

# WORKING IN OR NEAR SURFACE WATER

SaskPower Environmental Protection Plan for Transmission, Distribution and Fibre Optic  
Construction, Operations and Maintenance



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Appendix B –ENV Emergency Notification Template for High Disturbance Activities

Appendix C –SaskPower Closure Report Template

Appendix D –SaskPower Working On, In or Near Water Standard Operating Procedure

Appendix E –SaskPower Working On Ice Standard Operating Procedure

Appendix F – SaskPower Working in Water Transmission and Distribution Foundation and Structure Design Drawings

## Acronyms

AHPP – Aquatic Habitat Protection Permit

DFO – Fisheries and Oceans Canada

EMPA- *The Environmental Management and Protection Act, 2010*

ENV – Saskatchewan Ministry of the Environment, Fish, Wildlife and Lands Branch, Lands Unit

EPP – Environmental Protection Plan

SOP – Standard Operating Procedure

## Definitions

For the purposes of this document the following definitions apply:

- <sup>1</sup>Adverse Effect - means impairment of or damage to the environment or harm to human health, caused by any chemical, physical or biological alteration or any combination of any chemical, physical or biological alterations.
- All Conditions – refers to dry, frozen or wet surface water feature conditions.
- <sup>1</sup>Bank - means the rising ground bordering a water body or watercourse that serves to confine the water to the channel or bed.
- <sup>1</sup>Bed - means that portion of a water body or watercourse that is periodically or continuously covered by water.
- <sup>1</sup>Boundary - means the line or elevation contour surrounding a water body or watercourse where the aquatic vegetation and terrestrial plant species known to tolerate water saturated soils change entirely to terrestrial vegetation tolerating little or no soil saturation, and includes a minimum surrounding area of 5 metres measured outward from the top of the bank.
- Distribution – includes overhead poles, hardware (e.g., cross arms, insulators, dampers, etc.) and apparatus (e.g., pole mount transformers and switches) and conductor with voltage less than 72 kV.
- <sup>2</sup>Dry Conditions - means, with respect to soil, that the soil in the affected area is dry enough that vehicles or equipment used would not make a noticeable impact on the soil.
- Fish Bearing – a surface water feature containing vertebrate fish, including minnows and forage fish, of all life stages.
- Frozen Conditions - means, with respect to soil, that the soil in the affected area is frozen solid enough that vehicles or equipment used would not make a noticeable impact on the soil<sup>2</sup>; with respect to the surface of the water body, frozen to safely support equipment but not necessarily frozen to the bed.

- Incident - means an occurrence that did result, or could have resulted, in any injury, damage, loss or Environmental Impact or that caused a breach of corporate policy, Laws or other requirement.
- Reaching In –completing in water work from dry ground (e.g., road edge) or access matting with minimal disturbance to the bed, bank or boundary. Completion of pole installations, salvage or replacement meets the definition of “dry” conditions under this scenario.
- Riparian Area - the lands adjacent to a surface water feature where the vegetation and soils are strongly influenced by the presence of water.
- <sup>1</sup>Surface Water – means water that is above the surface of land and in a river, stream, lake, creek, spring, ravine, coulee, canyon, lagoon, swamp, marsh or other watercourse or water body, whether the water is there permanently or intermittently.
- Surface Water Feature – the landscape feature containing surface water.
- Transmission – includes overhead poles, hardware (e.g., cross arms, insulators, dampers, hardware, overhead shield wire, etc.) and conductor with voltage equal to or greater than 72 kV.
- Underground – includes underground distribution or fibre optic cable.
- <sup>2</sup>Watercourse - includes a gully, valley floor, drainage ditch or any other channel, including any artificial channel, in which water flows either permanently or intermittently.
- Wet Conditions - means, with respect to soil, that the soil in the affected area is wet enough that vehicles or equipment used will make a noticeable impact on the soil (e.g., potential for admixing, compaction and rutting).
- Wetland – includes land saturated with water for long enough to promote the formation of water altered soils, growth of water tolerant vegetation and biological activity adapted to a wet environment.

References:

1. *The Environmental Management and Protection Act, 2010*
2. *The Environmental Management and Protection (General) Regulations*

# 1 Introduction

## 1.1 Purpose

SaskPower routinely requires access to surface water and riparian areas for the purposes of operation, maintenance and construction of distribution and transmission powerlines and fibre optic cable. SaskPower maintains over 150,000 kilometres (km) of linear infrastructure and completes over 8000 new service connects annually in addition to adding new power generation and transmission lines as required to meet the growing demand for electricity within the province of Saskatchewan. Approximately 6% (72,000) of the existing structures are estimated to occur within a surface water feature. The number has grown in recent years due to a number of factors (e.g., climate, drainage modification, customer growth).

SaskPower has developed this Environmental Protection Plan (EPP) to document a consistent approach to prevent, minimize, mitigate, monitor and reclaim an adverse effect to surface water features before, during or after an activity.

Activities scoped within this EPP that occur within the bed, bank or boundary of **non-fish bearing surface water on private and occupied provincial Crown land** are authorized if they are planned and completed according to the EPP and any supplementary approvals required.

This approach will enable SaskPower to more efficiently plan and execute construction, operation and maintenance activities that are in or in proximity to surface water.

## 1.2 Regulatory Framework

An EPP is enabled under Section 38 (5)(e) of the provincial *The Environmental Management and Protection Act, 2010* (EMPA) to authorize work that may routinely require an Aquatic Habitat Protection Permit (AHPP). Traditionally, permits have been submitted for any routine activity that has the potential to disturb the bed, bank or boundary of a surface waterbody.

Some minor exceptions to specific SaskPower activities already exist in *The Environmental Management and Protection (General) Regulations* including directional boring, direct ploughing and vegetation removal for the purpose of utility line maintenance; however, only under frozen or dry conditions.

The federal *Fisheries Act* provides additional regulatory oversight of surface water features containing fish. Fisheries and Oceans Canada (DFO) requires a self-assessment for activities occurring within fish bearing surface water features.

Impacts to fish bearing surface water features are not included within the scope of this EPP.

Review of the EPP will be completed every two years or as required in consultation with the Ministry of Environment and the EPP will be updated or amended as required.

## 2 EPP Development and Training

The EPP mitigation was developed by SaskPower following consultation with Ministry of Environment, external consultants and internal subject matter experts from SaskPower Environment and applicable business units. The EPP mitigation measures will be integrated into the existing SaskPower project planning and environmental screening process. Training is required for all SaskPower employees and contractors involved in the planning, development and execution of construction, operation and maintenance projects in or near surface water.

## 3 Scope of EPP Application

### 3.1 Activity Characterization and Potential Adverse Effects

SaskPower reviewed the suite of potential activities that may have the potential to occur in surface water and characterized the potential effects associated with the activities. Activities are categorized based on the type of disturbance and potential for residual adverse effects to surface water quality, and alteration to the surface water feature. Residual adverse effects could occur through deposition of deleterious substances (e.g., accidental spills and releases), erosion and siltation through vegetation removal and soil damage by heavy equipment. The potential effect is variable depending on the type of activity, the mitigation method, the seasonality of construction and class of surface water feature (Table 3-1).

**Low** disturbance activities that are within or have the potential to impact the bed, bank or boundary of a surface water feature are included within the scope of this EPP (Table 3-3). Low disturbance activities completed as per the EPP may result in negligible alteration of the surface water feature or water quality.

**Medium** disturbance activities that are within or have the potential to impact the bed, bank or boundary of a surface water feature are included within the scope of this EPP (Table 3-3). Medium disturbance activities completed as per the EPP may result in a minor, short term alteration of the surface water feature and water quality.

**High** disturbance activities are excluded from the scope of the EPP and require a project specific Aquatic Habitat Protection Permit (AHPP) (Table 3-4). High disturbance activities are more invasive, non-routine and may require specialized equipment and mitigation measures that fall outside the scope of this EPP.

**Table 3 -1: Activity Disturbance Evaluation Framework**

<b>Disturbance Category</b>	<b>Typical Activity Description</b>	<b>Potential Effect Pathway and Characterization</b>
<b>Low</b>	<p>Activities include use of boats, foot access, all-terrain vehicles, light trucks, on ice work and non-invasive methods during wet conditions.</p> <p>Use of equipment (e.g., bucket trucks, tracked vehicles, cranes) during frozen or dry conditions with appropriate mitigation.</p>	<p>Negligible to low change to surface water quality and alteration of surface water feature. Effects may include:</p> <ul style="list-style-type: none"> <li>Localized, minor shallow rutting (rutting to the extent that admixing of soil horizons occurs) and vegetation alteration</li> </ul>
<b>Medium</b>	<p>Activities include use of equipment (e.g., bucket trucks, tracked vehicles) during wet conditions with appropriate mitigation (e.g., access matting, reaching in).</p>	<p>Minor change to surface water quality, minor alteration of surface water feature. Effects may include:</p> <ul style="list-style-type: none"> <li>Localized moderate to deep rutting and minor vegetation removal</li> <li>Temporary, localized alteration to surface water quality through siltation and suspended sediment (e.g., settling of soil around newly installed pole)</li> </ul>
<b>High<sup>1</sup></b>	<p>Activities include the use of heavy machinery (e.g., heavy canes, trenching, etc.) in wet conditions or has infill, excavation or extensive ground disturbance in all conditions (dry, frozen or wet).</p>	<p>Major change to surface water quality and/or major alteration of surface water feature. Effects may include:</p> <ul style="list-style-type: none"> <li>Permanent surface water feature alteration</li> <li>Long term alteration of surface water quality via siltation and suspended sediment</li> </ul>

Notes:

1. All "High" disturbance activities require review by ENV and a project specific AHPP.

The activities listed in Table 3-3 and Table 3-4 have been provided as examples to assist disturbance category determination of routine activities. The listed activities are not exhaustive; however, they are indicative of most types of routine activities undertaken by SaskPower when constructing, operating and maintaining linear infrastructure. Activities not specified will be evaluated according to Table 3-1 as they arise during the SaskPower environmental screening process. If there is any uncertainty regarding the potential for high disturbance, SaskPower will consult with ENV prior to initiation. If conditions or equipment change during the course of a project and the potential for high disturbance becomes probable, ENV will be consulted immediately and the appropriate action taken.

### 3.1.1 EPP Application within Wetlands

Two systems of wetland classification are commonly used within Saskatchewan to characterize and identify wetlands: Stewart and Kantrud<sup>1</sup> and the Canadian Wetland Classification System<sup>2</sup>. The Canadian Wetland Classification System encompasses broad categories applicable to all regions of Canada. Stewart and Kantrud is more specific to the prairie and parkland regions of the province. For the purposes of the EPP, classes from the Canadian Wetland Classification System are used as the primary class designation (i.e., bog, fen, swamp, marsh, shallow open water). Mineral wetlands (i.e., marsh, shallow open water) are further characterized by permanence as described in Stewart and Kantrud (i.e., Class I – Ephemeral, Class II – Temporary, Class III Seasonal Ponds and Lakes, Class IV – Semi Permanent Ponds and Lakes, Class V – Permanent Ponds and Lakes and Class VI Alkali). Organic wetlands (i.e., bog and fen) are characterized by high water tables and are considered permanent. Swamps are generally considered to be mineral though may have organic characteristics and are likely to have high groundwater tables. For the purposes of the EPP, swamps are considered permanent unless field evaluation determines they are dry and will support equipment at the time of construction.

Wetland classes, permanence and application of the EPP are outlined in Table 3-2.

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<sup>1</sup> Stewart, R.E. and H.A. Kantrud. 1971. Classification of Natural Ponds and Lakes in the Glaciated Prairie Region. Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Washington, D.C., USA. Resource Publication 92. 57 pp.

<sup>2</sup> National Wetlands Working Group. 1997. The Canadian Wetland Classification System, 2nd Edition. Warner, B.G. and C.D.A. Rubec (eds.), Wetlands Research Centre, University of Waterloo, Waterloo, ON, Canada. 68 p.

**Table 3-2: Application of EPP within Wetlands**

Wetland Class <sup>1</sup>	Water Permanence <sup>2</sup>	Application of EPP
Bog, Fen, Swamp	Not Defined	<ul style="list-style-type: none"> <li>● Low disturbance activities during all conditions (dry, frozen or wet)</li> <li>● Medium disturbance activities during frozen or dry conditions or completed by “reaching-in” from adjacent roadside or dry ground during wet conditions</li> <li>● High disturbance activities require AHPP during all conditions (dry, frozen or wet)</li> </ul>
Marsh and Shallow Open Water	Class IV – Semi Permanent Ponds and Lakes  Class V – Permanent Ponds and Lakes  Class VI – Alkali Ponds and Lakes	<ul style="list-style-type: none"> <li>● Low disturbance activities during all conditions (dry, frozen or wet)</li> <li>● Medium disturbance activities during frozen or dry conditions or completed by “reaching-in” from adjacent roadside or dry ground during wet conditions</li> <li>● High disturbance activities require AHPP during all conditions (dry, frozen or wet)</li> </ul>
Marsh and Shallow Open Water	Class I – Ephemeral  Class II – Temporary  Class III Seasonal Ponds and Lakes	<ul style="list-style-type: none"> <li>● Low disturbance activities during all conditions (dry, frozen or wet)</li> <li>● Medium disturbance activities during all conditions (dry, frozen or wet)</li> <li>● High disturbance activities require AHPP during all conditions (dry, frozen or wet)</li> </ul>

## Notes:

1. As defined by: National Wetlands Working Group. 1997. The Canadian Wetland Classification System, 2nd Edition. Warner, B.G. and C.D.A. Rubec (eds.), Wetlands Research Centre, University of Waterloo, Waterloo, ON, Canada. 68 p.
2. As defined by: Stewart, R.E. and H.A. Kantrud. 1971. Classification of Natural Ponds and Lakes in the Glaciated Prairie Region. Bureau of Sport Fisheries and Wildlife, U.S. Fish and Wildlife Service, Washington, D.C., USA. Resource Publication 92. 57 pp.
  - a. Class I Ephemeral - free surface water for only a short period of time after snowmelt or storm events in early spring
  - b. Class II Temporary - periodically covered by standing or slow moving water. They typically have open water for only a few weeks after snowmelt or several days after heavy storm events.
  - c. Class III Seasonal Ponds and Lakes – surface water present through the majority of the growing season, but is typically dry by the end of summer
  - d. Class IV Semi Permanent Ponds and Lakes – surface water is present for most or all of the year, except in periods of drought
  - e. Class V Permanent Ponds and Lakes – surface water is present throughout the year
  - f. Class VI Alkali Ponds and lakes – surface water is typically not permanently present-
  - g. Boreal bogs, fens and swamps are not defined in Stewart and Kantrud and are considered permanent unless field verification determines they are dry.

### 3.2 Low and Medium Disturbance Activities

All Low and Medium disturbance overhead and underground transmission, distribution and communication line construction and maintenance activities that require in or near surface water work are included within the scope of the EPP. Table 3-3 contains examples of typical activities considered to be Low or Medium disturbance. Refer to Appendix A for more detailed activity descriptions.

**Table 3-3: Environmental Protection Plan– Examples of Low and Medium Disturbance Activities In or Near Surface Water Features**

Low Disturbance	Medium Disturbance
<p>These activities<sup>1</sup> are considered Low disturbance in all surface water features during <b>dry, frozen and wet</b> conditions:</p> <ul style="list-style-type: none"> <li>● transmission and distribution:                             <ul style="list-style-type: none"> <li>● ground patrol</li> <li>● structure assessment</li> <li>● inspections</li> <li>● pole testing</li> <li>● hardware tightening</li> <li>● winter ice access trails and ice thickening</li> <li>● tree trimming/removal by hand</li> </ul> </li> <li>● underground distribution and fibre optic directional drilling/boring beneath surface water features if start and end points are located outside of boundary</li> </ul> <p>These activities are considered low disturbance during <b>dry or frozen</b> conditions:</p> <ul style="list-style-type: none"> <li>● underground distribution and fibre optic line construction (i.e., trenching and ploughing in)</li> <li>● mechanical vegetation clearing</li> <li>● transmission and distribution activities:                             <ul style="list-style-type: none"> <li>● pole installation (e.g., foundation, structure, anchors)</li> <li>● pole hardware replacement (cross arm, insulator, damper, switch, transformer, etc.)</li> <li>● stubbing</li> <li>● salvage</li> <li>● restringing and marking conductor</li> <li>● line raise</li> <li>● cathodic protection and grounding</li> <li>● corrosion protection</li> <li>● overhead shield wire stringing</li> </ul> </li> </ul>	<p>These activities<sup>1</sup> are considered Medium disturbance under any of the following scenarios:</p> <ol style="list-style-type: none"> <li>1. The activity occurs within Marsh or Shallow Open Water Class I, II and III wetlands during <b>wet</b> conditions</li> <li>2. The activity can be completed by “reaching in” during <b>wet</b> conditions for all other surface water features and classes</li> </ol> <ul style="list-style-type: none"> <li>● transmission and distribution activities:                             <ul style="list-style-type: none"> <li>● pole installation (e.g., foundation, structure, anchors)</li> <li>● pole hardware replacement (cross arm, insulator, damper, switch, transformer, etc.)</li> <li>● stubbing</li> <li>● salvage</li> <li>● restringing and marking conductor</li> <li>● line raise</li> <li>● cathodic protection and grounding</li> <li>● corrosion protection</li> <li>● overhead shield wire stringing</li> </ul> </li> </ul>
<p>1. Detailed disturbance activity descriptions are included in Appendix A.</p>	

### 3.3 High Disturbance Activities

All high disturbance activities are not included within the scope of the EPP and require a separate project specific Aquatic Habitat Protection Permit (AHPP) prior to initiating the work. Table 3-4 contains examples of typical activities considered to be high disturbance.

**Table 3-4: Environmental Protection Plan– Examples of High Disturbance Activities in Surface Water**

High Disturbance
<p>These activities are considered High disturbance:</p> <ul style="list-style-type: none"> <li>● Medium disturbance activities<sup>1</sup> within Class IV, V and VI Marsh and Shallow Open Water and Bog, Fen and Swamp wetlands under <b>wet</b> conditions unless reaching in from adjacent dry ground (e.g., equipment entry into wetland)</li> <li>● new underground distribution line construction under <b>wet</b> conditions (i.e., trenching and ploughing in)</li> </ul> <p>The following activities are considered High disturbance in any surface water feature during all conditions (dry, frozen or wet):</p> <ul style="list-style-type: none"> <li>● replacement and/or relocation of distribution apparatus (i.e. reactors, pad mount transformers, regulators)</li> <li>● island structures or rip rap</li> <li>● gabion baskets or sheet piles</li> <li>● bank cuts and stabilization</li> <li>● infill roads</li> <li>● drainage works</li> </ul> <hr/> <p>1. Medium disturbance activities are listed in Table 3-3 and detailed descriptions are included in Appendix A.</p>

### 3.4 Emergency Activities

Transmission and distribution emergencies requiring immediate repair can occur at all times of the year and in all ground disturbance conditions. Completing maintenance work under emergency status allows work to proceed without acquiring typical required permits (e.g., AHPP). However, the work must meet the definition of an emergency or hazardous condition as defined in *The Power Corporation Act*. These include conditions that may endanger the safety of the customer or the public. Emergency scenarios typically include:

- outages
- fire
- imminent health, safety or environmental risk
- infrastructure damage or imminent risk of damage

In the event of an emergency, SaskPower will implement the mitigation within the EPP to the extent practical. Refer to Section 6.3 for emergency notification requirements.

## 4 Effects Management and Mitigation Measures

SaskPower's Environmental Screening System (ESS) and internal project screening process ensures that activities are planned using the best available information, screening results are documented and activities proceed with effective mitigation and operational controls in place. Mitigation requirements for protection of surface water features are contained in Table 4-1. The measures will be integrated into SaskPower's project screening process and applied to all projects occurring in or near surface water.

SaskPower has also taken steps to ensure an integrated approach is taken to ensure the safety of crews and environmental protection when working in or near surface water. This approach is documented in the *SaskPower Working On, In or Near Water Standard Operating Procedure (SOP)* and the *Working on Ice SOP* (Appendix D and Appendix E). These documents are periodically updated and SaskPower Safety should be contacted for the most current version.

SaskPower has also developed a standardized approach for construction of new structures and replacement of old structures in surface water. This approach is outlined in the *SaskPower Working in Water Transmission and Distribution Foundation and Structure Design Drawings* (Appendix F). These drawings are periodically updated and SaskPower Standards should be contacted for the most current version. Transmission pole and foundation solutions are likely to be project and/or site specific depending on the voltage class, structure type and site conditions.

The following appended SaskPower controlled documents are supplementary to the EPP and are provided for information purposes only. The documents may be updated at any time without consultation with ENV. Current documents will be provided in activity work plans (e.g., shop papers) as required.

