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On The Cover: Scenic view of the Nicklaus North Golf Course in Whistler, BC, site of the 2012 CECA National Industry Conference (see ad page 33). Photo courtesy of Tourism Whistler; photographer Mike Crane.

Ontario Electrical Contractor

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The President's Remarks

Jim Kellett

Welcome to the first issue of *The Ontario Electrical Contractor* for 2012.

It has become the tradition in this issue to put the economists from the Ontario Construction Secretariat (OCS) on the spot for their annual "Economic and Construction Outlook". Katherine Jacobs and her OCS colleague, Rishi Sondhi, have come through again this year with their forecast aptly entitled "Managing Adversity". Though the treatment for the effects of recession in the form of massive injections of stimulus funding is over, the long-term effects of the government spending drug are expected to carry the construction economy through 2012. There is so much institutional, heavy engineering and renewable energy work in the pipeline that it will mask the tepid growth in the commercial and industrial markets this year. So for those involved in the stimulus markets, 2012 will feel like 2011 while those in the private sector markets will see small improvements in line with Canadian and American economic growth.

Our feature business improvement article in this issue is about the application of Radio Frequency Identification (RFID) technology to tool, equipment and material control. Hadi Farahani's cartoon on page 12 of the two electricians 'walking' their power tools shows just how far we have come since the Pet-Net days! Professors Saiedeh Razavi and Carl Haas review the technology, its immediate and traditional applications as well as emerging uses such as integrating with Building Information Modeling (BIM) systems. Where margins are tight, accurate tracking of work progress, location of materials installed or on-site and efficient deployment of equipment are essential to profitability. RFID has the potential to make immediate returns for electrical contractors who apply its common uses right now to reduce losses in time and material. But it is the future of RFID that seems limitless. As the professors write, "The future may not be foreseeable, but once achieved, it will be trackable".

One of our closest allies in this industry is the Electrical Safety Authority (ESA), which not only oversees compliance with the Ontario Electrical Safety Code, but also administers electrical contractor licensing in partnership with the electrical contracting industry. ESA has committed to publish articles here on a regular basis on topics which are timely and relevant to the contractors' business. In this issue we kick off with an update on Plan Review. It is no secret that plan review has been under increasing stress as it took on functions arguably remote from its primary safety function. Following a yearlong review and re-engineering, ESA now reports a reduction in the plan review backlog from over 500 to less than 50. This is an example of both ESA and the contractor community working to improve the industry – contractors with more complete and accurate applications and ESA with better systems and more focus on the safety mandate. Hopefully more communications from ESA through this magazine will further improve contractor/regulator relations.

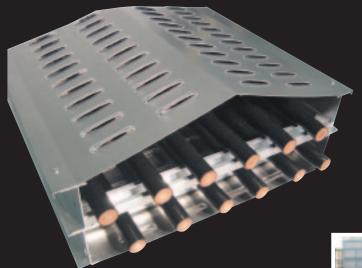
As always OEC has a strong safety component throughout. This issue includes two cold weather articles — one on cold weather driving and the other on the effects and symptoms of cold stress. The Toolbox Talk in this issue gives you a "how to…" for conducting safety talks. This is a skill all supervisors, foremen and safety reps should be trained for. Effective communication, engaging the workers and reinforcing the message are essential skills for all safety leaders.

In keeping with the financial planning focus of this edition, additional articles in this issue are in the area of organization, succession planning, disability insurance and retirement. While we can't control everything, we can be well prepared for unforeseen events and avoid unnecessary hardship.

I am sure you will find something in this issue to help make your business more successful, however any comments or suggestions for articles on topics you want to see covered are always appreciated and I am always open to hearing from you. Drop me a line at the ECAO office.

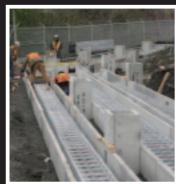
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Managing Adversity:

Ontario's Economic and Construction Outlook



By Katherine Jacobs, Director of Research and Analysis, and Rishi Sondhi, Construction Information Coordinator, of Ontario Construction Secretariat www.iciconstruction.com

2011 was a challenging year for practically all developed economies. Between an historic U.S. debt downgrade, wildly gyrating financial markets, debt troubles in the U.S. and across the Atlantic, and natural disasters in Japan, Canadian residents have had more than enough challenges thrown at them. Despite these shocks, economic growth in both Canada and Ontario has kept their heads above water.

Now, with 2011 over, we turn to the outlook for 2012. What are the expectations for Ontario's economy and, in turn, for the construction sector? To answer the first question, we turn to the projections of key forecasters. The consensus of their forecasts sees growth clocking in at two per cent for 2012, essentially matching economic growth recorded in 2011.

