Digital Twin Ontario

Process Optimization for Lashing to Electric poles (POLE)

Strategies to Avoid and Defer Make-Ready Work when Lashing Fibre to Electric Utility Owned Poles

Developed for the Accelerated High-Speed Internet Program (AHSIP) and in support of Designated Broadband Projects in Ontario.

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DigitalTwinOntario.ca

info@digitaltwinontario.ca

Contents

Program Overview

The Government of Ontario has committed almost $4B to help connect every region of Ontario to reliable, high-speed internet by the end of 2025.

In 2021, the Ontario Legislature passed the Supporting Broadband and Infrastructure Expansion Act, 2021 and the Building Broadband Faster Act, 2021 (BBFA) along with changes to the Ontario Energy Board Act, 1998 and One Call Act, 2012. In November 2021, BBFA Guideline 1.0 was developed to reduce barriers, speed up broadband deployment and support the successful implementation of the BBFA. Stakeholders and partner ministries provided input into the development of the Guideline. The current Guideline 3.0 reflects the latest legislative and regulatory authorities and will be updated if required. To build upon this legislation, the Ontario government passed the Getting Ontario Connected Act, 2022, which further reduces barriers, duplication, and delays. The passing of these Acts enabled the Accelerated High-Speed Internet Program (AHSIP). AHSIP's primary purpose is to expedite the delivery of provincially significant broadband projects by removing barriers to building broadband.

Since 2021, the Government has made significant progress to advance AHSIP. In May 2022, Infrastructure Ontario (IO) in conjunction with the Ontario Ministry of Infrastructure (MOI) formed the Technical Assistance Team (TAT) in support of AHSIP. In spring 2022, eight Internet Service Providers were awarded contracts to deploy high speed internet infrastructure throughout the province.

The scale of the AHSIP is unprecedented in Ontario and requires significant make-ready work (utility power pole replacement or modification) to implement. As part of program initiation and development, IO and TAT have consulted with Internet Service Providers (ISPs), infrastructure owners, municipalities and utilities including Local Distribution Companies (LDCs), supply chain partners and subcontractors through various market soundings and technical working groups. During these consultations, ISPs and LDCs have identified concerns regarding the quantity of make-ready work required to implement the program. Before an ISP or any other company can add a new attachment or line to a utility pole, the existing attachments may need to be rearranged so that the pole can safely accommodate the new attachment or line. This is known as 'Make-Ready Work'. As part of market engagement, LDCs have provided infrastructure data to TAT, which has been overlayed against the premises which AHSIP will serve, providing a better sense of the magnitude of impact AHSIP will have on LDC infrastructure.

To put the quantity of make-ready in perspective, in Hydro One Network Inc.'s (Hydro One's) rate filing EB-2021-01100F[1] , between 2023-2027, Hydro One anticipated a replacement of 51,500 poles and refurbishment of 14,000 poles in a five-year period beginning in 2023. Based on Hydro One's current make-ready requirements and approach, for designated broadband projects, it is estimated that approximately 150,000 Hydro One poles would require pole replacement and 220,000 Hydro One poles would require make-ready work. This represents more than a 5.5x increase Hydro One's make-ready efforts compared to scenarios where the broadband projects were not implemented.

TAT proposes that the following mitigation measures be used which leverage existing legislative and regulatory tools and comparable project learnings in order to achieve the Government's commitment to connect every region of Ontario to reliable, high-speed internet by the end of 2025.

Minimizing Barriers to Construction

To support AHSIP partners in meeting their obligations and achieve the government's commitment to bring high-speed internet to every region of Ontario by the end of 2025, TAT proposes that the below strategies be implemented to optimize and reduce or defer project make-ready.

1.0 **Avoid Make-Ready Work When Permissible**

2.0 **Defer Complex Make-Ready Work Where Conditions Permit**

3.0 **Use Products to Strengthen and Extend the Life of Existing Poles**

4.0 **Implement a One-Touch Make-Ready Approach**

5.0 **Leverage Previously Engineered Plans to Reduce Re-Engineering**

6.0 **Future Considerations**

The following sections describe the challenges faced, potential strategies, and anticipated outcomes for each proposed mitigation measures. In addition to these strategies, there may be other strategies that LDCs may adopt to help achieve the government's commitment to bring high-speed internet to every region of Ontario by the end of 2025.

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1 Ontario Energy Board. (n.d.). EB-2021-0110 - Decision. EB. Retrieved April 18, 2023, from https://www.oeb.ca/node/3899#:~:text=The%20OEB%20has%20issued%20a,2023%20to%20December%2031%2C%202027.
The OEB has issued a Decision on Settlement Proposal and Order on Rates, Revenue Requirement and Charge Determinants on an Application for electricity transmission and distribution rates and other charges for the period from January 1, 2023 to December 31, 2027.

Make-ready mitigations

Avoid make-ready work where permissible

Defer complex make-ready work where conditions permit

Leverage already engineered plans to reduce re-engineering

Use products to **strengthen and extend the life of existing poles**

Implement a **one-touch make-ready** approach

To help achieve the Government's 2025 commitment by:

Simplified Make-Ready Work

- One-Touch Make-Ready (OTMR) will reduce the number of on-site visits and streamline the process for making changes to utility poles
- Pole strengthening devices will reduce instances of utility pole failures and complex make-ready work

Faster Deployment

- Greater acceptance of "materially insignificant" applications by LDCs will expedite approvals and deployment
- Leveraging exemptions for pole upgrades that do not meet current Standards will help avoid disputes and expedite project timelines
- Preventing the duplication of P.Eng reviews for engineered plans will mitigate unnecessary delays and avoid duplication of work

Reduced Costs

- Fewer material and labour costs will be required as pole replacements and significant upgrades are reduced through use of temporary measures and pole-strengthening products
- OTMR will reduce costs for labour and materials, overall cost of making changes to utility poles and mitigate against additional costs due to delays and avoidable make-ready.

1.0 Avoid Make-Ready Work When Permissible

- A first-principles objective of avoiding make-ready work is to reduce the burden on ISPs. It is important to note that make-ready work has a significant impact on how far an ISP's subsidy goes towards building networks, versus renewing municipal or utility infrastructure.

1.1 Apply Materially Insignificant ESA Provisions

Issue:

- The application of ESA (Electrical Safety Authority) DB-07-15-V2 "Materially Insignificant" Work where the LDC's Professional Engineer determines if the proposed work is deemed to be "materially insignificant".

- If the strategy to consider some work as "materially insignificant" is accepted by the LDC, the LDC can evaluate the ISP's submission as "materially insignificant" or "not materially significant". The LDC can exempt "materially insignificant" work from the ESA audit requirements of Sections 7 and/or 8 of Regulation 22/04 and that work will be deemed compliant with Regulation 22/04. Bell Canada (Bell) and Cogeco Inc. (Cogeco) have created presentations to support the concept of overlash being "materially insignificant" in certain conditions (refer to Appendix 1: Accelerated Access to Poles in Quebec, dated May 10, 2021).

- To further support the theory that adding a fibre cable to an existing communication strand is materially insignificant, refer to Appendix 7: SPIDA MIA Over Lash Study. A study was performed in SPIDA to show that in various pole classes, span distances and pole framing adding a 1-144 fibre to an existing communication strand; the increase in pole utilization was less than 1%.

- Fibre properties and specifications support overlash as not "materially significant" (refer to Appendix 2: OFS DuctSaver Rollable Ribbon (RR) Central Core Cable Specifications, July 2021).

- While some LDCs allow the use of materially insignificant ISP attachments, many other LDCs do not accept these from ISPs or have a documentation process to record and approve a materially insignificant pole attachment.

- Hydro One MIA: The Hydro One MIA protocol is the removal of a larger diameter/heavier cable and replacement with smaller diameter/lighter cable. This results in a positive deviation.

- Material Insignificant Alterations ("MIA") on Bell poles: MIA on Bell poles is the ability to lash up to a 144-fibre cable without completing pole calculations. Undue hazards need to be reviewed and identified.

Anticipated Outcomes:

- The acceptance of an application as "materially insignificant" by the LDCs could lead to increased efficiency in the approval process for pole attachments. This would reduce the need for design analysis and potentially save time and costs for both the ISP and the LDC. LDCs consideration of "materially insignificant" work without the need for design analysis is expected to reduce make-ready costs if they do not need to replace poles that could accommodate additional attachments. The development of a process to handle "materially insignificant" pole attachment applications by LDCs would promote standardization within an LDC, and a further process developed across the industry would create a more consistent and transparent process for all parties involved.

1.2 Allow ISPs to use ESA Exemptions for Poles which Do Not Meet Current Standards

Issue:

- The application of ESA DB-01-20-v1: Previous Editions of Overhead and Underground Standards as it pertains to "materially insignificant" alterations.

- This bulletin allows for use of previous versions of C22.3 No.1 for Overhead Systems and C22.3 No.7 for Underground Systems which LDCs use to "grandfather" existing poles so they do not have to bring poles up to current standards and codes for materially insignificant changes (i.e., Like for Like pole changes during storms or pole replacement programs). Currently, some LDCs consider overlashing of a new fibre optic cable to an existing ISP strand to be materially significant and require the pole to be analyzed and brought up to current standards for all attachments. In many situations, the pole as it stands today will fail a load evaluation based on the new standard, prior to adding any telecom attachments.

- A new addendum weather loading clause was added to the current standard CSA C22.3 No1-20. Some LDCs (such as Hydro One) have started to request that ISPs include design analysis of a new addendum to CSA C22.3 No1-20 issued around February 2022, for historical wind loading. By requesting these new standards be followed, there have been cases where existing down guy and anchoring is now determined to be failing and thus requiring make-ready. In some other cases, the pole has been determined to be failing, requiring the installation of an increased pole class.

- It is difficult to design for the new CSA weather loading requirements if the LDC has requested it, as it is challenging to determine the historical weather conditions for the geographical area where the attachment poles are situated. It is also not clear if this new clause in CSA is official or a potential cause for the next release of CSA C22.3 No.1.

- In February 2023, the Canadian Radio-television and Telecommunications Commission (CRTC) published regulatory measures[2] to facilitate access to poles owned by Canadian carriers to accelerate the deployment of broadband-capable networks in regions of Canada with limited or no access to such networks.

- The measures included a determination that new parties seeking access to poles are not responsible for the costs associated with corrective works, to the extent that poles or third-party equipment was out of compliance with standards prior to receipt of the new attachment request and directed incumbent local exchange carriers (ILECs) to enter into good-faith negotiations with pole attachers. Similar decisions could be made by regulatory bodies to encourage good-faith negotiations and prevent ISPs from incurring costs for bringing utility pole infrastructure up to current codes when installing materially insignificant infrastructure.

Anticipated Outcomes:

- It is expected this clarification will bring greater consistency in the application of ESA DB-01-20-v1 and other relevant standards, which could help to avoid confusion or disputes, and reduce costs associated with corrective works for poles deemed as non-compliant under new standards.

- This will also bring increased transparency and accountability in the regulatory process, which could help to build trust and confidence among stakeholders.

1.3 Use of Certificate of Deviation Approval to Defer or Exempt Make-Ready Work

Issue

- The application of ESA DB-02-16-v1 : Certificate of Deviation-Certified Lists may be used to reduce the amount of make-ready required by both the LDCs and ISPs mainly surrounding separation distances between secondary/neutral and communications with consideration given to CSA standards and "Qualified Workers" in the communications space. The ESA Bulletin contains direction on how an LDC may demonstrate compliance with Regulation 22/04 with respect to deviations from section 5 "When safety standards met" of Regulation 22/04, approved by a P.Eng. as acceptable to meet the requirements of Regulation 22/04.

- Direction from the ESA requires LDCs to establish or utilize a certified list of deviations from required standards, if the LDC deems it appropriate to do so. The certified list of deviations shall meet the requirements of Regulation 22/04 - Section 9 and where that section is

2 Canadian Radio-television and Telecommunications Commission (15 Feb, 2023) Telecom Regulatory Policy CRTC 2023-31 https://crtc.gc.ca/eng/archive/2023/2023-31.htm
Regulatory measures to make access to poles owned or controlled by Canadian carriers more efficient

not applicable the deviations are to be P.Eng., approved and state the failure to meet the standards will not materially affect the safety of any person or property.

- An example third-party attacher certificate could include the following items, for which the Professional Engineer would identify and approve each deviation which would apply to any given pole:

1. neutral wires sag below the line of sight of upper communication attachment when:
    - Span length is less than 75m.
    - Neutral wire is part of multi-grounded neutral system.
    - Neutral wire I measured in its maximum sag condition.
    - Communications is measured in its Thermal sag condition.
    - Closest distance between the neutral and Communications is greater than 0.3m under above conditions.
2. Streetlights that may or may not have been bonded to the neutral strand are within 1.0m of the highest (communications) strand
3. Single damaged or missing vertical ground wires.
    - Consecutive vertical ground locations on a pole lead that are both missing or damaged are excluded.
4. The following items at the pole if they are at least 0.6m above the highest communications strand:
    - Secondary Risers
    - Drip loops of power service wires or secondary cable bundles
    - Mechanical protection over primary riser cables
5. Secondary wires (e.g., Triplex, Spun Buss Secondary...) that sag below the line of sight of upper communication attachments when:
    - Secondary wire is measured in its maximum sag condition
    - Communications is measured in its Thermal sag condition

- Closest distance between Secondary Wire and Communications is greater than 0.3m under above conditions.

- While some LDCs allow the use of a Certificate of Deviation stamped by a P.Eng. from the engineering firms, many other LDCs do not accept the certificate. For LDCs who do not allow the Certificate of Deviation to be applied, the result can range from raising secondary/neutral attachments; streetlight bonding; raising risers/drip loops; to pole replacements for taller poles.

- There are also some LDCs who do not currently accept a deviation certificate, but do not require the attacher to request make-ready to raise existing communications attachments or secondary wires, drip loops etc. if the proposed attachment is compliant and existing communication attachments (attached above the proposed communication attachment) are not compliant. Most LDCs who do not accept a deviation certificate require make-ready to raise attachments to gain separation even if the proposed attachment is compliant and other existing attachments are not.

- If a Certificate of Deviation is not allowed by the LDC, the resulting make-ready can range from minor raising of LDC attachments (i.e., drip loops, u-guards, secondary/neutral strands, bonding streetlights) to major make-ready like pole replacement for taller poles to accommodate raising of secondary/neutral and equipment and separation of LDC attachments to primary etc. However, any make-ready regardless of how minor can result in delays for the communication attachment to be permitted.

Anticipated Outcomes:

- The ability to exempt make-ready work using the Certificate of Deviation will reduce costs and disruptions to existing infrastructure due to reduced make-ready work, resulting in faster and more efficient deployment. Clear guidance and encouragement from ESA and OEB will help standardize the pole attachment process and pole replacement decisions across all the LDCs, resulting in increased efficiency and consistency in the industry.

2.0 Defer Complex Make-Ready Work Where Conditions Permit

Issue

- ESA bulletin DB-11-12-v3 : Certificate of Deviation Approval states that some “make-ready work” may not be deemed required to be completed, prior to the work that identified the “make-ready work” starting, however, many LDCs are not aware that this bulletin has been published, and may not be aware of the implication allowing for the ISPs to attach to their poles in a more expedient manner.

Anticipated Outcomes:

- By adopting ESA bulletin DB-11-12-v3, it is anticipated that ISPs could expedite pole attachments as the identified "make-ready work" can be done at a later date. The widespread knowledge of this strategy within the industry is expected to increase the adoption of the practice and facilitate delivery of the program.

3.0 Use Products to Strengthen and Extend the Life of Existing Poles

Issue

- The main causes for complex make-ready work or utility pole replacement are driven by the high probability of hydro pole failure due to lower pole class, accidental structural damage and/or severe weathering of poles, the requirements for a taller pole to allow the ISP to attach and maintain acceptable ground clearance and all conductor/communications separations, and the strength/condition of structural support attachments, for example crossarms.

- There are many products available using different technologies to modify a utility pole to strengthen, enhance capacity and height. However, the use of each product is dependent on the approval of each LDC. For poles that are under-classed, implementation of these devices would strengthen the pole, and pending OEB approval, costs could be rate-based. Product specifications for a number of these Mechanical Devices and Applications can be found in Appendix 4.

- Some LDCs have already begun to use pole strengthening technology. Hydro One, for example, has used the Tough Truss product in the past in cases of pole class failure and or pole damage concerns. In Hydro One's rate filing EB-2021-0110 ISD D-SR-07, Page 8 of 12 Pole Refurbishment states the "Pole Refurbishment investment installs structural supports on poor-condition poles as an alternative to replacement. Poles that qualify for refurbishment include poles where the damage is isolated to the ground line, poles that are on road, and poles that do not have third party attachments. Poles are prioritized based on their reliability risk." Hydro One also stated in their latest OEB rate filing that they are planning to refurbish 18% (or 14,000) existing poles, significantly reducing the number of poles which would need to be replaced. Use of mechanical refurbishment would result in strengthened existing poles with reduced potential outages.

- Pole strengthening devices will help mitigate the pole supply risk as fewer new poles will be required.

- Pole extension products have been used in the past by many LDCs. While there have been concerns such as the extension leaning at an angle compared to the original pole, or existing pole damage/weathering at the top of the old pole, the new products have generally addressed these concerns.

- It should also noted that ESA DB-01-15-v2 "In-field Equipment Refurbishment" ESA states that it views refurbishment work performed in-field to be equivalent to in a repair facility. This includes cable injection programs, filling significant sized voids in poles (e.g., woodpecker holes), pole strength restoration wraps, and other similar work.

- Use of mechanical refurbishment and extension can be significantly less costly than pole replacement. Table 1 below details the approximate cost to replace a pole compared to the use of mechanical refurbishment for the most common pole replacement causes. Based on the unique location and access to the pole, the cost to install a replacement pole compared to the use of mechanical refurbishment may be significantly greater (e.g., it could cost significantly more to fly in replacement poles, or replace poles in rear lot with limited access that will not allow for typical pole installation using line trucks compared to mechanical refurbishment or use of a pole extension).

- Originally only Commscope had certified crews to install the Tough Truss product. Now there are several companies that are approved by the manufacturer to install this product in Ontario making the deployment in large numbers and locations more feasible.

Table 1: Pole replacement costs compared to Mechanical Devices and Applications* refurbishment

*Mechanical Devices and Applications products found in Appendix 4

Concern	Magnitude of Cost to Replace	Example Refurbishment Product/Strategy	Mechanical Device Implementation
Pole under classed (not compliant for strength)	$20K+	Tough Truss (increase the class of pole and bring damaged pole back into specification)	$3K
Pole damaged (e.g. damage caused by snow plow, sever cracks in pole, extreme weathering)	$20K+	Tough Truss or Pecker Patch or Bull Wrap (repair damage)	$1.5K
Pole too short (additional height needed for primary/secondary or equipment for separation to communication attachment, or communications ground clearance)	$20K+	Pole Top Extension (increase height of pole and resolve damaged or weathered pole top.)	Estimate $2K for single phase or $5K for 3 phase

Implementation Opportunities:

Hydro One:

- Hydro One has now implemented the use of the Tough Truss product as an accepted practice for damaged poles to restore them to their original pole class. Hydro One is undertaking studies to use the product to increase pole class.

