ONTARIO ENERGY BOARD

IN THE MATTER OF the *Ontario Energy Board Act, 1998* (the "Act"). S.O.1998, C.15, (Schedule B).

AND IN THE MATTER OF and application by K2 Wind Ontario Limited Partnership for an order or orders pursuant to section 92 and 97 of the *Ontario Energy Board Act, 1998* (as amended) granting leave to construct an electricity transmission line and related facilities to connect the K2 Wind Power Project to the IESO-controlled grid, in Huron County, in the Township of Ashfield Colborne Wawanosh, in Ontario.

AFFIDAVIT of Michael Leitch in the matter of OEB-2012-0458.

I, Michael Leitch, of the Township of Ashfield Colborne Wawanosh, in the County of Huron, in the Province of Ontario, make oath and hereby affirm:

1. I recently retired in September 2012, from Hydro One Networks Incorporated, after 32 years. I have a diploma from Fanshawe College as an Electrical Engineering Technician. I started my career as a Construction Electrical Technician at the Bruce and then moved to the Darlington Generating Stations working in the plants and switch yards. In 1985, I transferred to the Strathroy Area Office and then in 2003, to the Clinton Area Office as an Area Distribution Engineering Technician. I worked out of the Clinton Office until my retirement. My job involved the design of high voltage hydro lines and I have a thorough knowledge and understanding of the design and construction of these lines and the safety issues involved in high voltage situations. I worked on Hydro One's portions of the K1 Wind Project in Ashfield Colborne Wawanosh Township design and as such have knowledge of the matters hereinafter deposed.

2. From reviewing the design presented by K2 Wind Ontario Limited I have concerns that the project is inadequately designed to meet present standards and this raises a multitude of safety issues, especially with the magnitude of danger involved with this high voltage.

The K2 230Kv Underground Transmission Line

3. The proposed 5.1 km 230 Kv underground transmission lines from the K2 Transformer station on Belgrave Road will travel down Lanesville Line on private property then travel across more private property to Glens Hill Road, where they will then go on road allowance to the K2 substation property and into the 500Kv Sub Station on Hydro Line Road. Attached as Exhibit A to my affidavit is a copy of K2's Description of Proposed 230Kv Underground Transmission Line. Attached as Exhibit B to my affidavit is a copy of K2's Location of Proposed Facilities and Transmission Line Segments.

4. K2's 245Kv underground cable installation details show the 245Kv cable at a depth of 1200mm with a 190mm separation. The cables will be placed in crushed limestone and trench back filled with excavated native soil. A warning tape will be installed approximately 0.3m above the cables and will run the length of the underground cables. The K2 installation details do not provide for any additional mechanical protection. The cross sectional given is a distribution standard for voltages less than 69Kv. While this standard may work as a minimum for K2's 34.5KVv lines, I do not believe it will work for the 230Kv lines. Attached as Exhibit C to my affidavit is a copy of K2's Proposed Cross Section of Underground Cable Installation.

5. The CSA standards do not address transmission designs which are greater than 69Kv. Generally, hydro lines at high extreme voltages such as 230Kv for underground cables are not located on road allowances because of the dangers they present. These lines are placed away from the public to restrict access. Attached as Exhibit D to my affidavit is a copy of the ESA Referral to CSA Standards for Minimum Clearances. Attached as Exhibit E to my affidavit is a copy of CAN/CSA-C22.3 NO.7-10. Attached as Exhibit F to my affidavit is a copy of CAN/CSA-C22.3 NO.1-10.

6. One of the portions of the K2 transmission line that is located on private property is at the corner of Glens Hill Road and Lanesville Line. This corner consists of municipal drains which cross this field. K2 has indicated in the description of proposed 230Kv underground cable installation that they will have directional bore streams and road crossings. It is important that K2 have regard to the municipal drains as they will require cleaning out and maintenance work. Despite the fact that there are three municipal drains in the field that the 230Kv line crosses, K2 has not provided any cross sectional drawings for areas of directional boring. It should be noted that as ducts are required in the boring location, there will be an effect to the heat dissipation of the 230Kv cables. K2 has not provided any information regarding the type and size of the ducts to be used. No information about what depth the boring will be at or how low the sections of ducting will be. Additionally, they have provided no information on how the cables will be pulled into the duct work given the size and weight of the 230Kv 1000mcm XLPE insulated cables. Attached as Exhibit G to my affidavit is a copy of K2's Description of Proposed 230Kv Underground Cable.

7. The AEIC Guide CG5 2005 covers cable installations practices, physical limitations which hinder cable-pulling, and equations for successful installation. Cable life is assured by following the limits of tension and side wall pressures presented in the document. Attached as Exhibit H to my affidavit is a copy of an excerpt from the AEIC Guide CG5 2005 Purpose and Scope to Pulling Power Cables.

8. There are some other variables that are of concern in respect of the cables. These other factors include, but are not limited to: the trench profiles, trench materials, trench depths, protection systems, conduits, duct systems, distance, splicing vaults and the conductor itself. The conductor is described as having a 230 Kv rating, 1000mcm, compressed Al with XLPE insulation. The Semiconductor shield type, shield grounding, metallic sheath type, external layer type, ground resistivity (ohms/meters), and cable construction are not provided by K2. These are important for the pulls, splices and cable protection. Attached as Exhibit I to my affidavit is a copy of the AEIC List of Available Rules and Guides.

9. Important information that should be included in an application of this nature is missing. There is no mention of the following:

- Induction studies to be conducted to verify there are no impacts on existing utility services and conformance to CSA C22.3 No.3 and CSA C22.3 No.6.
- Grounding design to address the electro-chemical corrosion of underground metallic structure as per CSA C22.3 No.4.
- Post-construction testing for stray voltage and conformance to CSA C22.3 No.3 and CSA C22.3 No.6. Attached as Exhibit J to my affidavit is a copy of the DWPI Reference TO CSA C22.3 N0.3, CSA C22.3 NO.6 AND CSA C22.3 NO.4 Post-Construction Testing for Stray Voltage.
- Testing for Electromagnetic Fields. EMFs. Dufferin Wind Power states that EMF's will be able to be measured out to 10 feet from centre line of their 230Kv cable.
- Design for marking underground cables for electronic locating. You do not simply hook an underground locator to these high voltage cables.
- Final designs for the five splicing vaults and their locations.
- If splicing vaults are not used, then there is no design for the extra mechanical and electrical protection required since the metal mechanical protective sheath will be cut back to make splices
- Addressing water issues at splicing vault or splice locations. Cable splices do not have the same protection to water penetration as somewhere in the middle of the cable. Attached as Exhibit K to my affidavit is a copy of Pictures of Proposed Splice Locations.
- Final design for splices and splice protection, including design for bonding of sheaths and grounding of the shield and design for the cross bonding link boxes. Different designs for vaults verses direct burial
- The 7km , three phase 27.6 Kv line expansion required to provide service to the Hydro One Switch yard.
- Cross sectional design for multiple circuits of 34.5 Kv cables

10. The high voltage cable that will be used by K2 is not something that can simply be buried a meter underground as proposed by K2. The cables will require more mechanical

protection to ensure that they are safe. The location for the planned 230Kv underground cable is a location where persons will be tilling land, cleaning out ditches, rebuilding roads, installing and repairing drainage tiles, installing fence posts and other utilities will be working on their underground plant.