- Appendix B –ENV Emergency Notification Template for High Disturbance Activities
- Appendix C –SaskPower Closure Report Template
- Appendix D –SaskPower Working On, In or Near Water Standard Operating Procedure
- Appendix E –SaskPower Working On Ice Standard Operating Procedure
- Appendix F – SaskPower Working in Water Transmission and Distribution Foundation and Structure Design Drawings

**Table 4 -1: Mitigation Requirements for Protection of Surface Water Features**

Activity	Mitigation
<b>Planning Activity</b>	
Site Selection and Structure Placement	<ul style="list-style-type: none"> <li>a. Identify surface water using best available topographical data when planning structure placement and access routes (e.g., aerial imagery, GIS data, LiDAR, project specific land cover mapping and field data if available)</li> <li>b. Avoid structure placement in surface water features where practical. If avoidance is not possible, position structure near the surface water boundary</li> <li>c. Ground truth structure placement during final design and prior to construction during site readiness check</li> <li>d. Clearly mark surface water boundaries if work is occurring within or in proximity to surface water features</li> </ul>
Environmental Screening	<ul style="list-style-type: none"> <li>a. With the exception of routine patrols, inspections and minor operational repairs (e.g., switch reset), maintenance activities must be screened within the SaskPower Environmental Screening System</li> </ul>
Structure Foundation Selection	<ul style="list-style-type: none"> <li>a. Select a structure foundation that is suitable for water depth, minimizes potential for erosion and provides adequate protection from ice shearing during spring thaw (refer to Appendix F – <i>SaskPower Working in Water Transmission and Distribution Foundation and Structure Design Drawings</i>)</li> </ul>
Seasonal Avoidance	<ul style="list-style-type: none"> <li>a. Plan activities to occur under dry or frozen ground conditions where feasible</li> <li>b. If ground conditions deteriorate, ensure a contingency plan is in place to reduce ground disturbance (e.g., access matting is in place)</li> </ul>
Access Planning and Equipment Selection and Storage	<ul style="list-style-type: none"> <li>a. Ensure that crossing with construction equipment and vehicles will only occur if an existing crossing at another location is not available or practical to use</li> <li>b. Surface water and riparian areas will be avoided by 30 m when possible and crossings will be a one time event under wet conditions</li> <li>c. For structures within road allowance under wet conditions, utilize equipment that can be set-up on the road and reach in to complete installation or replacement</li> <li>d. Under wet conditions, ensure access matting is in place prior to initiation and review considerations within the <i>SaskPower Working On, In or Near Water SOP</i> (Appendix D)</li> <li>e. Consider the use of a geotextile liner under access matting for longer duration activities or activities requiring multiple trips</li> <li>f. Under frozen conditions review considerations within the <i>SaskPower Working On Ice SOP</i> (Appendix E)</li> <li>g. Ensure access points and/or crossings will conform closely to the natural topography of the site and avoid cut or fill sections to</li> </ul>

**Table 4 -1: Mitigation Requirements for Protection of Surface Water Features (cont'd)**

Activity	Mitigation
	<p>reduce erosion</p> <ul style="list-style-type: none"> <li>h. Machinery access will be limited to a single point on one bank where practical</li> <li>i. Should clearing of vegetation be necessary for right-of-way access, only enough will be cleared to provide safe passage and operation of construction equipment</li> <li>j. Ensure structures, facilities, staging areas, or laydown yards will not be placed within the surface water boundary</li> <li>k. Ensure additional workspace will be located in an area where it will not impact surface water boundary (recommend minimum distance of 15 m)</li> <li>l. Ensure construction camps will be located in an area where it will not impact surface water boundary (recommend minimum distance of 100 m)</li> </ul>
<b>Construction, Operations and Maintenance Activity</b>	
Project Start-up Meeting	<ul style="list-style-type: none"> <li>a. Review access plan, EPP mitigation measures and any measures identified in screening results, permit applications and permits during start-up meeting</li> <li>b. Complete a daily safety and environment hazard and risk assessment and review applicable <i>SaskPower Standard Operating Procedures</i> as applicable (Appendix D and E)</li> <li>c. Ensure Environmental monitor is on site if required as per secondary environmental screening requirements or permit conditions if applicable</li> </ul>
General	<ul style="list-style-type: none"> <li>a. Complete in water work as quickly as possible while minimizing impact</li> <li>b. Activities will be suspended during heavy rainfall events and when soils are saturated and rutting and compaction may result</li> <li>c. Appropriate spill response materials and equipment will be maintained on-site for the duration of the project</li> <li>d. Deleterious substances will not be discarded into water or left in a situation where there is potential to enter water</li> <li>e. All necessary equipment and materials will be on-site before any work begins</li> <li>f. Low-ground pressure construction equipment will be used to enter surface water features during construction if standing water or saturated soils are present</li> <li>g. All equipment will be clean and in sound mechanical repair before nearing or entering surface water</li> <li>h. All watercraft, water-related equipment, and other items for use within or adjacent to water bodies must be free of aquatic invasive species (i.e., clean, drained and dry)</li> </ul>

**Table 4 -1: Mitigation Requirements for Protection of Surface Water Features (cont'd)**

Activity	Mitigation
Incidents	<ul style="list-style-type: none"> <li>a. All incidents, including minor incidents (e.g., rutting, sediment releases, etc.) must be reported to the SaskPower contract administrator (contractor) or site supervisor (internal) and SaskPower Resource or Environmental Specialist as applicable. An email summary of the incident shall be sent to incidentsenv@saskpower.com. SaskPower has a 24/7 Safety, Environment and Security Reporting Line (306-566-6200) if there are any questions about a possible incident or if the SaskPower contract administrator or onsite supervisor cannot be contacted. Any incident in violation of the EPP approval or provincial law will be reported to the Ministry of Environment.</li> <li>b. All regulated releases (refer to volumes specified in The Saskatchewan Environmental Code – Discharge and Discovery Chapter) and all releases to water must be reported at the earliest possible opportunity to the Provincial Ministry of the Environment Enforcement Centre Spill Report Line at 1-800-667-7525. Contractors phone in their own regulated releases. Environment Specialists call in for SaskPower.</li> </ul>
Fuelling and Fuel Storage	<ul style="list-style-type: none"> <li>a. Fuelling of vehicles and machinery should not occur within 100 m of a surface water feature boundary. If exception is required based on site conditions, fuelling is to be continuously monitored and spill containment equipment must be on site</li> <li>b. Fuelling of portable equipment (pumps, chainsaws, etc.) should not occur within 5 m of a surface water feature boundary during dry or wet conditions. If this is not feasible, secondary containment (e.g., calf sled, tarps, etc.) and/or drip trays are required when refueling portable equipment (pumps, chainsaws, etc.)</li> <li>c. Fuel, oil, chemicals, and other hazardous materials will be stored a minimum of 100 m from the surface water boundary. If exception is required, contact SaskPower Environment</li> </ul>
Soil Salvage, Excavation, Terrain Stability and Sediment Control	<ul style="list-style-type: none"> <li>a. Where a seasonal or dry surface water feature must be disturbed (i.e., excavation), the organic layer of soil will be removed from the area and stored separately from other soils and the organic soil layer will be replaced last during reclamation</li> <li>b. Remove excavated material to a stable area above the high-water mark or active floodplain of the surface water feature as feasible</li> <li>c. Excavated materials from waterbodies that cannot be transported because of saturation should be allowed to settle back around area they were excavated from (e.g., small amount of sediment following a pole installation at base of pole)</li> <li>d. Loose material should be protected from being eroded or reintroduced into the water (e.g., silt fence)</li> <li>e. Unstable, erodible soils will be exposed for the minimum amount of time necessary</li> <li>f. Work will be suspended if sedimentation is occurring within surface water and further protection measures to control sedimentation loading will be implemented</li> <li>g. Erosion and sediment control will be placed in all ditches that drain directly into any water near crossing or encroachment locations</li> </ul>

**Table 4 -1: Mitigation Requirements for Protection of Surface Water Features (cont'd)**

Activity	Mitigation
	<ul style="list-style-type: none"> <li>h. Erosion protection and sediment control measures may be required to minimize erosion and maintain bank stability. Control measure may include: <ul style="list-style-type: none"> <li>▪ silt fences, sediment traps, diversion berms, slash or mulch</li> </ul> </li> <li>i. Mulch or compacted brush (when available) will be placed on the sides of the crossing location where necessary to help protect the bank from excessive disturbance and potential erosion</li> <li>j. Sediment control measures will be inspected and cleaned regularly (i.e., removing trapped sediment) and necessary repairs will be made immediately</li> <li>k. On disturbed slopes outside of surface water boundaries use diversion berms and/or shallow diversion ditches to direct sediment-laden or turbid runoff into vegetated areas outside of the surface water boundary</li> </ul>
Vegetation Clearing	<ul style="list-style-type: none"> <li>a. Hand clearing of vegetation will occur within 30 m of surface water features during wet conditions</li> <li>b. Mechanical clearing will only take place under dry or frozen conditions. The riparian and shrub vegetation between the work area and the water edge will be retained; if clearing must occur, vegetation that will not interfere with the right-of-way will not be cleared</li> <li>c. Vegetation will be hand cut at ground level from unstable or erodible banks, avoiding use of heavy machinery</li> <li>d. Trees will be felled away from the water and fallen trees, slash, and other debris inadvertently placed in the water or on ice will be removed immediately</li> </ul>
Herbicide Application	<ul style="list-style-type: none"> <li>a. On target vegetation within 30 m of surface water features, either targeted basal bark, low volume foliar or cut stump backpack application methods will be used and a minimum 5 m buffer from the surface water feature boundary will be maintained unless additional setback is required as per the product label</li> <li>b. Herbicide will not be applied to the bed, bank or boundary of a surface water feature and all label requirements will be followed</li> </ul>
Directional Drilling and Boring	<ul style="list-style-type: none"> <li>a. Underground facilities that cannot be routed around surface water, may be installed using a directional drilling method</li> <li>b. Ensure that if any water will be withdrawn from any surface water feature, SaskPower Environment is notified to ensure an assessment of this activity has been completed and permits are obtained</li> <li>c. A buffer zone of approximately 20 m from boundary of the surface water feature should be established as a “no equipment zone’ for vegetated areas or if the area is previously disturbed (i.e., cultivated field), an area approximately 10 m from boundary of the surface water feature should be established as a “no equipment zone’</li> <li>d. If the directional drilling occurs in steep terrain (greater than 5%) additional buffer may be required or further mitigation such as silt fencing is required to ensure no silt enters the surface water feature</li> </ul>

**Table 4 -1: Mitigation Requirements for Protection of Surface Water Features (cont'd)**

Activity	Mitigation
	<ul style="list-style-type: none"> <li>e. During the drilling, excess mud and fluid will be held within a temporary holding tank outside of the surface water feature boundary for eventual disposal offsite</li> <li>f. Top soil will be stripped at bell holes and along with the subsoil placed away from the waterbody boundary</li> <li>g. Ensure a frac-out contingency plan is in place prior to proceeding</li> </ul>
Working on Ice	<ul style="list-style-type: none"> <li>a. No substances (e.g., fuel, oil, waste, etc.) are to be left remaining on the ice surface at any time</li> <li>b. No storage of equipment or hazardous substances is permitted on the ice</li> <li>c. Access to the ice surface during construction will be limited to one entry and one exit point</li> <li>d. If flooding is required to increase ice thickness, the following measures apply: <ul style="list-style-type: none"> <li>▪ apply secondary containment to portable water pumps used to increase ice thickness (refuelling portable equipment on ice is permissible under these conditions)</li> <li>▪ locate holes away from the waterbody edge and any visible vegetation</li> <li>▪ maintain the greatest distance from the bed of the water body and the suction intake</li> <li>▪ install appropriate mesh on the pump intake to prevent debris and -aquatic invertebrate intake</li> <li>▪ maintain a minimum of 0.6 m of water depth</li> </ul> </li> <li>e. Pole studs should be removed following structure replacement if is safe to do so</li> <li>f. Pole holes remaining following salvage should be backfilled with clean crushed rock if surface water is frozen to bottom or dry at time of removal</li> <li>g. Excavated materials from waterbodies that cannot be transported because of saturation should be allowed to settle back around the area they were excavated from (e.g., small amount of sediment following a pole installation at base of pole)</li> </ul>
Reclamation	<ul style="list-style-type: none"> <li>a. Complete all reclamation work within 30 days of project completion or as ground conditions allow</li> <li>b. Riparian zones along surface water features will be allowed to re-vegetate naturally unless it is adjacent to a shoreline where there are potentially erodible soils and short-term stabilization measures are deemed necessary</li> <li>c. An approved weed free, native seed blend for seeding disturbed banks will be sourced before construction begins</li> <li>d. Stabilization, reclamation and clean-up of areas adjacent to surface water will be carried out immediately after construction; where water levels are high, reclamation and clean-up may be deferred until a later date when conditions are suitable</li> <li>e. Original contours and drainage patterns at all disturbed surface water features will be re-established; where original contours cannot be achieved, a stable profile will be established unless otherwise directed by site-specific design</li> </ul>

## 5 Environmental Monitoring, Quality Assurance and Reporting

SaskPower or a representative will review the need for a third party Environmental Monitor during the environmental screening process. Qualifications and the roles and responsibilities of the Environmental Monitor must be in accordance with *SPIGEC No. 6 - Required Qualifications – Field Environmental Monitors for Oil and Natural Gas Exploration and Development Projects (2002)* and *SaskPower’s Environmental Monitor Handbook*.

Closure Reports (template in Appendix C) or suitable alternative (e.g., as built report) will be completed for all medium disturbance activities and as per permit conditions for high disturbance activities. Reports will be completed by the crew, contractor or Environmental Monitor and will be submitted as per SaskPower Environment and/or ENV requirements.

SaskPower’s quality assurance program will be implemented to ensure EPP requirements are implemented in the field. The quality assurance program includes field-based work observations by SaskPower Environment staff, consultant representatives and SaskPower Construction and Operations Managers.

Any non-compliance will be reported to ENV immediately and documented within the Closure Report.

## 6 Notification

### 6.1 Landowners and Occupants

SaskPower will provide notice to landowners and occupants prior to completing work. Requests will be considered and accommodated as is practical.

### 6.2 Ministry of Environment

SaskPower will notify ENV of medium disturbance activities. Notification will enable ENV inspection and audit as required.

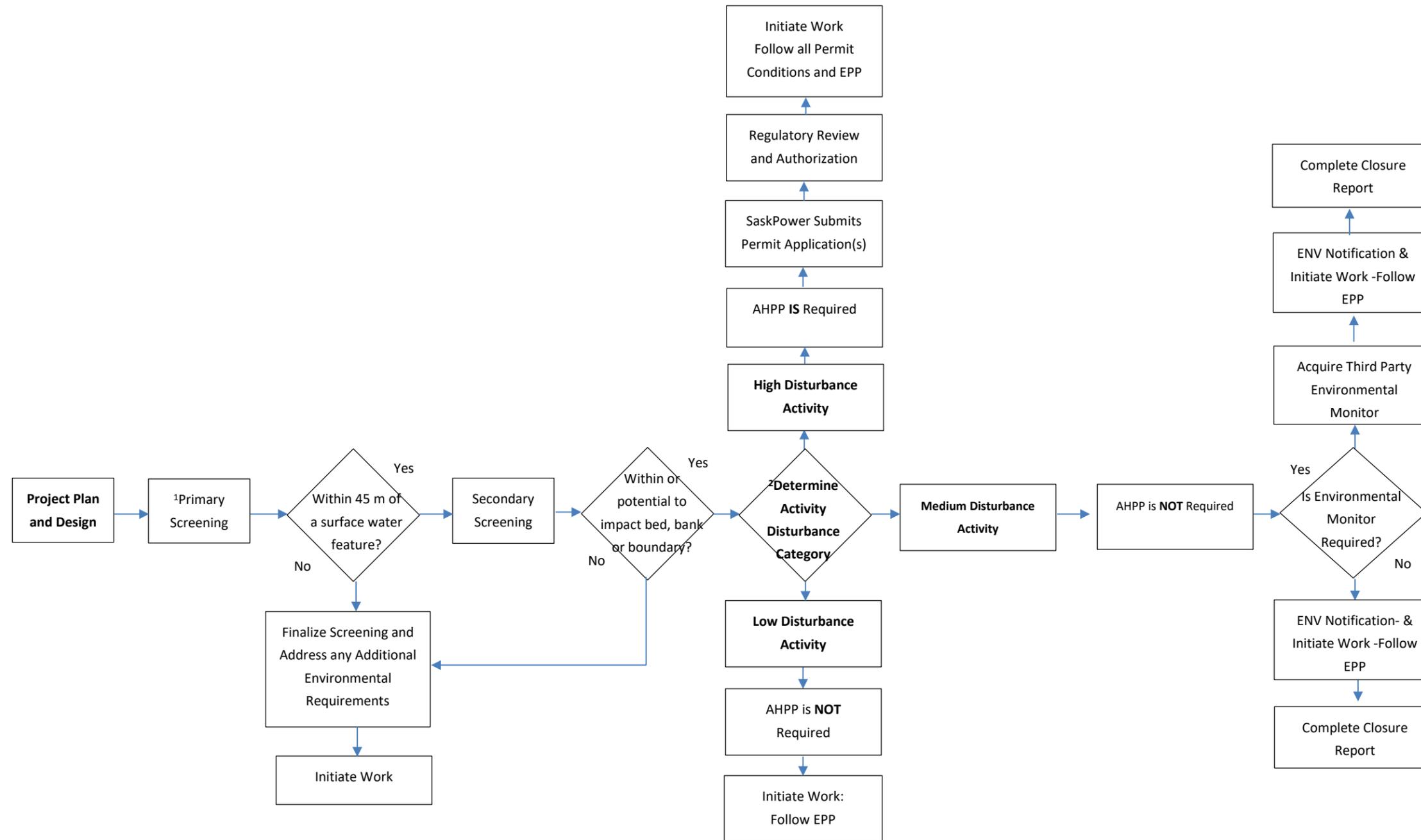
Low disturbance activities are exempt from notification. High disturbance activities require a project specific Aquatic Habitat Protection Permit prior to proceeding and permit conditions will be applied.

#### 6.2.1 Emergency Notification

Under emergency scenarios, if practical, advance notifications for high disturbance activities will be submitted by email to the regional ENV office using the emergency notification template in Appendix C or initial phone call. Otherwise, follow-up notification and closure reporting will occur as it is reasonable to do so.

Figure 6-1 depicts the EPP application, notification and permitting requirements for Low, Medium and High Disturbance activities.

Figure 6-1: Environmental Protection Plan Application, Notification and Permit Pathway



1. Routine low disturbance maintenance activities such as patrols, inspections, etc. may not undergo primary screening, however, the EPP mitigation measures still apply.
2. Refer to Table 3-1, Table 3-3 and Appendix A for assistance determining disturbance category.

## **Appendix A – Project Activity Descriptions**

Activity	Equipment	Procedure
<b>Transmission and Distribution</b>		
<ul style="list-style-type: none"> <li>ground patrol and inspections; structure assessment; pole testing; hardware tightening</li> </ul>	<ul style="list-style-type: none"> <li>side by side</li> <li>crew truck/bucket truck</li> <li>light portable boat</li> <li>Argo</li> <li>ATV</li> </ul>	<ul style="list-style-type: none"> <li>Traveling right-of-way to check on existing infrastructure and complete minor repair work as required via pole climbing or light bucket truck.</li> </ul>
<ul style="list-style-type: none"> <li>winter ice access trails and ice thickening</li> </ul>	<ul style="list-style-type: none"> <li>crew truck</li> <li>front end loader/skid steer</li> </ul>	<ul style="list-style-type: none"> <li>Snow clearing and ice flooding to enable access along right-of-way. Completed during frozen conditions.</li> </ul>
<ul style="list-style-type: none"> <li>tree trimming/removal by hand</li> </ul>	<ul style="list-style-type: none"> <li>brush saw</li> <li>chain saw</li> </ul>	<ul style="list-style-type: none"> <li>Tree limbing and/or removal using hand tools.</li> </ul>
<b>Underground Distribution and Fibre Optic</b>		
<ul style="list-style-type: none"> <li>directional drilling/boring</li> </ul>	<ul style="list-style-type: none"> <li>directional drill unit</li> <li>water truck</li> <li>crew trucks</li> <li>hydrovac</li> <li>back-hoe</li> </ul>	<ul style="list-style-type: none"> <li>Small pilot hole excavated prior to directional drilling, and as the bore is drilled, it may need to be enlarged (reamed) to accommodate the fibre-optic or conductor cable. A hydrovac is required to daylight existing utilities and remove any release of drilling fluid. A back hoe is used to excavate bell holes (1.5 m deep, 1 m wide, and 3 m long, although bell holes up to 5 m in length are required in some instances). Drilling fluids include a mixture of bentonite clay and water, which are injected into the ground while the drill bit is operating. Some of these fluids may escape to the surface, particularly at the entry point, when the bit and attached cables are backed out and retrieved from the ground. This viscous solution is typically present in small volumes and is easily managed on level surfaces. A temporary holding tank will be utilized to contain excess drilling fluid if required.</li> </ul>
<ul style="list-style-type: none"> <li>ploughing in</li> </ul>	<ul style="list-style-type: none"> <li>tandem bulldozer team (i.e., plough and pull cats)</li> <li>crew trucks</li> </ul>	<ul style="list-style-type: none"> <li>A bulldozer (plough cat) is mounted with a plough and a reel of conductor cable to be installed is used to cut a furrow in the ground and place the utility within it. One or more additional bulldozers (pull cats) are used to pull the ploughing bulldozer along its path. The furrow is later closed with the tracks of a bulldozer (track-packing). Surface water features are only ploughed through if dry or frozen; otherwise they are directionally drilled or bored.</li> </ul>
<ul style="list-style-type: none"> <li>trenching</li> </ul>	<ul style="list-style-type: none"> <li>chain trencher</li> <li>reel trailer</li> <li>crew trucks</li> </ul>	<ul style="list-style-type: none"> <li>Trenching is accomplished via a tracked or wheeled machine with a chain mechanism mounted on the back that cuts through the soil. The machine cuts a trench approximately 15 cm wide and 1.6 m deep and windrows the soil along the top of the trench. The cable is then placed into the bottom of the trench and the trench is back-filled using a blade mounted to the trencher.</li> </ul>