Bell:

- Bell has now implemented the use of the Tough Truss products as an accepted practice for damaged poles to restore them to their original pole class and to increase pole class.

Anticipated Outcomes:

- The use of mechanical devices such as Tough Truss and Pole Top Extensions can increase the class of a pole and bring damaged or weathered poles back into specification without requiring a full pole replacement. This can result in fewer pole changes needed overall,

reducing the need for new pole installations. Using mechanical devices to modify poles is also expected to reduce the amount of labour, equipment and material required for pole replacement, allowing LDC resources to complete other maintenance and repair work, and helping to alleviate potential skilled trade resource availability constraints and supply chain issues related to pole shortages.

- Typical pole replacement costs roughly $20K or more depending on the reason for replacement. Given the magnitude of the program, using mechanical devices such as Tough Truss or pole top extensions is expected to result in significant savings. In addition, the use of mechanical devices can potentially extend the life of existing poles.

4.0 Implement a One-Touch-Make-Ready Approach

Issue

- Some LDCs allow for the use of the "One-Touch-Make-Ready" (OTMR) model whereby the ISP construction sub-contractor can perform all the make-ready work required on behalf of all other ISP attachments requiring telecom make-ready. Some LDCs also allow pre-qualified construction subcontractors to perform all the simple and complex power make-ready. If both OTMR approaches are used, the cost and schedule impacts are reduced.

- To implement a OTMR approach, ISPs need permission from competing LDCs to modify their infrastructure and attachments. In addition, LDCs must agree to allow an ISP's subcontractor to perform power make-ready tasks on their behalf, which will require a list of LDC approved subcontractors and materials.

- Some LDCs do not allow for a communications strand attachment to be on both sides of the pole as "boxing in" of the pole was a potential issue for placing a new pole. However, most LDCs do not make this a restriction and in some cases, it can be a requirement. Many LDCs request that the communications attachments be on the same side as the secondary, however there are many instances where there are already communication attachments not on the same side as the secondary.

- While some LDCs are using the OTMR approach successfully, not all LDCs have implemented, with some citing union concerns. Hydro One offered Option 1 (OTMR) to all ISPs.

- Bell created a presentation for Hydro Quebec and other ISPs on Bell poles to allow accelerated access to Bell poles which covers OTMR and other processes (refer to Attachment 1 details). In Quebec in 2020, a total of 100,000 poles reviewed and processed for third parties. Of the 100,000 poles, 90% were approved without make-ready; 3% required make-ready; 6% were denied; >1% were denied based on reserved capacity. The document

includes an action plan with the following items and associated impacts:

1. Cleaning up the permit request queue for make-ready work required an increase of resources to prioritize permits that were stuck in the funnel and considerable coordination with HQ (Hydro Quebec?) to reduce backlog and make-ready timelines.

2. Developed criteria which allow Applicants to proceed with the work before make-ready work is completed. This resulted in the retaining of independent Engineering firms and resulted in a reduction of required make-ready work going forward by about 20%.

3. Allow the ISPs to conduct make-ready work (through certified contractors) that previously only Bell could do on their behalf where little risk of service disconnection or damage to facilities. This reduces coordination and cycles, accelerates deployment.

4. Allow both power and telecom work to be done by a certified contractors trained in both types of work. Based on a trial with Hydro Quebec and Bell in Montreal, this resulted in a reduction of cycle time by +- 200 days.

5. Allowing the ISP's Engineer to certify that its deployment activities can be conducted safely despite anomalies on the pole with the ISPs agreeing to an indemnity clause reduces inter-engineer disputes and reduces necessary resources by pole owners.

6. Process to allow applicant to propose temporary installation to circumvent problematic poles.

Anticipated Outcomes:

- Use of the OTMR model can accelerate the process of replacing poles as well as adding or relocating new attachments and electrical equipment to the poles by reducing the time required for each ISP to complete their portion of the work. With OTMR, fewer trucks and personnel are required to access each pole, which can reduce the cost of making changes to power utility poles. This can also help prevent delays that could result in additional costs due to project overruns. By streamlining the process for making changes to utility poles, OTMR can reduce the risk of accidents and injuries caused by having multiple companies working on the same pole at different times. Fewer pole replacements and reduced make-ready if LDCs allow ISPs to attach the communications strand on both sides of the pole using the same bolt.

5.0 Leverage Previously Engineered Plans to Reduce Re-Engineering

Issue

- ESA Bulletin DB-10-12-v1: Attache Developed Plans/Work Instructions and LDC review states that re-engineering is not required by the LDC. However, ultimately LDCs determine the process and extent of review. Some LDCs use a lengthy review process whereby the review is performed by a third-party engineering firm. This process is both time consuming and costly as in some cases, projects are re-surveyed, re-calculated (or calculations are reviewed), and plans are reviewed. This may result in multiple revisions and the review process may cost the ISP more than the cost of the ISP's engineering subcontractor to complete the drawings/ design/permit applications as part of the entire project. All review costs are then paid by the ISP as part of the make-ready costs.

- LDCs have communicated that many ISPs engineering sub-contractors are not providing submissions that meet the LDC's design guidelines (such as survey, design and CAD drawings), which in LDCs opinion, confirms the need for the review, even though these submissions are stamped by a Professional Engineer. Some LDCs also believe that ISP design firms require training on how to complete designs that meet CSA/ESA/IHSA standards.

- There are LDCs who are actively addressing the concern with the cost/time of application review by a third-party Engineering company. By publishing a standard cost for the review based on pole quantity groupings and work task descriptions regardless of which approved third-party company performs the review on behalf of the LDC. They have also established time frames for the approved third-party to perform the review and create the make-ready forms on behalf of the LDC.

Recommendation

TAT proposes the following:

- All LDCs to establish/publish a rate and timeframe document if they are using a third-party engineering firm to perform their reviews. This will allow for full transparency and the ISP will know what they will be charged for the review.

- All ISP's establish a pre-submission internal review process to ensure all of their Engineering Sub Contractors are providing design submissions that meet CSA/ESA/IHSA standards and fully utilize all available ESA bulletins to avoid/defer any make-ready.

Anticipated Outcomes:

- Completion of a Third Party Attachment Training course (by the ISP and each of their Engineering Sub Contractors) could help ensure that all parties have a common understanding of the LDCs expectations and requirements for engineering submissions (Examples for Hydro One applications are PAR versus Standard, OPAF and MIA – see Glossary), reducing delays and rework caused by deficiencies in these submissions.

- Establishing and publishing a rate and timeframe process for third-party reviews will provide greater clarity in LDC review costing and could result in a faster and more cost effective review if a large number of LDCs posted this information publicly. It would also provide greater clarity to ISPs in costing and scheduling their work.

6.0 Innovative Considerations

In the power space and copper decommissioning, the utilization of self-supported cables and non-conductive cables, such as ADSS fibre-optic cables is common.

Self-supported cables, also known as all-dielectric self-supporting (ADSS) cables, are fibre-optic cables designed to carry data and communications signals. Unlike traditional power cables that rely on additional support structures such as poles or towers, ADSS cables are designed to be self-supporting, making them suitable for overhead installations.

Non-conductive cables, like ADSS fibre-optic cables, offer unique benefits when deployed in the power space. Unlike traditional power cables, which are typically made of conductive materials like copper or aluminum.

Copper decommissioning refers to the process of gradually phasing out copper-based cables and replacing them with alternative solutions, such as fibre-optic cables.

Use of aerial conduit products like Dura-Line MicroDucts in situations which would allow multiple ISP's to blow in fibre as needed using the same attached aerial conduit (only permit once). This would alleviate the issue of multiple ISP's having to request attachments along the same spans.

The benefits of these technologies, including reduced installation costs, improved reliability, enhanced safety, and better performance are attractive options for infrastructure projects. Simultaneously, the trend of copper decommissioning offers opportunities for cost savings, technological advancements, and environmental sustainability. Embracing these future considerations can pave the way for a more efficient, resilient, and sustainable infrastructure.

Glossary

Attacher (developed plan or work instruction): Refers to the ISP or LDC that is looking to build on an existing pole with updated infrastructure. This often results in the evaluation of the pole's End of Life (EOL) status and an assessment of the relevant make-ready work to facilitate the required updates to the pole that will enable a safe attachment.

Broadband: The term broadband commonly refers to high-speed internet access that is always on and faster than traditional dial-up access. Broadband includes several high-speed transmission technologies, such as fibre, wireless, satellite, digital subscriber line and cable. The CRTC defines universal service objective as having access to actual download speeds of at least 50 Mbps and actual upload speeds of at least 10 Mbps

Canadian Radio-television and Telecommunications Commission (CRTC): The CRTC is an administrative tribunal that regulates and supervises broadcasting and telecommunications in the public interest. Their mandate given by the Parliament of Canada, and administered through the Minister of Canadian Heritage, focuses on achieving policy objectives established in the Broadcasting Act, Telecommunications Act and Canada's anti-spam legislation (CASL).

Canadian Standards Association (CSA): Global organization dedicated to safety, social good and sustainability. They are a leader in Standards Development and in Testing, Inspection and Certification in Canada, and the U.S., Europe and Asia.

Complex Power Make-Ready: Complex Make-Ready can involve the relocation of multiple attachments and electrical equipment on the pole outside of the Communications Space, as well as pole replacement and transferring all attachments and equipment to the new pole. This requires significant effort requiring specialized crews and coordination between the companies involved. This type of make-ready can take significantly longer to complete and may require the temporary removal of some attachments, which can result in service disruptions for customers.

Electrical Safety Authority (ESA): Regulates and promotes electrical safety in Ontario. The ESA has a mandate from the Ontario government to improve electrical safety for the public by anticipating, understanding and preventing electrical-related harms.

Fibre and/or Fibre-Optics: Fibre refers to the fibre-optic cable used in broadband connection. Fibre can send data as fast as about 70% the speed of light and can reach speeds of up to 940 Megabits per second (Mbps), with low lag time. Fibre-optic cables replace copper wires and are not as susceptible to severe weather conditions as other types of traditional cables, which helps minimize outages and reduce potential electrical interference.

Hydro One Permit Application Examples:

Permit Applications Requirements ("PAR"): The preferred permit application for the Networks Project Execution Model is that the Applicant submission includes the information as outlined in the Permit Application Requirements ("PAR"). The Applicant would complete full engineering analysis (strength, clearances, and separations checks) to determine if the existing pole is suitable for the proposed attachment. The analysis shall meet the requirements found in "Hydro One Networks Inc. Requirements for Joint Use Partners". Any required make-ready and defects (as applicable) shall be identified in permit drawing (i.e. pole has insufficient strength, increase height due to clearances, suspect insulators, etc.). Hydro One will complete a technical review of the submitted design and develop a make-ready design package based on the suggestions and any defects identified in the field.

Standard Permit: Alternatively, Hydro One would attach permit drawings that only identify the proposed attachments (historical approach). The historical approach is that the Applicant submits its plans to place its attachments or alter the number, size, or nature of its attachments on Hydro One's poles. As the pole owner, Hydro One will determine the appropriate pole size and class and verify clearances.

Hydro One's Over-Lash Previously Accounted For: For existing installations, ESA provided clarity in bulletin DB-01-20 V1 that new attachments to a pole can be added without bringing the pole assembly up to current standards only if it can be demonstrated that the new attachment(s) were "previously accounted for", then the pole strength does not need to be re-evaluated.

Hydro One Overhead Distribution Standards – Section 4-1 – Poles, outlines the requirements when determining the strength of the pole required. Using this standard, Hydro One historically designs joint use bundles by rounding up to the next 2.5 cm (1"), 5.0 cm (2") or 7.5 cm (3") diameter when determining the strength of the pole(s) required. This practice then allows over-lashing of an existing bundle to be considered previously accounted for where the diameter is not increasing to the next 2.5 cm (1") interval.

Hydro One MIA: The Hydro One MIA protocol is the removal of a larger diameter/heavier cable and replacement with smaller diameter/lighter cable. This results in a positive deviation.

Independent Electricity System Operator (IESO): The Independent Electricity System Operator (IESO) is the Crown corporation responsible for operating the electricity market and directing the operation of the bulk electrical system in the province of Ontario. The IESO delivers key services across the electricity sector including: managing the power system in real-time, planning for the province's future energy needs, enabling conservation and designing a more efficient electricity marketplace to support sector evolution.

Infrastructure Health and Safety Association (IHSA): Ontario's health and safety resource that works to improve the lives of Ontario workers by providing the resources and training that control and eliminate safety hazards in work environments that involve high-risk activities.

Infrastructure Ontario (IO): Infrastructure Ontario (IO) is a Crown agency of the Province of Ontario that supports the Ontario government's initiatives to modernize and maximize the value of public infrastructure and real estate. IO upholds the government's commitment to renew public services and does so in co-operation with the private sector.

Internet Service Provider (ISP): An internet service provider, is the company that provides clients with internet access. ISPs can provide this access through multiple means, including dial-up, DSL, cable, wireless and fibre-optic connections. A variety of companies serve as ISPs, including cable providers, mobile carriers, and telephone companies.

Lashing: Lashing is the process of taking any outdoor cable, usually a tray or instrumentation cable, and attaching it to a messenger wire so that it may be used in aerial applications. Stainless steel lashing wire is used to lash overhead coaxial or fibre optic cable to a supporting steel strand or over lash of existing cable or cables.

Local Distribution Company (LDC): Local distribution companies are responsible for distributing power at less than 50kV from the transmission system to homes and businesses across the Province of Ontario. For a map of Ontario's LDCs, visit the IESO's Ontario Electricity Map.

Make-Ready: Before an Internet Service Provider (or any company) can add a new attachment or line to a utility pole, the existing attachments may need to be moved around so that the pole can be made ready to handle a new attachment or line. This is known as 'Make-Ready Work'. Telecom Make-Ready work is performed in the Communications Space. Power Make-Ready work is performed in the Power Space and is categorized either as Simple Power Make-Ready or Complex Power Make-Ready.

Materially Insignificant: The ESA views "materially insignificant" work to consist of any replacement, alteration, upgrades or addition of new structural loads that does not materially change the existing electrical installations, as determined by the Electrical Distributor (typically relating to forces on poles & strength of poles).

Ministry of Energy (ENERGY): The Ministry of Energy is responsible to ensure that Ontario's electricity system functions with reliability and productivity. The organization oversees Ontario's electricity pricing regulations, develops policies to lower energy costs for consumers and businesses, promotes energy efficiency and clean technology innovation, collaborates with Indigenous partners and energy sector stakeholders, and enhances consumer efficiency and performance.

Ministry of Infrastructure (MOI): The Ontario Ministry of Infrastructure is responsible for overseeing the province's plan to deliver effective and resilient infrastructure, guide investments in schools, hospitals, roads, bridges, transit and other critical services that are crucial to the everyday lives of Ontarians. people's daily lives. MOI is committed to the expansion of broadband and cellular services across the province, including rural, northern and Indigenous communities.

One Touch Make-Ready (OTMR): One Touch Make-Ready is a process used by telecommunication companies to simplify and speed up the deployment of new equipment on existing utility poles. It allows a single crew to perform all Telecom Make-Ready and Power Make-Ready workon the pole, reducing the time and cost associated with deploying new equipment.

Ontario Energy Board (OEB): Ontario's independent energy regulator who oversees how energy companies operate to ensure the public interest to served. Their responsibilities include setting delivery rates that energy utilities can charge, licensing energy companies in the electricity sector and natural gas marketers, developing new energy policies, and providing information and tools to help consumers understand the rules that apply to them.

Overlash: Involves an attacher tying communication conductors to existing, supportive strands of cable on poles, which enables attachers to replace deteriorated cables or expand the capacity of existing facilities while reducing construction disruption and associated expense.

Pole Top Extensions: Risers that can be affixed to the top of power distribution poles to add capacity to existing poles or replace damaged pole tops.

Professional Engineer (P.Eng): A person who holds a license or temporary license under the Professional Engineers Act (Ontario Regulation 22/04)

Qualified Workers: The workers are "qualified" in their ability to recognize electrical hazards and other potential safety concerns, which may cause them to implement specific safety measures or work procedures to avoid the item. They are required to take a training module called "Health and Safety Guidelines for Contractors - Working at Heights Module", among other requirements before they are deemed qualified.

Simple Power Make-Ready: Non-complex work that is performed outside of the Communications Space on utility poles. This includes replacing missing copper ground wire on the pole, rearranging conductor dips (e.g., drip loops) encroaching in the Communications Space and tensioning and moving (raising) the neutral wire to create required separation from telecom attachments. This make-ready work can typically be completed relatively quickly and does not require significant coordination between the companies involved.

Telecom Make-Ready: Work that is performed in the Communications Space of the pole dealing with telecom attachments. This work primarily involves rearranging or removing existing telecom strand, fibre, and equipment (e.g., splice enclosures, power supplies) in order to make space in the Communications for new telecom attachments, fix inadequate separation between telecom attachments and fix inadequate ground clearance for existing telelcom attachments. This work does not include working in the Power Space of the pole.

Tough Truss: A mechanism used as an alternative to pole replacement that can correct overloaded poles or add bending capacity to improve structural resilience.

Appendix 1: Bell Accelerated Access to Poles in Quebec, dated May 10, 2021

Accelerated Access to Poles in Québec

10 May 2021

Bell

Over 100k poles reviewed and processed in Quebec in 2020 for 3rd parties

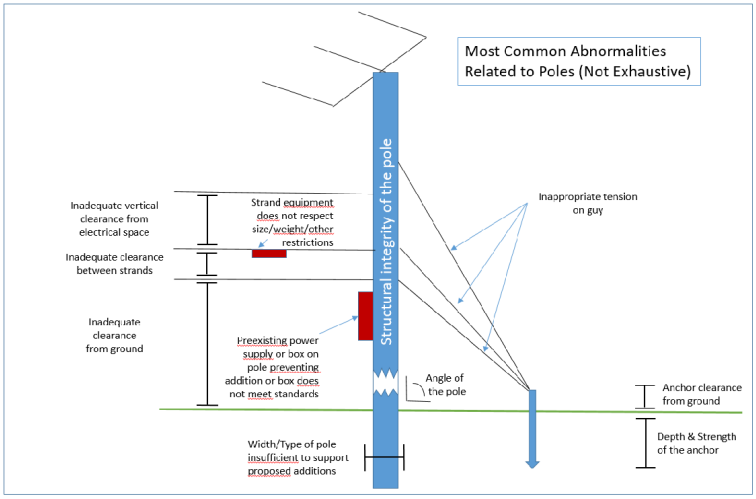
90% Structures Approved without any Make ready

3% Required "make ready" work

6% Denied

<1% Denied on the basis of reserved capacity

The vast majority of complaints and delays are with respect to timelines associated with make ready work which can take over two years in some instances.