11. I have been advised by John O'Neil at the CSA and do verily believe that according to CAN/CSA-C22.3 No.7-10 rules, projects with voltages over 69 Kv are done on a case by case design. The rules are clear that they are not applicable to the selection, design, and installation of supply transmission cable that are greater than 69Kv and that conditions not covered by the standard are governed by the equivalent standards in common use or by the authority having jurisdiction.

Hydro One's CABLE and Accessories; DESIGN, SUPPLY AND INSTALLATION of HV & EHV XLPE INSULATED CABLES SYSTEMS. LS-11-148

12. Hydro One has certain standards for installing high voltage cables. These standards include, but are not limited to the following:

- Trench cross-sections shall be as per Hydro One sketches included in the Technical Specification;
- All trenches shall be excavated true to the centerline and grade shown on the approved plan and profile drawing, except where unforeseen interferences are encountered. In such cases, specific approvals shall be obtained from Hydro One for modifications to the centerline and grade;
- The contractor shall, at his own expense, open trial holes along the proposed route as necessary to confirm feasibility of the route;
- Trench bottoms shall be uniform and free of all loose rock, stones, or other foreign matter; and
- Adequate shoring of the trench shall be provided contractor. Water entering the excavation shall be promptly removed and disposed of at all times during construction work, until the structures and backfilling are completed.

Attached as Exhibit L to my affidavit is a copy of Hydro One's Cable and Accessories;

Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems

LS-11- 148 Section 7.2 Trenching

13. In addition to the Hydro One requirements for trenching, there are also requirements relating to the cable bedding and trench backfill. These requirements include, but are not limited to the following:

- Before cable pulling, a bedding material shall be placed in the bottom of the trench, of material and thickness as described in the Technical Specification;
- After the cable is installed, the trench shall be backfilled as indicated in the trench cross section drawing;
- The composition and installation method of the bedding and backfill shall meet the requirements of Hydro One LS-11-046 for compacted limestone screenings, or LS-11-047 for fluidised materials;
- The contractor shall establish a quality control procedure to ensure that the thermal resistivity of the backfill and bedding materials meets the requirements of the Technical Specification; and
- Only soils approved by Hydro One shall be used to backfill the cable trenches for surface reinstatement

Attached as Exhibit M to my affidavit is a copy of the Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.3 Cable Bedding &Trench Backfill

14. Additionally, Hydro One has certain requirements in respect of mechanical protection. These requirements include, but are not limited to the following:

- Except where installed in a duct-bank, permanent tunnel, or directionally drilled, the cables shall be provided with a 25MPa non-reinforced "High Strength FTB" concrete protection, in accordance with LS-11-047. Alternatively, 25MPa non-reinforced concrete protections, as per LS-11-002, may be acceptable with Hydro One's approval. The protection shall be designed either as non-reinforced removable types of "patio stones" or may be made of a poured in place slab with Hydro One approval. Locations of mechanical protections and thickness shall be shown on trench cross-section sketch; and

- Prior to backfilling over the concrete cover, location measurements shall be taken to provide an "as constructed" plan and profile of the completed cable installation.

Attached as Exhibit N to my affidavit is a copy of the Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.5 Mechanical Protection

15. I have been advised by Badriath Comar, a Senior Design Specialist for Engineering Services Stations at Hydro One, and do verily believe that in accordance with the above standards that under no circumstances would 230Kv be installed without some sort of cement mechanical protection. Attached as Exhibit O to my affidavit is a copy of the Hydro One Cross Sectional of High Voltage Underground Trench.

Dufferin Wind Power

16. Dufferin Wind Power in their design for their proposed 230Kv underground line in the Shelbourne area show a 30mm concrete barrier for mechanical protection located below the marker tape in their typical 230Kv ductbank arrangement for direct burial. They also have a cross sectional for directional boring. It shows the ducts at 5000mm. Attached as Exhibit P to my affidavit is a copy of the Dufferin Wind Power's Cross Sectional of 230Kv Underground Cable Proposed Direct Burial and Bored Cross Sections.

17. My review of all the attached data, along with my conversations with the individuals identified in this affidavit, along with my own expertise in the field, lead me to the conclusion that K2 has not provided enough mechanical protection in its design for the 230Kv underground cable. Cables of this voltage require more than a warning tape. A red coloured cement barrier is at least a minimum requirement.

18. In my opinion, there are extreme hazards associated with K2's current proposed design. The limits of the approach are defined in the Construction Regulation, Industrial

Establishments and also in the Electrical Utility Safety Rules published by the Infrastructure Health & Safety Association.

19. There are three classifications of limits of approach to live equipment and these are dependent upon the worker's training and qualifications. The "general" limits of approach are for persons who have not had training on the limits of approach. Between 750 and 150,000 volts, unqualified personnel may work no closer than 3m (10Ft) from live equipment. At 150,000 to 250,000 volts the limit of approach is 4.5m (15ft) and over 250,000 volts unqualified personnel must remain at least 6m (20ft) away from live equipment. These same limits apply to mobile equipment.

20. The questions posed by the above are things such as:

- What is the safe distance to be working near these lines with heavy equipment such as tractors with cultivators, posthole augers, plows or sub-soilers, backhoes cleaning out ditches or fixing drainage tiles or Hydro trucks changing poles?
- When the protective metal sheath is cut back to make splices, the electrical protection it provides in terms of limits approach no longer exist. It is exposed live equipment and must be considered as such. This is one reason splicing vaults are used.
- Extra mechanical protection is required in these areas for the possibility of electrical contact plus the cable is no longer protected against explosion by being incased in protective sheath. This is another reason splicing vaults are used.
- If one of these cables is accidently hit the following explosion could be fatal.
- The cable sheath losses it protective capabilities when damaged or hit.

21. K2's plans call for them to take out 15m wide easements on private property for the route of the 230Kv line. Even with proper mechanical protection, these easement areas should be restricted to no tillage or grass strips. The cable markers will also be an obstacle for farm equipment which can be 60 ft. wide. Unless the depth of the trench is increased by several feet to allow a safe separation, these areas should have restrictions in the easements. A minimum of 1.2 meters of undisturbed soil should be maintained as part

of a safe mechanical barrier. If normal farm practices work the top two feet than this should be added to the trench depth. We had an instance last year in the township where a tractor and cultivator contacted 44Kv and burned up. The operator is lucky to be alive. Attached as Exhibit Q to my affidavit is a Picture of the Tractor Fire after it came in contact with a 44Kv.

22. Additionally, in the K2 proposed design, the portion on road allowance is not clear as to the underground cables' location. It would be impossible to have 15m along the road as the whole road allowance is only 22m. The cables should not be located directly under the ditch bottom where ditch cleanout or erosion can occur. They also should not occur near existing underground utilities (1000mm min separation required Hydro One LS-11-148 section 7.4 clearances). Nor should they be near fences, property lines, hydro poles or catch basins. This would leave the shoulder of the road. Attached as Exhibit R is a copy of Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.4 Clearances

23. I am of the opinion that if K2 is unable to meet the above standards, then they must provide condition guarantees for outages on the 230Kv underground line every time some work is required to take place near their locations.

24. In conversations with Sandy Fleming from K2, he stated that the cables would be located under the road bed. This makes some sense as they would be protected mechanically by the road itself from accidental digging. The Underground Electric Transmission Lines Public Service Commission of Wisconsin requires a reinforced road surface layer and buried concrete barrier over the thermal backfill for transmission wires. Attached as Exhibit S is a copy of an excerpt from the Underground Electric Transmission Lines Public Service Commission of Wisconsin.

