

Welcome to the
Eastern Alberta
DC Transmission Line

Information Session



ATCO *Electric*

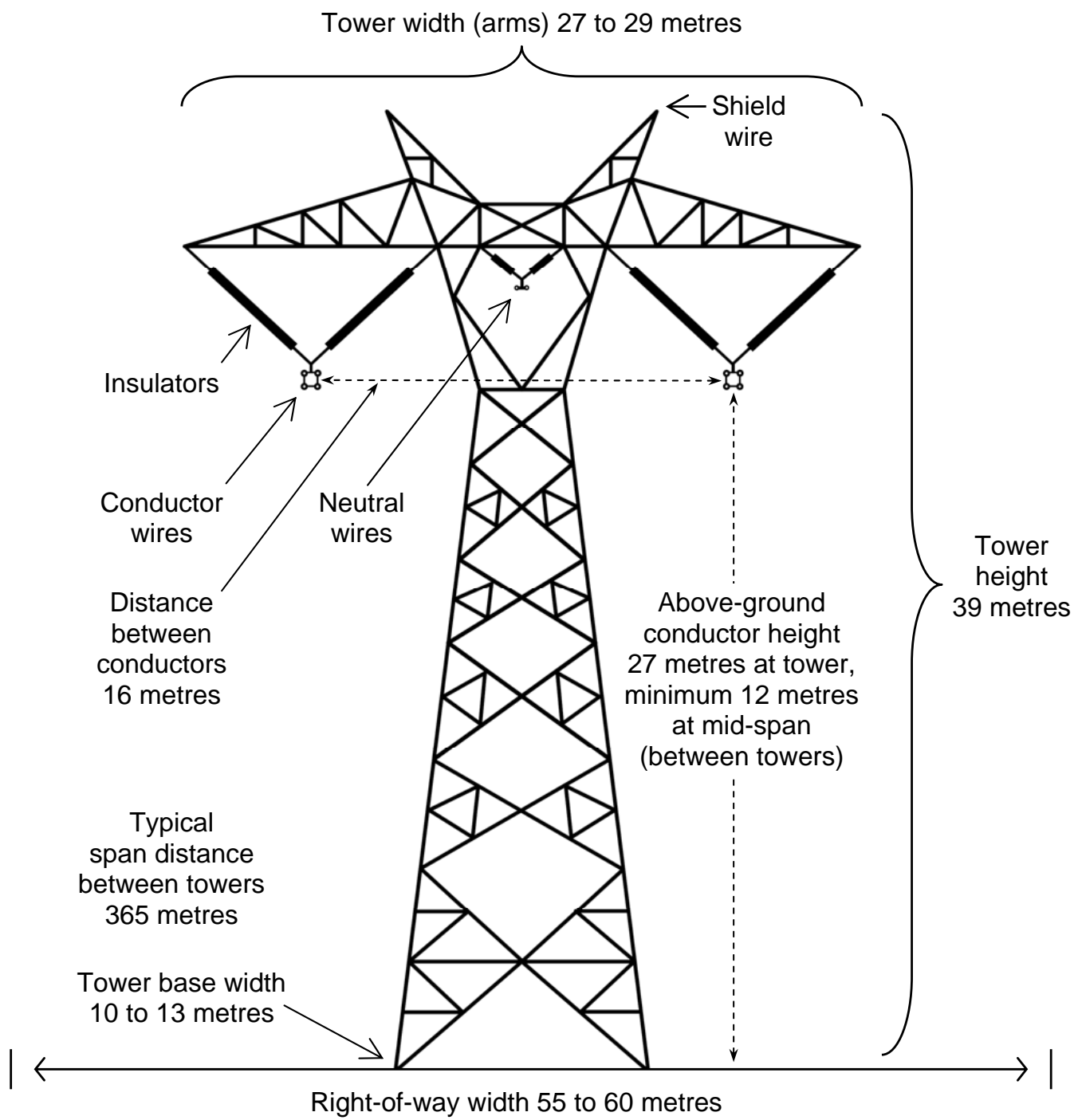
works for you

AC-DC Converter Stations

- Needed at each end of the line to convert power from alternating current (AC) to direct current (DC), and from DC to AC.
- Fenced area is about 500 by 500 metres (1640 by 1640 feet).
- Northeast site to be near the planned Heartland substation in the Gibbons-Redwater area. Requires 500 kV AC lines between new site and Heartland substation.
- Southeast site to be near transmission lines in the West Brooks area. Requires 240 kV AC lines to connect to the existing transmission lines.