**Mechanical Vegetation Clearing**

Activity	Equipment	Procedure
<ul style="list-style-type: none"> <li>vegetation management</li> </ul>	<ul style="list-style-type: none"> <li>drum mulcher or hydro axe</li> <li>feller buncher</li> <li>chainsaw crew</li> <li>crew truck</li> <li>bucket truck</li> </ul>	<ul style="list-style-type: none"> <li>Only under dry or frozen conditions the vegetation within 30 m of a surface water feature is cleared using a drum mulcher, hydro axe or feller buncher depending on the timber size. The mulched material is left on the ROW. Salvageable timber is removed from the wetland boundary.</li> </ul>
<b>Distribution Line Construction and Maintenance</b>		
<ul style="list-style-type: none"> <li>pole installation</li> </ul>	<ul style="list-style-type: none"> <li>bucket truck</li> <li>back-hoe or skid steer</li> <li>texoma drill truck with telescopic crane arm</li> <li>nodwell (optional)</li> <li>reel trailer</li> </ul>	<ul style="list-style-type: none"> <li>Depending on the foundation holes are excavated using a drill truck (direct imbed and culverts), back hoe (rocky soil) or using a track hoe with screw attachment for screw piles or vibration attachment for stubs. In wetlands, the foundation type will depend on ground conditions and water depth as per the standard in <i>SaskPower Working in Water Transmission and Distribution Foundation and Structure Design Drawings</i> (Appendix F). The structure is assembled on the ground and lifted into position with the crane arm on the drill truck. When the pole is in the hole, the drill truck holds the pole in position as a back-hoe or skid steer backfills the hole or culvert with crushed rock or the excavated native soil.</li> </ul>
<ul style="list-style-type: none"> <li>hardware and apparatus replacement (switch, cross-arms, insulators, transformer, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>crew truck</li> <li>bucket truck</li> <li>nodwell</li> </ul>	<ul style="list-style-type: none"> <li>Crews access the structures using a crew, bucket truck or nodwell and complete the necessary repairs/ changes to the structure.</li> </ul>
<ul style="list-style-type: none"> <li>stubbing</li> </ul>	<ul style="list-style-type: none"> <li>track hoe with pneumatic air hammer</li> <li>bucket truck</li> <li>crew trucks</li> </ul>	<ul style="list-style-type: none"> <li>Steel stub reinforcements are installed adjacent to structures to stabilize the structures and provide additional protection from future damage. Steel stub reinforcements are installed using a pneumatic driving system consisting of an air hammer assembly, a winch pole assembly, and a pull-down assembly. The steel stubs are first lifted into place adjacent to the pole and then hammered into place using the pneumatic driving system. Steel stub reinforcements are driven approximately 1.5 to 2 m into the ground on either side of the pole and secured to the pole with steel straps.</li> </ul>
<ul style="list-style-type: none"> <li>salvage</li> </ul>	<ul style="list-style-type: none"> <li>bucket truck</li> <li>backhoe</li> <li>pole trailer</li> <li>3-reel wire trailer</li> <li>crew truck</li> </ul>	<ul style="list-style-type: none"> <li>Personnel disconnect the conductors from the insulators using a bucket truck and lower the conductors. The conductors are then spooled, secured, and recycled. The power pole structures are then pulled from the ground using a digger truck and lowered to the ground. The structures are then dismantled, and the wood poles and components are then loaded onto a flatbed trailer to be recycled or disposed of at an approved facility. In wetlands, salvage can occur on ice or by winching the pole out. Holes are back filled with clean crushed rock only if dry or frozen to the bottom. Soils disturbed during the anchor abandonments are then replaced and allowed to re-vegetate naturally.</li> </ul>

Activity	Equipment	Procedure
<ul style="list-style-type: none"> <li>restringing conductor</li> </ul>	<ul style="list-style-type: none"> <li>bucket truck</li> <li>reel trailer</li> </ul>	<ul style="list-style-type: none"> <li>A bucket truck is used to attach the conductor to each pole-mounted insulator. Once the conductor is seated atop of the pole, the line is tensioned and fastened in place.</li> </ul>
<ul style="list-style-type: none"> <li>line raise</li> </ul>	<ul style="list-style-type: none"> <li>bucket truck(s)</li> </ul>	<ul style="list-style-type: none"> <li>A bucket truck(s) with an insulated attachment is used to raise the conductors to sufficient height to enable safe passage of equipment or to facilitate pole replacement.</li> </ul>

#### Transmission Line Construction and Maintenance

<ul style="list-style-type: none"> <li>pole hardware replacement (cross arm, insulator, damper, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>crane</li> <li>bucket truck</li> <li>crew truck</li> </ul>	<ul style="list-style-type: none"> <li>Crews access the structures using a bucket truck or crane and complete the necessary repairs/ changes to the structure in the air.</li> </ul>
<ul style="list-style-type: none"> <li>pole installation</li> </ul>	<ul style="list-style-type: none"> <li>crane</li> <li>bucket truck</li> <li>skid-steer</li> <li>front-end loader</li> <li>texoma/line truck with auger</li> <li>crew trucks</li> <li>nodwell crane</li> </ul>	<ul style="list-style-type: none"> <li>Screw barrels or screw piles (Appendix F) are the preferred foundation for transmission pole placement in surface water. Using a track hoe with screw attachment the pile is drilled into the ground with or through the ice with minimal surface disturbance. The structure is then assembled on the ground and lifted into position with a crane or crane attachment on a bucket truck. When the pole is in the hole, a skid steer fills the hole or culvert with crushed rock.</li> </ul>
<ul style="list-style-type: none"> <li>stubbing</li> </ul>	<ul style="list-style-type: none"> <li>track hoe with pneumatic air hammer</li> <li>bucket truck</li> <li>crew truck</li> </ul>	<ul style="list-style-type: none"> <li>Steel stub reinforcements are installed adjacent to structures to stabilize the structures and provide additional protection from future damage. Steel stub reinforcements are installed using a pneumatic driving system consisting of an air hammer assembly, a winch pole assembly, and a pull-down assembly. The steel stubs are first lifted into place adjacent to the pole and then hammered into place using the pneumatic driving system. Steel stub reinforcements are driven approximately 1.5 to 2 m into the ground on either side of the pole and secured to the pole with steel straps.</li> </ul>
<ul style="list-style-type: none"> <li>salvage</li> </ul>	<ul style="list-style-type: none"> <li>bucket truck</li> <li>crew truck</li> <li>skid steer, track hoe, or back hoe</li> </ul>	<ul style="list-style-type: none"> <li>The pole is stabilized with a bucket truck and then cut off several metres up. The remaining pole is pulled or excavated from the ground using a skid steer, track hoe or back hoe.</li> </ul>
<ul style="list-style-type: none"> <li>restringing conductor or overhead shield wire</li> </ul>	<ul style="list-style-type: none"> <li>bucket truck</li> <li>crane</li> <li>reel trucks</li> <li>helicopter (optional)</li> </ul>	<ul style="list-style-type: none"> <li>Crews hang pulleys at each structure using bucket trucks or cranes. The line puller and tensioner are placed at each end of the area to be strung. The conductor is pulled in the opposite direction between the structures. Crews return to each structure to remove the pulleys and attach (clip in) the conductor to the insulators. Helicopters may be used in some cases to string the conductor.</li> </ul>

Activity	Equipment	Procedure
<ul style="list-style-type: none"> <li>line raise</li> </ul>	<ul style="list-style-type: none"> <li>bucket truck(s)</li> </ul>	<ul style="list-style-type: none"> <li>A bucket truck(s) with an insulated attachment is used to raise the conductors to sufficient height to enable safe passage of equipment or to facilitate pole replacement.</li> </ul>
<ul style="list-style-type: none"> <li>cathodic protection and grounding</li> </ul>	<ul style="list-style-type: none"> <li>backhoe</li> <li>crew truck</li> </ul>	<ul style="list-style-type: none"> <li>A hole is excavated so that the anode bag is installed adjacent to the pole; wires are then attached to the pole. Ground rods are inserted into the ground adjacent to the pole and the ground wires are attached to the pole.</li> </ul>
<ul style="list-style-type: none"> <li>corrosion and ice protection</li> </ul>	<ul style="list-style-type: none"> <li>portable sandblaster</li> <li>crew truck</li> <li>a rubber-tired backhoe or hydrovac</li> <li>portable welding equipment</li> </ul>	<ul style="list-style-type: none"> <li>Corrosion and ice protection may include re-coating, ultraviolet protection application, welding on collars, re-installing anodes, and installing upright culvert structures, as required. Activities are only completed under frozen or dry ground conditions. The structures will first be excavated to a depth of ~ 1 m and 0.5 m radius. It is then sandblasted to remove the compromised coating and allow effective adhesion of new coating. New coating material is then applied with a hand-sprayer. In winter, a poly tent is erected around the structure and an electric heater is used to maintain a suitable temperature for 24 hours to allow the coating to cure. At locations where damage to the steel structures has occurred as a result of ice movement, corrosion, or external factors, a steel collar may be welded onto the pole to reinforce the structure and prevent future damage. Upright culvert structures may also be installed around structures in wet areas and backfilled with crushed rock to mitigate potential future damage as a result of seasonal ice movement.</li> </ul>

## **Appendix B –ENV Emergency Notification Template for High Disturbance Activities**

*This document is periodically updated and SaskPower Environment should be contacted for the most current version.*

## **Ministry of Environment Emergency Notification Template for High Disturbance Activity in Surface Water**

The following template is to be used when an emergency notification for High Disturbance activity is required. Notifications are to be submitted by email or verbally to the regional ENV office.

**SUBJECT:** Order No. **XXXXXXX** Notification for **EMERGENCY** Work in Surface Water

We have received notification of a project to **INSTALL/REPAIR POLE, OTHER** at **GENERAL LOCATION**. Below is a summary of the proposed activities:

### **Proponent**

- Saskatchewan Power Corporation
- Contact Information

### **Location**

- XX-XX-XX-XX (see attached map).
- UTM (NAD 83 Zone XX) Easting Northing (centre of project)

### **Proposed Schedule**

- Provide date and duration of work that is to occur.

### **Proposed Activity**

- Provide brief description of proposed activity including ground disturbance, access plan, set-backs and waste disposal if applicable

### **Sensitivities**

- Saskatchewan Conservation Data Centre records search, water depth, crown land or private, wildlife species potential, native grassland, sand hills, etc.

### **Procedure and Reasoning for Work In Water**

- Provide rationale for emergency work or work in wet conditions
- Provide work plan

### **Comments**

- The SaskPower Environmental Protection Plan will be followed.
- Attach location map and photos if available
- Closure Reports are required for “High” disturbance activities completed under Emergency notification.

## **Appendix C –SaskPower Closure Report Template**

*This document is periodically updated and SaskPower Environment should be contacted for the most current version.*

Please complete the following form when a Closure Report is identified in the ESS screening results.  
This form must be submitted within 30 days of project completion.

## CONTACT INFORMATION

NAME		DATE
TITLE	COMPANY	PHONE #

## PROJECT DETAILS

SERVICE ORDER NUMBER	PROJECT TYPE
PROJECT NAME	
PROJECT START DATE	PROJECT COMPLETION DATE
LAND LOCATION	
GPS COORDINATES	

## DETAILED INFORMATION

HAVE THERE BEEN ANY SPILLS? YES      NO IF YES, PROVIDE SPILL DETAILS
WHAT WAS THE WETLAND CONDITION IN THE WORK AREA AT THE TIME OF CONSTRUCTION? WET      DRY      FROZEN
IF WET, WHAT ADDITIONAL MITIGATION WAS USED? NONE      TRACKED EQUIPMENT      RIG MATTING      REACHING IN FROM DRY GROUND OTHER
IF NONE, EXPLAIN
HAS THERE BEEN ANY VARIANCE FROM THE EPP CONDITIONS AND/OR BMPs? YES      NO IF YES, EXPLAIN

## BEFORE AND AFTER PHOTOS

IMAGE 1 - BEFORE	IMAGE 2 - BEFORE	IMAGE 3 - BEFORE
IMAGE 1 - AFTER	IMAGE 2 - AFTER	IMAGE 3 - AFTER

ADDITIONAL COMMENTS	
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Send form to [EnvirScreening@saskpower.com](mailto:EnvirScreening@saskpower.com) and they will forward to the ENV as required.  
Please attach any additional photos along with any other relevant documentation to the request e-mail.  
**Include photos of any areas that required reclamation (e.g. smoothing ruts,etc.)**

Send Form

Reset Form

## **Appendix D –SaskPower Working On, In or Near Water Standard Operating Procedure**

*This document is periodically updated and SaskPower Safety should be contacted for the most current version.*



# Working On, In or Near Water

Standard  
Operating  
Procedure

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# Working On, In or Near Water

Standard Operating Procedure

## 1.0 Purpose

This SOP provides:

- Approved methods to consider when working on, in or near water and the Safety and Environmental considerations.

## 2.0 Roles and Prerequisites

Role(s)	Quantity Required	Prerequisites
Worker(s)	1 or more (Recommended to have a second worker as a designated rescuer)	<ol style="list-style-type: none"><li>1. Understanding of the requirements of this Standard Operating Procedure</li><li>2. First Aid/CPR training</li><li>3. Environmental Best Management Practices Training</li></ol>

## 3.0 Tools and Equipment

### Minimum Tools and Equipment Required:

- Canadian approved personal flotation device/life jacket(s)
- Waders (hip or chest)
- Steel toe rubber boots
- Rescue equipment: Life ring buoys, long ropes, and long handled life hooks (as required)
- Rescue boat (As required)
- Spill Kit - Required in the event of any release of a contaminant into the water or on thin ice

## 4.0 Procedure

### The Procedure

NOTE: The following requirements shall be met prior to the start of the procedure:

- Complete Hazard, Aspect and Risk Assessment
- Applicable Personal Protective Equipment (PPE) is available and in good condition
- Consider Environmental Best Management Practices and Permits required to complete the work. - If equipment or a vehicle(s) becomes stuck in an environmentally sensitive area (i.e. wetlands, native prairie), contact the Environment Department prior to extraction so that environmental impacts and regulatory risks can be addressed
- Ensure spill kit is readily available in the event of an unplanned release of a contaminant into the water or onto thin ice

**CAUTION: No work is to be done on, in or near water when lightning is in the area**

**NOTE:** In some circumstances workers may be allowed to work without personal flotation device/ life jackets. If workers are constantly protected from falling in the water by body harness, fully installed guardrail systems or safety nets. All other circumstances require the use of a personal flotation device/ life jackets

If the work is to be performed on an ice surface, refer to the Working on Ice Standard Operating Procedure for calculations of ice thickness required

### 1.0 Pre-work Checklist

#### 1.1 Pre-work checklist

1.1.1 Worker(s) shall review the following before starting work on, in or near water:

**NOTE : It is critical that all workers maintain situational awareness at all times. Ensure workers are accounted for at all times**

- ***If working alone, follow the working alone policy. There shall be no work alone in water deeper than .6m (2')***
- *Complete a hazard, aspect and risk assessment including environmental considerations*
  - *Reinforce the need to maintain situational awareness at all times with all workers*
  - *Identify depth of water*
  - *Temperature of the water*
  - *Weather Conditions:*
    - *Wind or the potential for strong winds*
    - *Visibility to the work location*
    - *Lightning*
  - *Identify if water is flowing (Direction and current)*
  - *Determine the equipment required to safely perform the work required (Ie: Tracked digger, boat, hip/chest waders, ATV etc.)*
  - *Safest access to the work location. Also consider potential environmental impact when determining the route*
  - *Life jackets, personal flotation devices, waders, etc. are available as required to perform the task at hand*
  - *Have necessary rescue equipment readily available*
  - *Document appropriate provisions for communication and emergency response plan with directions to all workers involved*
  - *Flowing water*
    - *Severity of the current flow*

- *Is there ice or debris floating in the moving water that could injure or cause the worker to lose their balance, injure a worker or damage equipment*
- *Can the equipment safely and efficiently maneuver through the current*
- *When working with non-SaskPower responders in flood zones, workers shall determine muster points, person in charge and notify the Out of Scope Manager in charge for Region/Area of the work to be done*

### 1.2 Methods to perform the work

#### 1.2.1 Walking into the work location

**Caution:** *If a worker falls over into the water, the hip or chest waders can fill with water and make it extremely difficult to regain footing and get out of the water.*

- *If using Chest Waders, the straps are to be over the PFD/Life Jacket for ease of removal if required*
- *Life jacket or PFD is required when the depth of water is unknown. If the water is known to be deeper than .6m (2') a life jacket or PFD is required.*
- ***If working alone, follow the working alone policy. There shall be no work alone in water deeper than .6m (2')***
- *A designated watch person is to remain on the shore with the rescue rope attached to the worker in the water*
- *Walk carefully to ensure the best footing possible*
- *Using a sturdy stick or shovel to determine if there are any holes or obstructions on the ground beneath the water ahead of the worker. This also ensures the worker does not exceed the depth of water in comparison to the height of the waders being used*
- *Inform the designated watch person of the emergency plans and contact information in the event a worker loses footing and/or falls into the water, which could fill the waders with water and may hinder the worker to regain their footing*

#### 1.2.2 Considerations when determining the type of mobile equipment or boat to be used

- *Life Jacket or PFD is required when the depth of water is unknown. It is recommended that if the water is known to be deeper than .6m (2') that a life jacket or PFD is required.*
- *Tracked equipment, depending on the water depth*
- *Some examples of equipment designed to float on water: Argo, boat or other watercraft*

- *The approximate total weight of personnel, equipment and material shall not exceed the total allowable weight that the equipment or boat is rated for*
- *Stability required if work is to be done from within the equipment or boat*
- *Known thin ice (To be attempted in emergency situations only)*
  - *This shall not be attempted when working alone*
  - *Refer to the Working on Ice SOP for calculating ice thickness requirements*
  - *When work is to be performed on thin ice, a small boat may be used to access the work location. Workers on the ice shall wear a PFD/Life Jacket and full body harness with lanyards securely attached to the boat as they walk alongside holding the boat on the ice surface*
  - *The boat shall have a rope attached which is monitored and held by a designated watch person(s) on the shore at all times. This is to ensure the workers can exit the water to safety quickly if the ice fails. There shall be a minimum of two workers holding the boat at all times to assist with the balance of the boat*

### 1.3 Rig Mats

#### 1.3.1 Rig Mat Considerations - Determine the following:

- *Type and amount of rig mats required to access the work location*
- *Path for rig mats to be placed*
- *Is the water depth safe for vehicles or do the rig mats need to be stacked*
- *Rig mats float - anchoring may be required*
- *Do the rig mats need to be chained together in order to recover them with ease*
- *Are buoys required so the workers and equipment operator(s) know the location of the edge of the mats while driving/walking in and out of the water*

## 2.0 Environmental Considerations

### 2.1 Spill Kit use

- *It is very important to watch for any release of a contaminant*
- *The spill kit will absorb only a small release. If a larger release of contaminant has occurred, contact SaskPower Environmental Specialist or 566-6200 immediately to report the spill. Have as many details as possible*



## Working On, In or Near Water

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### 2.2 Environmental Permitting requirements

- *The In-Scope Supervisor shall review the shop papers to determine and follow the conditions of the Environmental Permit*
- *Depending on the task to be performed and the type of waterbody, the Ministry of Environment (MOE) may require additional information and requirements to complete the job*
- *An example of additional requirements may be:*
  - *Notification to MOE prior to start up*
  - *Coordinating with the local Environmental Monitor to be on site while the job is being performed*
  - *Closure reports - to be completed at the end of the job, including pictures and specific information required on the Closure Report Form. If assistance is required to complete this form, contact a SaskPower Environmental Specialist*

## 5.0 Components

The following is a list of components for this SOP which can be accessed through the SOP System:

Component Name	Component Type	Component Description	Location of Component
N/A			

## 6.0 Acronyms, Definitions and Symbols

### Acronyms and Abbreviations

**PLT - Power Line Technician**

**PFD - Personal Floatation Device**

**HARA - Hazard/Aspect and Risk Assessment**

### Definitions

**Life Jacket** - A Canadian approved standard life jacket is designed to turn an unconscious person from face down to face up in the water.

**Personal Flotation Device** - A Canadian approved device that is capable of keeping a worker's head above water without effort by the conscious worker, and may include a device that is designed to protect a worker from hypothermia.

**Waders (hip or chest)** - A waterproof boot extending from the foot to the thigh, hip or chest, traditionally made from vulcanized rubber, but available in more modern PVC, neoprene and Gore-Tex variants.