25. The portion of the 230Kv located on road allowance is planned for the south side of Glens Hill Road from Splice location 1 to Splice location 2, about 950 meters in length. The ditch along this south side of Glens Hill Road is 1.2 meters deep. The bottom of the

ditch is 3.1 to 4 meters from property line with a steep incline to the traveled portion of the road located 6.4 meters from property line. K2 states that the K2 Transmission Line located within road allowance will be 3 to 3.5 m from residential property lines. K2 will make reasonable efforts to install the line (i) between the roadside drainage ditch and the boundary of road allowance; and (ii) at depth that will avoid conflicts with other infrastructure. But the bottom of the ditch is already in this 3 to 3.5 meter location. There are many trees and at least one bell box along the property lines. If the K2 Transmission Line is installed between the ditch and road it will be cutting into the 1.2m steep bank along the road. This will make the trench right next to the road and 2.4 meter or 8 feet deep if their design depth is used. The trench in this location should really be 6 to 8 feet below final grade to protect against the effects of frost in road bed areas. This trench will have to remain totally open while the cables are installed. This installation will include the installation of the thermal back fill material, ducts (if used), cables and cement protective cover or cement encasement. With this deep trench open for days right along the road, road lane closures will be required. Plans for future ditch clean outs and deepening must also be taken into consideration for the design of cable depth of installation. Attached as Exhibit T to my affidavit is a copy of Pictures of K2'S Proposed Road Allowance Route Ditches

26. In conversations with Paul Wendelgass from K2 after Ashfield Colborne Wawanosh Township meetings, he repeatedly stated that direct burial was all that was required and that no additional mechanical protection was required. He also could not give any other examples of 230Kv underground cables installed as he said K2's design would be.

27. In K2 Wind's response to the Resident Group's interrogatory, two examples of other 230Kv underground cable installations were given. They are first the Halton Hills Generating station: a 230Kv transmission line comprising approximately 2km of direct buried 230Kv cables as well as a crossing under Highway 401. The line is installed on both private and public lands in a rural area. And second the Wolfe Island Wind Project: includes a 230Kv transmission line that comprises approximately 4.5 km of underground

cable and 7.6 km of submarine cable on both public and private land, through both rural and urban areas

28. The Halton Hills Generating Station 230Kv lines consist of six cables. The length of the cables are 1,480m. The installation consisted of six eight inch ducts encased in concrete running along an existing regional road. The project also included crossing Highway 401 with 8 separate parallel 8 inch diameter conduits. It also included constructing four poured in place concrete splicing bays. The installed ducts are encased in concrete along the regional road. It would be expected that the same standards would be used along the public road allowance in Ashfield Colborne Wawanosh in respect of the K2 project. That being the cables are installed in ducts, encased in concrete. Attached as Exhibit U to my affidavit is a copy of the Halton Hills Generation Station 230Kv Underground Cables.

29. The Wolfe Island Wind Project is the other project identified by K2. Before the Ontario Energy Board in respect of this project, it was stated that: "The cable is buried at 1.2 metres below surface. The cable itself is buried in sand bedding to protect it from mechanical damage, and then above that there will be 100-millimetre layer of concrete that is dyed red for identification in case someone digs in that area. Then above that, there will be a warning tape that is placed above the concrete, so if anybody digs down towards the cable, they will see the warning tape first, identifying to them that there is a buried cable below that portion. Then the concrete provides mechanical protection, so if it is a backhoe, they won't be able to come into contact with the cable if they are digging in that area." The Wolfe Island Wind Project, like K2 is a Samsung affiliated project. One would expect that as such, the company would be versed in the design standards it previously employed for a project of this magnitude. As an example, red dyed concrete was considered a required mechanical safety barrier for heavy equipment working in the area. Attached as Exhibit V to my affidavit is an excerpt from the Ontario Energy Board, File No; EB-2007-0034 (Kingston), pg. 40, lines 15 to 28 and pg. 41, lines 1 to 3.

30. John Smith and Rachel Mosier, chair and past chair of the Insulated Conductor Committee (ICC) for the institute of IEEE wrote a small article on Education Empowers

Cable Engineers for Transmission & Distribution World. The following are two topics from this paper.

> **Installation Challenges**: Most utilities have a field workforce experienced in installing overhead and underground systems. Some of the newer wind farm construction and installation companies, however, often have a steep learning curve, especially when it comes to installing the collector systems and its associated cables. As a result, utility engineers often discover improper installation of underground connectors, in addition, poor jointing leads to partial discharge and subsequent failures. Utilities also face another problem: the use of inadequate backfill material for collector cables systems at wind farms. If installers do not adequately test for soil resistivity and make necessary adjustments, the utility often can face serious problems with cable overheating due to improper design of the thermal resistivity of the installed cable systems.
>
> **Lack of Standards** : at this point there is no industry standards for underground distribution for renewable energy. The ICC, however has been working with discussion groups to write standards and guidelines that utilities can use for the installation and testing of wind farm collector cable systems.

Attached as Exhibit W to my affidavit is a copy of Education Empowers Cable Engineers.

31. Based on all my years of experience in working with and designing electrical infrastructure, it is my belief that <u>no approvals should be given at this time</u>. Too much of the final design is unknown. There are too many safety concerns and questions that have not been addressed. K2 has only done two soil tests along the proposed 5.1km route. This does not give a true example of the existing soil resistivity. How can you start a design if you don't know what is there? Even the cable size is dependent on how it is installed and in what it is installed in. What has been presented by K2 has too many unknown variables to be approved. The design presented by K2 Wind does not provide any mechanical protection and this does not meet current construction standards for a line of this high

voltage. All existing and proposed examples of underground 230KV transmission lines in Ontario have mechanical protection provided.

32. K2 in their response to the Residents Group interrogatory questions K2 fails to adequately answer questions in regards to public safety and the proposed design.

33. ACW is a small rural township. They have no expertise in the field of high voltage transmission. Going forward, the Board cannot leave an issue of public safety to unqualified Township staff to decide what is the best design to meet the installation requirements on road allowance. ACW Township has the final review of K2 Plans of the installation work before installation work begins under the municipal road use agreement. But they are to review the Plans without delay after receipt from K2. If the only examples that K2 can give of 230Kv Underground Transmission are the Wolfe Island Wind Project and the Halton Hills Generation Project, then they should be at least building to these standards that have been used in other municipalities. The K2 230Kv Underground Transmission should be in ducts encased in concrete on Township road allowance. The remaining portions under private property should have a protective red dyed concrete cover above the thermal material. The trench for all 6 sections should be at least 2 feet deeper. Splicing vaults should be used because of the extra protection they afford to the cables weak spots, the splices. All boring locations should be 5m deep for road and water course crossings. Corners should not be cut when it comes to public safety especially when the hazard is 230,000 volts. If the design does not meet these requirements it should not be accepted or given permission to construct.

34. I make this affidavit in support of the position being advanced by the ACW Group of interveners, and for no other or improper purpose.

AFFIRMED BEFORE ME in the Township of Ashfield Colborne Wawanosh, in the County of Huron, in the Province of Ontario this 22nd day of MARCH, 2013

A COMMISSIONER for the Swearing . Of Oaths

Mark Becker, Clerk Treasurer
Township of
Ashfield-Colborne-Wawanosh
Commissioner for taking Oaths etc.