Typical 500 kV HVDC Lattice Tower



Transmission Line Quick Facts

(All numbers are typical and approximate, and will vary with final route and design.)

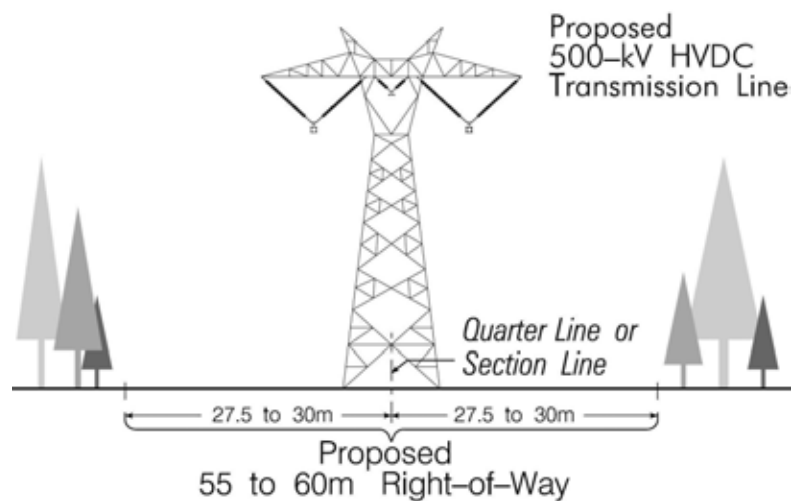
Total length:	500 kilometres
Total towers:	1500
Span between towers:	365 metres (1200 feet)
Tower height:	39 metres (128 feet)
Tower width (at arms):	27 to 29 metres (89 to 95 feet)
Max. tower base (square):	13 metres (43 feet)
Min. conductor height:	12 metres (39 feet)
Total wires:	2 sets of 4 conductor wires, 1 set of 2 neutral return wires, 2 sets of overhead shield wires
Right-of-way width:	55 to 60 metres (180 to 197 feet)
Total right-of-way:	2750 hectares (6800 acres)