## Working On, In or Near Water

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### Symbols

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N/A

## 7.0 Policies and Regulatory Requirements

This SOP is a result of the following regulations, policies, industry standards, and corporate directives and standards:

### Regulatory Requirement(s)

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- Occupational Health and Safety Regulations 1996
  - *Section 108*

### Policies

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- Hazard/Aspect and Risk Assessment Policy
- Personal Protective Equipment Policy
- T&D Working Alone Policy

### Standards

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- Deviation from Safe Work Procedures Standard
- Personal Protective Equipment Standard
- Hazard/Aspect and Risk Assessment Standard
- Working On, In or Near Water Standard
- Working Alone Standard
- Working on Ice Standard

### Other

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- Safety and Environment Rulebook
- Environmental Best Management Practices

## 8.0 References

### References

Flood Safety Directive  
Working on Ice Standard Operating Procedure

## **Appendix E –SaskPower Working On Ice Standard Operating Procedure**

*This document is periodically updated and SaskPower Safety should be contacted for the most current version.*

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## 1.0 Purpose

This SOP provides:

- Information, direction, and specifies the requirements for SaskPower employees and contractors when working on ice

## 2.0 Roles and Responsibilities

Role(s)	Quantity Required	Prerequisites
Workers	2 or more	<ol style="list-style-type: none"> <li>1. Understanding of how to identify the type of ice and how to correctly measure the ice.</li> <li>2. Understand the characteristics of the ice surface and strengths</li> <li>3. Ability to perform Ice thickness calculations from this SOP for the weight of the equipment to be used</li> </ol>

## 3.0 Rationale

### Minimum Tools and Equipment Required:

- Ice auger or drill
- Shovel
- Measuring tape
- Rope for rescue
- Personal flotation devices
- Ice picks or claws for self-rescue (to assist the rescuer)
- Window breaking tool inside the cab and readily available inside the cab of each unit that will be traveling and working on the ice surface (Ie: Ballpeen hammer or ResQMe device)
- **NOTE:** Tracked equipment is the preferred equipment for working on ice

## 4.0 Procedure

### The Procedure

NOTE: The following requirements shall be met prior to the start of the procedure:

- Complete Hazard, Aspect and Risk Assessment (HARA)
- Applicable Personal Protective Equipment (PPE) is available and in good condition
- Consider Environmental Beneficial Management Practices - If equipment or a vehicle(s) becomes stuck in an environmentally sensitive area (i.e. wetlands, native prairie), contact the Environment Department prior to extraction so that environmental impacts and regulatory risks can be addressed

### 1.0 Working on ice

#### 1.1 Personal protective equipment (PPE)

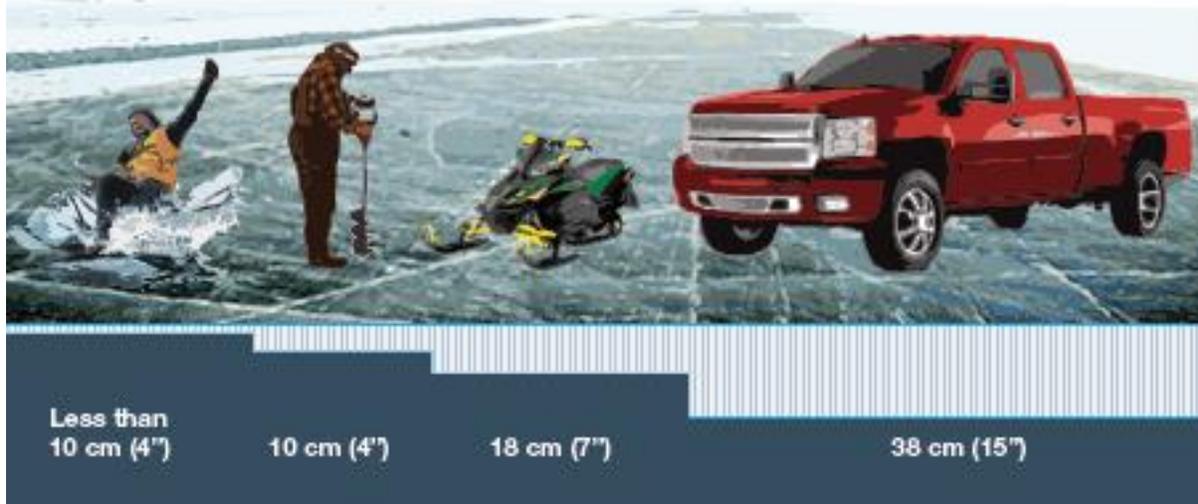
1.1.1 Workers shall review the following to ensure they have the required PPE:

- *A CSA approved life jacket/personal flotation device*
- *Standard PPE shall be required for all scheduled work activities in accordance with the Personal Protective Equipment Policy*
- *PPE specific to on ice work activities shall be provided and may include, but is not limited to a personal flotation device, axe or ice chisel, ice picks, a rescue rope and safety harness with front D ring(s)*

#### 1.2 Working on Ice Checklist

1.2.1 Before starting work on ice, workers shall ensure that each of the following points are reviewed and completed as required

- ***NOTE: Maintain situational awareness at all times. Do not work alone when working on ice***
- *Complete a hazard and risk assessment, including emergency rescue*
- *Consideration must be given to increased weight on outriggers during load movement. Outrigger pads are mandatory*
- *Choose an alternative route or method when possible to avoid working on ice*
- *Where possible, choose path free of vegetation in ice. Be aware of possible creeks or springs in the area*
- *Check the condition of the ice at the shoreline*
- *The worker performing the testing shall wear a safety harness attached to the front D-ring with an adequate length of rescue rope and held by a worker(s) on a safe surface when the thickness and quality of the ice cover is unknown or questionable*
- *Check the quality of the ice visually prior to testing the ice (clear, blue indicates good quality ice or white, cloudy ice indicates poor quality ice) Illustrated in Section 2*
- ***If ice is less than 10 cm thick, the worker shall vacate the area immediately*** (from Construction Health & Safety Manual Chapter 35-Infrastructure Health & Safety Association)



- Create a hole in the ice for measuring the thickness and determining if the ice is of good or bad quality
- Use a measuring tape, measure the thickness of the ice and the depth of the water below and record measurements at each hole. Also check to see if the water is up to the ice and that there is no air between the ice and the water. **It is very important to understand that it is the water that supports the ice. Ice is a floating sheet.**
- Check the vehicle(s) gross vehicle weight (GVW) and include the weight of all additional cargo to determine ice thickness required
- Regardless of previous tests, ice thickness tests shall also be done on the day that work will begin on the ice
- Have rescue equipment kept readily available for immediate emergency use and not left on the equipment that is being used
- Inform all designated watch person(s) of the emergency response plan, including contact information

## 2.0 Ice Evaluation

### 2.1 Ice evaluation facts

2.1.1 Workers shall review the following information to help identify the quality of ice and ice cracks:

- Blue ice is the densest, heaviest and the strongest
- White ice is lighter due to a higher air/water ratio and is considered to be 50% as strong as blue ice
- Ice close to rocks, beaver huts or the shore is thinner

- *Ice under snow is generally thinner - This is why it is important to keep the snow and snow piles clear for the area to be driven/worked on*
  - *Freshwater ice is stronger than saltwater ice*
- 2.1.2 Workers shall understand that it is the water beneath that supports the ice and be aware of the following hazards:
- *Air pockets between the bottom of the ice and the surface of the water*
  - *Ice ridges*
  - *Condition of ice at shoreline*
  - *Water moving under the ice*
  - *Areas where water flows onto the ice*
  - *Vegetation through the ice surface*
- 2.1.3 Ice cracks
- *The water in wet cracks indicates that the cracks reach the bottom of the ice cover. Wet cracks that extend over the ice cover for several metres reduce the bearing capacity of ice. Theoretical studies show that the presence of one wet crack reduces the bearing capacity of the ice by 50% (Ashton 1986). Areas with wet cracks should be flagged off and workers kept away from them. These areas should also be repaired, bridged or closed off completely to people and equipment/vehicles*
  - *Dry cracks show that they do not penetrate the ice sheet and are not an immediate problem. Dry cracks that extend more than 50% of the ice thickness should be repaired immediately or avoided. Dry cracks may be hard to detect when covered by snow and this is one reason to keep the ice cover clear of snow*
  - *Load-induced cracks are those caused by moving/stationary loads that are too heavy for the ice. Field studies have shown that gradually overloading the ice leads to three stages of cracking, as shown in Figures 6 and 7 below*

**Figure 6:** Aerial View of radial (spoke-like) and circumferential (round) cracks forming on overloaded ice



*Thicker ice can provide a warning, but thinner ice can fail so rapidly that radial cracking cannot be relied on for any warning as shown in Figure 7 below*



**Figure 7**  
Breakthrough of a D10 Caterpillar tractor following formation of a circumferential crack pattern

The following chart was obtained from Infrastructure Health & Safety Association, Mississauga, Ontario. Customer service 1-800-263-5024. <http://www.ihsa.ca>

## ICE TYPES (Ashton 1985)

**Figure 1:**  
Clear blue lake ice



**Blue ice:** Ice that grows below the layer of surface ice under calm conditions. It usually forms in vertical, columnar crystals that contain few air bubbles. It appears to be blue because it's clear enough to see the water underneath it.

**Figure 2:**  
Clear blue river ice



**Figure 4:**  
Frazil ice (slush ice)



**Frazil ice (slush ice):** Ice made up of disk-shaped ice particles that form and join together in agitated water. It is usually found in rivers or streams with turbulent waters.

**Figure 3: White (snow) ice**



**White ice (snow ice):** Ice that forms on top of the surface ice by natural or man-made flooding of snow. It's white because it contains a significant number of air bubbles. White opaque ice, or snow ice, is normally considered to be only half as strong as blue ice.

**Figure 5: Jam ice**



**Jam ice:** An accumulation of ice that often forms on rivers or streams. It occurs when currents move pieces of ice cover to an area where they accumulate and freeze together to form very rough and thick ice covers.

*The following chart was obtained from Work Safe Alberta Committee. Best Practice for Building and Working Safely on Ice Covers in Alberta, Government of Alberta, January 2013*

<b>TABLE 1 : ICE TYPES AND THEIR VARIABILITY</b>		
<b>Ice Type</b>	<b>Ice Thickness</b>	<b>Quality and Strength</b>
<b>Freshwater lake (blue) ice</b>	<b>Low variability over an area</b>	<b>Uniform ice quality</b>
		<b>Higher strength due to low variability</b>
<b>River (blue) ice</b>	<b>Medium to high variability over an area</b>	<b>Fairly uniform ice quality</b>
	<b>More prone to losing underside ice thickness to currents</b>	<b>Variable strength due to variable ice thickness</b>
<b>Natural overflow (white) ice</b>	<b>High variability over an area</b>	<b>Overflow ice, caused by natural water overflow onto the ice surface, usually contains high air content and is considered to be 50% as strong as freshwater lake ice when calculating</b>
<b>Constructed flood ice</b>	<b>Good practices can build uniform ice</b>	<b>Uniformity and quality depend on construction practices</b>
		<b>If ice is constructed using sound construction practices, which may include pumping fresh water directly onto the surface of bare ice (flooding), then this ice, once completely frozen and inspected, can be considered as having similar strength to Freshwater lake ice</b>
<b>Peatland ice (Muskeg)</b>	<b>High variability</b>	<b>Strength is highly variable due to water chemistry and temperature</b>
		<b>Frost depth depends on air temperature, peat composition/thickness and ground cover</b>
		<b>Requires specialized analysis and investigation of ice conditions</b>

The following chart was obtained from Infrastructure Health & Safety Association, Mississauga, Ontario. Customer service 1-800-263-5024. <http://www.ihsa.ca> in regards to the spacing of test holes

### GUIDANCE ON SPACING AND FREQUENCY OF AUGER TEST HOLES IN ICE

The number and spacing of manual auger test holes to check ice thickness depend on:

<b>TABLE A-1: RECOMMENDED MAXIMUM SPACING OF AUGER TEST HOLES FOR MEASURING ICE THICKNESS</b>			
<b>Water Body Type</b>	<b>Pre-construction</b>	<b>Construction</b>	<b>Operations</b>
Rivers - fast moving or high currents	5 m between test holes along centre line or a minimum of 5 holes	25 m between test holes along alternating sides of centre line	50 m between test holes along alternating sides of centre line
Rivers - slow moving and within 250 m of shore	10 m between test holes along centre line	50 m between test holes along centre line Check known thin areas.	100 m between test holes along alternating sides of centre line Check known thin areas.
Rivers - slow moving and more than 250 m offshore	20 m between test holes along centre line	100 m between test holes along centre line	200 m between test holes along alternating sides of centre line
Lakes - within 250 m of shore	10 m between test holes along centre line	50 m between test holes along alternating sides of centre line Check known thin areas.	100 m between test holes along alternating sides of centre line Check known thin areas.
Lakes - more than 250 m offshore	20 m between test holes along centre line	100 m between test holes along centre line	200 m between test holes along centre line

*Note: These are maximum spacings for ice auger measurements. Additional measurements may be required in thin areas.*

- *For sloughs, and other small water bodies use: Lakes - within 250m of shore in the table above*
- *In addition, a test hole is to be drilled at the worksite to monitor the ice activity*

## 2.2 Calculating ice thickness and strength

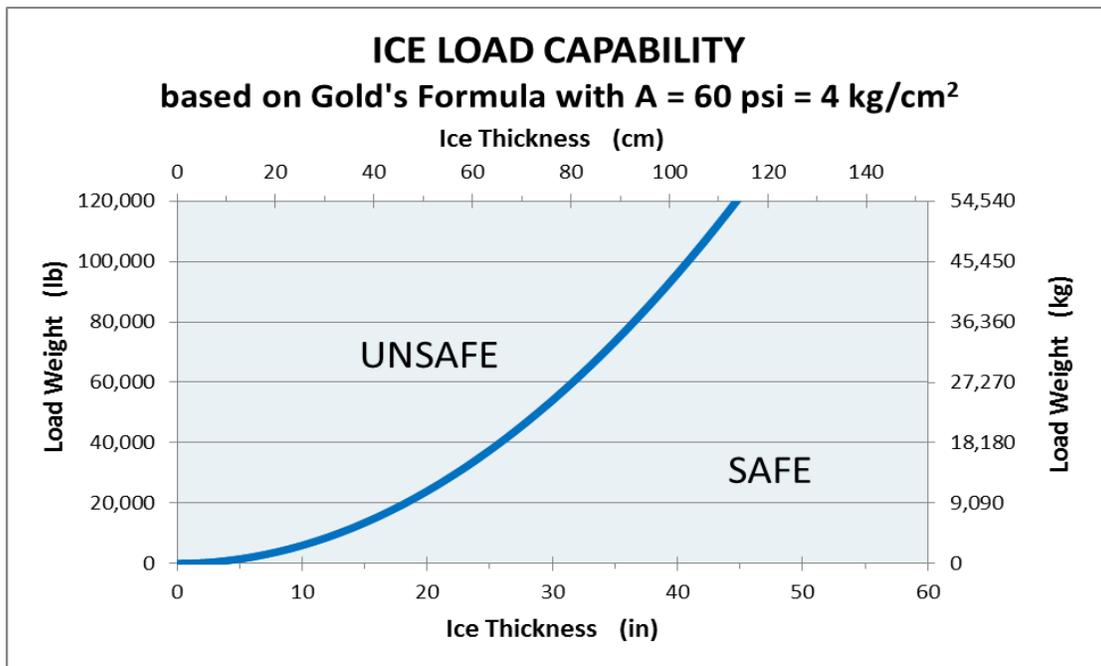
### 2.2.1 Gold's formula

- All guidelines currently in use in Canada are based on a technical paper published by Dr. Lorne Gold in 1971 entitled *Use of Ice Covers for Transportation*
- Gold's formula for loading can and should be used when the actual ice thickness is known:

### 2.2.2 Explaining Gold's formula:

$$P = A h^2 \quad - \text{ or } - \quad h = \sqrt{\frac{P}{A}}$$

- Where  $P$  is the load in lb,  $A = 60 \text{ psi}$ ,  $h$  is the ice thickness in inches. Alternatively,  $P$  can be in kg,  $A = 4 \text{ kg/cm}^2$ , and  $h$  is in cm. These criteria are depicted in the chart below



The following chart was obtained from Work Safe Alberta Committee.  
Best Practice for Building and Working Safely on Ice Covers in Alberta,  
Government of Alberta, January 2013

**TABLE 3: ALLOWABLE LOADS IN KGS FOR A-VALUES AND EFFECTIVE ICE THICKNESS**



h= Effective Ice Thickness (cm)	A=3.5	A=4	A=5	A=6
	Low Risk	Tolerable Risk	Moderate Risk	Substantial Risk
20	1400	*	*	*
25	2200	*	*	*
30	3150	*	*	*
35	4300	4900	6120	7350
40	5600	6400	8000	9600
45	7100	8100	10100	12100
50	8750	10000	12500	15000
55	10600	12100	15100	18100
60	12600	14400	18000	21600
65	14800	16900	21100	25300
70	17100	19600	24500	29400
75	19700	22500	28100	33700
80	22400	25600	32000	38400
85	25300	28900	36100	43300
90	28300	32400	40500	48600
95	31600	36100	45100	54100
100	35000	40000	50000	60000
105	38600	44100	55100	63500
110	42300	48400	60500	**
115	46300	52900	63500	**
120	50400	57600	**	**
125	54700	62500	**	**
127	56450	63500	**	**

**Limitations: This table must be used in conjunction with the hazard controls identified in Table 4**

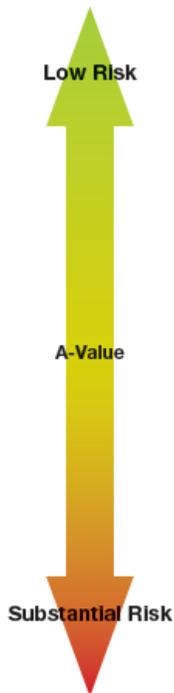
\* Follow minimum allowable weights

\*\* Seek the advice of a professional engineer

The \* in the top right of Table 3 refers you to the following table:

TABLE 5: MINIMUM ICE THICKNESS FOR LIGHTER LOADS	
Load / Situation (Slow Moving Loads)	Minimum Effective Thickness (cm)
Person walking (120 kg)	10
Snowmobiles (Maximum weight machine + rider <500 kg)	18
¾ ton 4x4 vehicles (Maximum GVW of 5,000 kg)	38

TABLE 4: A-VALUES AND HAZARD CONTROLS (NOT TO BE USED FOR LOADS LESS THAN 1,500 KG—USE TABLE 5)					
A-value Lake Ice	A-value River Ice	Level of Risk	Hazard Controls		
			Monitoring Controls	Maintenance Controls	Administrative Controls
4	3.5	Low	Manual ice measurements and checking of ice quality	Repairs and maintenance as needed	<ul style="list-style-type: none"> <li>Ice safety plan</li> <li>Orientation and instruction for workers and operators</li> <li>Routine worksite observations to enforce rules of ice cover</li> </ul>
5	4	Tolerable	<ul style="list-style-type: none"> <li>Program of regular manual ice measurements</li> <li>Ice quality monitoring program</li> </ul>	Repairs and maintenance as needed	<ul style="list-style-type: none"> <li>Ice safety plan</li> <li>Orientation and instruction for workers and operators</li> <li>Routine worksite observations to enforce rules of ice cover</li> </ul>
6	5	Moderate	<ul style="list-style-type: none"> <li>Daily program of regular ice measurements or program for regular GPR ice profiling plus manual ice measurements</li> <li>Ice quality monitoring program</li> </ul>	Regular repairs and maintenance	<ul style="list-style-type: none"> <li>Ice safety plan</li> <li>Orientation and training for workers and operators</li> <li>Daily enforcement of rules of ice cover</li> </ul>
7	6	Substantial – special provisions	<ul style="list-style-type: none"> <li>Program for regular GPR ice profiling and manual ice measurements.</li> <li>Ice quality monitoring program – flexibility for alternate measurements</li> </ul>	Daily program of repairs and maintenance	<ul style="list-style-type: none"> <li>Ice safety plan</li> <li>Orientation and training for workers and operators</li> <li>Daily enforcement of rules of ice cover</li> </ul>



## 3.0 Loads

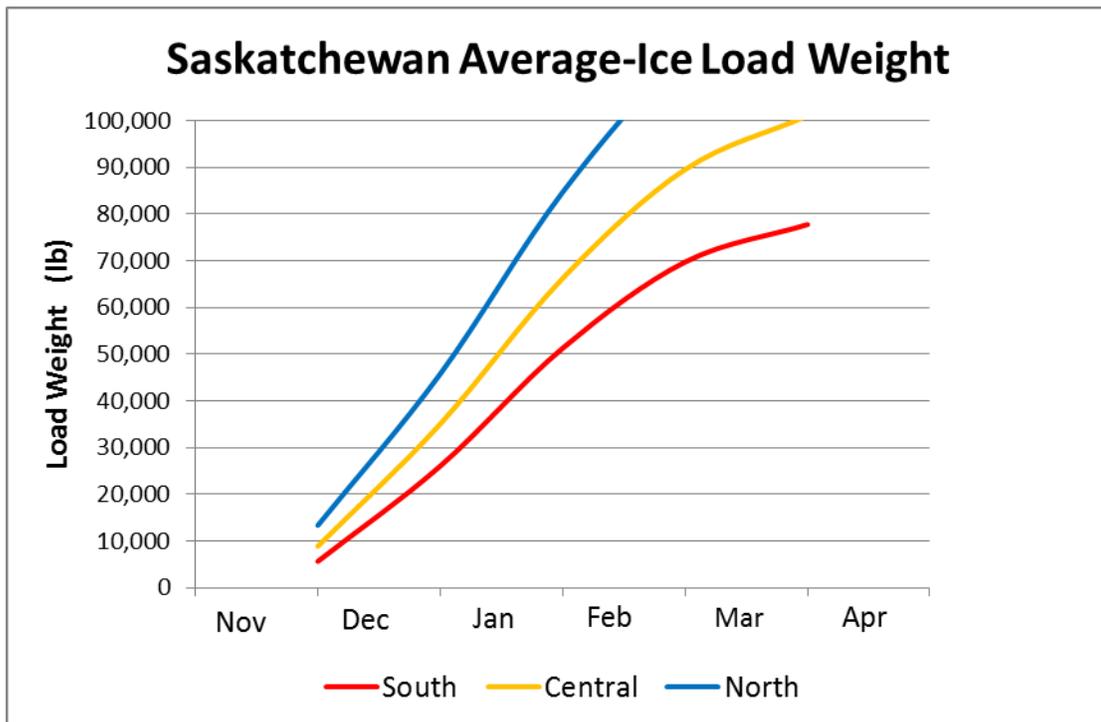
### 3.1 Types of Loads

3.1.1 Workers shall review the following types of loads to anticipate the demand on the ice in terms of the number and weight of the workloads:

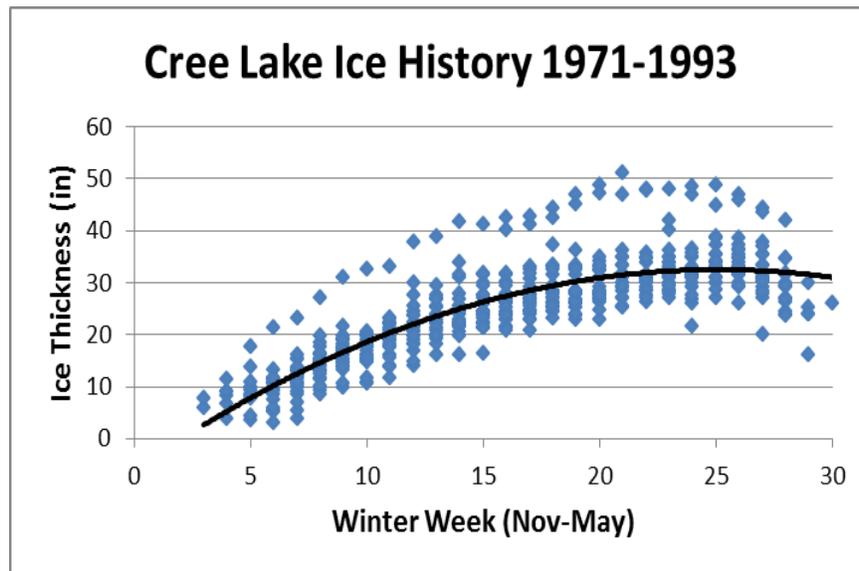
- *Foot traffic (total load less than 120 kg) such as workers carrying out initial testing of the ice. Snowmobiles (total load less than 500 kg) used*

at the beginning of the season for one-time access to a site or to pioneer a trail for ice road clearing

- Light vehicle traffic (total load less than 5,000 kg) to move personnel and light equipment to a worksite across an ice cover that has been cleared of snow to promote ice growth
- Construction vehicles/equipment including amphibious vehicles (total load less than 22,500 kg) used to clear snow and build ice
- Heavy vehicle traffic (22,500 to 63,500 kg) for moving heavier equipment across an ice cover that has been cleared/built for this purpose
- Heavier and more frequent loads require greater hazard controls to offset the higher risk of ice failure (may require engineer evaluation)
- The following chart is an idealized graph that very roughly predicts what the load bearing capacity will be in different parts of Saskatchewan throughout the winter months. It is merely an initial guide based on theoretical calculations. Average temperatures were obtained from Environment Canada data (1981-2010) for 23 sites in Saskatchewan, 8 in the south, 8 in the central region, and 7 in the north. The parameter of concern is the number of degree-days in the month that the temperature was below freezing. Clearly, individual years and months can differ from the average weather. And different sites can have differing growth rates depending on water flow, size, depth, vegetation, topography. Cree lake data are given as an example



- *Load bearing capacity is determined using Gold's formula (National Research Council of Canada, 1971). In essence it says that freshwater ice can support a weight in proportion to its tensile strength and the square of its thickness. Typically the tensile strength runs between 130 and 230 psi with an average of 180 psi. To this value, we apply a safety factor of 3 and use 60 psi. The safety factor covers the varying quality of ice, freshwater versus saltwater ice, river versus lake ice, some melting, ridges, cracks and other imperfections. In addition, it allows for the creep of ice from leaving a vehicle in place for several hours*



- *The information regarding the Cree Lake history shows how the ice thickness can vary from year to year. From the average curve, the variation is generally +/- 5 inches (12.5cm) except for two cold years where it went over 10 inches (25cm)*

### 3.2 Effects of temperature change on ice

#### 3.2.1 Workers shall understand the effect of temperature change on ice

- *A sudden temperature drop (more than 20°C over a 24 hour period) causes ice to contract and may create wet cracks or openings in the ice*
- *A warm period when the air temperature remains above freezing for 24 hours or more allows the ice to warm rapidly from the surface down. These effects are greatest on bare ice and are reduced by increasing depths of snow cover. Even though the ice may have adequate thickness, ice strength can be substantially reduced the longer it is exposed to sunlight and above freezing temperatures (Ashton 1986)*
- *If the average air temperature exceeds 0°C for more than 48 hours, the following steps shall be taken:*

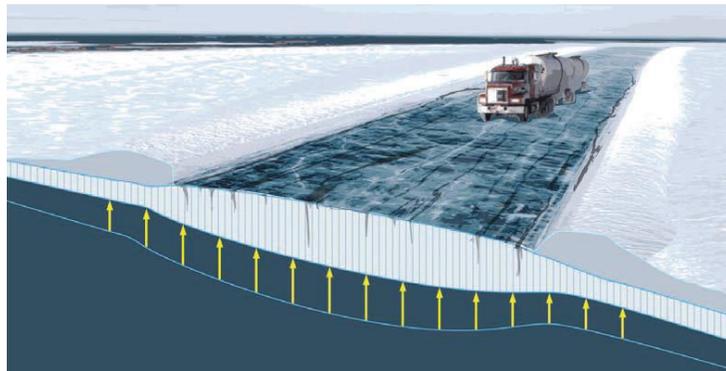
- 1. Determine the minimum ice thickness
- 2. Calculate the allowable weight for the measured ice thickness using Table 3 and reduce it by 50%.
- 3. Monitor ice conditions for signs of decay, cracking and water
- 4. Re-evaluate the allowable weight if the average air temperature remains below 0°C
- 5. If circumstances dictate, consult with a professional engineer to assess the load and ice requirements and capacity of the ice cover

### 3.3 Clearing the Ice Surface

#### 3.3.1 Workers must make considerations when clearing the ice surface

- *Workers must remove or tamp the snow that is on the ice and build snowbanks along the sides of the road to build a cleared lane width. However, there are two consequences when removing snow and building snow banks: (1) the thicker ice in the cleared lane rises because it is more buoyant and (2) the thinner ice under the snowbanks depresses the ice cover because of the weight of the snow. As shown in Figure 24, this can lead to longitudinal cracks on the ice surface of the upward bending ice in the cleared lane and to cracks on the ice bottom of the downward bending ice underneath the snowbanks. The cleared lane cracks do not tend to be a hazard and can be managed through repairs. However, the cracks underneath the snowbanks can be hazardous if they extend upwards to the surface*
- *See Figure 24 (Worksafe Alberta) below which illustrates the effect of clearing ice.*

**Figure 24:** Effect of cleared road on ice thickness



*Table 7: Recommended minimum dimensions for the cleared road width (bank to bank) and cleared driving lane width. In most cases these recommended dimensions should provide enough snow storage space so that snow clearing equipment can clear snow into this space without needing to move the older snow banks and travel over the thinner ice that will be beneath those snow banks.*

TABLE 7: RECOMMENDED MINIMUM ROAD DIMENSIONS		
Operating Vehicles	Cleared width - bank to bank (m)	Driving lane - width (m)
Light vehicle traffic (5,000 kg)	20	10
Construction (22,500 kg)	25	15
Super B Train (63,500 kg)	30+	20

- *Snow must be cleared away from the vicinity (see section 3.5.1 for the definition of vicinity) of the work area where vehicles and equipment are to be utilized and parked*

### 3.4 Driving on Ice

3.4.1 Workers shall ensure the following safety measure when driving equipment on the ice to the work location

- *Know the location of the window breaking tool or the window(s) shall be open*
- *Door unlocked or open*
- *No seat belt to be worn*
- *Slow approach to and off the shore line. Maximum 10km/hr*
- *Low speed while driving. Maximum speed of 15km/hr*

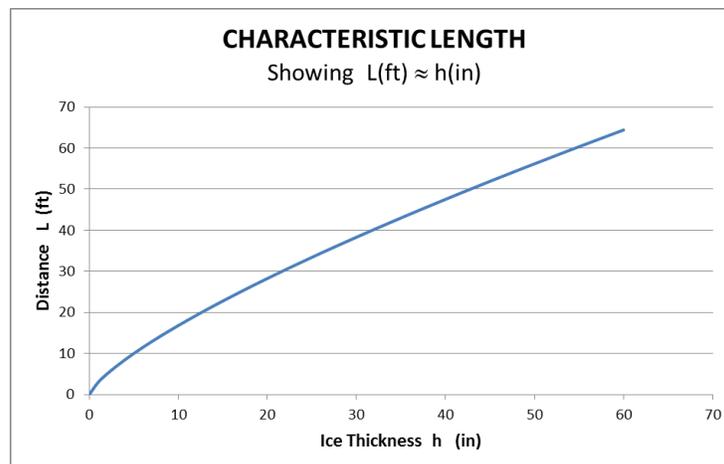
**NOTE :** *Abandon area on first sign of breakthrough*

### 3.5 Load Duration and Equipment Spacing

3.5.1 Workers shall consider how long the job will take and time on the ice:

- *Outrigger pads shall be used on all outriggers at all times*
- *Load duration must be considered because it affects the success or failure of the ice cover and the way the carrying capacity is analyzed. It results in movement called ice creep*

- *Vehicles moving across the ice cover are analyzed using a different design approach than is used for stationary (immobile/parked) loads such as equipment or drill rig sitting on the ice cover*
- *Best practice recommendation for slow-moving vehicles and short duration stationary loads on ice cover is less than two hours*
- *Loads greater than 63,500kg require recommendations from a professional engineer. They can be found online if required under the title Ice Engineering. Some suggestions are EBA Engineering Consultants (Edmonton) or NOR-Ex Engineering (B.C.) although there are others*
- *If inflow/outflow is a problem with water level, consult with a professional engineer for recommendations*
- *It is acceptable to park vehicles and equipment in the work area, however the load/weight of all equipment must be factored into the ice thickness calculation required*
- *When we refer to the load on the ice, it should be understood that we mean the total load of all vehicles and equipment in the vicinity. And by, "vicinity," we mean within a radius of about three characteristic lengths (aka action radius). Conversely, to exclude a load, park it outside this area*



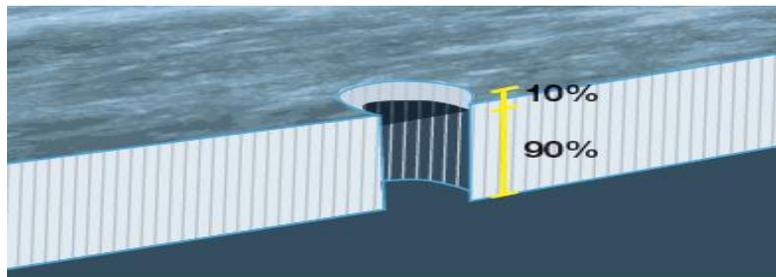
- *Parking for more than two hours on the ice cover should be avoided when possible.*

### 3.6 Effects of Stationary Loads on the Ice Surface

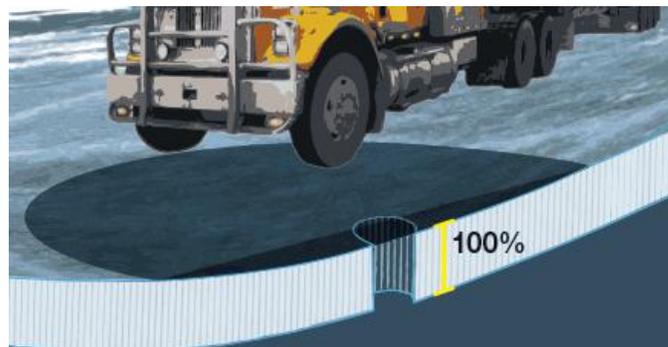
#### 3.6.1 Workers shall understand how the stationary load affects the ice:

- *Outrigger pads shall be used on all outriggers every time*
- *When parking a load at the work site, a hole is to be drilled into the ice close to the unit so it can be monitored by the worker*

- *Because ice is floating, it will sink to 90% of its thickness. The remaining 10% is known as freeboard. When a load is placed on the ice, it will stretch and depress. That is known as ice creep*
- *The illustration below indicates the water level in an auger hole showing positive freeboard and no ice deflection*



- *Once the freeboard reaches its minimum the resulting ice creep will permanently deform the ice and the deflection will increase*
- *If on the ice for an extended period of time and the creep deflection equals the freeboard, water from a hole near the load center will overflow onto the ice.*
- *Illustration below: Auger hole showing no freeboard and water is collecting on the ice because the ice has deflected under the load.*
- ***\*\*That is an indication that it is time to pack up and leave\*\****



## 4.0 Self-Rescue

### 4.1 Emergency Self-Rescue

#### 4.1.1 Workers shall review the following emergency self-rescue information:

- *Workers are not to work alone on ice, however having the information about self-rescue will greatly assist the rescuer in the event of ice failure.*
- *Remove boots if easily possible*
- *Refer to illustrations and timelines on the next page*

The following information is from Work Safe Alberta. Best Practice for Building and Working on Ice Covers in Alberta. [www.worksafely.org](http://www.worksafely.org)

## D2 EMERGENCY SELF-RESCUE



Contrary to popular myth, hypothermia does not occur in five to 10 minutes and it is possible for the person to achieve self-rescue. Dr. Gordon Giesbrecht, a specialist in cold water immersion at the University of Manitoba, summarizes what happens to humans in a cold water immersion situation with the expression "1 minute ... 10 minutes ... 1 hour ... 2 hours".

### One minute to control your breathing

For about one minute, the person will gasp for air in reaction to contact with the cold water. After one minute, the gasping subsides, the skin numbs and the sensation of intense cold decreases.

### Ten minutes of meaningful movement

The person has about 10 minutes to get out of the water.



#### Treading water

Do not panic and thrash about. Resist the urge to gasp, slowly tread water or grasp the edge of the ice to keep your head above the water.



#### Kick and pull

Keep your hands and arms on the ice and kick your feet. This brings your body to a horizontal position, parallel to the ice surface.



#### Horizontal kick and pull

Once horizontal, continue to kick your feet while pulling with your hands. Draw yourself up onto the ice.



#### Roll onto the ice

Keep your weight spread out as you roll, crawl, and slide across the ice until it will support your weight.

### One hour before losing consciousness

If the person manages to hang onto the ice or stay afloat after 10 minutes, the muscles in their arms and legs will lose the strength to get them out of the water. Eventually they will lose consciousness as core body temperature decreases to about 30°C. The actual time depends on the clothing worn, energy stores and body build. If arms, beard, or other part of the body is not frozen to the ice, the person will slip below the surface and drown.

### Two hours to be found

If the person stays above the surface of the water, rescue is still possible within two hours. At about two hours, death due to hypothermic cardiac arrest will occur when the body's core temperature falls below 28°C.

	<h1>Working on Ice</h1>	<p>Standard Operating Procedure</p>
---	-------------------------	-------------------------------------

## 5.0 Components

The following is a list of components for this SOP which can be accessed through the SOP System:

Component Name	Component Type	Component Description	Location of Component
SaskPower Ice Training Safety Video	Video	A video showing ice training safety	SOP Online - SOP Bundle: Working on Ice
Shaun's Story Video	Video	A video showing Shaun's experience with Ice	SOP Online - SOP Bundle: Working on Ice

## 6.0 Acronyms, Definitions and Symbols

### Acronyms and Abbreviations

**PLT** - Power Line Technician

**QEW** - Qualified Electrical Worker

**HARA** - Hazard/Aspect and Risk Assessment

**PPE** - Personal Protective Equipment

### General Requirements

**Personal Protective Equipment** – All workers shall ensure the following **Mandatory PPE** is used and in good condition

**Head Protection** - CSA approved head protection shall be worn by all personnel at the job site, work areas and in posted areas on site

**Eye Protection** - Approved safety glasses shall be worn by all personnel at the job site

**Clothing** - Minimum Class 2 FR/Class 2 High Visibility Clothing shall be worn by all personnel at the job site

**Footwear** - CSA approved, electric shock resistant footwear with minimum six inch (6") leather uppers for ankle support and a steel or composite toe

**Additional PPE Requirements** - To be determined according to the requirements of the task being performed. (Face Shield, rubber gloves, additional FR as determined using the SaskPower Arc Flash Tables) Review the procedure above for additional PPE requirements

### Definitions

**Axe or Ice Chisel** - a tool typically with a steel blade attached at a right angle to a handle or a long-handled chisel for cutting holes in ice to test ice up to 30 centimeters thick

**Ice Auger** - Either manually or mechanically operated auger for the purpose of drilling a hole through the ice

**Ice Picks or Ice Claws**- used to grip with hands and pull along the ice to complete a self-rescue if the ice fails

**Belt or harness front D-ring** - a connector used integrally in a harness as an attachment element or fall arrest attachment and in lanyards, energy absorbers, life lines, and anchorage connectors as an integral connector

**Personal Flotation Device** - an approved garment that is capable of keeping a worker's head above water without effort by the worker

**Rescue Rope** - A sound rope attached to the worker that is testing the ice. Used for tie off to the front D-Ring of the worker for assisted rescue

**Good quality Ice** - Clear, good quality ice has uniform thickness and strength; it appears to be blue or black because it's clear enough to see the water underneath it. Clear ice is relatively free of air bubbles and vegetation

**Bad quality Ice** - Natural flood (white) ice, which occurs when water floods the surface of natural ice.

*It can be of lesser quality due to the presence of snow and unfrozen water and has variable strength due to inconsistent ice thickness. It is considered to have 50% less strength than blue ice*

### Symbols

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N/A

## 7.0 Policies and Regulatory Requirements

This SOP is a result of the following regulations, policies, industry standards, and corporate directives and standards:

### Regulatory Requirement(s)

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*Saskatchewan Occupational Health & Safety Regulations.* - Part III, Section 34 and Part VII 101, 103, 106, and 108

### Policies

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- Hazard/Aspect and Risk Assessment Policy
- Personal Protective Equipment Policy
- Working Alone Policy

### Standards

---

- Hazard/Aspect and Risk Assessment Standard
- Deviation from Safe Work Procedure Standard

### Other

---

- Safety and Environment Rulebook
- Environmental Beneficial Management Practices

### 8.0 References

#### References

- Anon. Best Practices for Building and Working Safely on Ice Covers in Ontario, Infrastructure Health and Safety Association, Mississauga Ontario, January 2014.
- Ashton, G.D. River and Lake Ice Engineering, Water Resources Publication, Littleton Colorado, 1986.
- Beattie, J. Some Engineering Aspects of Working on River and Lake Ice, Technical Services and Research Report 15-384, SaskPower, Regina, 7 October 2015.
- Gold, L.W. "Use of Ice Covers for Transportation", Canadian Geotechnical Journal, Vol. 8, 1971, pp. 170-180.
- Safe Operating Procedures for Winter Roads Committee. Winter Roads Handbook, Ministry of Highways and Infrastructure, Engineering Standards Branch, Government of Saskatchewan, Saskatoon, December 2010.
- Work Safe Alberta Committee. Best Practice for Building and Working Safely on Ice Covers in Alberta, Government of Alberta, January 2013.
- Work Safe Alberta Committee. Field Guide to Working Safely on Ice Covers, Government of Alberta, November 2009.