Abnormalities can develop over time. We must correct them prior to our own deployment as well.

We anticipate a near tripling of access requests in the coming year or so due to an aggressive broadband subsidy program in Quebec. We have worked closely with Hydro Quebec to streamline processes.

Bell

2

Action Plan to Accelerate Access to Poles for Licensees/Applicants

	Actions	Description	Impacts	Timing	Dependencies	Status
1	Cleaning up the Queue + increasing resources for make ready work	Permit requests within « funnel » that are stuck with Bell (as opposed to a third party such as Hydro Quebec) to be reviewed, prioritized and actioned. Highly dependant on permit quality.	Required increase of resources and increased coordination with HQ: backlog significantly reduced + make ready timelines reduced	Ongoing	Bell, Hydro Québec Distribution, Licensees	
2	Revisions to engineering and construction standards	Developed criteria which allow Applicants to proceed with the work before make ready work is completed.	Hired independent engineering firms: Reduction of required make ready work going forward by about 20%	Implemented	Bell, Hydro Québec Distribution, TELUS	
3	"One Touch Make Ready (OTMR)" Telecom work done by Licensee	Allow the licensee to conduct make ready work (through certified contractors) that previously only Bell could do on their behalf where little risk of service disconnection or damage to facilities.	Reduces coordination and cycles and accelerates deployment for the applicant	4 trials conducted, now deployed but continuing to trial pole replacement	Bell, Licensees & contractors	
4	"OTMR" Telecom and Electrical Work by Licensee	Allow both electrical and telecom work to be done by a certified contractors trained in both types of work. The greatest limiting factor is the availability of contractor/resources that are trained for both electric and telecommunications work.	Reduction of cycle time by +- 200 business days, as experienced by Bell in Montréal in a trial in collaboration with Hydro Quebec.	Trial being conducted with HQ – likely to be limited to simple make ready work	Bell, Hydro Québec Distribution, Licensees	
5	Accelerated Access for Licensees with Indemnity Clause	Allows the Licensee's Engineer to certify that its deployment activities can be conducted safely despite anomalies on the pole with the Licensee agreeing to an indemnity clause.	Reduces inter-engineer disputes, reduces necessary ressources by pole owner to review permits and accelerates broadband deployment	Implemented and retrofit to convert existing backlog to benefit from new process	Bell	
6	Process to allow applicant to propose temporary installations to circumvent problematic poles	In some cases make ready work will not be able to be completed in a short turnaround. In such circumstances an applicant may propose a temporary installation to circumvent the block while accepting to remediate at their costs once the make ready work is completed	Newly implemented, this provides applicants a tool to significantly increase the speed of broadband deployment	Implemented and retrofit to convert existing backlog to benefit from new process	Bell, Licensees	

3

Bell

Sequence of events when a pole replacement is required

1. Bell plants new replacement pole next to current pole, informs electric utility that new pole is in place and is ready for electric facilities → Bell trialing process change to allow applicant to do this through approved contractors
2. Electric utility transfers facilities to new pole and adds any necessary guys/anchors, informs Bell that work is complete → Bell must wait for electric utility to complete its work prior to moving own strand to new pole
3. Cable company or other licensee(s) that owns strand on the pole moves their strand → Bell proposed tariff amendment will allow applicant to do this work through approved contractors
4. As its strand is typically the bottom strand on a pole, the incumbent service provider (e.g. Bell) is last to transfer facilities to the new pole (including the strand which licensee may have requested the right to attach to) → Bell process change allows applicant to do this through approved contractors
5. Licensee can then install facilities on Bell's strand

We have requested tariff amendments which would allow Bell and permit applicants to move facilities on behalf of other telecom attachers on a pole (step 3 above). Step 2 is outside of the CRTC's jurisdiction and requires collaboration with Electric Utilities and/or provinces.

4

Acceptance of liability / risks by applicant

1. We have in the past been deemed responsible, as owner of a support structure, for incidents including fatalities, that have occurred to a licensee/applicant's contractors during work on behalf of the licensee. Bell was not involved with the work other than approving a permit.

2. Hydro Quebec allows licensees to deploy their facilities prior to the completion of potential make ready work if they sign a full indemnity clause.

3. We have implemented forms similar to those used by Hydro Quebec for our new accelerated permitting and temporary installation processes which essentially state that:
   - The Applicant acknowledges that Bell/structure owner is relying on the applicant's own inspection in approving the permit
   - The Applicant understands and accepts all risks with respect to their work
   - The Applicant accepts remediation costs with respect to any temporary installations it installs
   - Any damage that occurs to the structure within 120 days of the applicant's work will be assumed to have been caused by the applicant unless they can demonstrate another cause.
   - Permits for accelerated process are P.Eng stamped, Bell does not review/challenge engineering but instead inspects post-deployment.
     - Applicant either accepts the risk of having to redo work if they missed something or proactively requests pre-deployment inspection by Bell to confirm what is required with respect to their application.
     - If Applicant compromised safety or we otherwise have reasons to be concerned, the applicant's ability to avail itself of the accelerated process can be revoked with written reasons.

5

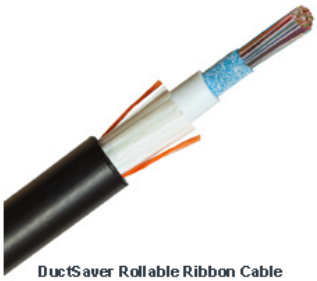
Bell

Appendix 2: OFS DuctSaver Rollable Ribbon (RR) Central Core Cable Specifications, July 2021

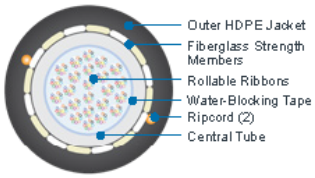
ofs
A Furukawa Company

DuctSaver® Rollable Ribbon (RR) Central Core Cable

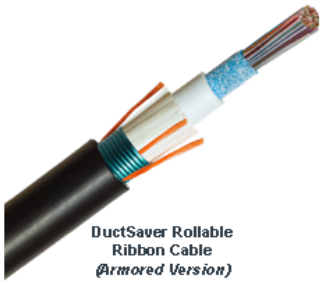
Increased Fiber Density and Improved Cable Coiling for Performance You Can Count On



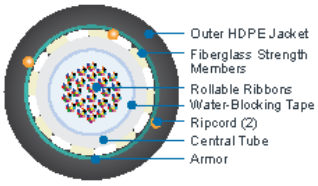
DuctSaver Rollable Ribbon Cable



DuctSaver Rollable Ribbon Cable Cross-Section



DuctSaver Rollable Ribbon Cable *(Armored Version)*



Features

- 12 fiber ribbon units featuring rollable ribbon technology
- Durable, highly crush-resistant central core design features with helically applied strength member system
- Fiber counts of 72, 144, 288, or 432
- Easily identifiable ribbon print marking using blocks and bars
- Completely gel-free construction
- Utilizes standard ITU-T G.652.D and G.657.A1 compliant fiber

Benefits

- Optimized for fast, cost-effective mass fusion splicing
- Ribbon and sheath design enables smaller cable outer diameter (OD) and reduced weight versus comparable flat ribbon designs
- Superior cable coiling for simplified handling and installation compared to LXE designs
- Gel-free design helps facilitate faster cable preparation
- Added protection of central core for increased robustness and ease of midspan access.
- Offers seamless splicing in existing fiber network with no mode field mismatch

Product Description

The DuctSaver® Rollable Ribbon (RR) Cable features 72, 144, 288, or 432 optical fibers in a gel-free, central core cable design. This cable features rollable ribbons, the newest optical fiber ribbon design from OFS. To form these ribbons, individual 250 µm fibers are partially bonded to each other at predetermined points. The cable design features a central tube construction with helical strength elements for durable protection and superior coiling performance to alternative products.

Why the DuctSaver Rollable Ribbon (RR) Cable?

The DuctSaver RR Cable's rollable ribbon design helps users to achieve highly efficient and cost-effective mass fusion splicing along with easy individual fiber breakout. This capability helps to simplify installation and save on labor costs. In addition, the DuctSaver RR Cable's greater fiber density can help to expand the capacity of existing pathways using smaller, lower-cost duct systems.

The DuctSaver RR Cable's ribbons may be "rolled" (compacted) and routed like individual fibers to facilitate use in smaller closures and splice trays.

In addition, this cable's completely gel-free water-blocking design also helps to reduce the time required to prepare cable ends which can also help with reduced labor and splice costs.

With its ability to maximize duct utilization, the DuctSaver RR Cable is an excellent choice for connecting very large fiber distribution hubs. It is also highly suitable for use in data centers, FTTx and access networks.

www.ofsoptics.com

A Furukawa Company

DuctSaver® Rollable Ribbon (RR) Central Core Cable

Specifications								
	Dielectric Versions				Armored Versions			
Fiber Count	**72**	**144**	**288**	**432**	**72**	**144**	**288**	**432**
Cable Outer Diameter - in. (mm)	0.35 (9)	0.39 (10)	0.47 (12)	0.57 (14.5)	0.43 (11.0)	0.46 (11.6)	0.54 (13.6)	0.63 (16.0)
Cable Weight - lb/kft (kg/km)	44 (65)	53 (79)	73 (109)	99 (148)	72 (106)	84 (125)	113 (168)	139 (207)

Handling (All Fiber Counts)		Temperature (All Fiber Counts)	
Minimum Bend Radius, with Load	15 x OD (Outer Diameter)	**Installation**	-22 °F to 140 °F (-30 °C to 70 °C)
Minimum Bend Radius, with No Load	15 x OD	**Operation**	-40 °F to 158 °F (-40 °C to 70 °C)
Minimum Bend Radius, Storage Coils	10 x OD	**Storage**	-40 °F to 167 °F (-40 °C to 70 °C)
Maximum Rated Cable Load (MRCL)	600 lb. (2700 N)		
Maximum Long-Term Load	180 lb. (800 N)		

Performance Standard (All Fiber Counts)

Tested per Applicable Requirements of ANSI/ICEA S-87-640 and Telcordia GR-20 CORE Issue 4.

Fiber Type[2]

Single-Mode Optical Fiber	Fiber (S1)	Fiber (S2)	Fiber (SF)	Standard	Typical* Attenuation (dB/km)	Maximum Cable Attenuation on Reel
AllWave®+ ZWP Optical Fiber	3	G	E	G.652.D/G.657.A1	0.35/0.3/0.22	0.4/0.4/0.3

NOTE: For more information regarding typical attenuation as well as attenuation parameters on Link Design Value (LDV) (Maximum end-to-end link attenuations over a concatenated span), please see OFS Application Note AN-111-A which can be downloaded at www.ofsoptics.com or contact your OFS representative.

DuctSaver RR Central Core Cable Ordering Information

Example: AT-3GE8Y4X-*NNN*
Armored Version: AT-3GE8Y2X-*NNN*

Part Number: **AT** - *S1 S2 SF S3 S4 S5 S6 - NNN*

S1 =	**Fiber Selection** See S1 in Fiber Type table above.	**S3 =**	**Sheath Construction** 8 = All Central Core Products	**S6 =**	**Central Core - Oversheath** X = No Oversheath
S2 =	**Fiber Transmission Performance** See S2 in Fiber Type table above.	**S4 =**	**Central Core Design** Y = Gel-Free Central Core Rollable Ribbon	*NNN* =	**Fiber Count** 072, 144, 288, 432
SF =	**Fiber Type[2]** See SF in Fiber Type table above.	**S5 =**	**Sheath Design** 4 = DuctSaver Dielectric Rollable Ribbon 2 = DuctSaver Armor Rollable Ribbon		

[1] Part Number shown is for a DuctSaver Rollable Ribbon Cable with standard AllWave+ZWP Optical Fiber attenuation: 0.35/0.31/0.27/0.25/0.27 dB/km @ 1310/1385/1490/1550/1625 nm and standard cable print.

OFS OPTICAL CABLE AT-3GE8Y4X-NNN [MM/YY] (UL) [HANDSET SYMBOL] [NNN] F [SERIAL #]

[2] Contact OFS Order Management for information on other cable variations including additional fiber types, attenuation and custom cable print.

NOTE: For more information regarding typical attenuation as well as attenuation parameters on Link Design Value (LDV) (Maximum end-to-end attenuation over a concatenated span), please see OFS Application Note AN-111 which can be downloaded at www.ofsoptics.com or contact your OFS representative.

GUIDING LIGHT FOR A BETTER LIFE.™

For additional information please contact your sales representative.

You can also visit our website at www.ofsoptics.com or call 1-888-fiberhelp (1-888-342-3743) USA or 1-770-798-5555 outside the USA.

OFS Marketing Communications
Doc ID: osp-184 Date: 07/21

Appendix 3: ESA Bulletins

DB-07-15-v3

Electrical Safety Authority

Distributor Bulletin

"Materially Insignificant" Work

Distribution Company Awareness

This bulletin contains direction on how an Electrical Distributor may demonstrate compliance with Regulation 22/04, with respect to "materially insignificant" work affecting electrical installations. ESA views "materially insignificant" work to consist of any replacement, alteration, upgrades or addition of new structural loads that does not materially change the existing electrical installations, as determined by the Electrical Distributor (typically relating to forces on poles & strength of poles). ESA recognizes the following examples may be deemed "materially insignificant": fibre overlashing, installation of flags, attachment of traffic signs and attachment of flower baskets (but is not limited to the examples listed).

ESA Direction

The Electrical Distributor determines if the proposed work is deemed "materially insignificant".

A declaration signed by a P.Eng (Attacher or Electrical Distributor), shall accompany any request for an attachment to be considered "materially insignificant". The declaration shall be in a format agreed upon by the Party's involved. The Electrical Distributor then reviews the request & declaration and deems the proposed work as either "materially insignificant" or "not materially insignificant".

The Electrical Distributor can exempt "materially insignificant" work from the audit requirements of Sections 7 and/or 8 of Regulation 22/04 and that work will be deemed in compliance with Regulation 22/04.

Examples

1. A P.Eng submits a request for a 3rd Party Attacher's fibre overlash to be reviewed as "materially insignificant" by the Electrical Distributor. If the Electrical Distributor deems the work to be "materially insignificant", then the Electrical Distributor may not require the 3rd Party Attacher to supply an approved plan, drawings or specifications for the work. The Electrical Distributor may require a Record of Inspection and Certificate to be completed.

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Website: https://esasafe.com E-Mail: Utility.Regulations@ElectricalSafety.on.ca

Electrical Safety Authority

Distributor Bulletin

2. A P.Eng submits a request for the Municipality's Canadian Flag attachments to be reviewed as "materially insignificant" by the Electrical Distributor. If the Electrical Distributor deems the work to be "materially insignificant", then the Electrical Distributor may not require the Municipality to supply an approved plan, drawings or specifications for installation work. The Electrical Distributor may also not require a Record of Inspection and Certificate to be completed.

3. A Municipality employee submits a request for the Municipality's Canadian Flag attachments to be reviewed as "materially insignificant" by the Electrical Distributor. The Electrical Distributor's P.Eng signs a declaration that the proposed work is "materially insignificant". The Electrical Distributor would then deem the work to be "materially insignificant". Then the Electrical Distributor may not require the Municipality to supply an approved plan, drawings or specifications for installation work. The Electrical Distributor may also not require a Record of Inspection and Certificate to be completed

ESA Recommendation

Electrical Distributors publish established parameters for work that could possibly meet "materially insignificant" and any documentation that they require to be submitted to the Electrical Distributor for review by any Attacher.

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DB-01-20-v1

Electrical Safety Authority

Distributor Bulletin

Previous Editions of the Overhead and Underground Standards

Distribution Company Awareness

This bulletin updates and replaces Bulletins DIB-03-08. It is recommended the copies of DIB-03-08 be destroyed and replaced with this bulletin. The intent of this Bulletin is to inform Ontario LDCs what is required to meet Regulation 22/04 when it comes to work on installations (i.e. new line sections, replacements, alterations, additions, upgrades) on existing overhead and underground systems.

ESA Direction

The following direction applies to all work deemed

(i) non-emergency work (see ESA Guideline – Section 7 for additional information); or

(ii) materially significant work (see ESA Bulletin on "Materially Insignificant" Alterations for additional information), under the C22.3 No.1 and/or C22.3 No.7 Standards ("Standard(s)").

Notes:

"Structure" is being defined as "the main supporting unit for a supply line and/or communication line".

"Accounted for" can be demonstrated by the original plans, approved standards and work instructions leaving provisions (e.g. loading, clearances and separations) for future attachments. Where the plans, approved standards and work instructions are not available, installed infrastructure may demonstrate they were accounted for, such as extra ducts for underground or brackets installed on structures for overhead. See bullets 5 & 6 below, for applicability of this statement.

1. Existing overhead and underground lines that have been constructed in compliance with a prior version of the Standards, may remain in service in the event of subsequent revisions of the Standards, and need not be modified to comply with the current Standard editions or the Standard editions identified in Regulation 22/04.
2. New line sections shall comply with the current Standard editions or the Standard editions identified in Regulation 22/04.

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Distributor Bulletin

3. Replacement or alteration of existing non-structure equipment (including conductors, insulators and other equipment), for the repair or replacement of failed or failing components, is permitted to meet the edition of the Standard in force at the time of the line's original design, and need not be modified to comply with current Standard editions.

4. Replacement of existing structures, meeting the like-for-like replacement definition (e.g. maximum limit of 1 dressed pole), for the repair or replacement of failed or failing components, is permitted to meet the edition of the Standard in force at the time of the line's original design, and need not be modified to comply with current Standard editions. All other replacements of structures shall comply with the current Standard editions or the Standard editions identified in Regulation 22/04.

5. Altering or adding new structural loads to a structure that were **accounted** for by the original design and that meet the requirements of the edition of the Standard in force at the time of the line's original design, is permitted (contingent on the approval from the structure owner) to meet the edition of the Standard in force at the time of the line's original design and need not be modified to comply with current Standard editions. All other alterations or additions of new structure loads to a structure shall comply with the current Standard editions or the Standard editions identified in Regulation 22/04.

6. Altering or adding new structural loads to a structure that were **unaccounted** for by the original design shall comply with the current Standard editions or the Standard editions identified in Regulation 22/04.

7. Non-structure upgrades, such as voltage conversions, where the original design meets the edition of the Standard in force at the time of the line's original design, is permitted to use the edition of the Standard in force at the time of the line's original design.

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Examples

The following are examples of the Direction section of this bulletin. Any reference numbers within the examples point the reader to the applicable Direction number **(#)**.