ATCO Electric

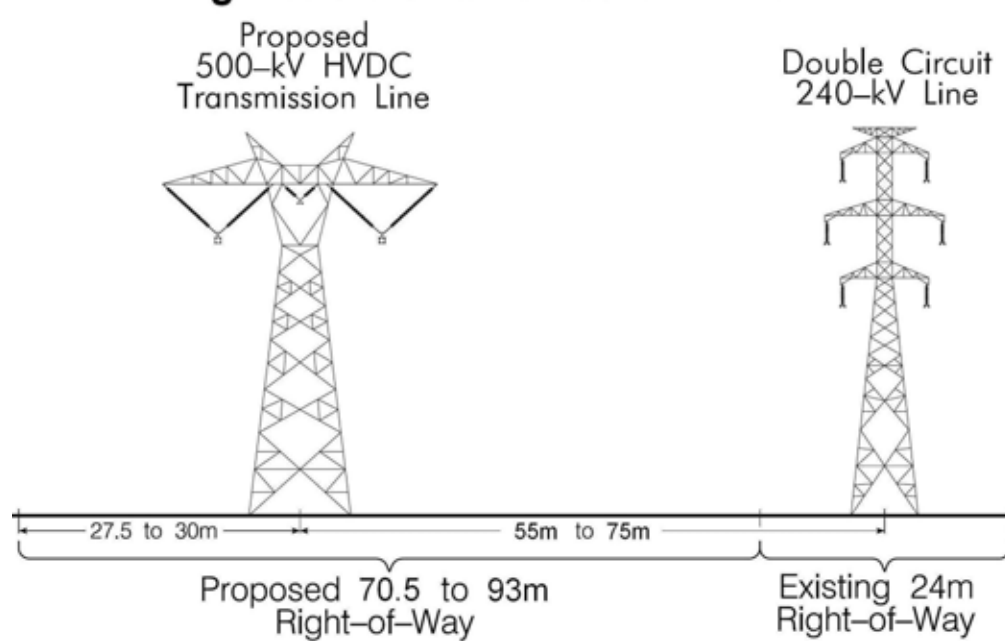
works for you

Typical 500 kV HVDC Right-of-Way

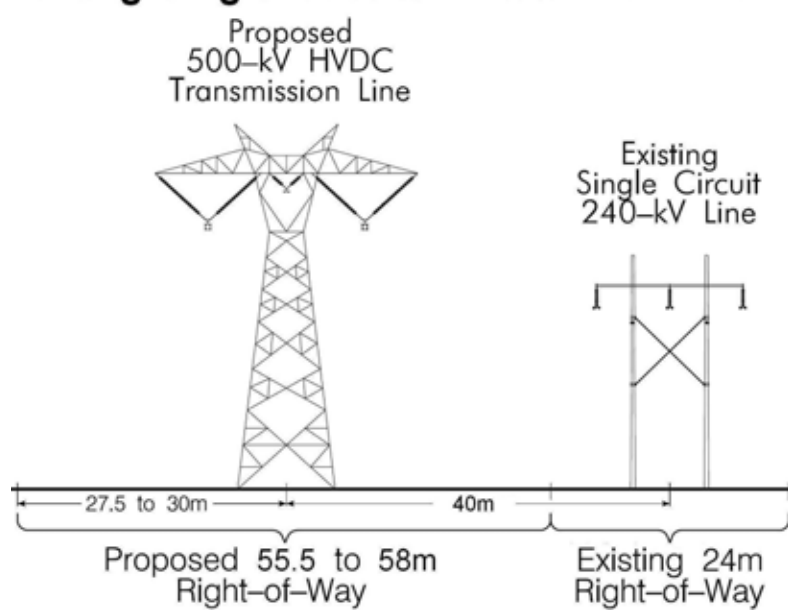
Cross-Country or Along Quarter Lines & Section Lines



Along Double-Circuit 240-kV Power Line



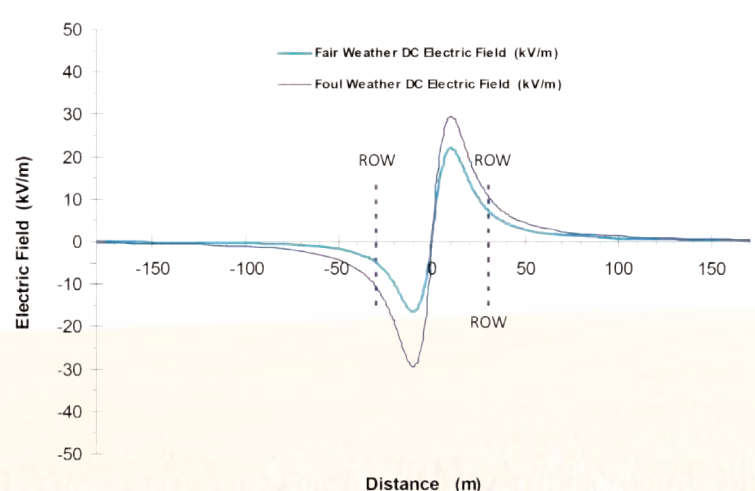
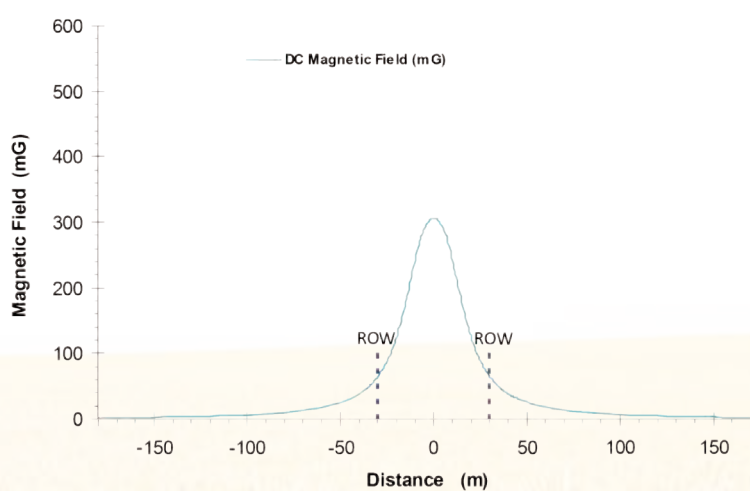
Along Single-Circuit 240-kV Power Line