## **Appendix F – SaskPower Working in Water Transmission and Distribution Foundation and Structure Design Drawings**

*These drawings are periodically updated and SaskPower Standards should be contacted for the most current version.*

## ***Transmission Drawings***

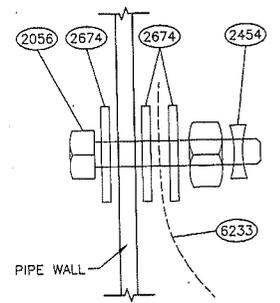
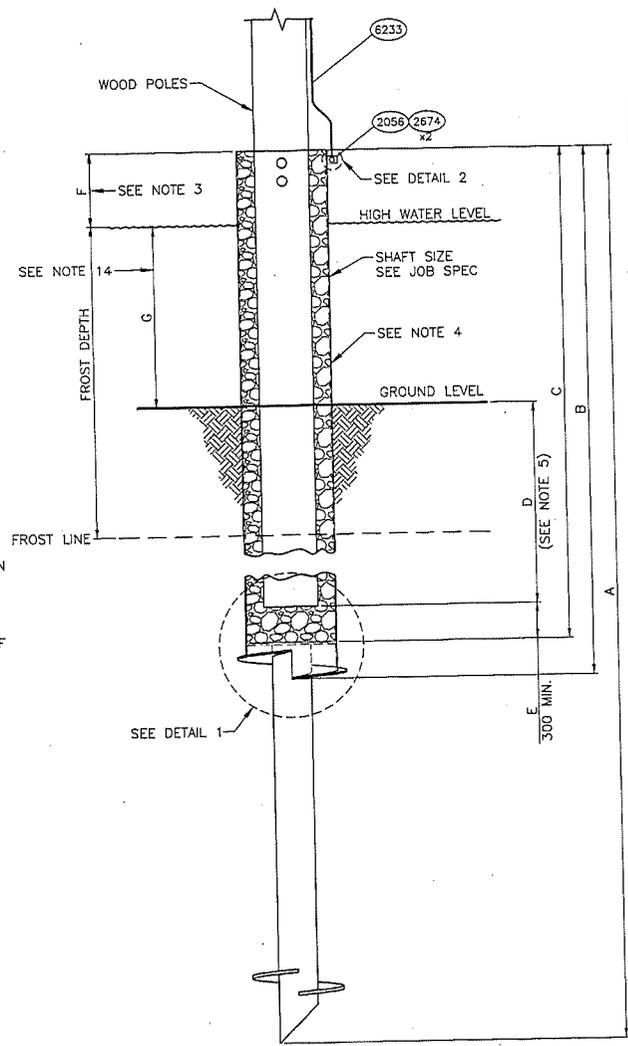
**NOTE:**

1. SCREW PILES TO BE VERTICAL +/- 2 DEGREES AND LOCATION WITHIN 75mm OF SPECIFIED POSITIONS.
2. IF MINIMUM INSTALL TORQUE HAS NOT BEEN REACHED BY THE TIME MAXIMUM DEPTH HAS BEEN REACHED, THE SCREW PILE WILL HAVE TO BE REMOVED AND A LONGER ONE USED.
3. FINAL PILE ELEVATION SHALL BE 0.61m ABOVE HIGH WATER LEVEL TO ACCOMMODATE WATER LEVEL FLUCTUATION.
4. INSTALL CRUSHED ROCK INTO SCREW PILE CYLINDER TO ESTABLISH POLE SET DEPTH "D", AND THEN FILL THE ANNULAR VOID BETWEEN POLE AND PILE WITH CRUSHED ROCK, AS PER LATEST GENERAL CONSTRUCTION SPECIFICATION.
5. 'D' IS THE DISTANCE BETWEEN POLE BUTT TO GROUND LEVEL, D=10% OF POLE LENGTH + 0.61m, UNLESS NOTED OTHERWISE.
6. REFER TO JOB SPEC FOR FRAMING & SETTING OF STRUCTURE.
7. ALL DIMENSIONS ARE IN mm, UNLESS NOTED OTHERWISE.
8. GROUNDING RESISTANCE IS REQUIRED TO BE LESS THAN 10 OHM WHERE POSSIBLE.
9. THE SUPPLIER SHALL PROVIDE ALL INSTALL TORQUE VALUES.
10. THE SUPPLIER SHALL NOTIFY SASKPOWER IMMEDIATELY OF ANY PILE NOT IN CONFORMANCE WITH THIS DRAWING.
11. SEE SHEET 3 FOR WATER DEPTH BETWEEN 1m TO 2m.
12. FOUNDATION DESIGN LOADS PROVIDED IN JOB SPECIFICATION.
13. REFER TO SHEET 4 TO SHEET 6 FOR SCREW PILE SELECTION.
14. THE SCREW PILE SUPPLIER SHALL LEAVE APPROPRIATE ALLOWANCES IN THE BARREL LENGTH FOR VARYING WATER DEPTH(HIGH WATER LEVEL). APPROXIMATE WATER DEPTH FOR REFERENCE IN DETERMINING TOTAL PILE LENGTH IS PROVIDED IN THE JOB SPECIFICATION.
15. HIGH WATER LEVEL MUST BE SITE VERIFIED THROUGH OBSERVATION OF HIGH WATER MARKS ON EXISTING POLES AND/OR VEGETATION BREAK LINES AROUND WATER BODY.

NO.	QUANTITY	CODE #	DESCRIPTION
2056	1	1-14-03	BOLT - MACHINE - 3/4" X 3"
2454	1	1-50-34	NUT - LOCK - 3/4" - GALVANIZED - SQUARE
2674	3	1-93-34	WASHER-ROUND- 2" O.D. - 13/16" HOLE
6233	-	2-83-04	WIRE - COPPER - #4/7 STR

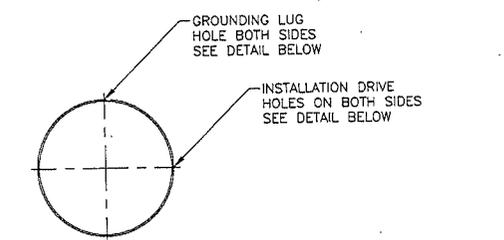
SCREW PILE DIMENSIONS (m)						
A	B	C	D	E	F	G
TOTAL LENGTH	BARREL LENGTH WITH FLIGHT	BARREL LENGTH WITHOUT FLIGHT	POLE SETTING DEPTH	DEPTH OF CRUSHED ROCK TO BE ADDED	BARREL LENGTH ABOVE HIGH WATER LEVEL	GROUND LEVEL TO HIGH WATER LEVEL
TBC	TBC	TBC	AS PER JOB SPEC	TBC	0.61	AS PER JOB SPEC

TBC = TO BE CONFIRMED BY SCREW PILE SUPPLIER

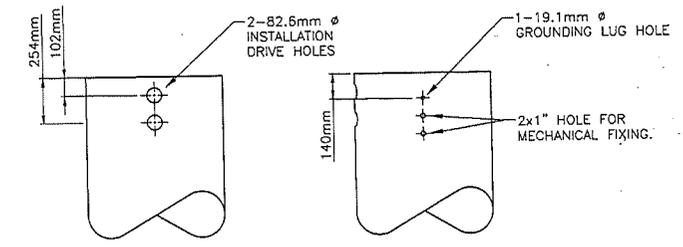


**DETAIL 2 - GROUND BOLT**

**POLE BASE DETAIL (ELEVATION)**



**GROUNDING LUG HOLE DETAIL**



**DETAIL 1 - LOWER SHAFT**

APPROVED FOR CONSTRUCTION

AutoCAD

<p><b>DESIGNED BY</b> J.J. KORNEYCHUK  <b>DRAWN BY</b> N.KIM  <b>APPR'D BY</b> E.KLEIN-RUTTEN  <b>SEALED BY</b> E.KLEIN-RUTTEN  <b>DATE (Y-M-D)</b> 2016/06/12</p>	<p><b>DESIGNED BY</b> J.J. KORNEYCHUK  <b>DRAWN BY</b> E.GOTANA  <b>APPR'D BY</b> M.ERETH  <b>SEALED BY</b> M.ERETH  <b>DATE (Y-M-D)</b> 2015-06-16</p>	<p><b>DESIGNED BY</b> R. GEARY  <b>DRAWN BY</b> J. KERR  <b>APPR'D BY</b> T.J. BUNKA  <b>SEALED BY</b> E. KLEIN-RUTTEN  <b>DATE (Y-M-D)</b> 2014/01/08</p>	<p><b>ENGINEERING SEAL</b></p>	<p><b>DRAFTING DEPT.</b></p> <p><b>DRAWN BY</b> DC  <b>CHECKED BY</b> _____  <b>DATE (Y-M-D)</b> 2013-01-03</p>	<p><b>SaskPower INTERNAL USE ONLY</b></p> <p><b>SCREW PILE POLE BASE FOUNDATION FOR STRUCTURES IN WATER UP TO 1m IN DEPTH (WOOD POLE)</b></p>	<p><b>AUTOCAD SOURCE FILENAME:</b> T07_107_01.DWG  <b>PLOT DATE:</b> 2016-06-14 <b>PAPER:</b> C  <b>PLOT TIME:</b> 10:50 AM  <b>PLOTTED BY:</b> YHAO  <b>SCALE:</b> AS SHOWN  <b>DRAWING No.</b> T07</p>
				<p><b>DESIGN DEPT.</b></p> <p><b>DESIGNED BY</b> J. J. KORNEYCHUK  <b>CHECKED BY</b> J. J. KORNEYCHUK  <b>APPROVED BY</b> M. ERETH  <b>SEALED BY</b> _____  <b>DATE (Y-M-D)</b> 2013-01-17</p>		<p><b>SHEET 1 OF 6</b> <b>REV. C</b></p>

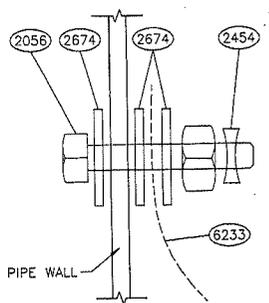
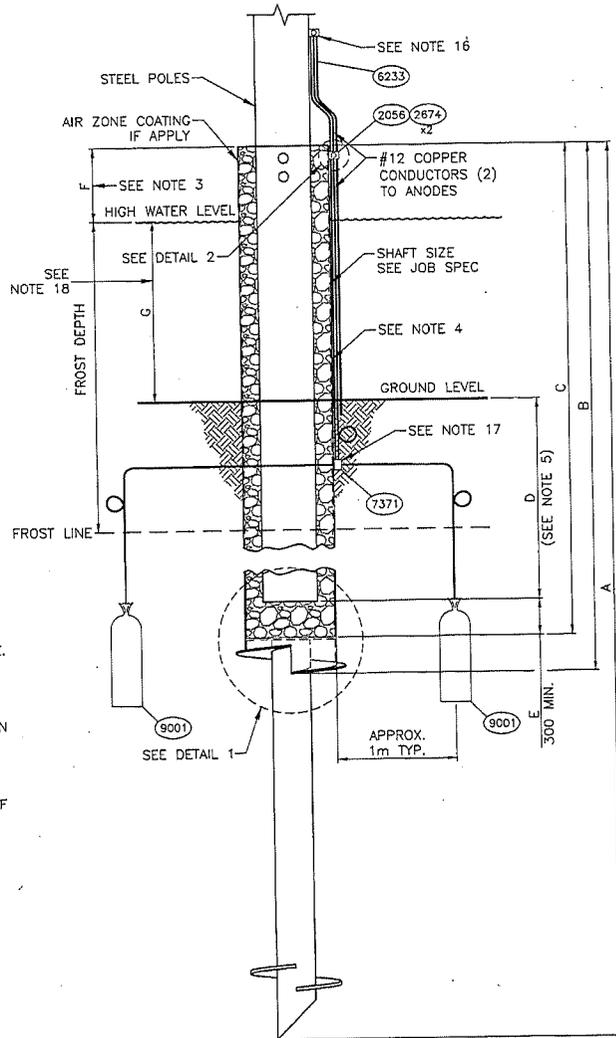
**NOTE:**

- SCREW PILES TO BE VERTICAL +/- 2 DEGREES AND LOCATION WITHIN 75mm OF SPECIFIED POSITIONS.
- IF MINIMUM INSTALL TORQUE HAS NOT BEEN REACHED BY THE TIME MAXIMUM DEPTH HAS BEEN REACHED, THE SCREW PILE WILL HAVE TO BE REMOVED AND A LONGER ONE USED.
- FINAL PILE ELEVATION SHALL BE 0.61m ABOVE HIGH WATER LEVEL TO ACCOMMODATE WATER LEVEL FLUCTUATION.
- INSTALL CRUSHED ROCK INTO SCREW PILE CYLINDER TO ESTABLISH POLE SET DEPTH 'D', AND THEN FILL THE ANNULAR VOID BETWEEN POLE AND PILE WITH CRUSHED ROCK, AS PER LATEST GENERAL CONSTRUCTION SPECIFICATION.
- 'D' IS THE DISTANCE BETWEEN POLE BUTT TO GROUND LEVEL, D=10% OF POLE LENGTH + 0.61m, UNLESS NOTED OTHERWISE.
- FOR STEEL POLES EXTRA COATING MAY BE REQUIRED.
- REFER TO JOB SPEC FOR FRAMING & SETTING OF STRUCTURE.
- ALL DIMENSIONS ARE IN mm, UNLESS NOTED OTHERWISE.
- GROUNDING RESISTANCE IS REQUIRED TO BE LESS THAN 10 OHM WHERE POSSIBLE.
- THE SUPPLIER SHALL PROVIDE ALL INSTALL TORQUE VALUES.
- THE SUPPLIER SHALL NOTIFY SASKPOWER IMMEDIATELY OF ANY PILE NOT IN CONFORMANCE WITH THIS DRAWING.
- SEE SHEET 3 FOR WATER DEPTH BETWEEN 1m TO 2m.
- FOUNDATION DESIGN LOADS PROVIDED IN JOB SPECIFICATION.
- REFER TO SHEET 4 TO SHEET 6 FOR SCREW PILE SELECTION.
- ANODE INSTALLED TO SAME DEPTH AS BOTTOM OF POLE, IF THIS CAN NOT BE ACHIEVED, THE ANODE SHALL BE INSTALLED A MINIMUM OF 1.8m DEEP.
- SEE T07-100 SHEET 2 FOR WIRE CONNECTION DETAIL AT STEEL POLE.
- SEE T07-110 FOR GEL TAP SPlice CONNECTION DETAIL FOR BELOW GROUND CONNECTION.
- THE SCREW PILE SUPPLIER SHALL LEAVE APPROPRIATE ALLOWANCES IN THE BARREL LENGTH FOR VARYING WATER DEPTH(HIGH WATER LEVEL). APPROXIMATE WATER DEPTH FOR REFERENCE IN DETERMINING TOTAL PILE LENGTH IS PROVIDED IN THE JOB SPECIFICATION.
- HIGH WATER LEVEL MUST BE SITE VERIFIED THROUGH OBSERVATION OF HIGH WATER MARKS ON EXISTING POLES AND/OR VEGETATION BREAK LINES AROUND WATER BODY.

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2454	1	1-50-34	NUT - LOCK - 3/4" - GALVANIZED - SQUARE
2674	3	1-93-34	WASHER-ROUND- 2" O.D. - 13/16" HOLE
4513	-	2-95-81	312 COPPER CONDUCTOR
6233	-	2-83-04	WIRE - COPPER - #4/7 STR
9001	2	12120014	ANODE -14.5kg
7371	1	2-68-30	GEL TAP SPlice

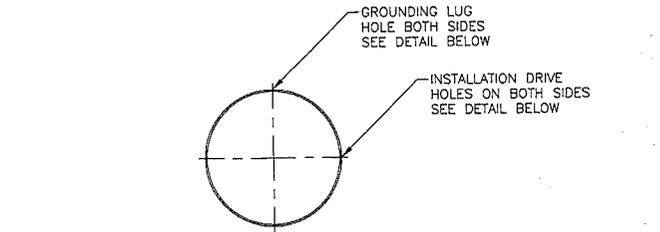
SCREW PILE DIMENSIONS (m)						
A	B	C	D	E	F	G
TOTAL LENGTH	BARREL LENGTH WITH FLIGHT	BARREL LENGTH WITHOUT FLIGHT	POLE SETTING DEPTH	DEPTH OF CRUSHED ROCK TO BE ADDED	BARREL LENGTH ABOVE HIGH WATER LEVEL	GROUND LEVEL TO HIGH WATER LEVEL
TBC	TBC	TBC	AS PER JOB SPEC	TBC	0.61	AS PER JOB SPEC

TBC = TO BE CONFIRMED BY SCREW PILE SUPPLIER

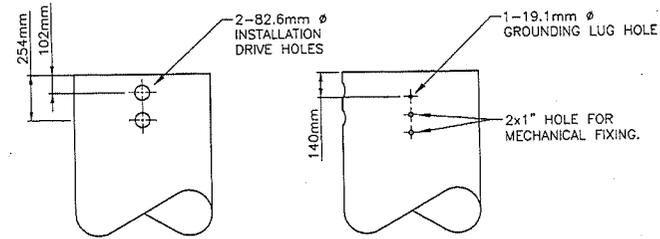


**DETAIL 2 - GROUND BOLT**

**POLE BASE DETAIL (ELEVATION)**



**GROUNDING LUG HOLE DETAIL**



**DETAIL 1 - LOWER SHAFT**

**APPROVED FOR CONSTRUCTION**

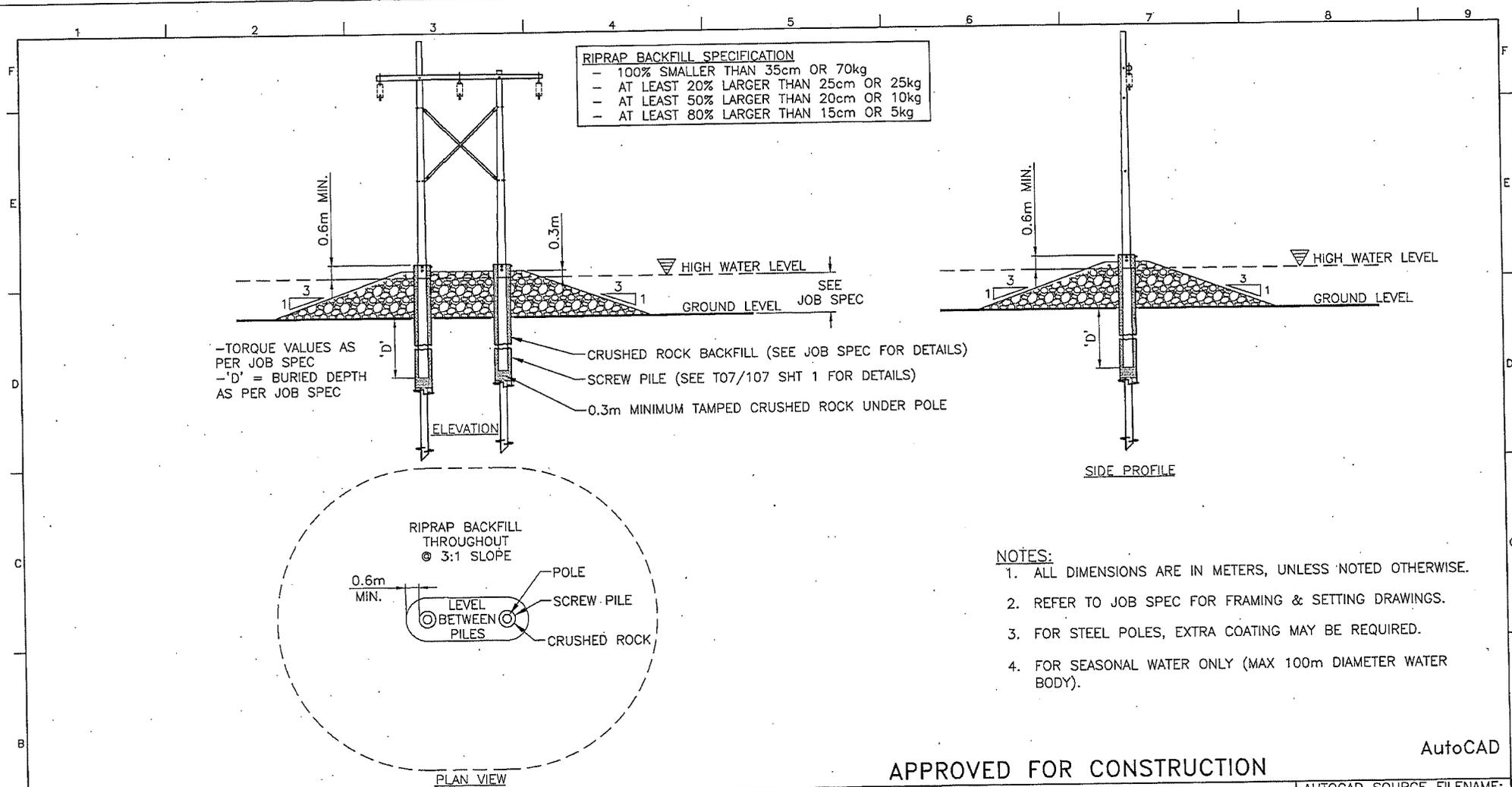
AutoCAD

**SaskPower** INTERNAL USE ONLY

**SCREW PILE POLE BASE FOUNDATION FOR STRUCTURES IN WATER UP TO 1m IN DEPTH (STEEL POLE)**

AUTOCAD SOURCE FILENAME: T07_107_02.DWG
PLOT DATE: 2015-06-15 PAPER: C
PLOT TIME: 2:50 PM
PLOTTED BY: YHAO
SCALE: AS SHOWN
DRAWING No. <b>107</b>
SHEET 2 OF 6 REV. <b>B</b>

DESIGNED BY	REVISION 'B' CONTINUED	ENGINEERING SEAL	DRAFTING DEPT.
J.JI	-ADDED 'HIGH' TO 'WATER LEVEL' IN ELEVATION VIEW	E.COTANA	DC
N.KIM		M.ERETH	CHECKED BY
E.KLEIN-RUITEN		M.ERETH	DATE (Y-M-D) 2013-01-03
DATE (Y-M-D) 2015-06-16		DATE (Y-M-D) 2015-06-16	
			DESIGN DEPT.
			J. LI
			CHECKED BY
			J. LI
			APPROVED BY
			M. ERETH
			SEAL BY
			DATE (Y-M-D) 2013-01-17



- NOTES:**
1. ALL DIMENSIONS ARE IN METERS, UNLESS NOTED OTHERWISE.
  2. REFER TO JOB SPEC FOR FRAMING & SETTING DRAWINGS.
  3. FOR STEEL POLES, EXTRA COATING MAY BE REQUIRED.
  4. FOR SEASONAL WATER ONLY (MAX 100m DIAMETER WATER BODY).