- LDC is constructing a new line section for additional customers or due to a relocation for a road widening. This is deemed a new line section **(2)** and shall comply with the current edition of the Standards or the Standard editions identified in Regulation 22/04.
- LDC is splicing or undertaking cable injection work. This is deemed as a replacement or alteration of existing non-structure equipment **(3)** and is permitted to meet the edition of the Standard in force at the time of the line's original design, without being modified to comply with the current edition.
- LDC is replacing failed or failing insulators. This is deemed as a replacement or alteration of existing non-structure equipment **(3)** and is permitted to meet the edition of the Standard in force at the time of the line's original design, without being modified to comply with the current edition.
- LDC is replacing one failed or failing structure. This is deemed as a replacement of an existing structure **(4)** and is permitted to meet the edition of the Standard in force at the time of the line's original design, without being modified to comply with the current edition.
- LDC is replacing more than one structure, where the structures are adjacent to one another. This is deemed as a replacement of existing structures **(4)** and shall comply with the current edition of the Standards or the Standard editions identified in Regulation 22/04.
- LDC or 3rd Party Attacher is adding a materially significant load to a structure. This is deemed as an alteration or addition of a new structural load **(5)** and is permitted to meet the edition of the Standard in force at the time of the line's original design (contingent on the approval from the structure owner), without being modified to comply with the current edition, as long as the structure load was accounted for by the original design. If it does not meet the criteria above, this is deemed as an alteration or addition of a new structural load unaccounted for by the original design **(6)** and it needs to comply with the current edition of the Standards or the Standard editions identified in Regulation 22/04.

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Electrical Safety Authority

Distributor Bulletin

- LDC is adding a new transformer on an existing pole, where this new structural load was unaccounted for by the original design. This is deemed as an addition of a new structure load unaccounted for by the original design **(6)** and it needs to comply with the current edition of the Standards or the Standard editions identified in Regulation 22/04.
- LDC is upgrading insulators in order to convert a line's voltage. This is deemed as an upgrade of existing non-structure equipment **(7)** and this is permitted to meet the edition of the Standard in force at the time of the line's original design, without being modified to comply with the current edition.

Clause: (C22.3 No.1-15 Overhead Systems)

1. Scope

1.2 Existing installations (including maintenance replacements and maintenance 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.

Clause: (C22.3 No.7-15 Underground Systems)

1. Scope

1.2 Existing installations, including maintenance replacements and maintenance 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.

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DB-02-16-v1

Electrical Safety Authority

Distributor Bulletin

Certificate of Deviation – Certified Lists

Overview

This bulletin contains direction on how an LDC may demonstrate compliance with Regulation 22/04, with respect to deviations from required standards. ESA accepts that a certified list of deviations from section 5 "When safety standards met" of Regulation 22/04, approved by a P.Eng, is acceptable to meet the requirements of Regulation 22/04.

ESA Direction

The LDC may establish or utilize a certified list of deviations from required standards, if the LDC deems it appropriate to do so. The certified list of deviations shall meet the requirements of Regulation 22/04 – Section 9 and where that section is not applicable the deviations are to be P.Eng approved and state the failure to meet the standards will not materially affect the safety of any person or property.

Regulation 22/04 Excerpt

Deviations from required standards

9. *(1) Where a distributor upgrades the distribution lines of a distribution system such that the system does not meet the standards for clearances and separations in respect of distribution lines referred to in subsection 5 (2) or (3), the distributor may still put the system into use if a professional engineer certifies that,*

a) the reason for failing to meet the standards was a lack of space; and
b) the failure to meet the standards will not materially affect the safety of any person or property. O. Reg. 22/04, s. 9 (1).

(2) If a distributor replaces a part or portion of an existing distribution system with a part or portion that is similar to the part or portion being replaced but that part or portion does not meet the safety standards set out in section 4, the distributor may put the system into use as long as no undue hazard to the safety of any person is created by doing so. O. Reg. 22/04, s. 9 (2).

An example of an acceptable 3rd Party Attacher certified list of deviations process is in Appendix A of this bulletin.

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Distributor Bulletin

Appendix A

Third Party Company Logo
Certificate of Deviation Approval for Non-Standard Items This certifies that the below list of deviations from CSA standards will not materially affect the safety of any person or property, if not resolved immediately. These items can be resolved over time through maintenance, pole line rebuild and street light replacement programs. The items covered by this Certificate are deemed to not be an imminent safety hazard for workers that are "qualified" to work in the communications space on poles, based on their knowledge, training and experience levels required. This Certificate is not intended to be applied to new pole lines or any situation where a pole is being replaced anyways. In those cases it is expected that the entire pole be brought up to 100% CSA standards compliancy. The workers are "qualified" in their ability to recognize electrical hazards and other potential safety concerns, which may cause them to implement specific safety measures or work procedures to avoid the item. They are required to take a training module called "Health and Safety Guidelines for Contractors - Working at Heights Module", among other requirements before they are deemed qualified. This Certificate can only be applied to Third Party Company projects, at their discretion, by inclusion of this Certificate into their attachment application. On a per attachment application basis, the exact poles and pole spans where this Certificate of Deviation Approval is being applied will be clearly identified on a separate form, completed by a competent person. A suitable form is attached to this Certificate, but similar forms are also acceptable. Third Party Company and the LDC may agree to identify some of these items through existing Joint Use Processes, or other agreed methods, rather than this form.

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Electrical Safety Authority

Distributor Bulletin

The Installation of work covered by this document meets the safety requirements of Section 4 of Ontario Regulation 22/04 with the following deviations:

1) Neutral Wires that sag below the line of sight of Communication Attachments when:
   a. Span length is less than 75 meters
   b. Neutral wire is part of a multi-grounded neutral system
   c. Neutral wire is measured in its maximum sag condition.
   d. Communications is measured in its Thermal sag condition
   e. Closest distance between the Neutral and Communications is greater than 0.3m under the above conditions.
2) Street lights that may or may not have been bonded to the neutral and are within 1.0m of the highest strand.
3) Single damaged or missing vertical ground wires. (Consecutive vertical ground locations on a pole lead that are both missing or damaged are excluded)
4) The following items at the pole if they are at least 0.6m above the highest communications strand:
   a. Secondary Risers
   b. Drip loops of power service wires or secondary cable bundles
   c. Mechanical protection over primary riser cables
5) Secondary Wires (e.g. Triplex, Spun Buss, Open Buss Secondary…) that sag below the line of sight of Communication Attachments when:
   a. Secondary wire is measured in its maximum sag condition.
   b. Communications is measured in its Thermal sag condition
   c. Closest distance between the Secondary Wire and Communications is greater than 0.3m under the above conditions.

In the generation of this Certificate, due consideration was given to current CSA Standards and the qualifications of "qualified workers" in the Communications space. The failure to meet the standards will not materially affect the safety of any person or property.

Reference	Title	Issue date
914-1000-200	Aerial Structure Design – Integrated Standard	2009-10-05

Name of Professional Engineer _____ Date _____

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Electrical Safety Authority

Distributor Bulletin

Deviations for Non-Standard Items

Project Name:		**Municipality:**	
Permit #		**Date:**	

Street	Bar code/ Pole #	Description of Deviation

Prepared by: _____ Date. _____

Position _____

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DB-11-12-v3

Electrical Safety Authority

Distributor Bulletin

"Certificate of Deviation Approval"

Distribution Company Awareness

This bulletin contains direction on how an Electrical Distributor may demonstrate compliance with Regulation 22/04, with respect to "make-ready work", affecting electrical installations. ESA views "make-ready work" to consist of the practice of rearranging, installing or removing equipment in order to safely accommodate additional infrastructure. ESA recognizes that some "make-ready work" may not be deemed required to be completed, prior to the work that identified the "make-ready work" starting.

ESA Direction

The Electrical Distributor determines if the proposed "make-ready work" is deemed required to be completed, prior to the work that identified the "make-ready work" starting.

A "Certificate of Deviation Approval" signed by a P.Eng (Attacher or Electrical Distributor), may identify "make-ready work" as something that is not required to be completed, prior to the work that identified the "make-ready work" starting. The "Certificate of Deviation Approval" shall be in a format agreed upon by the Party's involved. The Electrical Distributor reviews proposed design including the "Certificate of Deviation Approval" and if it is accepted by the Electrical Distributor the work may start without the completion of identified "make-ready work".

For more information, Regulation 22/04 Guidelines address how to deal with deviations from approved standard design drawings or plans, and the safety standards (see Sections 4 & 5 of Regulation 22/04).

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Electrical Safety Authority

Distributor Bulletin

Example (Generals)

1. The Electrical Distributor may choose to accept deviation(s) from CSA 22.3 No.1 on a pole, when the additional infrastructure would not create or make worse the existing deviation(s). This can be done through the use of a "Certificate of Deviation Approval" signed by a P.Eng, instead of implementing "make-ready work" on the pole.
2. The Electrical Distributor may choose to write deviation(s) from CSA 22.3 No.1 on a pole, when identified "make-ready work" has been deemed minor and work can safely proceed on the pole without the need for the identified "make-ready work" to be completed, before a new attachment to the pole is put into service.

Example (Specific)

3. An Attacher identifies that the clearances between the proposed attachment to the Electrical Distributors neutral would not meet standard's clearances and the neutral will need to undergo "make ready work" to meet standards. The Electrical Distributor may accept a "Certificate of Deviation Approval" to allow the attachment to occur and the neutral may or may not be moved at a future date.
4. An Attacher identifies that an existing Electrical Distributor guy wire needs to be re-tensioned. The Electrical Distributor may accept a "Certificate of Deviation Approval" to allow the attachment to occur and the guying may or may not be addressed at a future date.
5. An Attacher identifies that an existing Electrical Distributor guy anchor extends above the standard's identified ground level. The Electrical Distributor may confirm that the depth is adequate or accept a "Certificate of Deviation Approval" to allow the attachment to occur and the guying may or may not be addressed at a future date.

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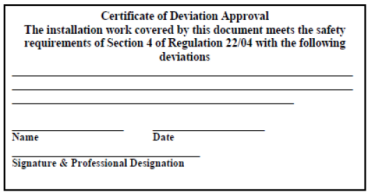
Electrical Safety Authority

Distributor Bulletin

Technical Guideline for Equipment, Design and Construction

Appendix A – Sample Certificates of Approval

The following "Certificate of Deviation Approval" is contained in the ESA Guideline. A Professional Engineer (P.Eng) or the Authority (Regulation 22/04 – Section 7(2)) may sign a "Certificate of Deviation Approval" in addition to or in replacement of a "Certificate of Approval", (reference Appendix A for a sample certificate). The deviations are to be listed on the Certificate of Deviation Approval.



Certificate of Deviation Approval
The installation work covered by this document meets the safety requirements of Section 4 of Regulation 22/04 with the following deviations

Name Date

Signature & Professional Designation

ESA Recommendations

Electrical Distributors publish established parameters for work the Electrical Distributor may accept "Certificates of Deviation Approval" regarding "make-ready work".

Sufficient time is provided to ensure "make-ready work" can be completed, in the event that the "Certificate of Deviation Approval" is not accepted by the Electrical Distributor.

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DB-01-15-v2

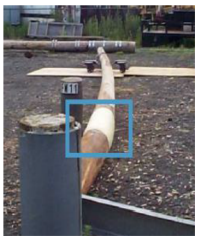
Electrical Safety Authority

Distributor Bulletin

"In-Field Equipment Refurbishment"

Distribution Company Awareness

This bulletin contains direction for how an Electrical Distributor may demonstrate compliance with Regulation 22/04, with respect to in-field equipment refurbishments. ESA views in-field refurbishment work to consist of cable injection programs, filling significantly sized voids in poles (ex. woodpecker holes), pole strength restoration wraps and other similar work.



ESA Direction

ESA views refurbishment work performed in-field to be equivalent to in a repair facility. The following sections of Regulation 22/04 apply to in-field refurbishments:

- Section 6: The Electrical Distributor ensures approval of the material used for the in-field refurbishment.
- Section 7: The process for completing the in-field refurbishment is be documented and approved.
- Section 8: The process developed by the LDC ensures that Records of Inspection and Certifications are completed before the equipment is put into use.

Refer to the "Technical Guideline for Equipment, Design and Construction" for more information.

ESA Recommendation

ESA recommends Electrical Distributors review existing processes and the Technical Guidelines to ensure compliance with Regulation 22/04. In addition, ESA recommends reviewing existing processes to ensure that timelines are considered for certain types of refurbishment work if specified by a manufacturer.

Note: Work such as general maintenance activities in a substation, switch lubrication or similar maintenance work does not fall under the scope of Sections 6 or 7 of Regulation 22/04. These activities are considered to be maintenance activities and not refurbishment.

August 6, 2021 1 of 1 **Bulletin DB-01-15-v2**

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DB-10-12-v1

Electrical Safety Authority

Distributor Bulletin

Attacher Developed Plans/Work Instructions and LDC Review

Distribution Company Awareness

ESA has received a request for additional information into the term "review" with respect to section 2.5.2 in the "Guideline for Third Party Attachments". This bulletin provides the requested additional information when working with attacher developed plans or work instructions.

Guideline for Third Party Attachments Excerpt

> 2.5.2 Attacher Developed
>
> The second approach is based on the attacher providing a plan or work instruction assembled by a professional engineer; by the attacher's engineering technologist certified by the Ontario Association of Certified Engineering Technicians and Technologists or by the attacher's competent person, from a standard design developed and approved by a professional engineer, to the owner. The owner will grant permission to proceed after a **review** of the design and the attacher's Certificate of Approval…

More Information on the Term "Review"

At a minimum, it is expected that the plan or work instruction will be "reviewed" by the LDC to ensure that the "Minimum Permit Drawing Requirements for Proposed Attachments on Owner Poles" exist on the approved plan or work instruction. More information on the drawing requirements can be found in Appendix A1 in the Guideline for Third Party Attachments.

The review of a project's plan or work instruction does not require re-engineering. For example engineering work, such as loading calculations, are not required to be re-confirmed/re-calculated by the LDC.

Note: Re-engineering is not required; however it is the LDC that determines the process for undertaking a review of attacher developed plan or work instruction. The LDC shall review to ensure the plan or work instruction meets the requirements of Regulation 22/04 and the Certificate of Approval covers all of the proposed construction.

ESA Recommends

ESA recommends LDCs create processes to meet or exceed the review of attacher developed plans or work instructions.

November 1, 2020 1 of 1 **Bulletin DB-10-12-v1**

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Appendix 4: Mechanical Devices & Applications – Product Information

Dura-Line MicroDucts:

Dura-Line MicroDucts are factory bundled in a carbon black high-density polyethylene (HDPE) oversheath with antioxidants for maximum UV protection and external ribs for easy gripping of lashing wire.

Dura-Line's SILICORE® ULF is an ultra-low friction, permanent, co-extruded lining that allows cable to be installed safer, faster, and farther than ever. The super-slick, non-greasy lining boasts a greater than 60% lower coefficient of friction than standard HDPE conduit. Testing at Dura-Line's state-of-the-art, world-class test track has shown that you can air-jet fiber optic cable into a MicroDuct lined with SILICORE ULF almost 5 times farther than without it.

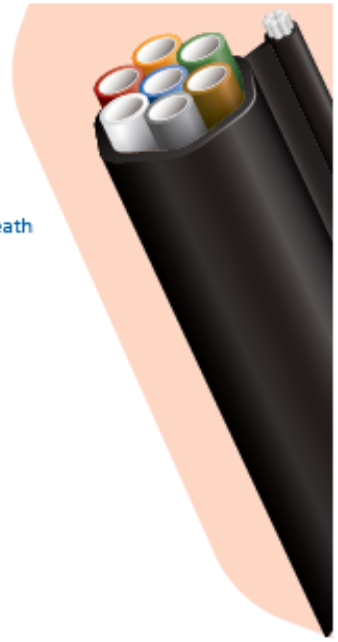
Multiple pathways with different configurations (7-way, 4-way, 3-way, 2-way) for one installation cost, allows flexibility and future growth. No special tools or equipment are required for installation.

Self Supporting Aerial MicroDuct:

7-Way product shown. Multiple configurations available.

MICROTECHNOLOGY

FUTUREPATH FIGURE-8



- Multiple pathways for one installation cost, allows flexibility and future growth
- MicroDucts are factory bundled in a carbon black polyethylene oversheath with antioxidents for maximum UV protection
- Extra high-strength galvanized steel strand utilizes industry standard aerial strand hardware
- No special tools or equipment needed; installation uses the same as traditional conduit or innerduct

INSTALLATION TYPES

Aerial

CONFIGURATIONS

2-way
4-way
7-way

STANDARD COLORS

MicroDuct

Oversheath

Custom Colors Available

FEATURES

STANDARD
SPECIFICATIONS/DETAILS FuturePath Figure-8 is a unit of bundled MicroDucts supported by a 1/4" Extra High Strength Galvanized Steel Strand. Manufactured from flexible HDPE (High Density Polyethylene).The Oversheath is carbon black polyethylene with antioxidants for maximum UV protection.
FILL RATIO Choose the correct MicroDuct size based on the Outer Diameter (OD) of desired MicroCable. Dura-Line recommends a fill ratio of 50% to 75% for optimal cable placement performance. Several factors impact jetting distance including the condition of route, bends, and equipment.
CONDUIT MARKINGS Permanent marking along FuturePath includes: material, relevant standards, production info, and sequential feet or meter markings. Custom options available.
CO-EXTRUDED LINING SILICORE® ULF (Ultra-Low Friction) is co-extruded inside the HDPE wall creating a slick, permanent, interior lining. With a coefficient of friction 60% lower than standard HDPE conduit without the aid of wet lubricants, SILICORE® ULF exhibits no loss in performance over time or in extreme temperature conditions.
INTERNAL RIBS Standard (except 3.5mm ID MicroDucts which are designed with a standard smooth interior)

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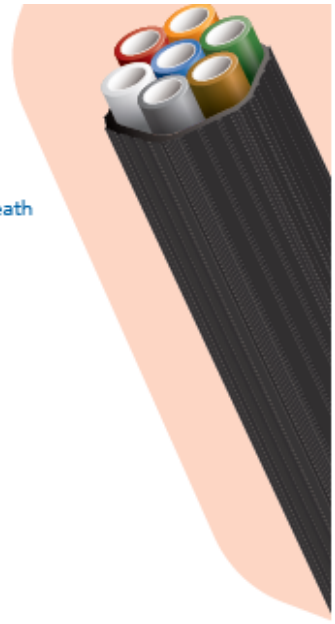
DLFP Fig8-6.23

Aerial MicroDuct for Overlash installation:

7-Way product shown. Multiple configurations available.

