SOP - Standard Operating Procedure

Definitions

Blocking:

The act of building up materials to stabilize outrigger pads, refer to IPT's Crane and Rigging Handbook.

Kelly Bar:

This bar goes inside the auger tube and telescopes out to drill deeper, used to connect the auger and the digger head.

Qualified operator (OH&S Regulation 204):

(i) The holder of a journeyman's certificate in the crane and hoist operator trade issued pursuant to the Apprenticeship and Trade Certification Act;

(ii) The holder of a proficiency certificate in a sub trade of the crane and hoist operator trade issued pursuant to the Apprenticeship and Trade Certification Act;



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(iii) an apprentice in the crane and hoist operator trade who is working under the direction of a person described in sub clause (i) or (ii); or

(iv) Any worker who:

(A) has received training, and has experience, in the safe operation of a crane that, in the opinion of the director, is equivalent to or superior to the training and experience of a person mentioned in [OH&S] sub clause (i), (ii) or (iii); or

(B) is a member of a category of workers whose training and experience in the safe operation of a crane, in the opinion of the director, is equivalent to or superior to the training and experience of a person mentioned in sub clause (i), (ii) or (iii).

Note: The approved SaskPower Digger Derrick Training Program meets the requirements of Regulation 204(iv) (A).

Symbols

N/A

11.0 SOP Components

SOP Component Name	SOP Component Type	SOP Component Description	Location of SOP Component
Digger Derrick – Install a Power-Installed Screw Anchor	Flowchart	The high level and mid-level flowchart for the procedure.	SOP Online – Digger Derrick or Boom Truck – Operations – Install a Power-Installed Screw Anchor

12.0 SOP Owner

SOP Owner
Operations Supervisor

13.0 References

N/A