Michael Leitch

LIST OF EXIBITS

Exhibit A : K2's Description of Proposed 230KV Underground Transmission Line.

Exhibit B: K2's location of proposed facilities and transmission line segments

Exibit C : K2's Proposed Cross Section of Underground Cable Installation

Exhibit D: ESA ESA Referal to CSA Standards for Minimum Clearances

Exhibit E: CAN/CSA-C22.3 NO.7-10

Exhibit F: CAN/CSA-C22.3 NO.1-10

Exhibit G: K2'S Description of Proposed 230kv Underground Cable

Exhibit H: AEIC Guide CG5 2005 Purpose and Scope to Pulling Power Cables

Exhibit I: AEIC List of Available Rules and Guides

Exhibit J: DWPI Reference TO CSA C22.3 N0.3, CSA C22.3 NO.6 AND CSA C22.3 NO.4 Post-Construction Testing for Stray Voltage

Exhibit K: Pictures of Proposed Splice Locations

Exhibit L: Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.2 Trenching

Exhibit M: Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.3 Cable Bedding &Trench Backfill

Exhibit N: Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.5 Mechanical Protection

Exhibit O: Hydro One Cross Sectional of High Voltage Underground Trench

Exhibit P: Dufferin Wind Power's Cross Sectional of 230kv Underground Proposed Direct Burial and Bored Cross Sections

Exhibit Q: Picture of the Tractor Fire after it came in contact with a 44Kv.

Exhibit R: Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.4 Clearances

Exhibit S: Underground Electric Transmission Lines Public Service Commission of Wisconsin

Exhibit T: Pictures of K2'S Proposed Road Allowance Route Ditches

Exhibit U:Halton Hills Generation Station 230Kv Underground Cables

Exhibit V: Ontario Energy Board, File No; EB-2007-0034 (Kingston), pg. 40, lines 15 to 28 and pg. 41, lines 1 to 3.

Exhibit W : Education Empowers Cable Engineers

This is Exhibit "A " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

A Commissioner For Taking Affidavits

Mark Becker, Clerk Treasurer
Township of
Ashfield-Colborne-Wawanosh
Commissioner for taking Oaths etc.

Exhibit A : K2's Description of Proposed 230KV Underground Transmission Line.

K2 Transmission Line

The K2 Transmission Line is an underground, 230 kV transmission line that will extend approximately 5.1 km, from a point of interconnection with the K2 Transformer Station, to a point of interconnection with the K2 Substation. The line will connect to the K2 Transformer Station site on the east side of the property and to the K2 Substation site on the south side of the property.

Along its 5.1 km route, the K2 Transmission Line will cross two streams and three roads.[1] All crossings will be directionally drilled, with the transmission line installed inside a plastic conduit.

The K2 Transmission Line cable will be laid in trenches approximately 1.0 m wide by 1.2 m deep. The trenches will be excavated using backhoes, trenchers or tracked excavators. The cables will be bedded in crushed limestone (or similar bedding material) and the trench will be backfilled with the excavated native soil. Warning tape will be installed approximately 0.3 m above the cables and will run the length of the

[1] Note that for the crossing under Lanesville Line, the K2 transmission line will cross under a stream as well.

underground cables. The top 0.1 m of soil will be stripped and laid beside the trench to reinstate the original ground level immediately after the installation of the underground cables.

A cross-sectional diagram showing how the K2 Transmission Line will sit in the trench, relative to the road, is included at Exhibit E, Tab 5, Schedule 1.

K2 Substation

This is Exhibit "B " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

A Commissioner For Taking Affidavits

Mark Becker, Clerk Treasurer
Township of
Ashfield-Colborne-Wawanosh
Commissioner for taking Oaths etc.

Exhibit B: K2's Location of Proposed Facilities and Transmission Line Segments

Filed: December 5, 2012
Exhibit D
Tab 2
Schedule 1
Page 1 of 2

LOCATION OF PROPOSED FACILITIES

The K2 Substation will occupy approximately 3 hectares of the 40 hectare site, at the northwest corner of Glens Hill Road and Tower Line in ACW Township.

The K2 Transformer Station will occupy approximately 0.5 hectares of the 4.05 hectare site, at the southwest corner of Belgrave Road and Lanesville Line in ACW Township.

The K2 Transmission Line will be located entirely within ACW Township. It will extend, underground,[1] from the K2 Transformer Station, approximately 5.1 km, to the K2 Substation, as more particularly described as follows below:

- **Segment #1:** commencing at the K2 Transformer Station, 1.95 km in a southwesterly direction, on private land, parallel to and on the west side of Lanesville Line, to a stream crossing of Lanesville Line;
- **Segment #2:** 0.25 km in a southwesterly direction, on private land, parallel to and on the east side of Lanesville Line;
- **Segment #3:** 0.35 km in a southeasterly direction, on private land, perpendicular to Lanesville Line, close to the base of Turbine 233;
- **Segment #4:** 0.7 km in a southwesterly direction, on private land parallel to Lanesville Line and going beneath a small stream before crossing the ACW township municipal right-of-way to reach the south side of Glens Hill Road;
- **Segment #5:** 1.07 km in a southeasterly direction along Glens Hill Road, within the ACW Township municipal right-of-way, until entering the west corner of the K2 Substation property; and
- **Segment #6:** 0.78 km in an easterly direction on the K2 Substation property to a point of interconnection with the K2 Substation.

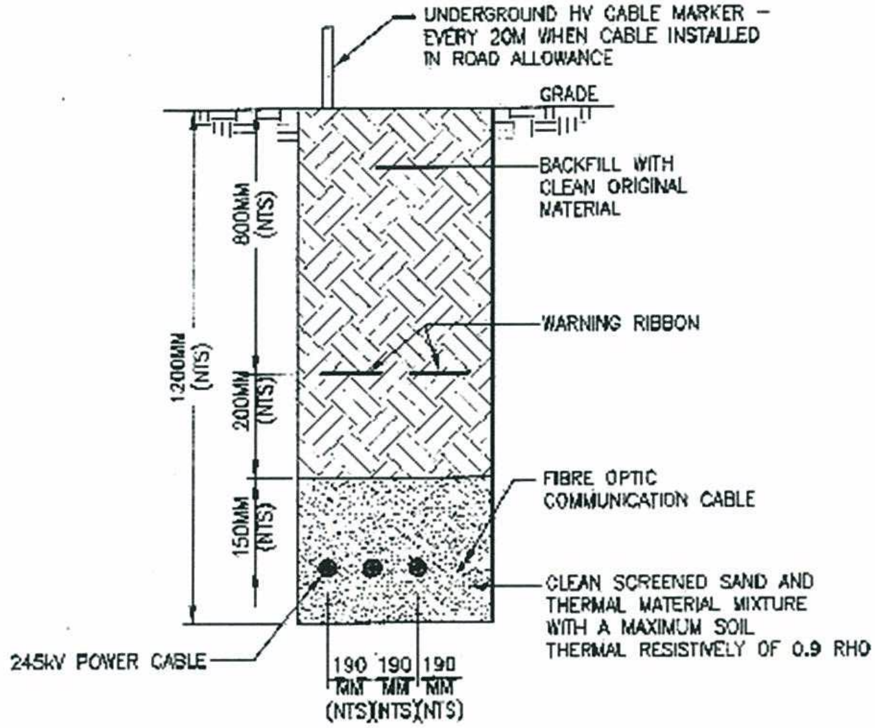
[1] The K2 Transmission Line will be buried underground for the entire length of its 5.1 km route.