MICROTECHNOLOGY

FUTUREPATH AERIAL



- Multiple pathways for one installation cost, allows flexibility and future growth
- MicroDucts are factory bundled in a carbon black polyethylene oversheath with antioxidents for maximum UV protection
- External ribs for easy gripping of lashing wire
- No special tools or equipment needed; installation uses the same as traditional conduit or innerduct

INSTALLATION TYPES

Aerial

CONFIGURATIONS

2-way 4-way
3-way 7-way

STANDARD COLORS

MicroDuct

Oversheath

Custom Colors Available

FEATURES

STANDARD

SPECIFICATIONS/DETAILS FuturePath is a unit of bundled MicroDucts. Manufactured from flexible HDPE (High Density Polyethylene).The Oversheath is carbon black polyethylene with antioxidants for maximum UV protection

FILL RATIO Choose the correct MicroDuct size based on the Outer Diameter (OD) of desired MicroCable. Dura-Line recommends a fill ratio of 50% to 75% for optimal cable placement performance. Several factors impact jetting distance including the condition of route, bends, and equipment.

CONDUIT MARKINGS Permanent marking along FuturePath includes: material, relevant standards, production info, and sequential feet or meter markings. Custom options available.

CO-EXTRUDED LINING SILICORE® ULF (Ultra-Low Friction) is co-extruded inside the HDPE wall creating a slick, permanent, interior lining. With a coefficient of friction 60% lower than standard HDPE conduit without the aid of wet lubricants, SILICORE® ULF exhibits no loss in performance over time or in extreme temperature conditions.

INTERNAL RIBS Standard (except 3.5mm ID MicroDucts which are designed with a standard smooth interior)

RIP CORDS For easy opening of the oversheath

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DL.FPAERIAL.45.22

Osmose Pole Restoration Products

Osmose®

Pole Restoration Products

Trusses, Banding, Installation Equipment

Pole Restoration is a third or less of the cost of pole replacement. A successful program can save a utility millions of dollars in unnecessary replacement costs. Osmose restoration products add many years of service life to older, weakened poles.

Osmo-C2-Truss®

Lighter weight, higher strength, lower cost - The optimized truss design provides the highest strength-to-weight ratio in the industry at a lower cost than other systems.

Patented design- Finite Element Analyses were used to optimize the cross-sectional shape and maximize the efficiency of the design.

Reduced rotation - The patented design concept enables the C2-Truss to minimize the twisting caused by transverse wind loads that reduce the performance of other truss shapes.

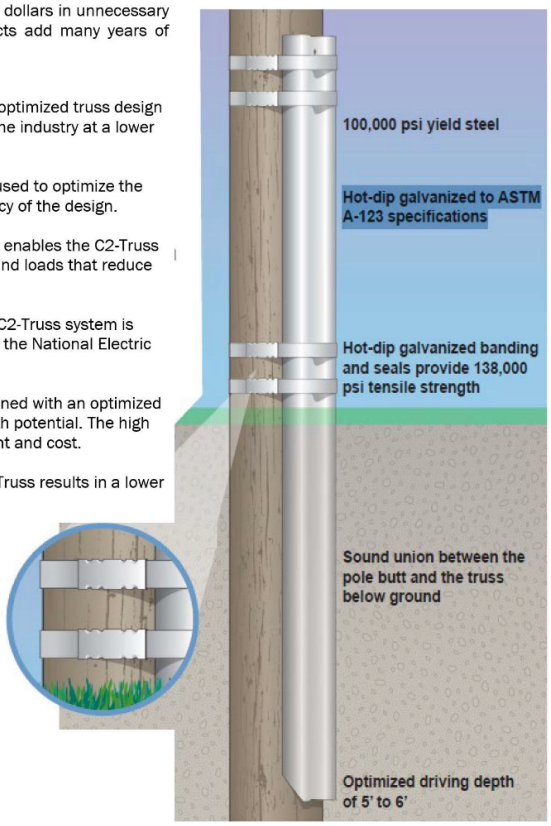
Engineered for safety and reliability - The Osmo-C2-Truss system is installed to exceed the strength requirements of the National Electric Safety Code (NESC).

Higher yield strength steel - 100,000 psi - combined with an optimized design allows the truss to develop its full strength potential. The high strength-to-weight ratio helps lower overall weight and cost.

Low profile—The unique design of the Osmo-C2-Truss results in a lower profile on the pole.

Longer lengths for high decay - The standard truss extends 5 feet above ground. Single piece trusses are available for applications up to 8 feet above ground. A two-piece design is available for taller applications.

Galvanized for corrosion protection - Every Osmo-C2-Truss system is hot-dip galvanized to ASTM A-123 specifications, ensuring long term corrosion protection.



Common C2-Truss Sizes	Theoretical Ultimate Strength
C2-36	37,200 ft-lb
C2-49	49,600 ft-lb
C2-56	56,400 ft-lb
C2-71	71,700 ft-lb

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Osmose®

Pole Restoration Products

Trusses, Banding, Installation Equipment

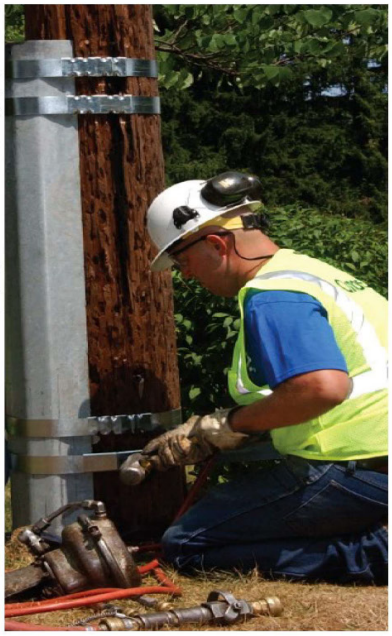
Osmo-C-Truss®

The Osmo-C-Truss system is constructed from A-572 Grade 60 and A-715 Grade 80 steel and exceeds the strength requirements of the National Electric Safety Code (NESC). Every Osmo-C-Truss is galvanized to the heaviest Coating Thickness Grade specified by ASTM A-123 for long-term corrosion protection.

The Osmo-C-Truss has been extensively tested throughout its' 50 year history. Tests have been conducted by Osmose, independent laboratories and pole owners nationwide.

Full-scale foundation testing allows Osmose to offer trusses with a shorter driving depth, saving pole owners money. The design of the Osmo-C-Truss system and the installation tools allow it to maintain positive contact with the pole butt below ground, insuring transfer of loads during bending.

Common C-Truss Sizes	Theoretical Ultimate Strength
980	76,900 ft-lb
1080	94,900 ft-lb
1180	112,200 ft-lb
1280	129,400 ft-lb



Banding and Seals

Osmose banding is stronger than other banding systems in the industry with over 138,000 psi tensile strength. The banding is hot-dip galvanized to 2.0 ounces per square foot - two to three times heavier than others - for long term corrosion protection unmatched by any other system. Banding comes in a 290 ft. coil.

Seals come in both the Single Band Galvanized Seal (push-type) or the Double Band Galvanized Seal (closed-type). Both are 2" W x 3" L and are packaged 250 seals per box.

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Osmose®

Pole Restoration Products

Ordering Information:

Osmo C2 Truss®

Lighter - *Stronger* - *Lower Cost*

Part Number	Size	Bending Strength (ft-lb)	Weight
72-020-009-100	C2-3610	37,200	82 lbs.
72-020-009-110	C2-4910	49,600	94 lbs.
72-020-009-120	C2-5610	56,400	103 lbs.
72-020-009-130	C2-7110	71,700	116 lbs.

Osmo-C-Truss®

Part Number	Size	Bending Strength (ft-lb)	Weight
75-020-000-099	5100	19,100	62 lbs.
75-020-001-100	6 x 10'	21,875	108 lbs.
75-020-001-110	7 x 10'	25,525	112 lbs.
75-020-001-120	8 x 10'	36,500	126 lbs.
75-020-001-130	9 x 10'	55,135	178 lbs.
75-020-001-150	980 x 10'	76,900	178 lbs.
75-020-001-160	1080 x 11'	94,900	209 lbs.
75-020-001-170	1180 x 11'	112,200	228 lbs.
75-020-001-180	1280 x 11'	129,400	245 lbs.
75-020-001-190	1380 x 11'	152,600	291 lbs.
75-020-001-201	1480 x 13'	170,200	315 lbs.
75-020-001-212	1580 x 13'	191,800	352 lbs.
75-020-001-221	1680 x 13'	211,100	365 lbs.

All C-Trusses are also available in lengths from 10' to 25'. Bolted design C-Trusses are also available.

C-Truss Materials

Part Number	Item	Size	Shipping Weight	Unit
75-020-001-010	Banding	2" x 290'	103 lbs.	Roll
75-020-001-020	Seals	Single 250/Box	50 lbs.	Box
75-020-001-021	Seals	Double 250/Box	50 lbs.	Box
75-020-001-030	CoverCap	Small	1.5 lbs.	Each
75-020-001-031	CoverCap	Large	3.5 lbs.	Each
75-020-001-033	C2 CoverCap	Small	1.5 lbs.	Each

C-Truss Installation Equipment—call for detailed equipment listing and pricing

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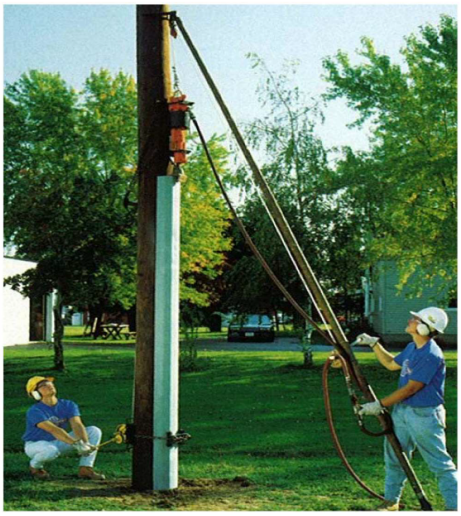
Osmose

Additional Products: Pole Restoration

Trusses, Banding, Installation Equipment

Installation Systems

Osmose offers both a pneumatic and manual installation system.



Pneumatic:

Air Hammer Kit - includes modified air hammer with muffler, hammer cradle & chain assembly and sheath driver & shank.

Pull-Down Winch and Steel Dolly - 2000 lb. capacity winch with heavy duty steel cable.

Tension Roller - Connects air hammer and pull-down winch for steady driving force and faster installation.

Pike Pole & Winch Assembly - 18' Fiberglass pike pole with 800 lb. capacity winch assembly and automatic locking mechanism for greater safety and easier use. Optional 16' sectional pike pole assembly is available. Note: Pike poles are recommended for lifting driving hammers only.

Air Tensioner (2") - High strength industrial tensioner with 2000 lb tensioning capacity at 100 psi air pressure.

Air Crimper (2") - Crimps both single and double-wrap band applications. 3000 lb crimp capacity to maximize joint efficiency.

Band Shear (2") - High capacity shear for easy and fast cutting of bands.

Band Dispenser (2") - Accommodates 100 lb. coils of banding.

15

Tough Truss Extra

Introducing the **Tough Truss™ Extra upgrading and restoring system** for common sizes of distribution wood utility poles. This new solution from Provincial Pole Specialists (PPSI) not only restores decayed poles to code mandated strength like regular trusses, but also upgrades the structure's bending capacity at the same time.

For utilities looking to harden their system and increase their Structural Resiliency™ to extreme weather, or provide the extra structure capacity needed for telecommunications cables, small cell antennas, and equipment that support broadband technology expansions, the Tough Truss Extra fills a solution gap. Even poles deteriorating in the ground line zone can increase its rated bending capacity by a 1 class equivalent upgrade.

PPSI utilizes Osmose pole restoration systems for their demonstrated dependability over more than five decades of field use. This new truss system provides another dependable solution utilities need urgently to address the more frequent and severe weather events affecting the electric and telecommunication grid.

Benefits of the Tough Truss Extra

- ✓ Improves the structure's bending capacity to a single class upgraded equivalent
- ✓ Decayed poles are restored to the code mandated strength required of a single class upgrade
- ✓ Designed for common distribution size wood poles
- ✓ Significantly extends pole life
- ✓ Cost-effective alternative to pole replacement
- ✓ Improves resiliency to extreme weather
- ✓ No service interruptions or outages are required
- ✓ Installation is scalable to utility needs. Use on a targeted pole-by-pole basis or on every pole on an entire line.

To contact your local PPSI professional, call 1-800-839-5405 or email info@provincialpole.com.

osmose.com

Tough Truss Upgrade

Thousands of poles in service today, although adequate at the time of installation, can no longer safely carry the loads they are required to support. The addition of new distribution lines, telecommunications equipment, and broadband infrastructure has increased loads beyond the capabilities originally intended, compromising the Structural Resiliency™, reliability, and safety of poles across North America.

The **Tough Truss™ Upgrade** works in conjunction with sound wood poles to create a combined bending capacity greater than the original pole class rating. To ensure that the load is proportioned properly between pole and truss, the stiffness and strength of the Tough Truss Upgrade is considered with the stiffness and strength of the pole. The result is a hybrid steel and wood structure, representing the best characteristics of both materials; the flexibility of wood and the consisten strength of steel.

Extensive testing has verified the strength expectations of the Upgrade solution, and Mother Nature has been putting real world installations to the test for more than 20 years.

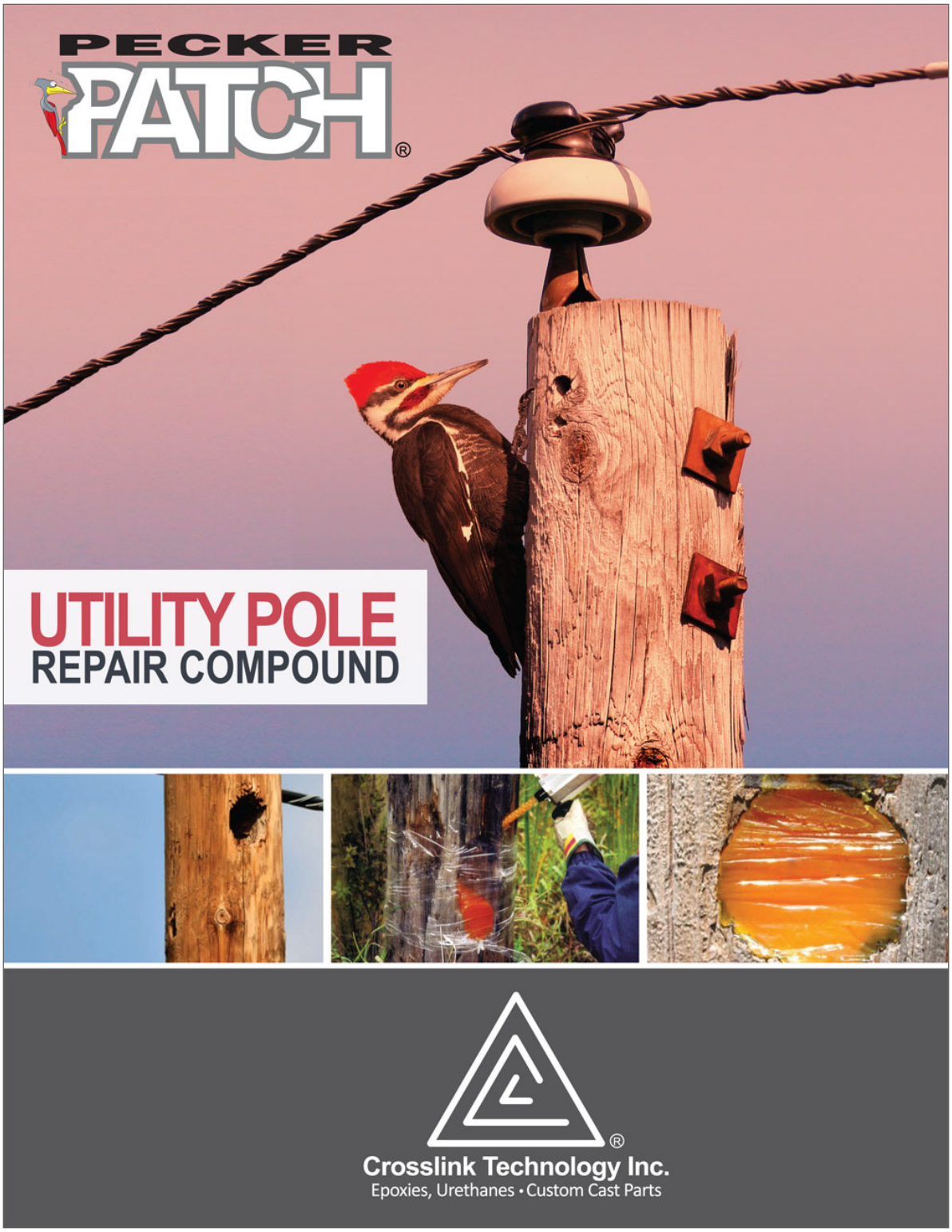
Benefits of the Tough Truss Upgrade

- ✓ Upgrade pole capacity by 1, 2, 3, or more classes
- ✓ Save money – the cost is often 1/3 or less than the cost of replacement
- ✓ Avoid the extra effort, possible outages, and delays associated with coordinating change-outs
- ✓ Upgrade an entire line without service interruption

To contact your local PPSI professional, call 1-800-839-5405 or email info@provincialpole.com.

osmose.com

Pecker Patch



Pecker Patch®
Utility Pole Repair

This user friendly, easy to apply **Polyurethane compound** was specifically developed to repair wood utility poles damaged by **woodpeckers, insects or rot**.

Our formulating efforts were primarily focused on the lineman's safety. We considered this to be most important.

Our second major focus was on the ease with which the product could be dispensed under the sometimes difficult conditions faced by the repair crew. We believe that we met our goals while minimizing the necessary trade-offs.

This product may also be used by Arborists to repair cavities in living trees damaged by storms or insects. Once applied, it is harmless to wildlife or domesticated animals. This product is well suited to tree maintenance and repair projects as well as repairing general wood structures.

The combination of set time and viscosity of this urethane compound has been optimized to minimize/eliminate leakage through the exterior cavities of the damaged area. Polyurethanes were found better suited to this type of application because the cured properties are better suited to climbing with minimal safety risk.

This urethane product is packaged in 1,500ml disposable cartridges and can be purchased in kits with each kit containing 10 cartridges.

The compound is mixed through a disposable static mix head (10 mix heads included in each kit).

Starter kits include a choice of dispense guns with 20 cartridges and 20 mix heads along with all the accessories necessary to apply the urethane compound.

A cost effective way to prolong the life of utility poles.

If woodpecker damage is costing your utility thousands of dollars in pole replacements, contact Crosslink Technology today for a safe, quick and easy to use Pole Repair Compound.