APPROVED FOR CONSTRUCTION

AutoCAD

DESIGNED BY J.LJ/M.KORNEYCHUK DRAWN BY N.KIM APPR'D BY E.KLEIN-RUTTEN SEALED BY E.KLEIN-RUTTEN DATE (Y-M-D) 2016/06/26	DESIGNED BY J.LJ DRAWN BY E.GOTANA APPR'D BY M.ERETH SEALED BY M.ERETH DATE (Y-M-D) 2015-06-16	<b>ENGINEERING SEAL</b>  	<b>DRAFTING DEPT.</b> DRAWN BY J. KERR CHECKED BY _____ DATE (Y-M-D) 2013/10/16	<b>SaskPower</b> INTERNAL USE ONLY  <b>SEASONAL WATER RIP-RAP PROTECTION FOR STRUCTURES IN WATER BETWEEN 1m - 2m</b>	AUTOCAD SOURCE FILENAME: T07_107_03.DWG PLOT DATE: 2016-06-14 PLOT TIME: 11:33 AM PLOTTED BY: YHAO SCALE: NOT TO SCALE
			<b>DESIGN DEPT.</b> DESIGNED BY K. BURNHAM CHECKED BY R. GEARY APPROVED BY T.J. BUNKA SEALED BY E. KLEIN-RUTTEN DATE (Y-M-D) _____		DRAWING No. <b>T07</b> <b>107</b> SHEET 3 OF 6 REV. B

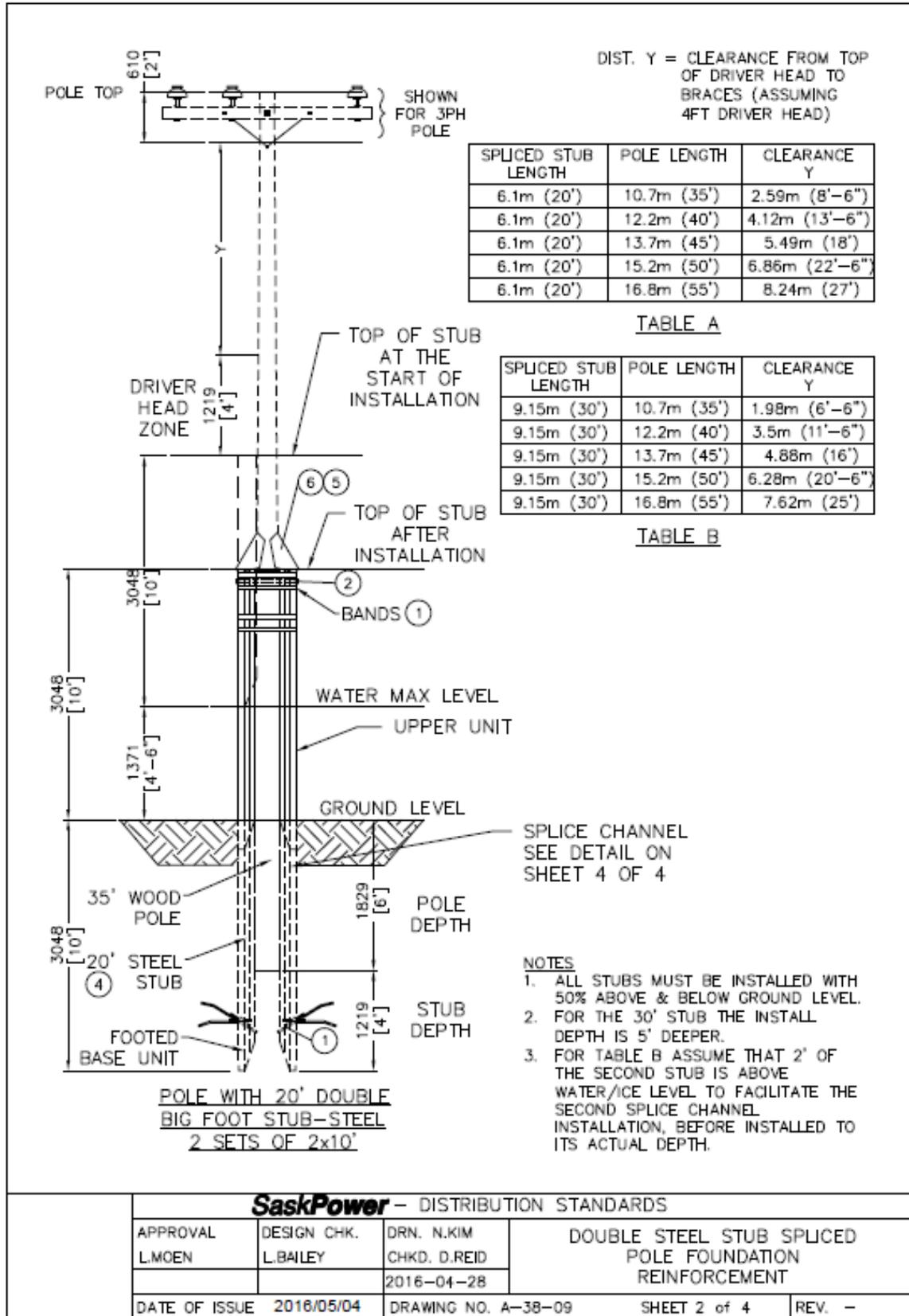
## ***Distribution Drawings***

SLOUGH CONSTRUCTION CRITERIA						
DRAWING #	ENVIRONMENTAL CONCERNS (YES/NO)	MAXIMUM WATER DEPTH	INSTALL VEHICLE	RELATIVE STRENGTH/EFFECTIVENESS	PROTECTION FROM SPRING THAW	NOTES
A-38-09 DOUBLE STUBS	N	4'-6"	LIGHT VEHICLE	+++	+++	LIMIT BASED ON INSTALLING STUB TO ½ LENGTHS IN EARTH, 3' FOR BANDS ABOVE THE ICE. SHOULD INCLUDE UPLIFT PLATES ('BIGFOOT') AND CROSS BOLT - DA BOLT.
A-38-08 SCREW PILES	Y	8'	TRACK - HOE	++++	++++	MOST ROBUST, MAY BE THE ONLY OPTION FOR VERY DEEP WATER. WATCH HIGH WATER MARK, TOP OF SCREW PILE MUST BE ABOVE ICE.
A-32-11 CULVERT	Y	4'	DIGGER	+++	++++	CULVERT EXTENDS ABOVE WATER AND DEEP INTO EARTH AT LEAST 6', 10' OR BETTER. NOT FOR STANDING WATER.
A-32-17 BUTT ANCHORS	Y	1.5'	DIGGER	++	+	ONLY GOOD FOR QUITE SHALLOW WATER (18" OR SO). MAY TEND TO SPLIT ICE THAT IS FORCED TOWARDS POLE BECAUSE OF THE SLOPE OF THE ANCHOR.
A-32-11A H-FRAME	Y	3'	DIGGER	++	+	MAY NOT REASONABLE IN ROAD ALLOWANCE, MIGHT BE DIFFICULT TO GET EASEMENT.
A-38-07 REGULAR STEEL STUBS	N	1.2'	LIGHT VEHICLE	+	++	MAY BE EFFECTIVE FOR SHALLOW WATER DEPTHS. MAY BE MORE MAINTAINABLE IN THE FUTURE.

**NOTES**

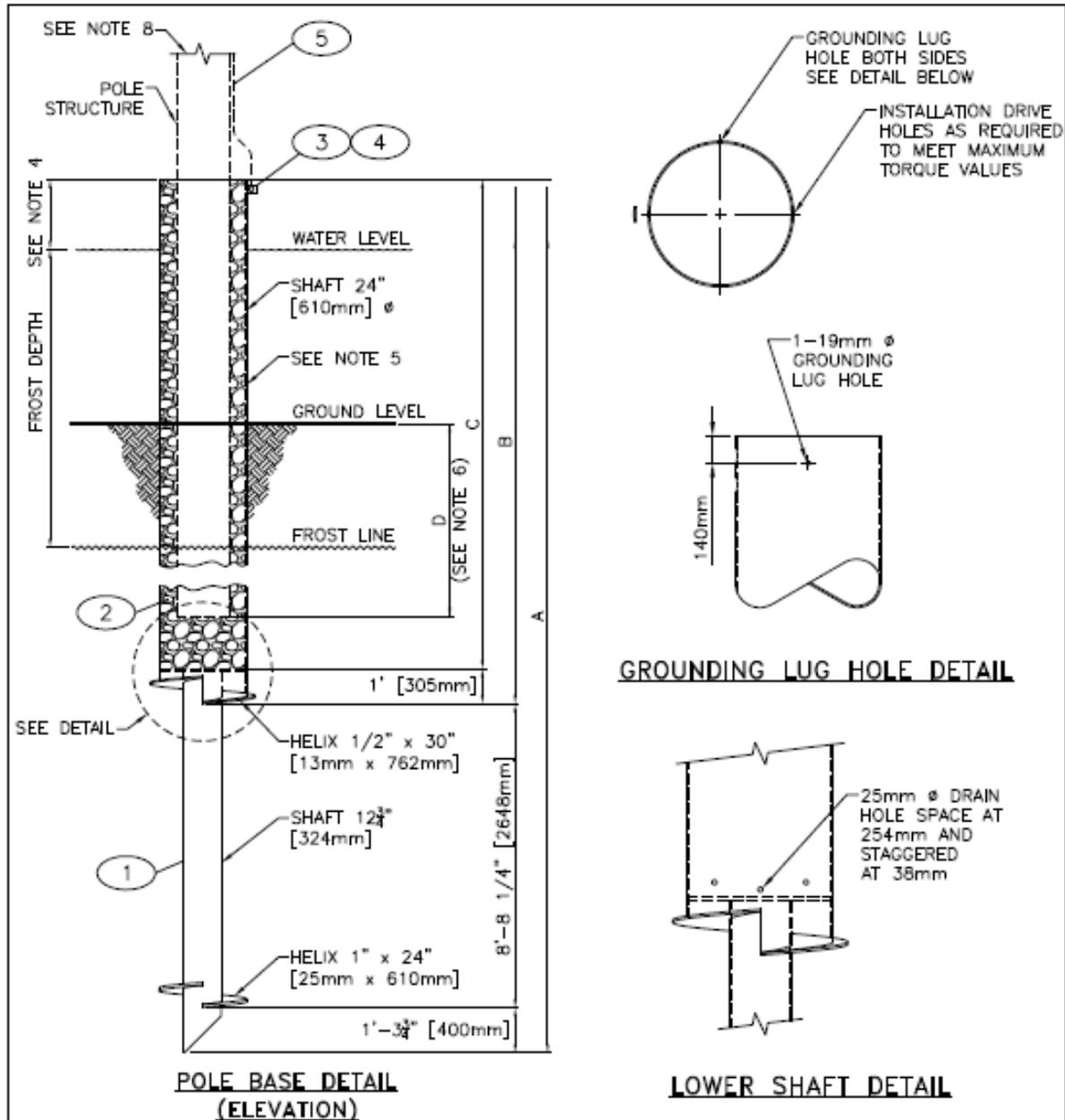
1. CONSULTATION WITH SASKPOWER ENVIRONMENTAL DEPARTMENT MUST BE DONE BEFORE INSTALLING IN WATER WHERE THERE IS SOIL DISTURBANCE.
2. NEED TO BE MINDFUL OF LINE CLEARANCE OVER THE ICE FOR DEEP WATER. CSA VEHICLE CLEARANCE IS 4.15M.
3. SHOULD GIVE CONSIDERATION TO REPLACING POLES MORE THAN FIVE (5) YEARS OLD TO ENSURE THAT THE POLE IS IN THE BEST CONDITION POSSIBLE IN ORDER TO GET THE GREATEST LONGEVITY OUT OF THE REMEDIATION.

<i>SaskPower</i> - DISTRIBUTION STANDARDS			
APPROVAL L. MOEN	DESIGN CHK L. BAILEY	DRN. CHKD. 2016-05-04	<b>SLOUGH CONSTRUCTION CRITERIA</b>
DATE OF ISSUE:		DRAWING NO: A-32-21	
		SHEET 1 of 1	REV. 0



**SaskPower** – DISTRIBUTION STANDARDS

APPROVAL L.MOEN	DESIGN CHK. L.BAILEY	DRN. N.KIM CHKD. D.REID	DOUBLE STEEL STUB SPLICED POLE FOUNDATION REINFORCEMENT
DATE OF ISSUE	2016/05/04	DRAWING NO. A-38-09	SHEET 2 of 4
			REV. -



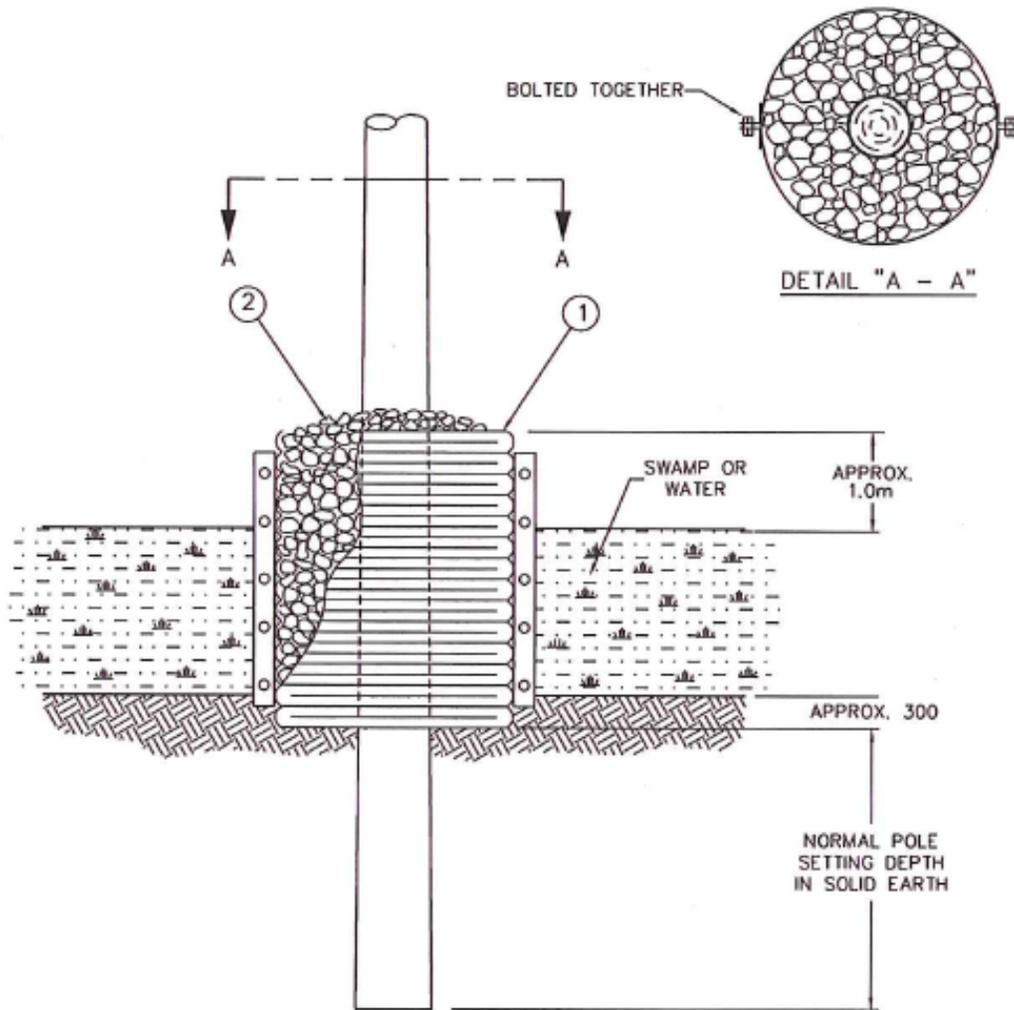
**MATERIAL REQUIREMENTS;**

1. STRUCTURAL STEEL MEMBERS SHALL CONFORM TO CSA S16 (DESIGN OF STEEL STRUCTURES).
2. PIPE SHAFT - ASTM A252 GRADE 3 OR BETTER STEEL PIPE, SEAMLESS OR STRAIGHT WELDED.
3. CAP PILE AND HELIX PLATE - ASTM A36 OR CSA G40.20/G40.21 44W(300W) HOT ROLLED STRUCTURAL STEEL PLATE.
4. WELDING SHALL CONFORM TO CSA W59 AND CSA W47.1. WELD TENSILE STRENGTH = 485 MPA(70ksi).
5. THE SCREW PILES SHALL BE SUITABLY COATED AS TO PROTECT THE BASE METAL FROM CORROSION.
6. THE SUPPLIER SHALL PROVIDE ENGINEER STAMPED DRAWINGS THAT SHOW ALL INSTALL DETAILS INCLUDING REQUIRED TORQUE VALUES (MAXIMUM, EXPECTED, AND MINIMUM) AND MINIMUM AND MAXIMUM EMBEDMENT AT EACH SITUATION LISTED IN THE TABLE IN NOTE 3 ON SHEET 3.

INSTALLATION NOTES LOCATED ON SHEET 3.

<b>SaskPower</b> - DISTRIBUTION STANDARDS				
APPROVAL	DESIGN CHK.	DRN. N.KIM	SCREW PILE POLE FOUNDATION	
L.MOEN	A.UHREN	CHKD.		
		2016-04-20		
DATE OF ISSUE	2018/05/04	DRAWING NO. A-38-08	SHEET 2 of 3	REV. B

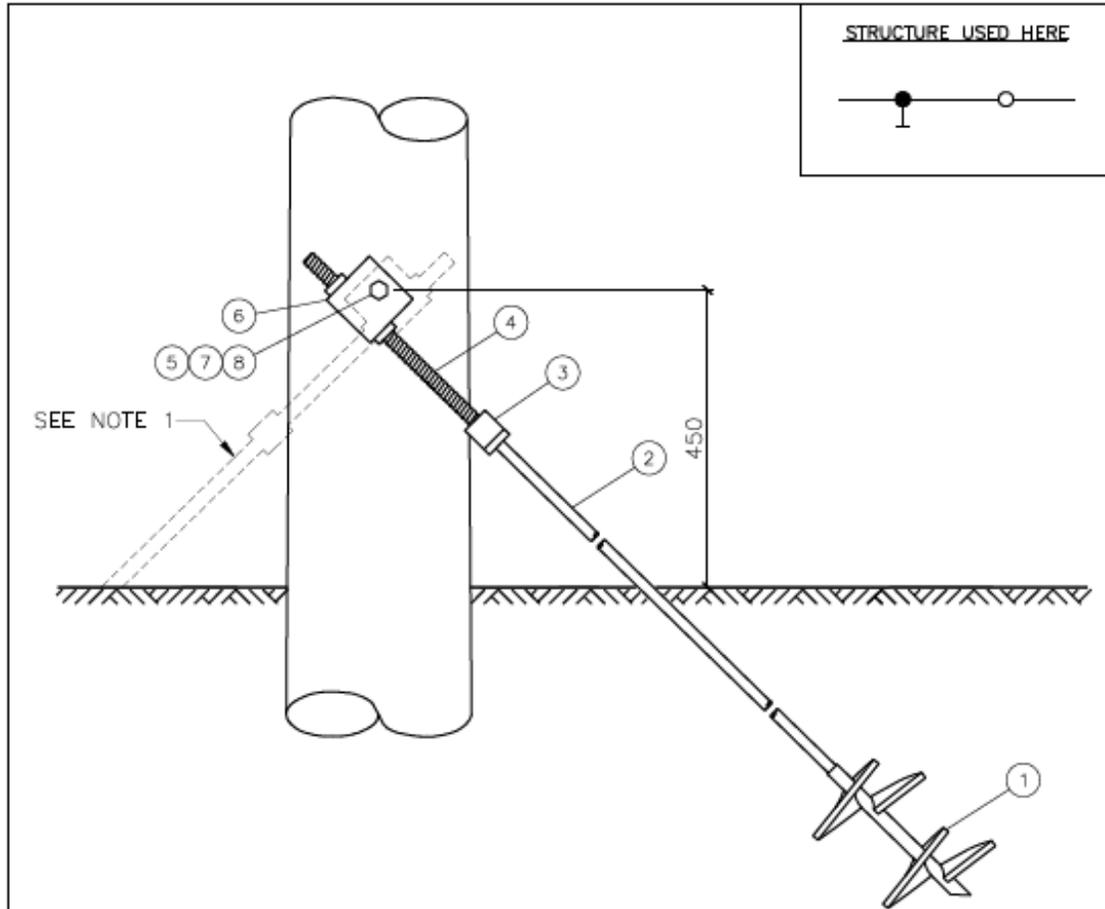
AUTO X DRAFT



SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

**SaskPower** - DISTRIBUTION STANDARDS

DRN. <i>DK</i>	DESIGN CHK.	APPROVAL	POLE FOUNDATION STRUCTURE FOR SWAMP OR MARSH CONSTRUCTION	
CHKD.	DATE	DATE		
DATE OF ISSUE: 2003/05/30	DRAWING NO. A-32-11	SHEET 2 of 2	REV. A	



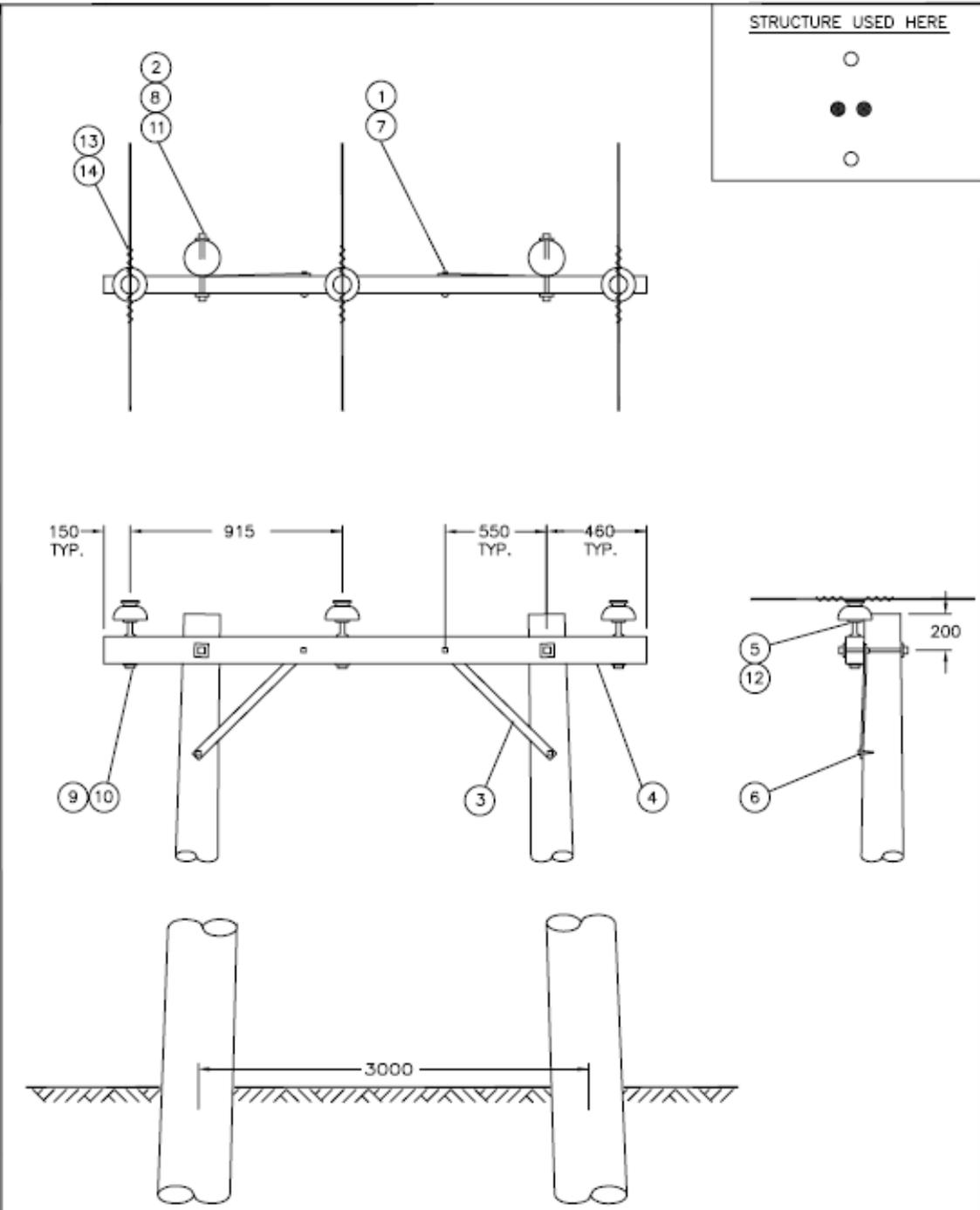
**CAUTION**  
 TO AVOID FAILURE OF THE HELIX, MAX. DIGGER TORQUE SHALL NOT EXCEED  
 8135 N.M. (6000 FT. LBS.) FOR PISA #6

- NOTE:**
1. A SECOND ANCHOR CAN BE INSTALLED ON THE OTHER SIDE OF THE POLE IF MORE SUPPORT IS NEEDED.
  2. FOR SINGLE ANCHOR INSTALLATION, ANCHOR SHALL BE INSTALLED ON THE FIELD SIDE OF THE POLE. ANCHOR IS STRONGEST IN TENSION.