This is Exhibit "C " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

A Commissioner For Taking Affidavits

Mark Becker, Clerk Treasurer
Township of
Ashfield-Colborne-Wawanosh
Commissioner for taking Oaths etc.

Exhibit C : K2's Proposed Cross Section of Underground Cable Installation



TYPICAL DIRECT BURIAL SECTION
N.T.S.

This is Exhibit "D " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

A Commissioner For Taking Affidavits

Mark Becker, Clerk Treasurer
Township of
Ashfield-Colborne-Wawanosh
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Exhibit D: ESA Referal to CSA Standards for Minimum Clearances

What are the CSA Standard minimum clearances?

The minimum clearances are outlined in the CSA Standard C22.3, No. 1-01 Overhead Systems and CSA Standard C22.3, No. 7-94 Underground Systems. To determine what is acceptable or not in terms of clearances it is important for distributors to have the most recent copy of the CSA Standards and ensure that the minimum requirements are incorporated into their standard design. The Standards can be purchased by calling 1-800-463-6727 or the on-line store at www.csa.ca

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This is Exhibit "E " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

A Commissioner For Taking Affidavits

Mark Becker, Clerk Treasurer
Township of
Ashfield-Colborne-Wawanosh
Commissioner for taking Oaths etc.

Exhibit E: CAN/CSA-C22.3 NO.7-10

CAN/CSA-C22.3 NO. 7-10

Overview | Detailed Information

Detailed Information

Update #1 was published as notification that this is now a National Standard of Canada.

Update(s) to this standard are available. To download any updates and/or register for email notification of future updates. **click here**.

Preface

This is the fourth edition of CSA C22.3 No. 7, Underground systems, one of a series of Standards issued under the Canadian Electrical Code, Part III. It supersedes the previous editions published in 2006, 1994, and 1986.

Scope

1.1 This Standard applies to the lines and equipment associated with underground electric supply and communication systems located entirely outside buildings and fenced supply stations. See CAN/CSA-C22.3 No. 61936-1 for installations within fenced or indoor supply stations.

1.2 Existing installations, including maintenance replacements, additions, and alterations, meeting the original designs that currently comply with prior editions of this Standard need not be modified to comply with this edition of the Standard, except as might be required for safety reasons by the authority having jurisdiction.

1.3 This Standard, which forms part of the Canadian Electrical Code, Part III, covers the requirements for construction of underground systems and includes electric supply and communication circuits that are installed alone, in joint use, or in proximity to each other or other facilities, and that (a) cross each other or other facilities; (b) cross under railways or highways; or (c) run under ground likely to be traversed by vehicles or pedestrians.

1.4 The requirements of this Standard do not constitute complete construction specifications but stipulate the minimum design requirements with regard to (a) safety to persons; (b) continuity of service; and (c) protection of property.

1.5 The selection, design, and installation of supply transmission cables (_>d69 kV) are not addressed in this Standard.

1.6 Conditions not covered by this Standard are governed by equivalent Standards in common use or by the authority having jurisdiction.

This is Exhibit "F " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

A Commissioner For Taking Affidavits

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Exhibit F: CAN/CSA-C22.3 NO.1-10

CAN/CSA-C22.3 NO. 1-10

Overview | Detailed Information

Detailed Information

Update #1 was published as notification that this is now a National Standard of Canada.

Update(s) to this standard are available. To download any updates and/or register for email notification of future updates **click here**.

Preface

This is the ninth edition of CSA C22.3 No. 1, Overhead systems, one of a series of Standards issued under the Canadian Electrical Code, Part III. It supersedes the previous editions, published in 2006, 2001, 1987, 1985, 1979, 1976, and 1970, and the original edition, which was published as a series of five Standards in 1959, 1953, 1947, and 1940.

Scope

1.1 This Standard applies to electric supply and communication lines and equipment located entirely outside of buildings and fenced supply stations.

1.2 Existing installations (including maintenance replacements, additions, and alterations) meeting the original designs that currently comply with prior editions of this Standard, need not be modified to comply with this edition of the Standard, except as might be required for safety reasons by the authority having jurisdiction.

1.3 This Standard, which forms part of the Canadian Electrical Code, Part III, provides requirements for the construction of overhead systems. It covers electric supply and communication circuits that (a) are installed alone; (b) are in joint use; (c) are in proximity to each other or other facilities; (d) cross each other or other facilities; and (e) cross railways, highways, navigable waterways, or land that is likely to be traversed by vehicles or pedestrians.

1.4 This Standard presents a choice between deterministic and reliability-based design methods. Reliability-based design methods are covered by CSA C22.3 No. 60826.

1.5 The requirements contained in this Standard do not constitute complete design and construction specifications, but rather prescribe the minimum design requirements that are most important to the (a) safety of persons; (b) continuity of service; and (c) protection of property.

1.6 Conditions not covered by this Standard are governed by equivalent Standards in common use or by the authority having jurisdiction.

This is Exhibit "G " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

A Commissioner For Taking Affidavits

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Exhibit G: K2'S Description of Proposed 230kv Underground Cable

3.

Identification	L20
Ampacity - continuous	500 A
Voltage Rating	245 kV
Basic Impulse Level	1050 kV
Installation	Underground cable
Conductors per phase	1
Conductor type	Compressed Al
Conductor size	1000 MCM
Insulation type	XLPE
Max Operating Temp	90°C
Circuit Length	5,100 meters - approximately
Geometry	Horizontal flat with 0.2 meter phase spacing Minimum burial depth 1.0 meters

This is Exhibit "H " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH, 2013

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Exhibit H: AEIC Guide CG5 2005 Purpose and Scope to Pulling Power Cables

PURPOSE

AEIC Guide CG5 2005 covers cable installation practices, physical limitations which hinder cable-pulling, and equations for successful installation. Cable life is assured by following the limits of tension and side wall pressures presented in the document.

SCOPE

AEIC CG5 Guide outlines pulling parameters for installing power cable(s) into conduit. The Guide only provides mathematical models for pulling single and three cables. A variety of pulling guides and computer models are available from cable manufacturers, research organizations, and lubricant suppliers. The Guide is expected to complement these publications and expand their models and practices.

The AEIC Cable Engineering Committee (AEIC-CEC) resolved conflicting data by selecting the model best suited for utility practice from several resources on cable-pulling. Removing and installing cable involves a complicated combination of variables which are often hard to predict and control. The information presented in the Guide is a compilation of data obtained through mathematical modeling, experimentation, and experience.