Next year, growth will be weighed on by a moderation in residential investment activity and the cessation of the infrastructure stimulus funding, while being lifted by consumer spending and export growth (thanks to continued economic growth in the U.S.). While two per cent isn't an overly robust rate, it is actually slightly stronger than what the province has seen, on average, since 2000. Additionally, two per cent growth is enough to generate increases in employment and a decline in the unemployment rate, albeit not a dramatic one. Note that the general consensus is that Ontario will not slip into recession in 2012.

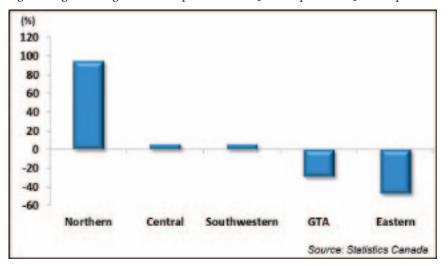
Ontario's construction markets: current trends and outlook

Industrial

Through the first nine months of 2011, industrial building permits were down 13 per cent versus their 2010 levels measured over the same period. Perhaps encouragingly, this decline was narrowly concentrated in the transportation/utilities segment, as major industrial transit work in the Greater Toronto Area (GTA) was accounted for in 2010 and fell out of the calculation in 2011. However, these transit projects will continue to provide work to Ontario's tradespeople until 2015. The regional breakdown of how industrial permit values compare with those of 2010 can be seen in Figure 1.

In terms of other major industrial segments, permit values were higher in the factories/ plants and the mining/agriculture segments, with gains in the former consistent with an increase in manufacturing sales, while

Figure 1: Regional change in industrial permit values — Jan. to Sept. 2011 vs. Jan. to Sept. 2010



increases in the latter were driven by the huge slate of mining work occurring in northern Ontario.

Looking ahead, industrial investment will likely be modestly higher in 2012. However, the level of activity will continue to remain severely depressed, with investment levels far below their recent 2006 peak.

In terms of supportive factors, the U.S. economy has continued to grow this year and is projected to drift modestly higher in 2012 (Figure 2). This will provide some support to exports and manufacturing sales, which, in turn, should help industrial investment.

Despite the natural disasters in Japan—which cut off the supply of materials needed for production—auto production has managed to increase slightly this year. Additionally, automotive sales have trended higher in Ontario. These two factors point to a (very) gradually healing automotive sector, which should provide some slight support for industrial investment in 2012. Indeed, Chrysler issued a permit for a large logistics warehouse in October, while a large expansion is planned for the Toyota plant in Cambridge. Additionally, GM has recently announced investment of close to \$200 million in its Oshawa facility to accommodate production of the Chevy Impala and Cadillac XTS.

Upcoming work in northern Ontario, concentrated in the mining sector, will be another source of growth next year. According to our projects data, within the North, nearly \$6 billion worth of construction work is slated to begin in 2012, highlighted by the \$2-billion atmospheric emission reduction plant at Copper Cliff and work at the Detour Lake gold mine. While some of the work with these projects will be classed as "engineering," the mining/agricultural component of industrial investment will undoubtedly receive a boost.

Commercial

Through September, commercial permit values were 20 per cent lower than the same period in 2010 and matched the level seen in 2009. This is likely a renormalization of commercial investment activity after a very strong 2010. All five regions of the province reported declines in commercial permit issuance. Of all the regions, northern Ontario had the smallest decline, while southwestern Ontario experienced the steepest drop.

Looking ahead to 2012, we anticipate that commercial investment will increase, though only modestly to moderately, owing to the influence of both positive and negative factors.

On the positive side, the vacancy rate in Toronto is trending lower. This is important, as the GTA represents more than half of Ontario's commercial market. The downtown Toronto core is undergoing what some are calling an "urban renaissance," whereby large companies such as Coca-Cola and Google are moving their offices to the core in the hopes of finding and retaining young employees. This should fuel both construction and renovation work in the region.

Meanwhile, in eastern Ontario, office vacancy rates remain very low in Ottawa, a plus for commercial construction in that city. Additionally, employment growth in Ontario is forecasted to increase in 2012, albeit at a much slower rate than last year. Finally, lending conditions for financial institutions have continued to ease and interest rates are not moving higher any time soon, meaning that financing is getting easier to obtain and is cheap.