Right-of-way widths may vary with final locations and designs. Additional right-of-way may be needed for vegetation clearing, larger structures, separation from other facilities and/or access.

Direct Current Electric and Magnetic Fields

- Electric and magnetic fields (EMF) are fields of force produced by electric voltage and current.
- Direct current (DC) does not cycle like alternating current (AC) and so its fields are referred to as static. Static fields also occur naturally in our environment.
- In Alberta, we live in a static magnetic field of about 580 milligauss (mG), produced by the Earth's core. The proposed DC transmission line will generate a static magnetic field level of about 300 mG. Combined with the Earth's field, the field level below the DC line would be about 650 mG (the fields do not add directly).
- The recommended limit for public exposure to static magnetic fields is 1,180,000 mG (ICES). A special limit of 5,000 mG is recommended for people who rely on cardiac pacemakers or other implanted medical devices (ICNIRP).
- Static electricity on a hairbrush, "static cling" on clothing, or walking across a carpet can produce static electric field strengths of 100 to 500 kilovolts per metre (kV/m). The maximum static electric field strength below the proposed DC line will be up to 30 kV/m.
- Static electric fields cannot penetrate animal tissue, so the public exposure guideline of 25 kV/m (ICES) is not based on health concerns. This is the level at which a person can perceive the static electric field.
- Electric and magnetic fields diminish rapidly with distance from the line.



Direct Current Electrical Effects

- Water droplets, dust, or other contaminants on the conductors can lead to a tiny electric discharge, called “corona”.
- When corona is present on a transmission line, it produces an audible buzzing noise, electromagnetic interference or “radio noise”, and electrically charged molecules called ions.
- The Alberta Utilities Commission’s most stringent limit for audible noise is 40 dBA, measured at the nearest residence, at night. The DC line will be designed to meet this limit at the edge of the right-of-way.
- Radio noise has been known to interfere with AM radio and analog television reception, but usually only when you are very close to or directly beneath the line.
- Modern communication devices such as satellite TV, FM radio, cell phones, wireless internet, two-way radios and GPS operate at much higher frequencies and rarely experience interference from radio noise.
- ATCO Electric observes all Canadian and Alberta electrical codes regarding communication interference, and measures radio noise levels to ensure prescribed limits are met.
- If communication interference occurs, ATCO Electric will work to rectify the condition if it is determined the transmission facility is the cause.

Environmental Considerations

At the heart of ATCO Electric's environmental efforts is a commitment to responsible development. Whether we are building new power lines or working on existing ones, we do our best to minimize impacts to environmentally sensitive areas such as wetlands and waterways, wildlife habitat, migratory routes, designated historical sites, parks and other protected areas.



- ATCO Electric conducts clearing, construction, reclamation and subsequent activities in accordance with Alberta Environment's "Environmental Protection Guidelines for Electric Transmission Lines" and complies with all relevant Federal and Provincial statutes and regulations pertaining to environmental issues.
- Our activities follow the terms and conditions of right-of-way agreements and Crown easements, and comply with all applicable laws, regulations and good utility practices.
- We take the necessary measures to address environmental concerns identified through environmental protection planning and in consultation with landowners and agencies.

Environmental Protection Planning

ATCO Electric meets or exceeds all regulatory and environmental agency requirements.