This is Exhibit “I ” referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit I: AEIC List of Available Rules and Guides

Guide for Establishing the Maximum
Operating Temperatures of Impregnated Paper and Laminated Paper Polypropylene Insulated Cables
AEIC CG1-07 (4th Edition) June 2007 - $45.00

Guide for Installation of Pipe-Type Cable Systems
AEIC CG3-2005 (2nd Edition) January 2005 - $50.00

Guide for Installation of Extruded Dielectric Insulated Power Cable Systems Rated 69 KV Through 138 KV
AEIC CG4-97 (2nd Edition) January 1997 - $17.00

Underground Extruded Power Cable Pulling Guide
AEIC CG5-(2nd Edition) - 2005 - $50.00

Click here for the Purpose and Scope Statement for CG5

Guide for Establishing the Maximum Operating Temperatures of Extruded Dielectric Insulated Shielded Power Cables
AEIC CG6-05 (2nd Edition) November, 2005 - $25.00

Guide for Replacement and Life Extension of Extruded Dielectric 5-35 KV Underground Distribution Cables
AEIC CG7-2005 (2nd Edition) 2005 - $26.00

Guide for Electric Utility Quality Assurance Program for Extruded Dielectric Power Cables.
AEIC CG8-2010 (3rd Edition) March 2010 - $40.00

Guide for Installing, Operating, and Maintaining Lead Covered Cable Systems Rated 5KV through 46KV
AEIC CG9-00 (1st Edition) May 2000 - $20.00
Reaffirmed in June 2008

Guide for Developing Specifications for Extruded Power Cables Rated 5 through 46 kV (1st Edition)
AEIC CG10-10 (2nd Edition) September 2010- $40.00

Guide for Reduced Diameter Extruded Dielectric Shielded Power Cables Rated 5 through 46kV
[illegible]

This is Exhibit "J " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit J: DWPI Reference TO CSA C22.3 N0.3, CSA C22.3 NO.6 AND CSA C22.3 NO.4 Post-Construction Testing for Stray Voltage

WHAT ARE EMF'S

Post-Construction Testing for Stray Voltage

During final design of the proposed transmission line, induction studies will be conducted to verify impacts on existing utility services (i.e. pipelines, underground cables, etc.) and conformance to CSA C22.3 No.3 "Electrical Coordination" and CSA C22.3 No.6 "Principles and Practices of Electrical Coordination between Pipelines and Electric Supply Lines." Grounding design during final design of the proposed transmission line will also address the electro-chemical corrosion of underground metallic structure as per CSA C22.3 No.4 "Control of Electrochemical Corrosion of Underground Metallic Structures." Remediation options for compliance are also provided within the above listed standards.

What are Electromagnetic Fields (EMFs)?

Electromagnetic Fields (EMF) are invisible lines of forces that you cannot see or feel that surround electrical equipment, power cords and wires that carry electricity, including outdoor power lines. EMF, radio waves, microwaves, visible light and x-rays are all forms of electromagnetic energy. Each one of these forms of energy travels in waves and the strength of their energy is related to their wavelength. EMF associated with electricity is called extremely low frequency (ELF) because it is found below 300 Hz (300 waves per second). In Canada, EMF associated with electricity travels at 60 Hz. ELF EMF has very little energy. In comparison, microwaves can travel at several billion waves per second and have enough energy to heat tissues.

Electric and magnetic fields can occur together or separately and are a function of voltage and current. Electric fields are commonly represented in units of volts per metre (V/m). Magnetic fields are represented by two common units: microTesla (μT) and milliGauss (mG).

This is Exhibit "K " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit K: Pictures of Proposed Splice Locations

splice location one

splice location 2

field beside splice location 2

splice location 3

splice location 4

splice location 5

This is Exhibit "L " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit L: Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.2 Trenching

7.2. Trenching

Trench cross-sections shall be as per Hydro One sketches included in the Technical Specification.

All trenches shall be excavated true to the centreline and grade shown on the approved plan and profile drawing, except where unforeseen interferences are encountered. In such cases, specific approvals shall be obtained from Hydro One for modifications to the centreline and grade.

The contractor shall, at his own expense, open trial holes along the proposed route as necessary to confirm feasibility of the route.

The trench bottoms shall be uniform and free of all loose rock, stones, or other foreign matter.

Adequate shoring of the trench shall be provided by the contractor. Water entering the excavation shall be promptly removed and disposed off at all times during construction work, until the structures and backfilling are completed.

This is Exhibit "M" referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH, 2013

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Exhibit M: Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.3 Cable Bedding &Trench Backfill

7.3. Cable Bedding & Trench Backfill

Before cable pulling, a bedding material shall be placed in the bottom of the trench, of material and thickness as described in the Technical Specification.

After the cable is installed, the trench shall be backfilled as indicated in the trench cross section drawing.

The composition and installation method of the bedding and backfill shall meet the requirements of Hydro One specification LS-11-046 for compacted limestone screenings, or LS-11-047 for fluidised materials.

The contractor shall establish a quality control procedure to ensure that the thermal resistivity of the backfill and bedding materials meet the requirements of the Technical Specification.

Only soils approved by Hydro One shall be used to backfill the cable trenches for surface reinstatement.

This is Exhibit "N " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit N: Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.5 Mechanical Protection

7.5. Mechanical Protection

Except where installed in a duct-bank, permanent tunnel, or directionally drilled, the cables shall be provided with a 25 MPa non-reinforced 'High Strength FTB' concrete protection, in accordance with

---

LS-11-047. Alternatively, 25 MPa non-reinforced concrete protections, as per LS-11-002, may be acceptable with Hydro One's approval. The protection shall be designed either as non-reinforced removable types of 'patio stones' or may be made of a poured in place slab with Hydro One approval. Locations of mechanical protections and thickness shall be as shown on trench cross-section sketch.

Prior to backfilling over the concrete cover, location measurements shall be taken to provide an "as constructed" plan and profile of the completed cable installation.

This is Exhibit "O " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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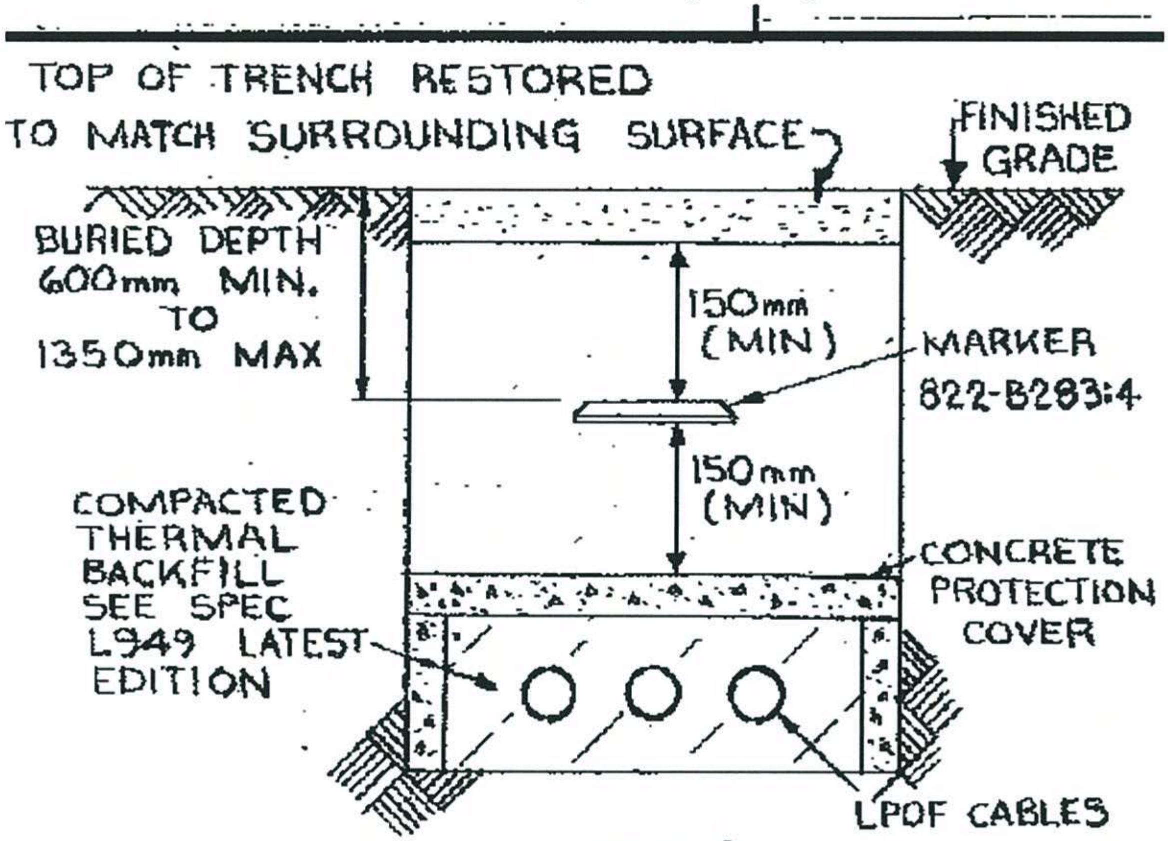
Exhibit O: Hydro One Cross Sectional of High Voltage Underground Trench