Features

- Climbable after cure (safety issue)
- The correct combination of gel time and viscosity to minimize/eliminate leakage through common exterior cavities
- Fills voids and bonds to cavity walls
- 1:1 Ratio for easy mixing
- Consistent cure
- Quick and easy dispensing (gun included)
- Moisture will not inhibit cure
- Designed to accommodate pole flexing without cracking or creating stress lines
- Non-nutrient to Fungi
- Wide range of application temperatures

Lineman Benefits

- No annoying mess getting gloves and clothes dirty
- No kneading or mixing before use
- No weighing or measuring the mix
- The dispense gun and cartridges are clean and easy to store
- Effortless dispensing (including the manual dispense gun)
- The repaired area is safely climbable without fear of slippage
- Long lasting, quick repairs
- Does not get hot when mixed and burn hands

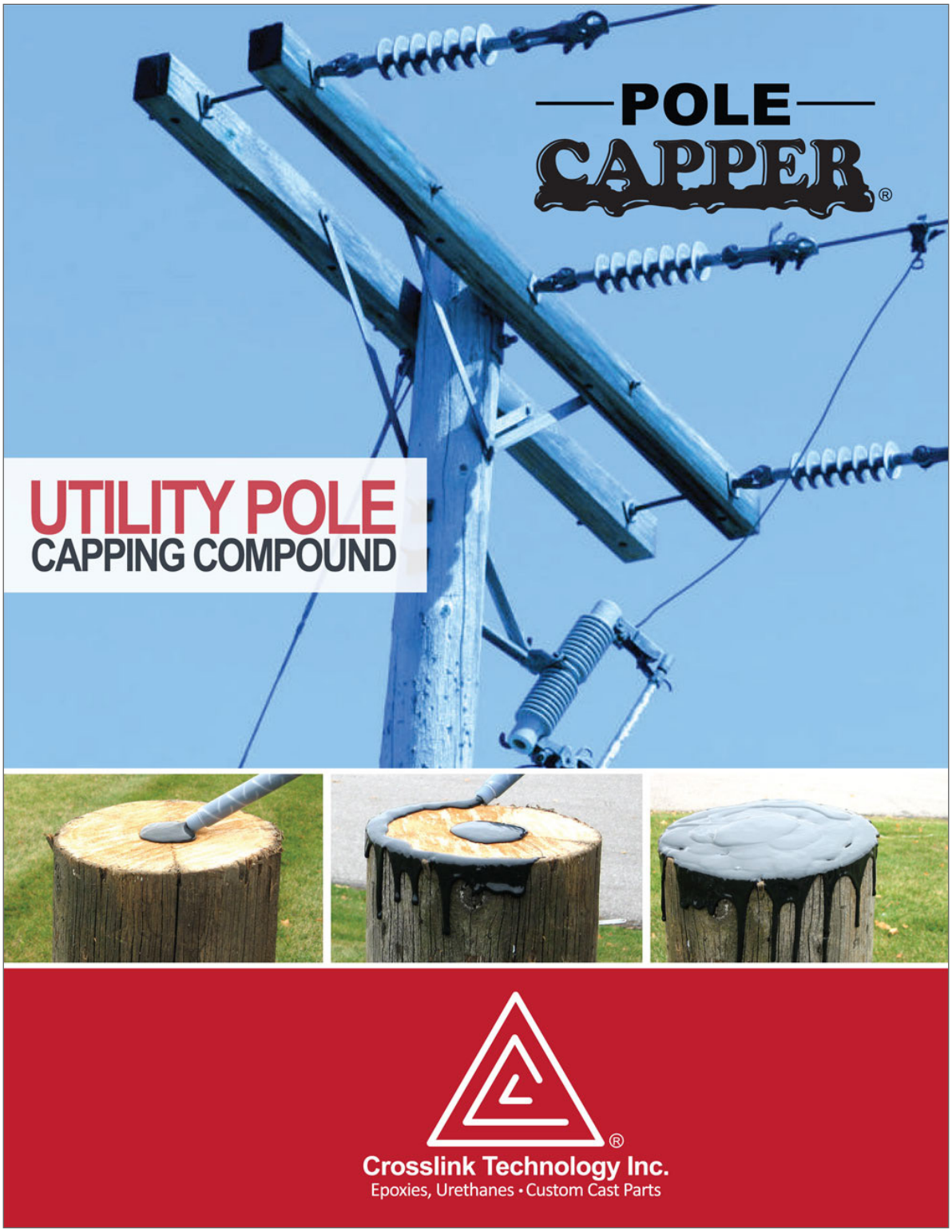
✓ All dispense guns are equipped with clutch mechanisms to prevent damage due to obstructed mix heads

✓ Partially used cartridges can be saved by removing the old mix head and re-capping the bottom opening of the cartridge

✓ The cartridges are suitable for use in a variety of dispense guns as follows:

- Manual (requires much less force than a regular caulking gun)
- Cordless (aka battery operated)
- Pneumatic dispense gun (requires compressed air)

Pole Capper


POLE
CAPPER®
UTILITY POLE
CAPPING COMPOUND
Crosslink Technology Inc.
Epoxies, Urethanes • Custom Cast Parts

PoleCapper®

Urethane Pole Top Sealant

PoleCapper® is an easy to use and clean to apply compound for the repair and protection of wood utility including telephone pole tops.

The product is designed to penetrate the top layer of the wood thereby eliminating the possibility of moisture entering under the protective layer that can occur with many traditional capping systems. Properly applied, this urethane system was designed for a slight overflow around the circumference of the pole to provide complete protection without having to apply any extra accessory materials such as tape etc.

Features

- Excellent UV resistance
- Extend pole life at minimal cost
- No concern about pole diameter
- Easy and clean to apply under the most difficult circumstances
- The compound does not support the growth of fungi
- Stops degradation and decay from moisture
- Material will cure in the presence of moisture
- Partially emptied cartridges remain useable
- Nothing else to purchase
- Starter kits include the dispense gun
- Replacement cartridges are readily available
- Fills large cavities and reinforces the top of the pole
- Penetrates into the pole and will not separate or crack
- Designed to cover the edge around the pole diameter
- Protects from damage caused by freeze and thaw conditions
- Protects from insects
- Protects pole top from woodpecker damage

Lineman Benefits

- No annoying mess getting gloves and clothes dirty
- Useable regardless of pole diameter
- No cleanup necessary after application
- No nailing or stapling required
- No kneading or mixing before use
- The dispense gun and cartridges are clean and easy to store in the truck
- Effortless dispensing, easy on the hands
- Long lasting repairs
- Just apply it and forget it!!!

Apply it and Forget it!

POLE CAPPER®

Application Instructions

The compound was designed for easy, effortless dispensing using the dispense gun supplied in starter kits or may be used interchangeably in the guns used to dispense the PeckerPatch® pole repair compound.

Tools needed:

- Dispense gun
- 1 Cartridge of **PoleCapper®**
- 1 pair of Latex® or equivalent gloves
- 1 Wire brush (to clean off loose wood and debris)

Precautions:

Read the material safety data sheet and wear gloves to prevent skin contact.

How to apply:

In order to eliminate mess and, at the same time, allow for good edge coverage with minimal flow down the sides of the pole, the material was developed with limited flow characteristics during application. *It is highly recommended that the first bead around the circumference of the pole is applied close enough to the edge to allow a slight overflow and provide an absolute seal from moisture around the edges.*

1. Inspect the pole top to make sure it is repairable.
2. Clean all loose debris and decayed wood from the top of the pole
3. Blow off any loose dust
4. Mount the cartridge into the gun
5. Slide off the protective cap and pull the plug out of the dispense end of the cartridge. **(Retain the plug and cap to re-seal the cartridge after use)**
6. Attach the static mix head provided to the dispense end of the cartridge making sure that the thread is snug
7. Start the application by dispensing at least 2 or 3 pulls of the trigger to the center of the pole first (This is a precaution in case the first 1 or 2 shots are improperly mixed through the mix head)
8. Using continuous motion, proceed dispensing to the outer circumference of the pole depositing even beads in a circular motion toward the center starting point
9. After the surface is completely covered, dispense a small amount of extra material over the center of the pole (at the original starting point). This will cover any improperly mixed product which may have been dispensed at the beginning
10. Touch up any inadvertently uncovered areas if any
11. Remove and discard the static mix head
12. Replace the plug and cap on the cartridge to allow any remaining material to be used later

Notes

- Unused material remaining in the cartridge can be used later provided that the cartridge is resealed with the plug and cap after each use

- Dispense the “beads” of product close together to avoid bare spots

- The product may be dispensed on wet poles under humid conditions without affecting its performance

- A slight overflow around the circumference of the pole is desirable

"Extending the life of Utility Poles"

March 25, 2022

Pole Life systems

Structural Reinforcements

www.polelifesystems.com

DISTRIBUTION POLE REINFORCEMENT KIT #DPR48SK & #DPR72SK

(PATENTED)

FOR DISTRIBUTION SCALE POLE DAMAGE CAUSED BY WOODPECKERS, CRACKING, AUTO ACCIDENTS, ETC.

9" to 11" Diameter Wood Poles

- Distribution Wood Poles – A 2-Part 1/8" galvanized steel reinforcement installed over the damaged area which brings the pole back to almost full strength. This prevents total pole replacement for large scale woodpecker, storm, auto damage. No foam, wrap or glue required.

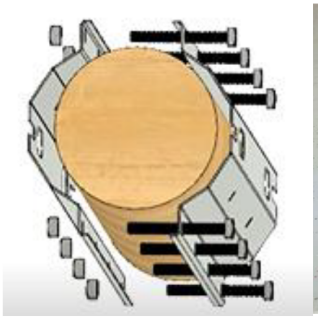
  KIT INCLUDES: (2) Steel Reinforcement Parts

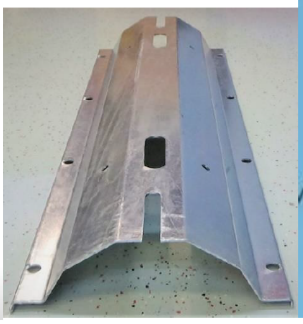
  Bolts and Hardware not included.

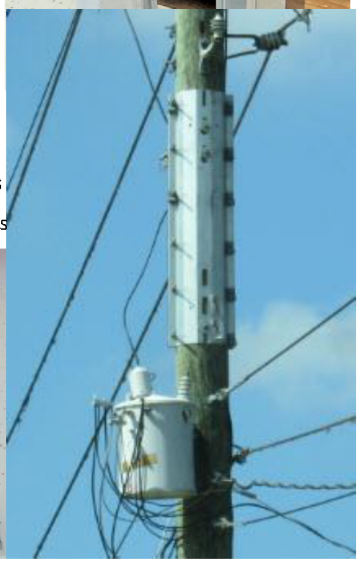
  Weight per 2-part set: Hardware Required:

  DPR48SK: 62 lbs. each DPR48SK: (8) 5/8" bolts/flat washers

  DPR72SK: 92 lbs. each DPR72SK: (12) 5/8" bolts/flat washers







Pole Life Systems, Inc. (727)478-7375

Pole Life Systems Distribution Pole Reinforcement Kit

March 25, 2022

Pole Life systems

Structural Reinforcements
www.polelifesystems.com

DISTRIBUTION POLE REINFORCEMENT KIT #DPR48SK & #DPR72SK

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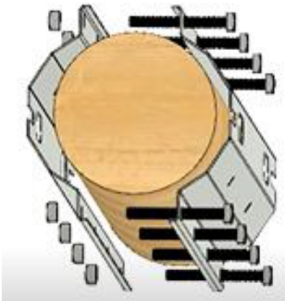
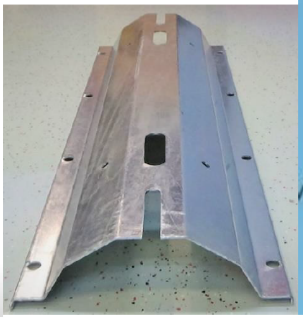
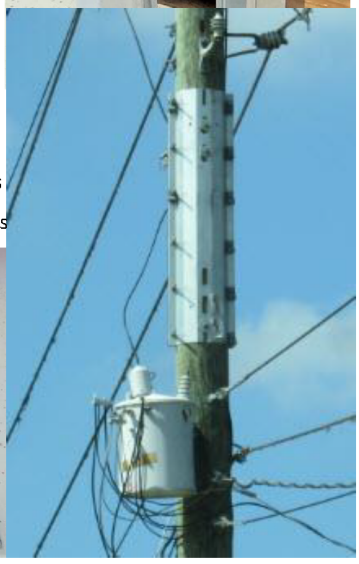






Pole Life Systems, Inc. (727)478-7375

Pole Life Systems Pole Cross Arm

info@polelifesystems.com (mailto:info@polelifesystems.com) (727) 478-7375 (tel:7274787375)
(https://www.youtube.com/channel/UCuikDadkQZisjGVnJuPMcng)

POLE TOP EXTENSION CROSS ARM CONSTRUCTION

POLE EXTENSION

Give your lines a raise with our CA50 Cross Arm pole extension assitant. Composite addition to raise your existing cross arms when that extra couple feet is needed.

Pole Life Systems Pole Top Extension

POLE TOP RESTORE- #PT26 8/10”
POLE TOP EXTENSION- #PT40 8/10”
(PATENTED)

Structural Reinforcements

www.polelifesystems.com

DESIGNED TO FIT ALL T&D WOOD POLES. PROVIDES STRUCTURAL STRENGTH TO DAMAGED OR DECAYED POLE TOPS. Also available to raise the attachment points up to 18” higher with the PT40.

Vertical or Horizontal Construction – Structurally strong steel sleeve slides over damaged or decayed pole tops. By using our product, you have permanently restored your pole tops, eliminating future O&M expenses.

This is a Capital expense investment.

Product Details: Material is 14-gauge galvanized steel, corrosion free, low cost and structurally rated to 3,000 lbs.

PT26

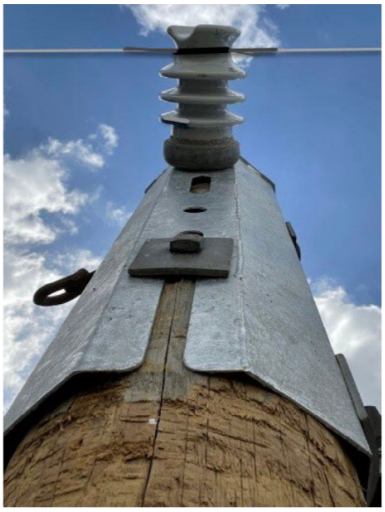
Hardware not included, compatible to all utility hardware and specifications.

Sizing: PT268, PT408 will fit 8” diameter pole top or smaller. Wt.: PT268 = 17 lbs. PT408 = 25 lbs.

PT2610, PT4010 will fit a 10” diameter pole top or smaller. Wt.: PT2610 = 22 lbs. PT4010 = 32 lbs.

ANSI Tested Strength: Vertical 3,000 LBS, Longitudinal 2,500 LBS, Transverse 2,500 LBS

PT40



Pole Life Systems, Inc. (727) 478-7375

Pole Life Systems Primary Reinforcement Kit

Primary Reinforcement Kit
#PRK30

Pole Life systems
Structural Reinforcement
www.polelifesystems.com

FOR SUPPORT ON ALL PRIMARY POLES:

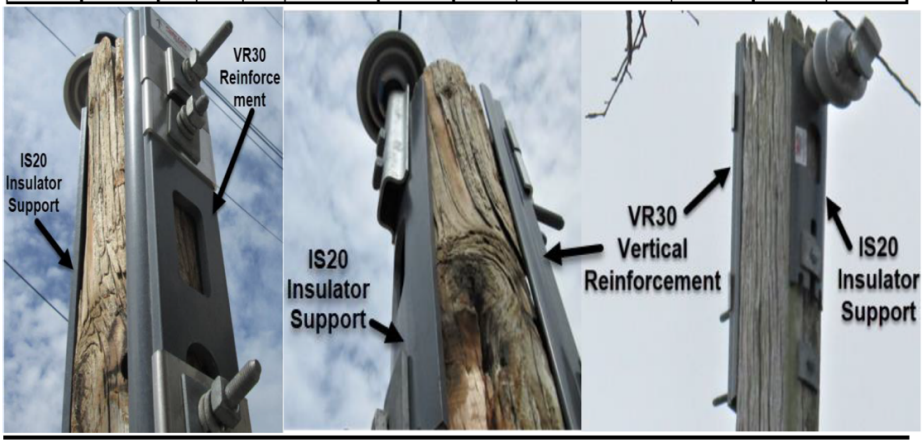
Post Top, Dead Ends & Pin Top Insulators.
Excellent for storm, woodpecker, and deterioration damage. Multiple uses including angles & alley arm.

Wood Poles Primary Construction – Pole Life Systems is an easily installed system that lowers the structural attachment point in all damaged top poles, while maintaining the conductors in their current position. Installing the IS20 along with a VR30 will bring back structural strength to your Distribution pole tops. Install a pole cap and you have permanently restored your pole tops extending the useable life of the pole and eliminating future O&M expenses. This can be used as Capital expense investment.

Kit Includes: (1) IS20, (1) VR30, (1) CPR5, (2) CPF5 Weight per Kit: 11.20 lbs.

Product Details: Material is solid 3/8" & 1/2" thick high strength composite, non-conductive, light - weight, fire retardant, corrosion free, low cost and structurally rated to **5,100** lbs. of additional strength. Hardware not included, compatible to all utility hardware and specifications.

Part Number	Slot/Bolt Width	Dimension (inch)			Approx. Ship Wt. Lbs. Each	Standard Package	ANSI Tested Strength Rating Minimum Ultimate (LBS)			Average Tensile Strength	Average Flexural Strength
		L	D	W			Vertical	Longitudinal	Transverse		
IS20	0.875	20	3/8	5	2.2	10 pcs.	5100	1200	1350	84,000 PSI	142,000 PSI
VR30	0.875	30	1/2	5.5	6.75	5 pcs.	5000	1800	1500	84,000 PSI	142,000 PSI



Pole Life Systems, Inc. (727)478-7375

Pole Life Systems Secondary Reinforcement Kit

Pole Life systems

Structural Reinforcements

www.polelifesystems.com

REINFORCEMENT FOR ANY
WIRE SIZE SMALLER THAN 336 ALSO FOR STREETLIGHT
BRACKETS AND SECONDARY POLES

SECONDARY REINFORCEMENT KIT

#SRK30

(PATENTED)

#CPR5

All Secondary Poles – With the use of our VR30 reinforcement system, your poles are back in compliance and safe again. Our system is a 20-minute install and is a permanent solution.

Kit Includes: (1) VR30, (1) CPR5 Weight per Kit: 7.50 lbs.

Product Details: Material is Solid 1/2" thick high strength composite product, non-conductive, light-weight, fire retardant, corrosion free, low cost and structurally rated to 5,000 lbs.

Hardware not included, compatible to all utility hardware and specifications.