SCALE: N.T.S. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE INDICATED

<b>SaskPower</b> – DISTRIBUTION STANDARDS			
APPROVAL M.ERETH	DESIGN CHK. A.UHREN	DRN. A.GATZKE CHKD. 2014-07-23	SLOUGH POLE BUTT ANCHOR
DATE OF ISSUE	2014/11/17	DRAWING NO. A-32-17	SHEET 2 of 2 REV. B

AUTO \* DRAFT

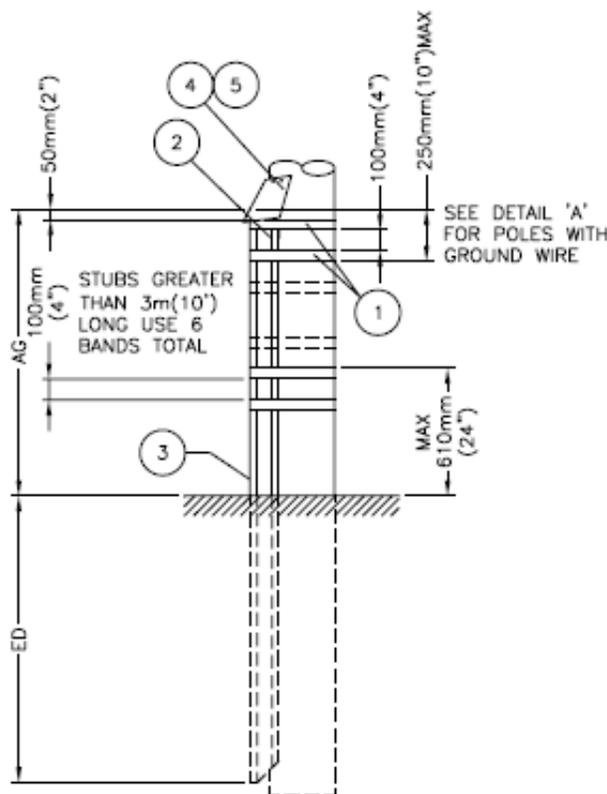


SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

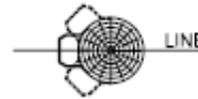
**SaskPower** – DISTRIBUTION ENGINEERING

DRN.	M.T.S.	DESIGN CHK.	SAFETY APP.	APPROVAL	TWO POLE TANGENT FOR SWAMP OR MARSH CONSTRUCTION
CHKD.					
DATE		DATE	DATE	DATE	
DATE OF ISSUE			DRAWING NO. A-32-11A		SHEET 2 of 2   REV. 0

AUTO DRAFT

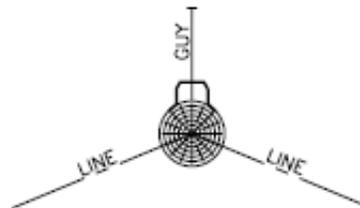


TANGENT, TAP AND DEFLECTION < 10°

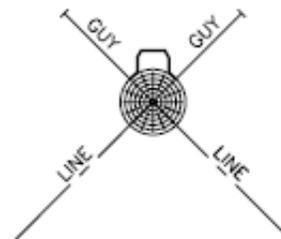


STUB MAYBE ROTATED ±45° TO AVOID OBSTRUCTIONS

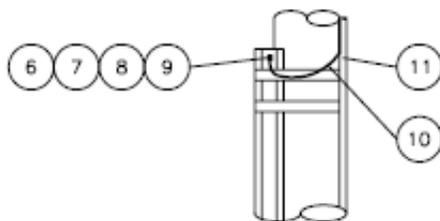
DEFLECTION 10°-30°



DEFLECTION, CORNER > 30°

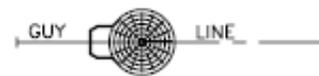


DETAIL 'A'

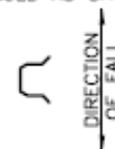


POLES WITH GROUND WIRE (SAFETY CAP SHOWN REMOVED) PLACE BANDS UNDER GROUND WIRE/MOULDING

DEAD END POLE



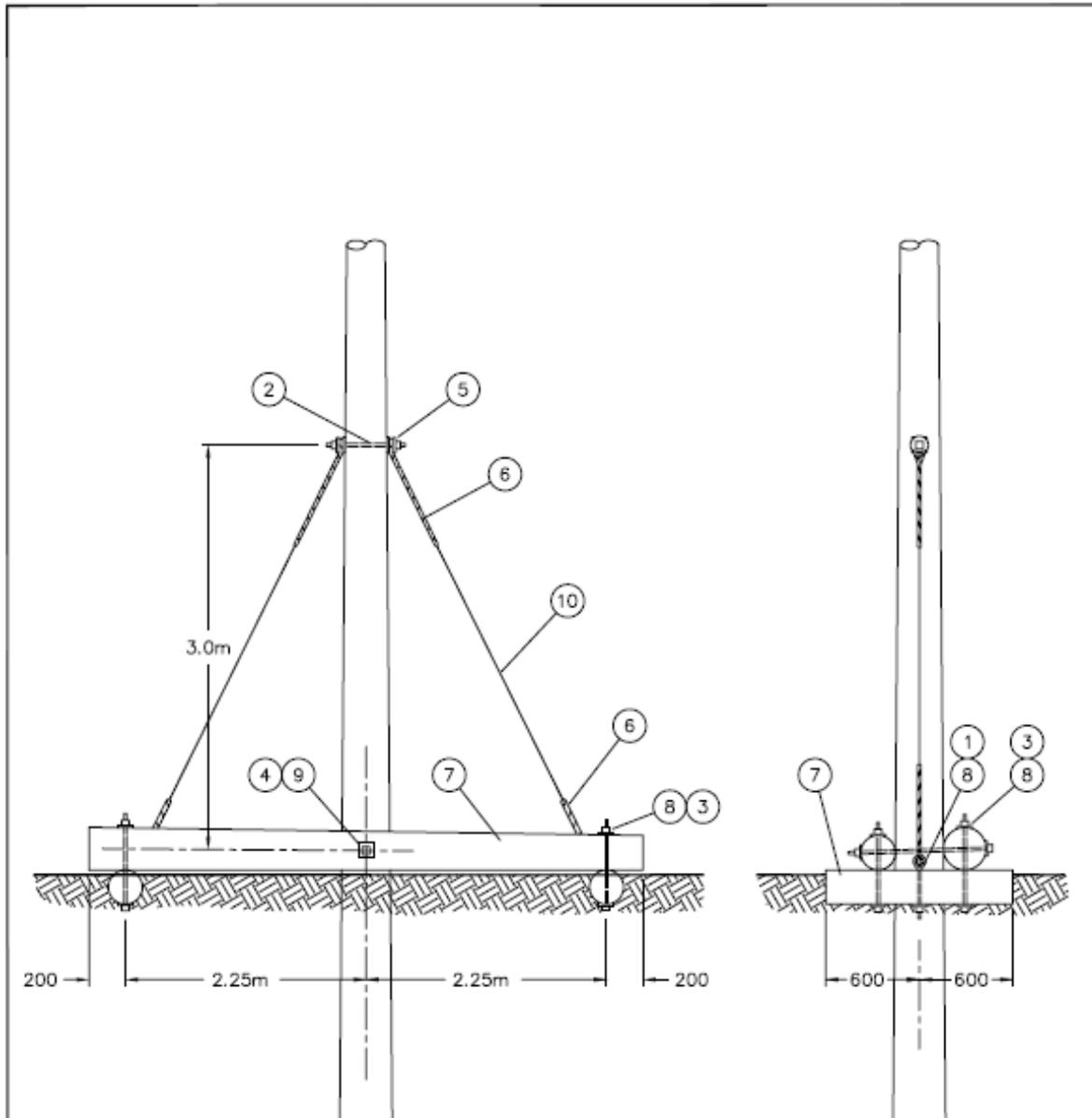
GENERAL GUIDELINE: THE STEEL STUB SHOULD BE PLACED AS SHOWN BELOW.



SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

**SaskPower** - DISTRIBUTION STANDARDS

DRN. J. Kerr	DESIGN CHK.	APPROVAL	POLE STUBBING - STEEL STUB
CHKD.			
DATE 01-03-13	DATE	DATE	
DATE OF ISSUE: 2003/05/30	DRAWING NO. A-38-07	SHEET 2 of 3	REV. 0



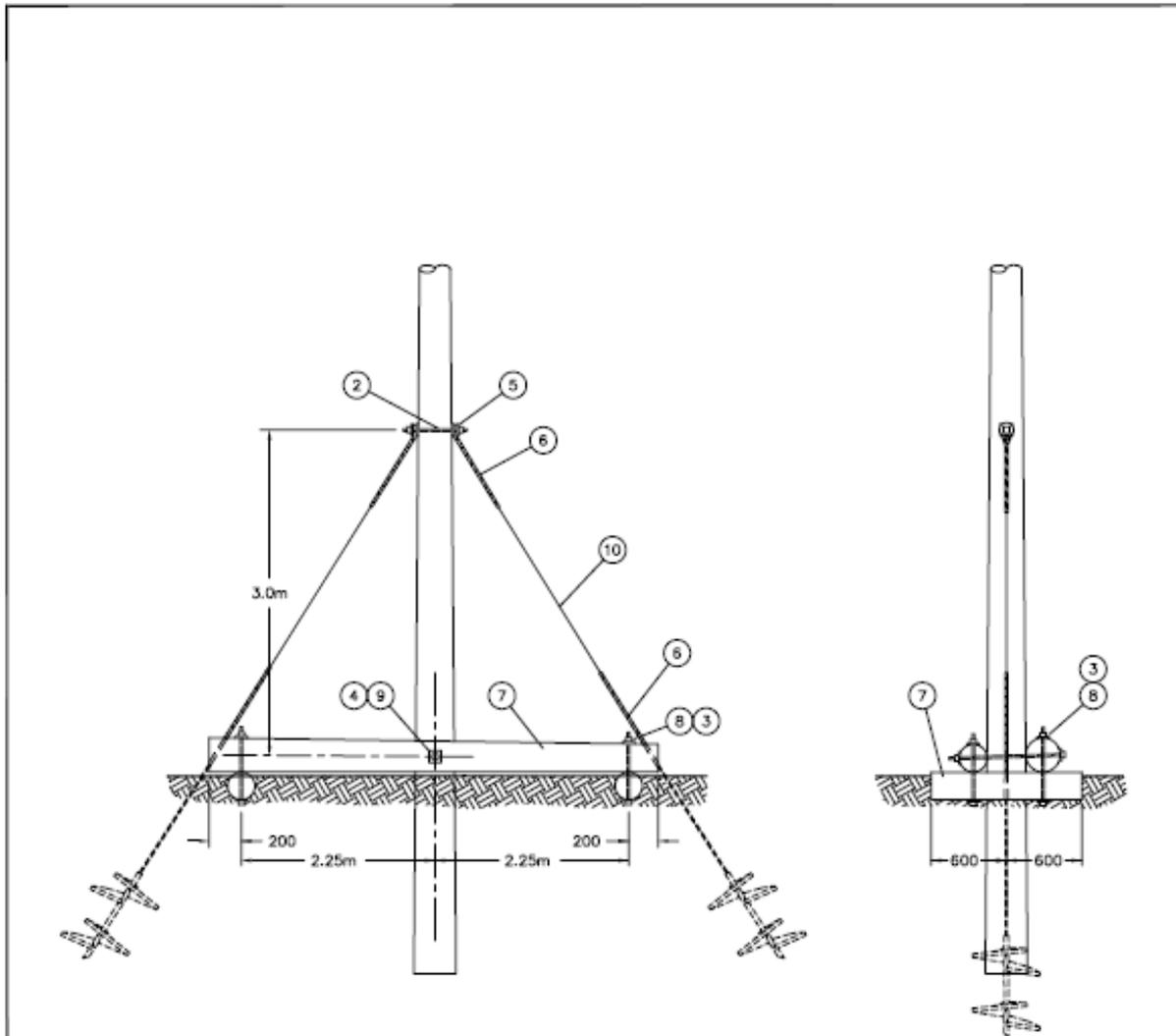
NOTE:

1. ITEM 7 (12.2m CL. 5 POLE) IS TO BE CUT INTO 4 PIECES AS SHOWN.
2. GUY WIRE IS TO BE TIGHTENED USING THE EYEBOLT AS THE ADJUSTMENT POINT.

SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

SASKATCHEWAN POWER CORP. - DISTRIBUTION ENGINEERING STANDARDS

DRN. <i>DK</i>	DESIGN CHK.	SAFETY APP.	APPROVAL	POLE FOUNDATION STRUCTURE FOR MUSKEG	
CHKD. <i>FTK</i>					
DATE 87-05-25	DATE	DATE	DATE		
DATE OF ISSUE 87-06-01			DRAWING NO. A-32-10	SHEET 2 of 2	REV. 0



SEE A-32-15 OR  
A-32-18 FOR ANCHORS

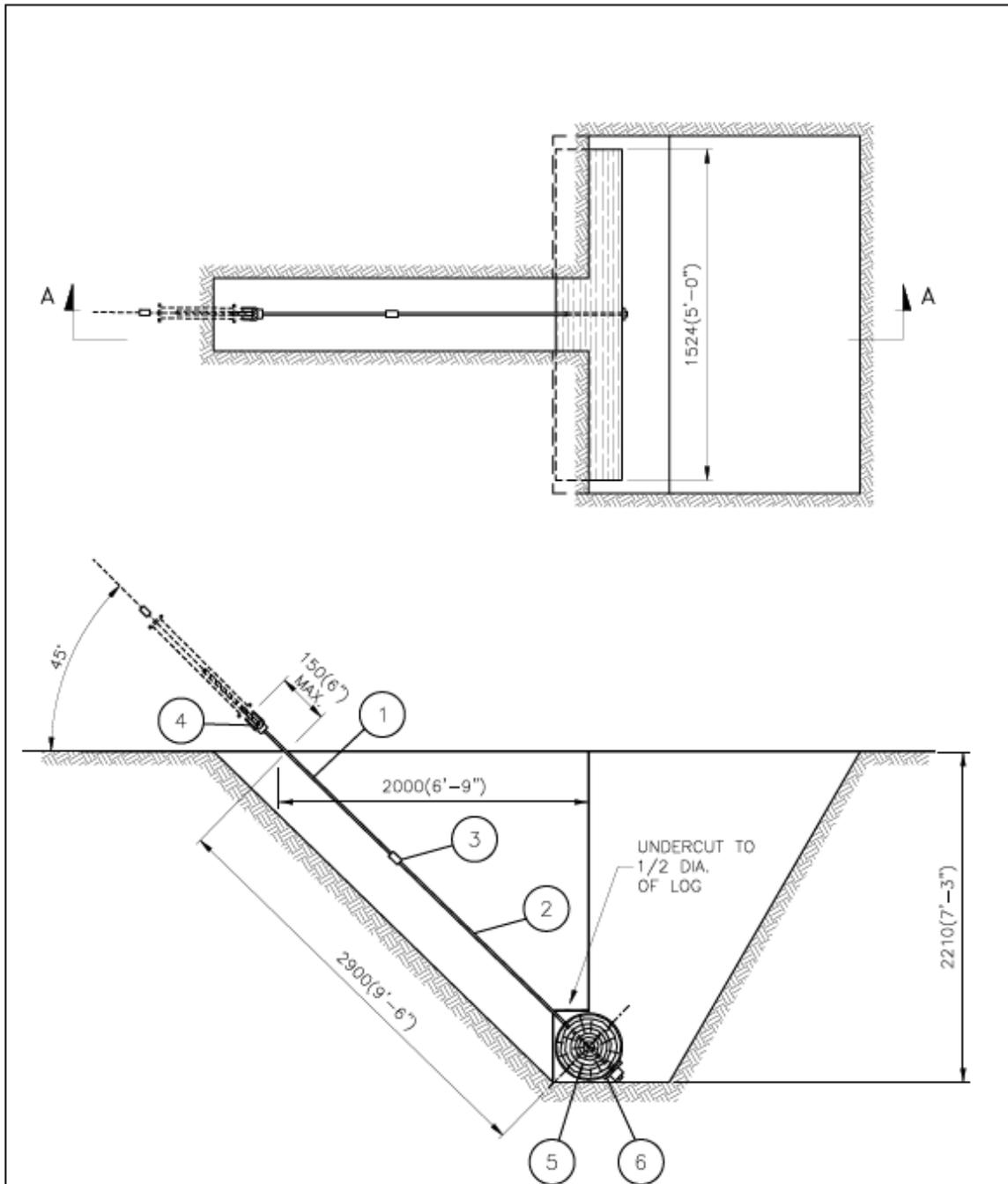
NOTE:

1. ITEM 7 (12.2m CL. 5 POLE) IS TO BE CUT INTO 4 PIECES AS SHOWN.

SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

**SaskPower** - DISTRIBUTION STANDARDS

DRN. DK	DESIGN CHK.	APPROVAL	POLE FOUNDATION STRUCTURE FOR MUSKEG WITH ANCHORS
CHKD.			
DATE	DATE	DATE	
DATE OF ISSUE		DRAWING NO. A-32-10A	SHEET 2 of 2 REV. 0



SECTION A-A

SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

<b>SaskPower</b> – DISTRIBUTION STANDARDS				
APPROVAL M.ERETH	DESIGN CHK. A.UHREN	DRN. A.GATZKE CHKD.	ANCHOR LOG INSTALLATION	
		2015-05-06		
DATE OF ISSUE	2015/08/18	DRAWING NO. A-32-18	SHEET 2 of 2	REV. A

NO.	QUANTITY		CODE NO.	DESCRIPTION
	A	B		
1	2	4	1-03-25	STRAPPING GALVANIZED 2" x .05" x 7'-0"
2	4	8	1-79-00	SEALS CRIMP DOUBLE
3	1	1	1-8X-XX	STUB POLE(SEE NOTE 1)

A - FOR TANGENT STRUCTURE  
B - FOR CORNER STRUCTURE

NOTE:

- SEE DRAWING A-38-04 FOR STUB SIZES.
- STUBS SHALL BE POSITIONED ACROSS LINE.
- ON TWO POLE STRUCTURES PUT STUBS ON THE OUTSIDE.
- BOTTOM BAND MUST BE ABOVE ROTTED PORTION.
- SEAL HAS TO COVER END OF BANDS.
- SET SAME DEPTH LENGTH OF STUB AS FOR ORIGINAL POLE.
- TWO SETS OF BANDS TO BE USED AT CORNER STRUCTURE.
- THE FOLLOWING POLES ARE NOT TO BE STUBBED:  
TRANSFORMER, OCR, FUSE, TAP-OFF, SWITCHES, DISCONNECTS,  
RAILROAD OR PIPELINE CROSSINGS AND DEADENDS.

SCALE: N.T.S. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS OTHERWISE INDICATED

SASKATCHEWAN POWER CORP. - DISTRIBUTION ENGINEERING STANDARDS

DRN. <i>B</i>	DESIGN CHK.	SAFETY APP.	APPROVAL	POLE STUBBING - PREFERRED METHOD
CHKD. <i>FTK</i>				
DATE 86-11-24	DATE	DATE	DATE	

DATE OF ISSUE 87-02-01      DRAWING NO. A-38-03      SHEET 1 OF 2      REV. 0