-FIG. 3-

TYPICAL CROSS SECTION

LPOF CABLE CIRCUIT

This is Exhibit "P " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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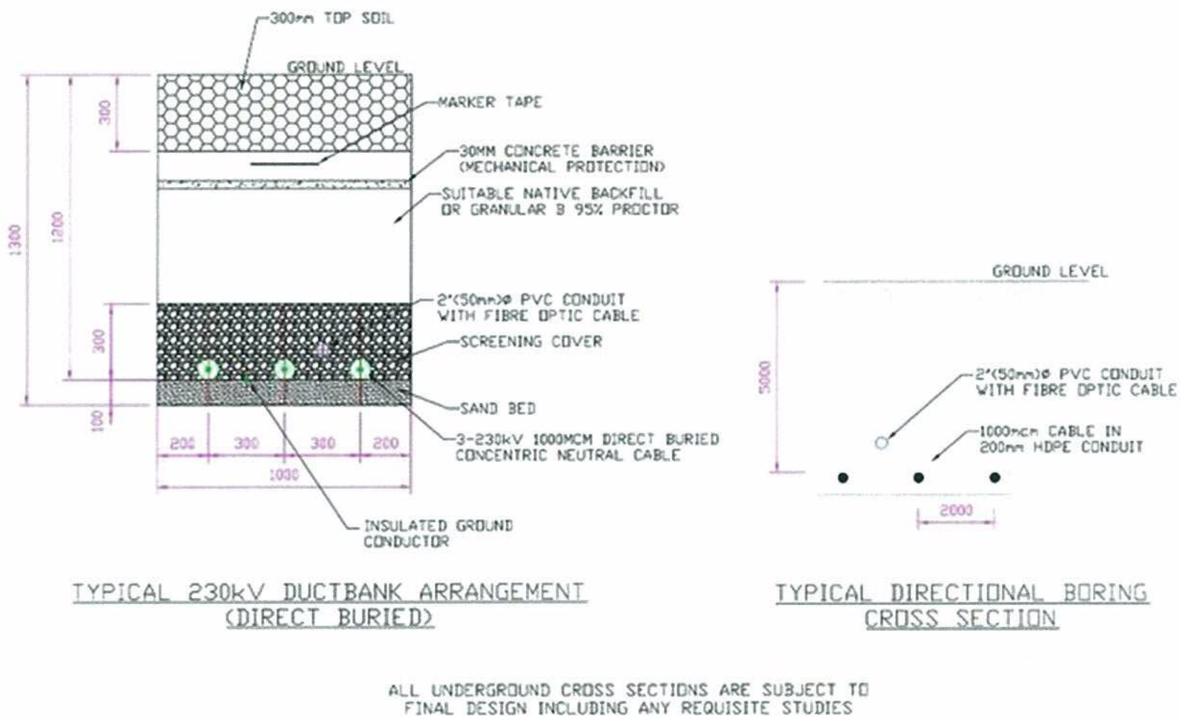
Exhibit P: Dufferin Wind Power's Cross Sectional of 230kv Underground

Proposed Direct Burial and Bored Cross Sections



This is Exhibit "Q " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit Q: Picture of the Tractor Fire after it came in contact with a 44Kv.

This is Exhibit "R " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit R: Hydro One's Cable and Accessories; Design, Supply and Installation of HV & EHV XLPE Insulated Cable Systems LS-11-148 Section 7.4 Clearances

7.4. Clearances

Where the cable system runs parallel to another underground installation (except other heat sources), a clearance of not less than 1000 mm shall be left between the cables and the existing installation. Wherever the cables cross an underground installation, the clearance shall be at least 500 mm. For other heat sources that run parallel to the cables, horizontal separation shall be minimum 1000 mm. The contractor shall take steps to mitigate any problem of interference from the heat source and ensure that the cable ratings are not reduced from the requirement per section 3.5 of this document.

The contractor shall co-ordinate with the owners of the facility that are exposed and these clearances may be increased at the demand of the authority concerned. It may also require that backfilling be completed to their satisfaction.

This is Exhibit "S " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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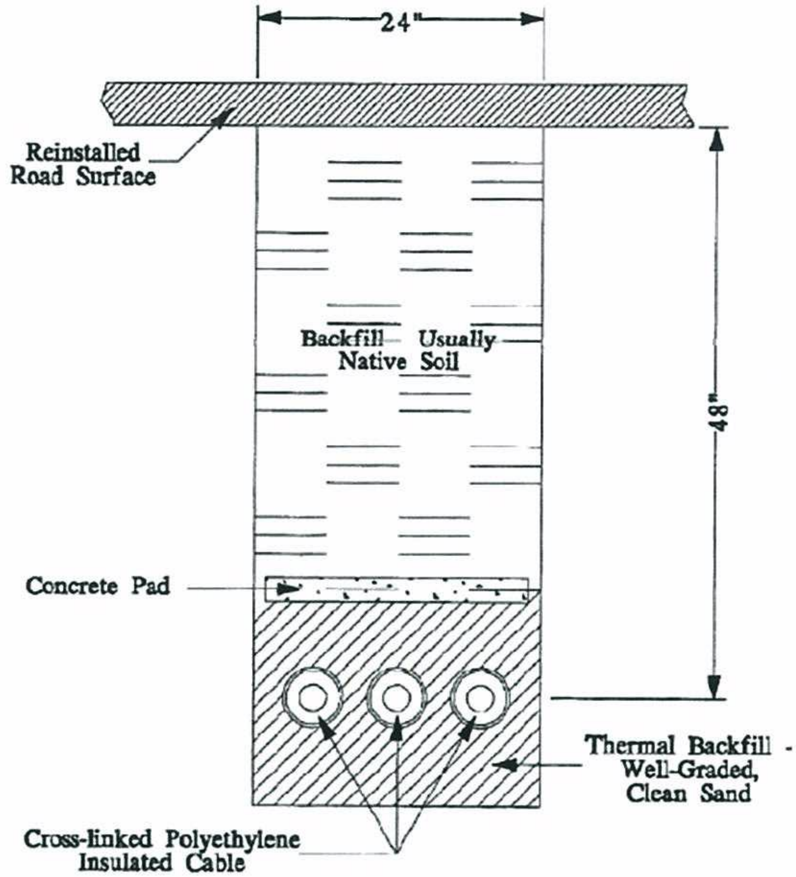
Exhibit S: Underground Electric Transmission Lines Public Service Commission of Wisconsin

Figure 13 Installation of XLPE Underground Cable Directly Buried



This is Exhibit "T " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit T: Pictures of K2'S Proposed Road Allowance Route Ditches

South side Glens Hill Road west of splice one, ditch profile looking east

South side of Glens Hill Road 1/3 of distance towards splice 2, ditch profile looking east

South side Glens Hill Road 2/3 of distance towards splice 2, ditch profile looking east

This is Exhibit "U " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit U: Halton Hills Generation Station 230Kv Underground Cables.