Our environmental and social setting reviews consider:

- Soil characteristics and sensitivity
- Air quality and noise impact from construction and operation
- Water body crossings
- Fish and fish habitat
- Wetlands
- Vegetation—presence of both rare plants and weeds
- Wildlife habitat
- Historical resources

ATCO Electric's construction and mitigation plan includes:

- Field survey to identify protected wildlife habitats and rare plants
- Use of previously disturbed sites for material yards and construction camps where practicable
- Geotechnical work to optimize foundation design
- Topsoil salvage and restoration where necessary
- Facility design to meet audible noise regulations
- Site clean up and reclamation
- Crop protection measures—cleaning practices to avoid transfer of soil-borne diseases like clubroot

Inspections will be conducted during construction to ensure the planned mitigation is implemented. Regular monitoring and maintenance of the facilities associated with the right-of-way will also be conducted during operation including: fences, gates, culverts, permanent all-weather access roads and measures that address soil erosion and weed control.

Land Access & Construction Stages

Early access for examinations & survey

- Environmental, archaeological, soil/geo-tech, etc.

Right-of-way preparation

- Clear trees
- Establish and prepare access & working areas

Foundation installation

- Excavate if required
- Deliver/move material
- Install steel or concrete footings

Tower installation

- Deliver tower materials
- Assemble and erect towers

Stringing

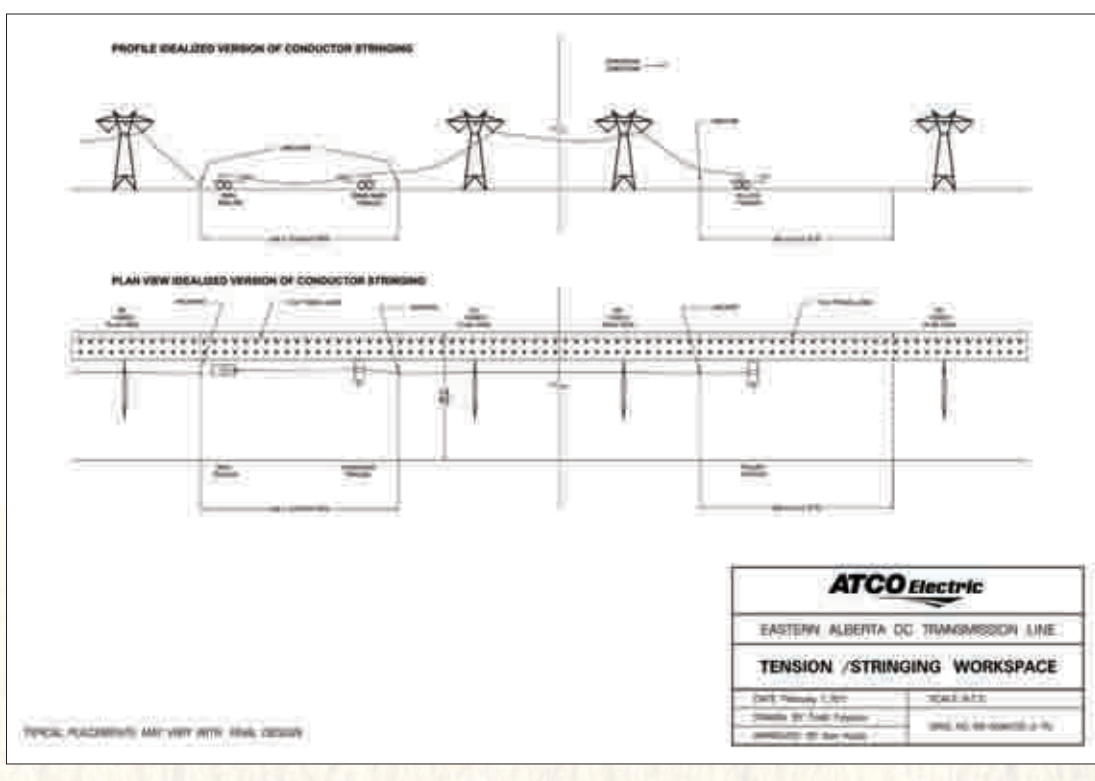
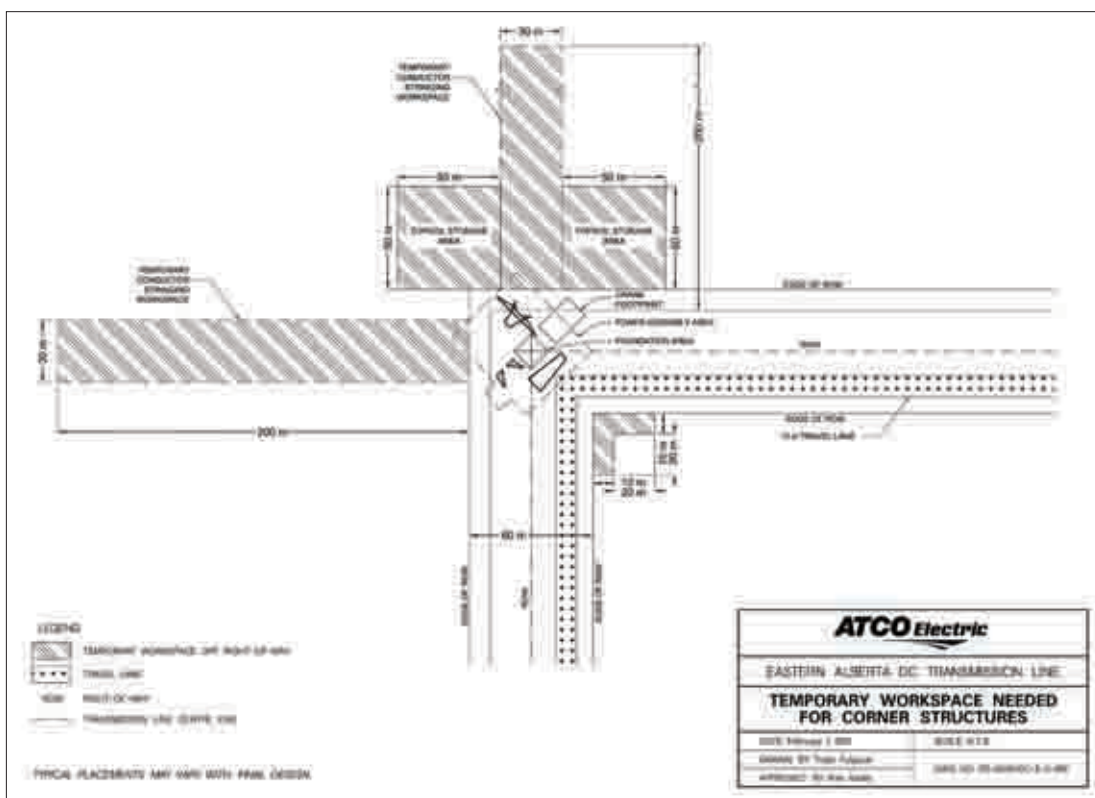
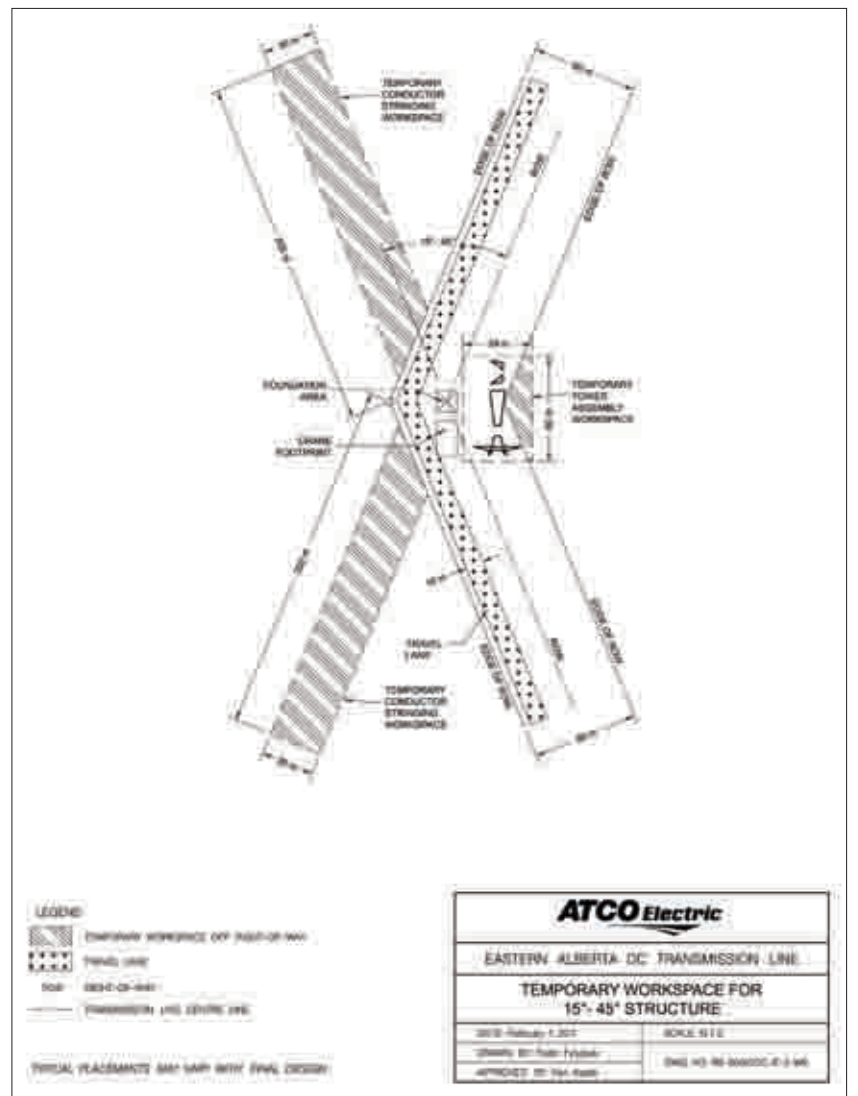
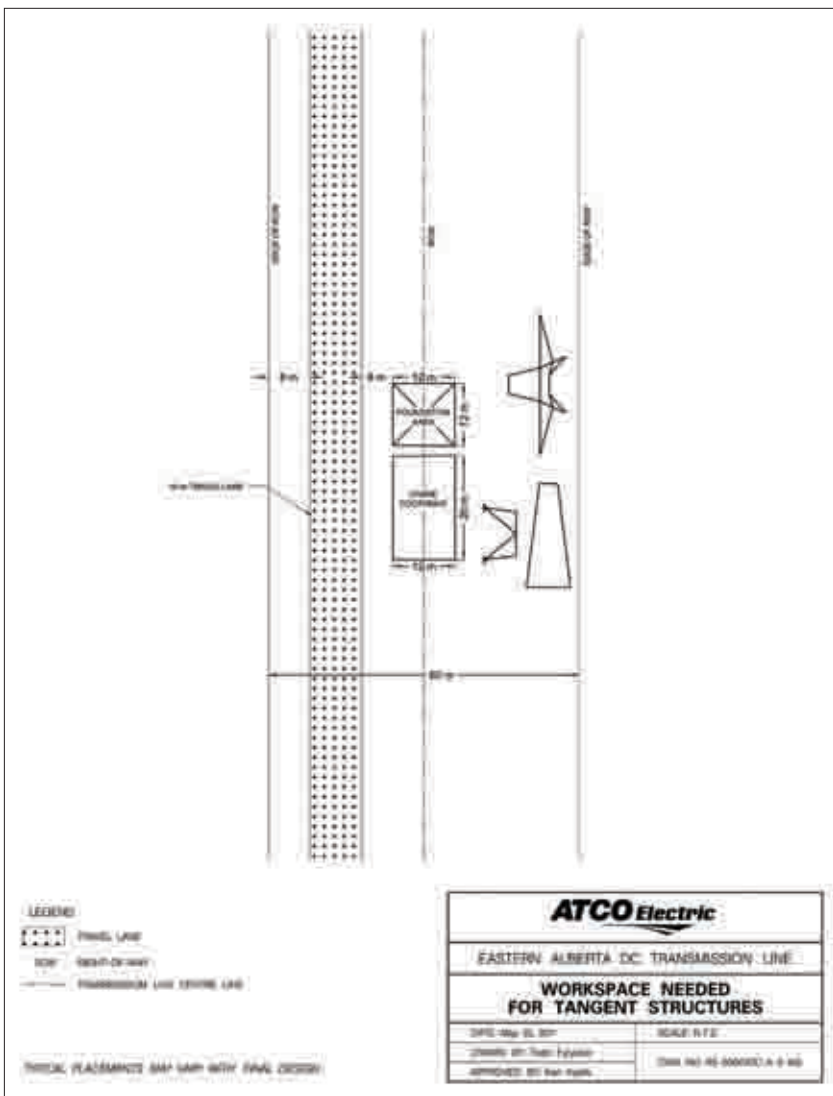
- Deliver wire reels
- Pull up and tie in the wires