Part Number	Slot/Bolt Width	Dimension (inch)			Approx. Ship Wt. Lbs. Each	Standard Package	ANSI Tested Strength Rating Minimum Ultimate (LBS)			Average Tensile Strength	Average Flexural Strength
		L	D	W			Vertical	Longitudinal	Transverse		
VR30	0.875	30	1/2	5.5	6.75	5 pcs.	5000	1800	1500	84,000 PSI	142,000 PSI

Pole Life Systems, Inc. (727)478-7375

March 25, 2022

Shakespeare Tuff Top Pole Extension

Shakespeare
A valmont BRAND

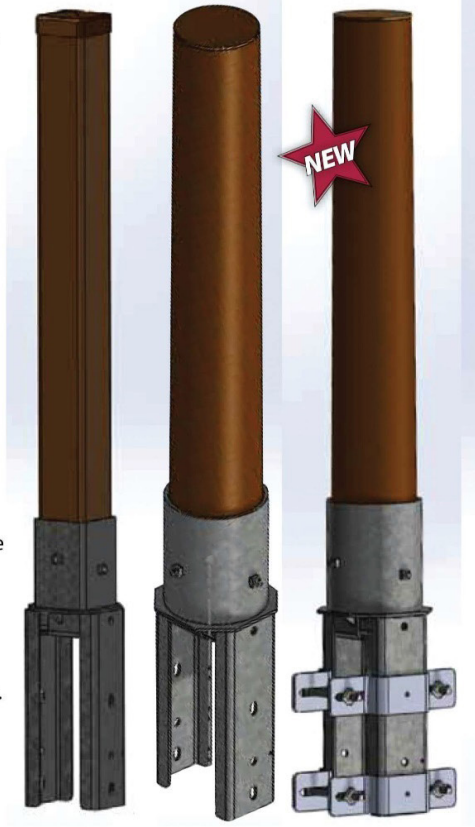
The Exceptionally strong, braggably economical Tuff-Top™ Pole Extension

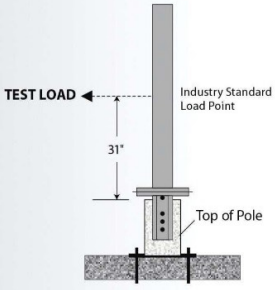
Unparalleled strength, unmatched economy.

- Exclusive: Filled with structural foam for strength and insect exclusion
- Available in a range of strength ratings
- Light weight, easily installed
- Unexcelled strength, high load capacities
- Adjustable 6" to 10" for pole diameter (19" to 31" circumference)
- Aesthetically pleasing, extends any pole–wood, composite, etc., with or without drilling holes in the top of the pole.

Shakespeare Composite Structures' Tuff-Top Pole Extensions provide a convenient, inexpensive, and durable way to add conductors or increase clearance on an existing pole installation, whether composite or other type of pole. These strong, attractive extensions are factory assembled from a length of fiberglass reinforced composite pole, plus a versatile attachment bracket.

The pole sections are **filled with a durable, permanent, structural foam** that excludes insects and water and discourages flexing. The versatile attachment brackets either bolt through the pole or, for strongest applications, clamp on. Either way, you can add one or more crossarms, as well as a ridge pin and other attachments. The pole sections come in three standard colors, or you can specify.





Tuff-Top Test Data

Series	Ultimate Load (lbs @ 31")	Ultimate Load (ft/lbs @ 31")
PTS	5,500	14,208
PTH	6,500	16,790
PTX	8,500	21,958
PTR	8,500	21,958

Shakespeare • 800.800.9008 • www.skp-cs.com

Grid Wrap Inc. - Bull Wrap & DEMIWRAP products

Company

GridWrap, Inc

Product

BullWrap™

Description

BullWrap™ is an innovative grid-enhancing solution designed to extend the lifespan and resilience of utility poles made of steel, composite, wood or concrete. Developed by GridWrap, Inc., it addresses critical infrastructure challenges such as decay, rotting, aging, car accidents, fire vulnerability, and structural degradation, all while being cost-effective and environmentally friendly.

Core Benefits

Structural Reinforcement:
BullWrap™ uses a specially designed composite system that enhances the structural integrity of the pole, significantly improving its load-bearing capacity and overall durability.

Field tests and lab analyses have shown up to a **threefold increase in pole strength** after application.

Load Transfer Filler:
Before wrapping, a high-compression strength load transfer filler is applied to the pole's surface.

This filler ensures seamless bonding between the pole and the wrap, filling voids and cracks for enhanced structural stability.

Moisture and Decay Barrier:
The wrap acts as an **airtight and watertight barrier**, protecting wooden poles from moisture ingress and oxygen exposure.

This significantly reduces or eliminates wood decay caused by fungi, mold, or other environmental factors.

Fire Resistance:
BullWrap™ enhances fire resistance, safeguarding poles in wildfire-prone areas.

It offers a reliable alternative to full pole replacement in regions with frequent fire hazards.

Durability in Harsh Environments:
The system is engineered to withstand UV exposure, saltwater conditions, and extreme temperatures.

Easy Installation:
BullWrap™ is designed for on-site applications without requiring heavy equipment or complex procedures.

This allows utility companies to deploy it quickly, minimizing service interruptions, especially for remote and less accessible regions

Cost-Effectiveness:
Compared to replacing utility poles (costing upwards of $20,000 per pole), BullWrap™ provides a much more affordable solution.

Company

GridWrap, Inc.

Product

DEMIRWRAP™

Description

DEMIRWRAP™ is a composite wrap system specifically designed to address **woodpecker damage** and other localized issues affecting wooden utility poles. It combines advanced composites with a specially formulated, **water-activated resin**, providing an easy-to-apply, durable, and environmentally friendly solution.

Core Benefits

Specialized Composite System

DEMIRWRAP™ utilizes a water-activated resin, simplifying the application process.

This resin cures quickly once applied less than 15 min, forming a robust protective layer.

Its chemical composition ensures a long-lasting bond to the pole surface.

Woodpecker Damage Mitigation:

The system reinforces areas affected by woodpecker activity, preventing further damage and reducing maintenance needs.

Its tough, resilient surface deters woodpeckers from returning.

Ease of Use:

Designed for rapid field applications, DEMIRWRAP™ is particularly suited for **localized repairs** or spot-reinforcement needs.

The water-activated resin eliminates the need for complex mixing or specialized equipment, making it ideal for quick repairs with application time of less than 10 min.

Environmental Protection:

Like BullWrap™, DEMIRWRAP™ acts as a moisture barrier, protecting wooden poles from environmental factors like rain, humidity, and UV exposure.

DEMIRWRAP™

This also helps reduce decay and prolongs the lifespan of the poles.

Durability:

The cured wrap is resistant to UV radiation, extreme temperatures, and other harsh conditions, ensuring performance over time.

Appendix 5: Hydro One Distribution System Plan Exhibit - B3

Filed: 2021-08-05
EB-2021-0110
Exhibit B-3-1
Section 3.0
Page 1 of 8

SECTION 3.0 – DSP – INTRODUCTION

3.0.1 FILING REQUIREMENTS

Hydro One Networks Inc. (Hydro One) has prepared a five-year Distribution System Plan (DSP) for the 2023 to 2027 period. This section includes a table of contents, index of tables, and mapping of Chapter 5 of the Filing Requirements (Consolidated Distribution System Plan Filing Requirements), issued on June 24, 2021, to the relevant sections within the DSP.

The DSP provides a consolidated set of documentation concerning Hydro One's distribution system including benchmarking, asset management, performance management, other capital planning factors, the integrated investment planning and customer engagement process, work execution and the resulting capital investment plan for the distribution system. Similar information regarding Hydro One Distribution's General Plant assets may be found in the General Plant System Plan (GSP) under Section 4.0 of the System Plans.

3.0.2 FORMAT OF THE DSP

Consistent with the Filing Requirements, Hydro One's DSP is organized as follows:

DSP Section	Content Description
Section 3.1	Overview – This section provides an overview of Hydro One's distribution system, the factors that were considered in developing the investment plan, and a summary of the investment plan.
Section 3.2	Asset Information and Life Cycle Strategies – This section presents the state of Hydro One's power system assets and their asset management and life-cycle strategies.
Section 3.3	Benchmarking and Other Studies – This section presents the external studies that have been undertaken to inform the investment plan.
Section 3.4	Connecting Distributed Energy Resources – This section provides information on the Distributed Energy Resources (DER), including renewable generation,

	connected to Hydro One's distribution system, along with information on historical and forecast renewable DER connections and capacity.
Section 3.5	Performance Measurement and Outcomes – This section presents Hydro One's approach to performance measurement, including discussion of the distribution scorecards.
Section 3.6	Other Capital Planning Factors and Considerations – This section details other factors which have informed the investment plan, including customer engagement and statutory and regulatory obligations.
Section 3.7	Investment Planning Process – This section summarizes the information found in SPF Section 1.6 – Asset Management and Investment Planning Process as related to Hydro One Distribution.
Section 3.8	Capital Expenditures Overview – This section summarizes Hydro One's capital investment plan for its distribution system for the five-year forecasting period (2023-2027).
Section 3.9	Capital Expenditures Trends and Variances – This section compares Hydro One's historical Distribution capital spending to previous OEB-approved funding and provides a ten-year snapshot (2018 – 2027) of Hydro One's capital spending for its Distribution business.
Section 3.10	Capital Work Execution Strategy – This section discusses the capital delivery process and Hydro One's approach to accomplish the proposed capital investment plan.
Section 3.11	Material Investment Summary Documents – This section includes detailed summaries of large investments (with forecast spending over $1M in any given year) over the 2023-2027 forecasting period in the OEB's System Access, System Service and System Renewal investment categories.

To assist parties in their review of the DSP, Hydro One has prepared a Table of Contents and Concordance found at Appendix 'A' which aligns the sections of this DSP with the Filing Requirements.

Witness: JESUS Bruno

Unless otherwise specified, the asset information contained in this DSP is taken as of December 31, 2020. Forecast costs for the 2023-2027 forecasting period are as forecast in Hydro One's 2022-2027 Distribution Business Plan (as presented in Exhibit A-03-01-01).

Witness: JESUS Bruno

1 **APPENDIX 'A' – TABLE OF CONTENTS AND CONCORDANCE**

Hydro One Reference	OEB Filing Requirements
3.0 Distribution System Plan	
3.1 – DSP – Overview	
3.1.1 Introduction	5.2.1
3.1.2 Distribution System and Service Area	5.3.2 a), b)
3.1.3 Summary of the DSP Capital Investment Plan	5.2.1, 5.4
3.1.4 The DSP is Reasonable and Appropriate	5.2.1, 5.3.1, 5.3.2 , 5.4, 5.4.1
3.2 – DSP – Asset Information and Life Cycle Strategies	
3.2.1 Introduction	
3.2.2 Asset Component Information – Distribution Stations	5.3.2
Asset Description/Purpose	5.3.2
Asset Demographics, Condition and Other Factors	5.3.2 c), d)
Asset Life Cycle	5.3.3 a), b)
3.2.3 Asset Component Information – Distribution Lines	5.3.2
Asset Description/Purpose	5.3.2
Asset Demographics, Condition and Other Factors	5.3.2 c), d)
Asset Life Cycle	5.3.3 a), b)
3.2.4 Asset Component Information – Wholesale Revenue & Retail Meters	5.3.2
Asset Description/Purpose	5.3.2
Asset Demographics, Condition and Other Factors	5.3.2 c), d)
Asset Life Cycle	5.3.3 a), b)
3.3 – DSP – Benchmarking and Other Studies	
3.3.1 Guidehouse and First Quartile Distribution Poles Replacement Program Benchmarking Report 2020	5.2.3 a)
3.3.2 Guidehouse and First Quartile Distribution Station Refurbishment Benchmarking Report 2020	5.2.3 a)
3.3.3 CNUC Hydro One Vegetation Management Study	5.2.3 a)
3.3.4 ClearPath OCP First Cycle Performance Assessment	5.2.3 a)
3.3.5 Trilliant Correspondence on Expected Service Life for Meters	5.2.3 a)
3.3.6 Hydro Quebec Accelerated Life Testing of Meters	5.2.3 a)
3.3.7 Guidehouse and First Quartile AMI Benchmarking	5.2.3 a)
3.3.8 ISG Billing and Call Centre Benchmarking	5.2.3 a)
Attachments: Benchmarking Studies	
Attachment 1 – Guidehouse and First Quartile	

Hydro One Reference	OEB Filing Requirements
Distribution Poles and Substations Benchmarking	
Attachment 2 – CNUC Hydro One Vegetation Management Study	
Attachment 3 – ClearPath OCP First Cycle Performance Assessment	
Attachment 4 – Trilliant Correspondence on Expected Service Life for Meters	
Attachment 5 – Hydro Quebec Accelerated Life Testing of Meters	
Attachment 6 – Guidehouse and First Quartile AMI Benchmarking	
Attachment 7 – ISG Billing and Call Center Benchmarking	
Attachment 8 – Smart Meter Efficiency Report	5.2.4
3.4 – DSP – Connecting Distributed Energy Resources	
3.4.1 Overview	
3.4.2 Renewable Applications	5.3.4 a)
3.4.3 Connection Forecast	5.3.4 b)
3.4.4 Capacity and Constraints	5.3.4 c) – e)
3.4.5 REG Investments	5.2.2 d)
Attachments:	
Attachment 1 – Hydro One Letter Summarizing Participation in IESO Regional Planning Activities	
3.5 – DSP – Performance Measurement and Outcomes	
3.5.1 Introduction	
3.5.2 Distribution Scorecard	5.2.3 a) – d)
3.5.3 Hydro One Distribution OEB Scorecard	5.2.3 a) – d)
3.5.4 Discussion of APB Results	
Attachments:	
Attachment 1 – OEB Appendix 5-A Metrics	
3.6 – DSP – Other Capital Planning Factors and Considerations	
3.6.1 Introduction	
3.6.2 How the Capital Plan Reflects Customer Engagement	5.2.1 b), 5.4 a)
3.6.3 How the Capital Plan Reflects Regional Planning, Regulatory Compliance, & System Modernization	5.2.2
3.6.4 How the Capital Plan Addresses Distribution System Losses	
3.7 – DSP – Investment Planning Process	
3.7.1 System Planning Process Phases	5.3.1 b)

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Hydro One Reference	OEB Filing Requirements
3.7.2 Strategy and Context	5.3.1 a)
3.7.3 Asset Management Process	5.3.1 b), 5.4 a), 5.4.1
3.7.4 Investment Planning Process	5.2.1 b), 5.3.1 b), 5.4 a), 5.4.1
3.8 – DSP – Capital Expenditures - Overview	
3.8.1 Introduction	
3.8.2 Capital Investment Plan	5.4.2, 5.4.3.1
3.8.3 Impact of Capital Investments on OM&A Expenditures	5.3.3 a), 5.4.2, 5.4.3.1
3.9 – DSP – Capital Expenditures – Trends and Variances	
3.9.1 Introduction	
3.9.2 Historical Capital Expenditures Trends and Variances	5.4.2, 5.4.3.1
3.9.3 Forecast Capital Expenditures	5.4.2, 5.4.3.1
Attachments:	
Attachment 1 - Dx Chapter 2 Appendix 2-AB - Capital Expenditures	
Attachment 2 – Capital Program Performance Report 2019 to 2020	
Attachment 3 – Acquired Utilities	
3.10 – DSP – Capital Work Execution	
3.10.1 Introduction	
3.10.2 Capital Delivery Process	5.3.3 a)
3.10.3 Project Oversight	5.3.3 a)
3.10.4 Factors Impacting Work Execution	5.3.3 a)
3.10.5 Safety	5.2.3
3.10.6 Productivity and Continuous Improvement	5.2.1 c)
3.11 – DSP – Material Investment Summary Documents	5.4.2, 5.4.3.2
D-SA-01 Joint Use and Relocations	
D-SA-02 New Load Connections, Upgrades, Cancellations	
D-SA-03 Customer Demand Distributed Energy Resources	
D-SA-04 Metering Sustainment	
D-SR-01 Distribution Stations Demand Capital Program	
D-SR-02 Mobile Unit Substation Program	
D-SR-03 Distribution Station Planned Component Replacement Program	
D-SR-04 Distribution Station Refurbishment	
D-SR-05 Distribution Lines Trouble Call and Storm Damage Response Program	

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Hydro One Reference	OEB Filing Requirements
D-SR-06 Distribution Lines PCB Equipment Replacement Program	
D-SR-07 Pole Sustainment Program	
D-SR-08 Distribution Lines Minor Component Replacement Program	
D-SR-09 Submarine Cable Replacement Program	
D-SR-10 Distribution Lines Sustainment Initiatives	
D-SR-11 Life Cycle Optimization & Operational Efficiency Projects	
D-SR-12 Advanced Meter Infrastructure 2.0 (AMI 2.0)	
D-SS-01 System Upgrades Driven by Load Growth	
D-SS-02 Reliability Improvements	
D-SS-03 Demand System Modifications	
D-SS-04 Energy Storage Solutions	
D-SS-05 Worst Performing Feeders	
D-SS-06 Power Quality and Stray Voltage	