Project Detail < Back to Project List View another project: 08 063 - HHGS - 230kV Feeder Connector

< Previous project Project 110 of 170 projects Next project >

HHGS - 230kV Feeder Connector

Client: Black & McDonald Limited
Owner: TransCanada Power
Job#: 08 063
Role: Subcontractor
Engineer: EHV Power
Primary Work Type: Utilities
Other Work Types: Power Transmission
Status: Completed
Location: Milton, Ontario, CA
Duration: Jun 2009 - Jun 2009
Value: $1M - 5M | Range
Contract Type: Cost Plus Fixed Fee

Black & McDonald

TransCanada
In business to deliver

Image 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 click image for larger view

The Halton Hills Generating Station is a 680 megawatt natural gas fuelled, high efficieny combined cycle power plant. It has the capacity to supply the needs of approximately 600,000 homes. Robert B. Somerville Co. Limited teamed with Black & McDonald Limited to construct the 1,480 meter long underground 230kV Connector cables from the power plant to the existing High Voltage Transmission Line. The installation consisted of six eight inch ducts encased in concrete running along an existing regional road.

The project included crossing Highway 401 with 8 separate parallel 8 inch diameter conduit. It also incuded constructing four poured in place concrete cabe splicing bays. Lastly the delivery and handling of the 230 kV cable including pulling into final location through the conduit.

Project Reference Links

- Halton Hills Generating Station

Robert B. Somerville Co. Limited | 13176 Dufferin Street, King City, Ontario Canada L7B 1K5 | Phone: 905 833 3100 | Fax: 905 833 3111

This is Exhibit "V " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit V: Ontario Energy Board, File No; EB-2007-0034 (Kingston), pg. 40, lines 15 to 28 and pg. 41, lines 1 to 3.

MS. WONG: Perhaps you could just describe for us, when the cable is buried, how far underground is it buried.

MR. PINTER: It is buried at 1.2 metres below surface.

MS. WONG: Is the cable itself covered or encased in anything?

MR. PINTER: The cable itself is buried in sand bedding to protect it from mechanical damage, and then above that there will be 100-millimetre layer of concrete that is dyed red for identification in case someone digs in that area. Then above that, there will be a warning tape that is placed above the concrete, so if anybody digs down towards the cable, they will see the warning tape first, identifying to them that there is buried cable below that portion.

Then the concrete provides mechanical protection, so if it is a backhoe, they won't be able to come into contact with the cable if they're digging in that area.

This is Exhibit "W " referred to in the Affidavit of Mike Leitch, Sworn Before me, on this 22ND day of MARCH , 2013

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Exhibit W: Education Empowers Cable Engineers

TRANSMISSION & DISTRIBUTION WORLD

January 1, 2012

Education Empowers Cable Engineers

By John Smith and Rachel Mosier, Insulated Conductors Committee

Veteran engineers are leaving the utility industry in waves, taking with them their experience with cables and the underground transmission and distribution systems. The Insulated Conductors Committee (ICC), a technical committee for the Institute of Electrical and Electronics Engineers (IEEE) within the Power & Energy Society, is helping to mentor incoming engineers to the electric utility industry to ensure that this knowledge isn't lost when experienced engineers leave the workforce.

Cable technology is often not a subject taught within the electrical or power engineering curriculums at colleges and universities nationwide. By drawing upon the experience of veteran engineers, however, the ICC is preparing today's young engineers to handle the challenges of tomorrow.

Condition of Cable

Young engineers will face the issue of aging infrastructure. As the electric industry evaluates the condition of cables in the field, the inspectors are discovering that on many distribution power systems, 1970s-era cables are nearing the end of their life. Due to both inferior materials and designs relative to today's cables and accessory design, these cables and cable systems need to be replaced. In the next 10 to 15 years, many utilities will need to retrofit significant portions of their underground distribution systems that are in operation today.

Installation Challenges

Most utilities have a field workforce experienced in installing overhead and underground systems. Some of the newer wind farm construction and installation companies, however, often have a steep learning curve, especially when it comes to installing the collector system and its associated cables.

As a result, utility engineers often discover improper installation of underground connectors. In addition, poor jointing leads to partial discharge and subsequent failures.

Utilities also face another problem: the use of in adequate backfill material for collector system cables at wind farms. If installers do not adequately test for soil resistivity and make necessary adjustments, the utility often can face serious problems with cable overheating due to improper design of the thermal resistivity of the installed cable system.

Lack of Standards

At this point, there is no industry standard for underground distribution for renewable energy. The ICC, however, has been working with discussion groups to write standards and guidelines that utilities can use for installing and testing wind farm collector cable systems.

The ICC is also developing standards that address remediation and restoration of the electrical performance of 1960s to early 1980s- era cables to extend their useful, reliable life. There are various methods being addressed in Standards being created or revised under the purview of ICC.

In addition, the ICC created a new subcommittee to focus on field testing of cables and accessories, which is being used extensively to increase cable system reliability.

Educating Engineers

Educating Engineers

The ICC is making today's underground cable engineers aware of best practices when it comes to cable system production, installation and maintenance. By becoming involved with this long-standing committee, engineers can exchange information, participate in discussion groups and learn from domestic and international experts in a noncompetitive, noncommercial environment. As a result, they can mitigate risks for their utilities, which often focus on reliability, safety and asset management.

At the ICC meetings, which happen twice a year, about 45 to 50 working and discussion groups address issues with cables and accessories. Six subcommittees also meet to offer and present opportunities for training and education to new engineers about issues that are pertinent to the underground infrastructure. And because of its importance, the ICC dedicates an entire afternoon strictly to education on topics chosen in advance by attendees.

While underground engineers face a plethora of challenges - from the aging workforce to the aging infrastructure - ICC is helping them gain knowledge, leverage other engineers' experience and develop solutions for the power industry.

John Smith (jsmithIII@generalcable.com [jsmithiii@generalcable.com]) is the incoming chair of the ICC, which he has been with since 1985. He also serves as the director of the Marshall Technical Center for General Cable Corp. in Scottsville, Texas, U.S.

Rachel Mosier (r.mosier@pdc-cables.com [r.mosier@pdc-cables.com]) has been with the ICC for 13 years and is finishing up her extended term as the chair of the ICC. She is the vice president for Power Delivery Consultants in Deep River, Connecticut.

Editor's note: For information on ICC's March 2012 meeting in Seattle, Washington, U.S., visit www.pesicc.org