Reclamation

- Clean up site
- Restore soil, fences, etc.

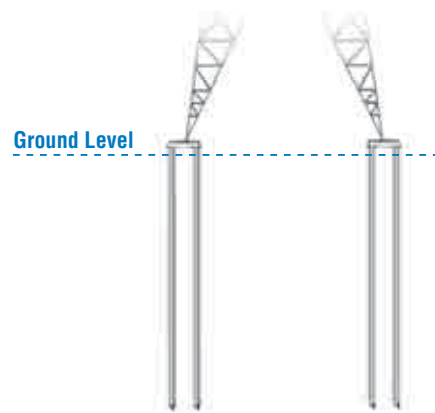


Workspace Requirements



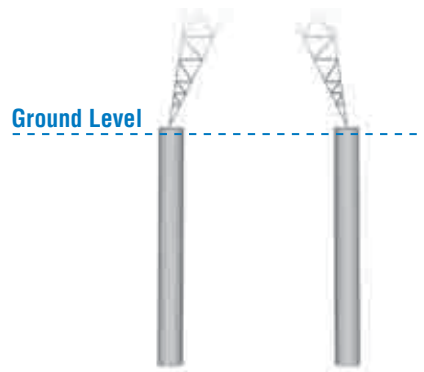
DC Transmission Line Foundation Types

Driven Pile Foundation



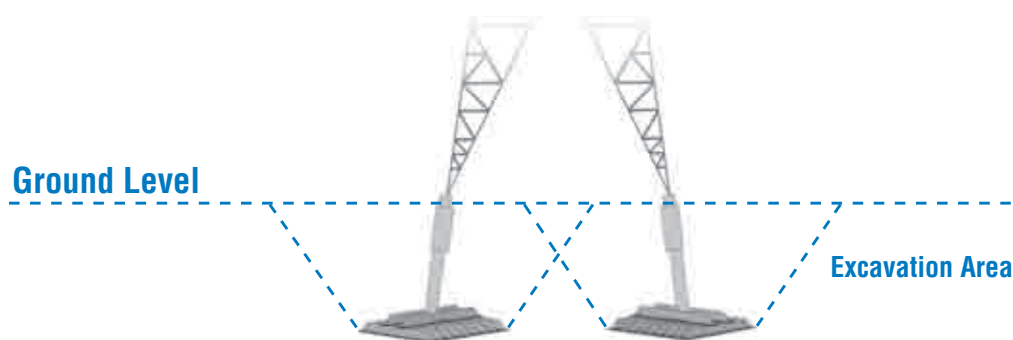
Used for tangent (in-line) structures or light to medium angle structures (where there is less than a 15 degree change in line direction). Foundation depth will vary between 10 and 15 metres depending on soil conditions.

Concrete Pier Foundation



Used for dead-end or heavy angle structures or for tangent (in-line) structures where ground conditions do not allow for driven pile foundations. Concrete pier foundations consist of four augured holes filled with reinforced concrete. Foundation depth will vary between 10 and 15 metres depending on soil conditions.

Grillage Footing Foundation



Typically used as an alternative for structures where ground conditions such as rocky terrain do not allow for driven pile or concrete pier foundations. Grillage footing is generally back-filled with soil, gravel or concrete. Foundation depth is approximately 3 metres.