1

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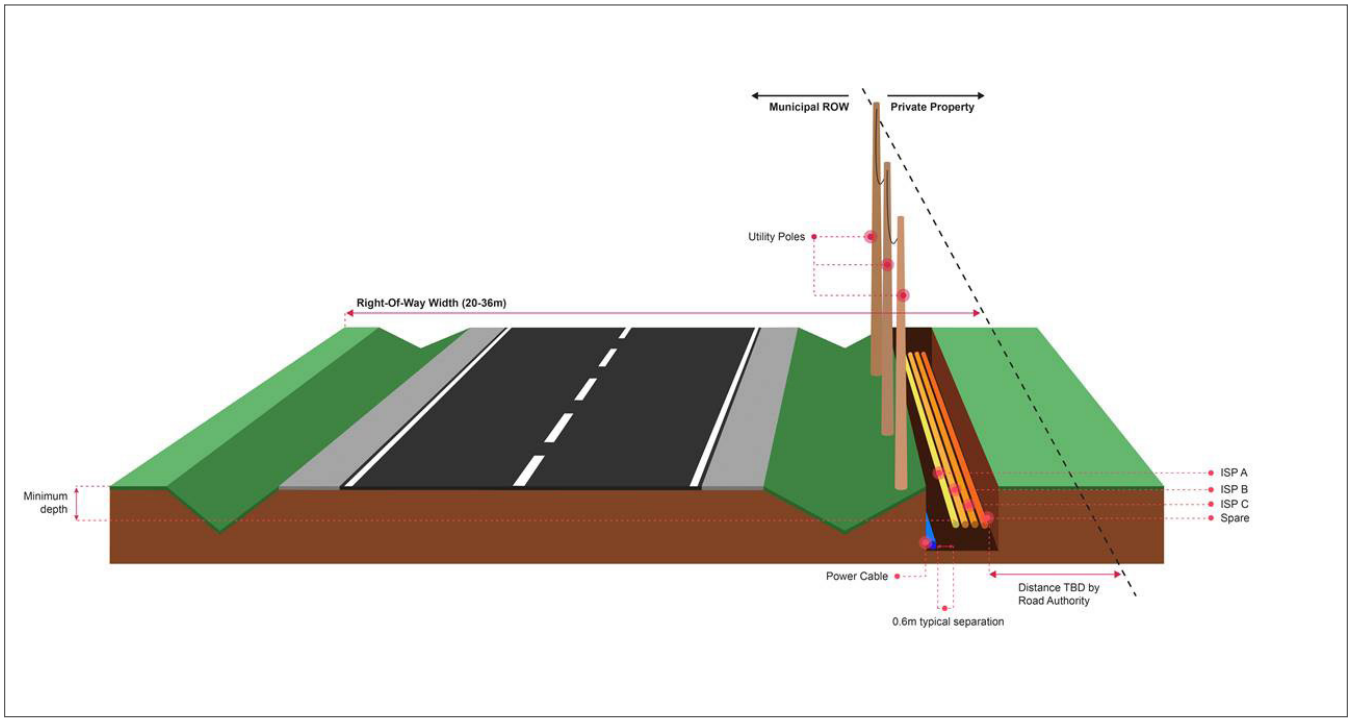
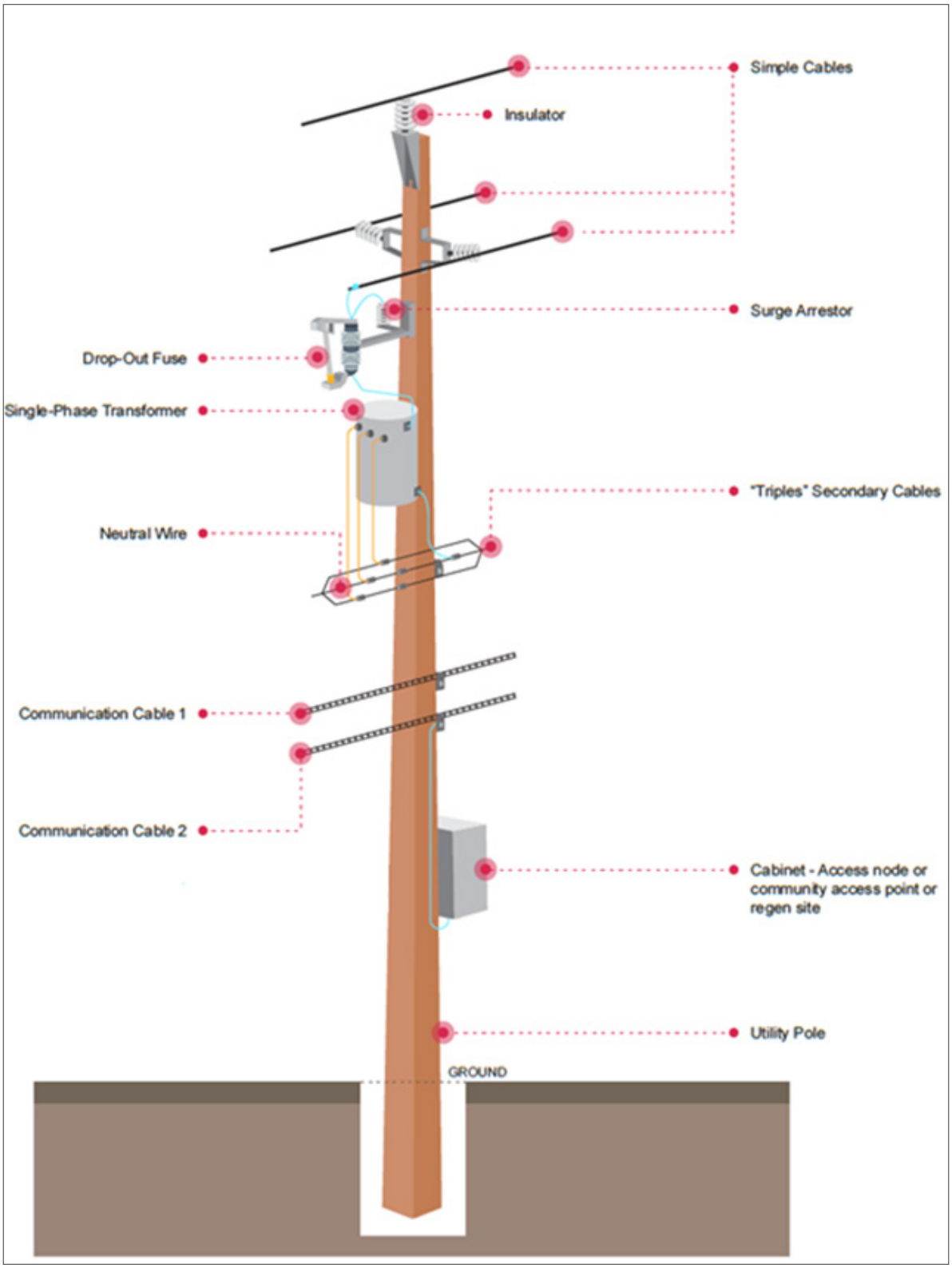
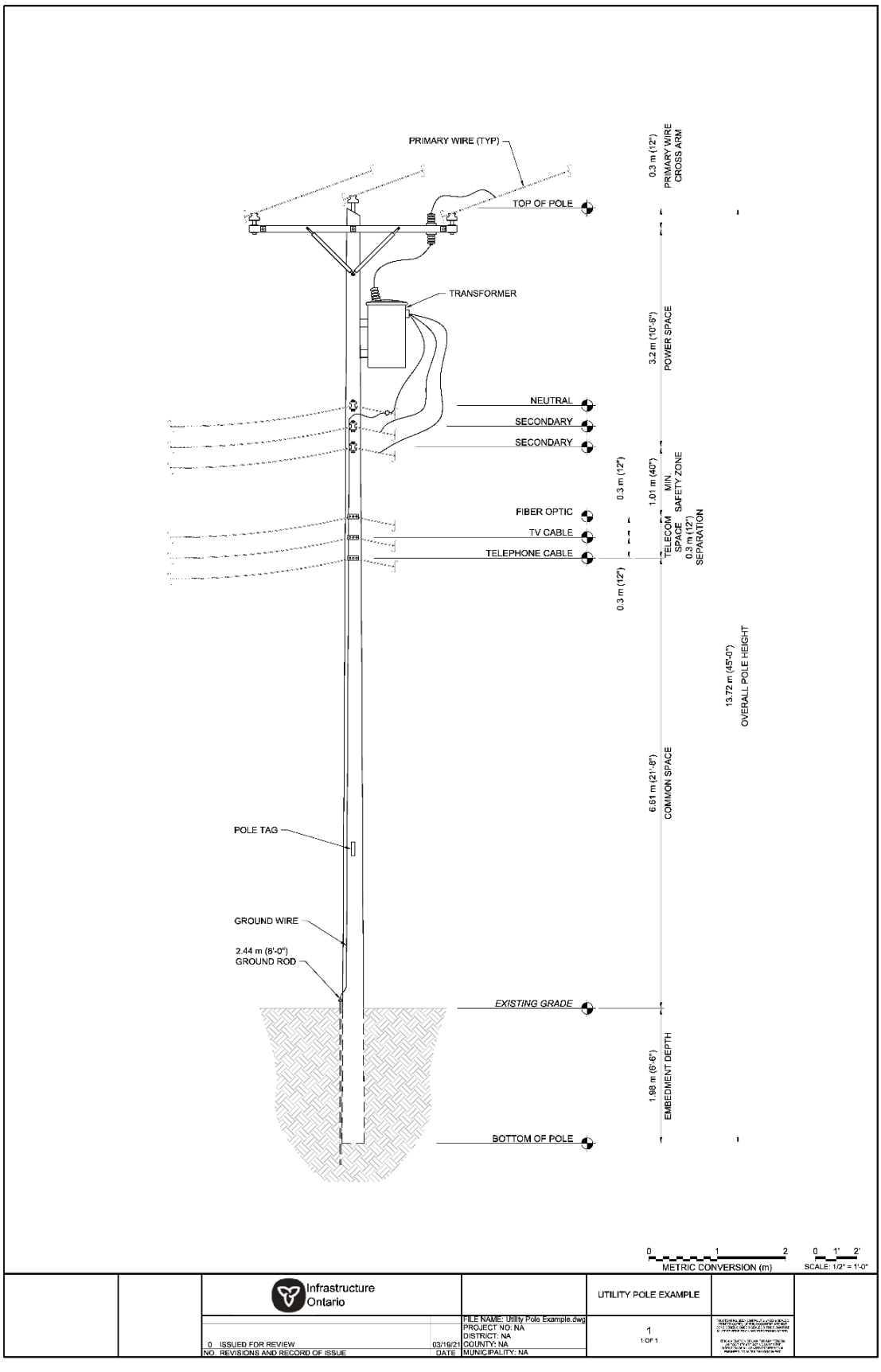
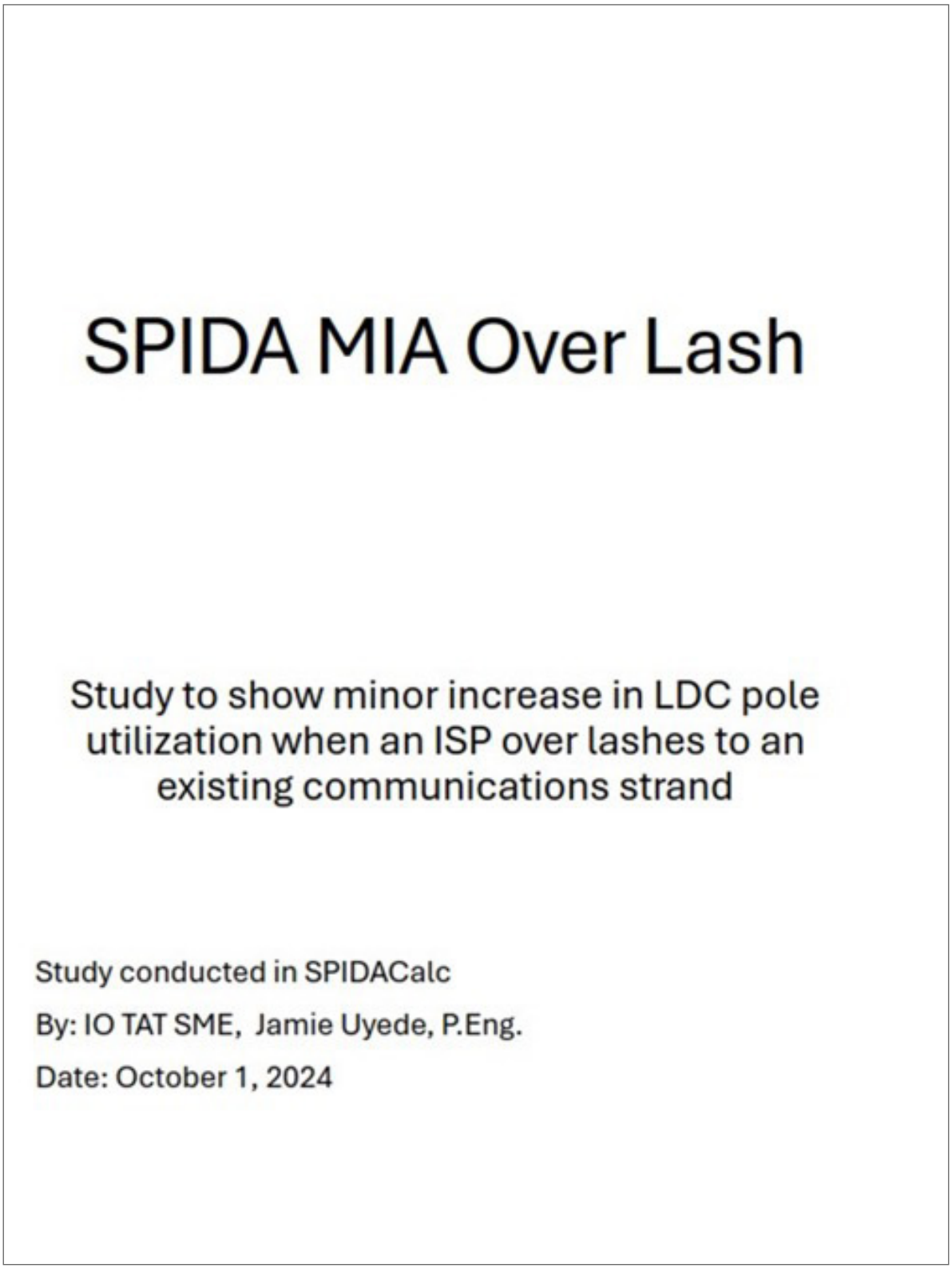
Appendix 6: Sample Pole Layout Drawings




Simple Cables
Insulator
Surge Arrestor
Drop-Out Fuse
Single-Phase Transformer
"Triples" Secondary Cables
Neutral Wire
Communication Cable 1
Communication Cable 2
Cabinet - Access node or community access point or regen site
Utility Pole
GROUND


PRIMARY WIRE (TYP)
TOP OF POLE
TRANSFORMER
NEUTRAL
SECONDARY
SECONDARY
FIBER OPTIC
TV CABLE
TELEPHONE CABLE
POLE TAG
GROUND WIRE
2.44 m (8'-0")
GROUND ROD
EXISTING GRADE
BOTTOM OF POLE
0.3 m (1'2")
PRIMARY WIRE CROSS ARM
3.2 m (10'-6")
POWER SPACE
0.3 m (1'2")
1.01 m (4'0")
MIN. SAFETY ZONE
TELECOM SPACE
0.3 m (1'2")
SEPARATION
0.3 m (1'2")
13.72 m (45'-0")
OVERALL POLE HEIGHT
6.61 m (21'-8")
COMMON SPACE
1.98 m (6'-6")
EMBEDMENT DEPTH
0 1 2
METRIC CONVERSION (m)
0 1' 2'
SCALE: 1/2" = 1'-0"
Infrastructure Ontario
UTILITY POLE EXAMPLE
FILE NAME: Utility Pole Example.dwg
PROJECT NO: NA
DISTRICT: NA
COUNTY: NA
MUNICIPALITY: NA
1
1 OF 1
0 ISSUED FOR REVIEW 03/19/21
NO. REVISIONS AND RECORD OF ISSUE DATE

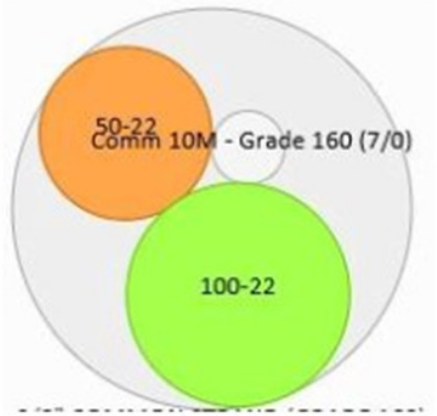
Appendix 7: SPIDA MIA Over Lash Study



Typical Bundles used in Study

Bundle diameter: 5.201cm

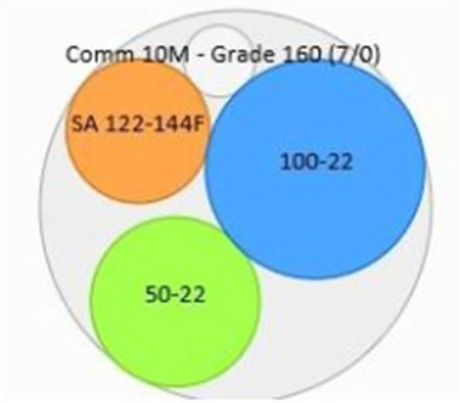
Weight: 17.6601N/m



Measured existing bundle

Bundle diameter: 5.201cm

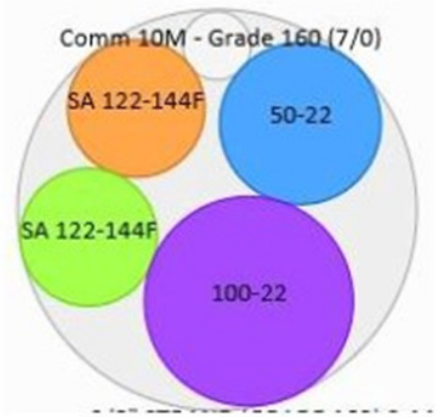
Weight: 20.4767N/m



Recommended
Over lash 1-144F on existing bundle

Bundle diameter: 5.561cm

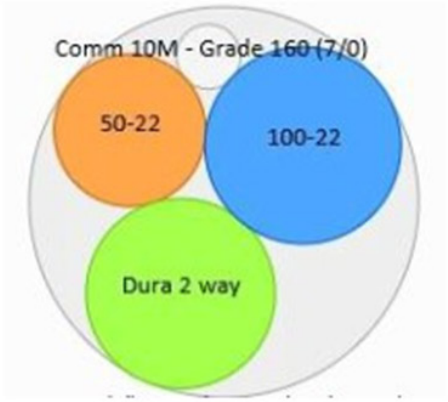
Weight: 23.2933N/m



Draft 1 for location 12
Over lash 2-144F on existing bundle

Bundle diameter: 5.7547cm

Weight: 20.3161N/m



Recommended for location 12
Over lash 2-way Duraline with 2-144F on existing bundle

Test case:

1. 35-4 tangent 45-7m span 0-06 percent
2. 35-5 tangent 45-7m span 0-11 percent
3. 35-5 tangent 60m span 0-19 percent
4. 35-6 tangent 45-7m span 0-17 percent
5. 35-7 tangent 45-7m span 0-35 percent
6. 40-4 tangent 45-7m span 0-05 percent
7. 40-5 tangent 45-7m span 0-09 percent
8. 45-4 tangent 45-7m span w-trans 0-21 percent
9. 35-5 dead end 60m span 0-08 percent
10. 45-4 DDE corner pole 60m span 0-01 percent
11. 45-4 non-tang 45-7m span 0-03 percent
12. 40-5 tangent w-duraline 60m span 1-12 percent

Explanation of location labels.

Example: 35-4 tangent 45-7m span 0-06 percent means 35' class 4 tangent pole (in line) with 45.7m spans and the percent pole utilization change is 0.06

For test cases 1-11, the percent increase in pole utilization when adding an over lash 144F ranges from 0.01 % to 0.35%.

For test case 12, the recommended design over lashed a 2-way duraline with each tube filled with a 144F (1.12% change). The draft 1 design over lashed 2-144F cables (0.85% change).

Summary

In our test cases the net effect of over lashing a 144F to an existing strand and cables is under a 1% change in pole utilization.

When adding either a 2-way duraline aerial conduit with each tube filled with a 144F to an existing strand and cables is under 2% as is adding two 144F cables. This exercise was meant to simulate an ISP placing a 144F and than at a later date a second ISP placing a 144F.

Conclusion:

If an LDC is comfortable in accepting a 1% cap on increase pole utilization as an MIA situation, then an ISP over-lashing a 144 Fibre to an existing communications strand should meet this criteria.

If an LDC is comfortable in accepting a 2% cap on increase pole utilization as an MIA situation, then an ISP over-lashing, 2-144 fibres or a 2-way Duraline aerial conduit with 1-144 fibre cables in each conduit to an existing communications strand should meet this criteria.

Digital Twin Ontario

DigitalTwinOntario.ca

info@digitaltwinontario.ca