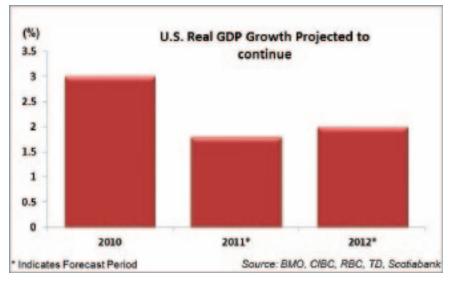
On the negative side, there is a cloud of uncertainty that has engulfed the global economy, thanks to debt problems in the U.S. and Europe. This has negatively impacted business confidence. Furthermore, stock market values have trended lower as the year has progressed, making Real Estate Investment Trusts (REITs) more weary of investing in the commercial market, according to CB Richard Ellis. Thankfully, pension funds have taken up some of this slack. Another drag on commercial prospects is the trend of rising vacancy rates in southwestern Ontario and parts of central Ontario.

Institutional

Institutional permit values were at a solid \$3.4 billion through September, only slightly lower than the record level achieved in 2010. This strength was concentrated in hospitals and schools as well as government buildings (i.e., courthouses) and was largely accounted for by Toronto. As the year progressed, the value of institutional permits cooled significantly as building intentions for hospitals, schools and government buildings unwound their earlier gains.

The outlook for institutional investment is influenced by a few factors. On the negative side, the infrastructure stimulus taps were officially turned off as of Oct. 31, meaning that institutional projects "brought forward" in order to take advantage of the stimulus

Figure 2: U.S. economic outlook





funding will come off the books. To this point, the provincial budget indicates that total infrastructure expenditures will fall by 11.5 per cent, thanks primarily to the cessation of the infrastructure stimulus.

However, expenditures on education, health and justice are expected to be slightly higher this year versus last, according to the provincial government. This squares with the sheer number of Infrastructure Ontario projects under construction or in the pipeline. Chief amongst these projects are a new \$2-billion hospital in Oakville and a \$1.75-billion hospital in Toronto. These major projects, combined with the slew of hospitals and courthouses currently under construction, mean that there will be a strong level of institutional work this year, though perhaps not as strong as the prior two record-setting years.

Engineering

Engineering investment growth figures to be

flattish in 2012. This is a function of the cessation of the infrastructure stimulus funding. The infrastructure stimulus money primarily assisted engineering projects in both 2010 and 2011, as most of the \$4 billion was spent on local roads and bridges, water/wastewater and public transit, according to the Parliamentary Budget Officer.

This negative impact is expected to be countered by a few major projects, most notably the Windsor-Essex Parkway, on which preliminary stages of construction have begun. Additionally, major work at mines in the north and construction related to the renewable energy sector (i.e., wind farms and solar parks) in northern and southwestern Ontario will provide an offset. Longer-term, the outlook is favourable for engineering investment, with nuclear refurbishment work at Darlington on the books, an air-rail link between Union Station and Pearson International Airport,

the Ottawa light rail transit project and the Waterloo Rapid Transit project all poised to energize engineering construction.

The bottom line

We see construction growth remaining at a strong level in 2012. Industrial and commercial investment will likely be modest to moderately higher, in line with improving economic conditions in both Canada and the U.S. Expenditure details contained in the provincial budget, coupled with the sheer amount of institutional projects under construction, suggests that institutional investment will likely be strong in 2012, even if it doesn't match the back-to-back record years of 2010 and 2011. Finally, engineering construction growth will likely be relatively flat, owing to the stopping of the infrastructure stimulus, but a bevy of large projects means the engineering outlook is positive over a longer-term horizon.

Table 1: Vacancy rates in major office markets

City	Rate (%)	Versus one year ago
London	14.2	Flat
Toronto	7.8	Lower
Waterloo	7.4	Higher
Ottawa	6.5	Higher

Source: CB Richard Ellis



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Illustration by Hadi Farahani



RFID tags for tools and materials management

By Carl T. Haas, P.E., Ph.D., Professor, Department of Civil Engineering, University of Waterloo and Saiedeh N. Razavi, B.Sc., M.Sc., Ph.D., Assistant Professor, Department of Civil Engineering, McMaster University

Introduction draft

During the course of a typical construction project, contractors have always had to face the daunting challenge of managing their tools and materials. Valuable time and resources are wasted looking for misplaced items, leading to unforeseen and unpredictable strains on project timing and budgets. Better tracking has always been something to aspire to.

A class of technologies has recently emerged to effectively manage the tracking of materials and tools, and thus minimize losses. These technologies also have the added bonus of being able to support automated shipping, receiving and inventory functions. At the core of these technologies are Radio Frequency Identification (RFID) tags that

integrate GPS-enabled readers, wireless distributed computer networks and management software.

RFID-based technologies can be applied to:

- tool management systems;
- materials supply chain management;
- materials locating on sites, inside and outside; and
- emerging capabilities, such as automated earned value tracking.

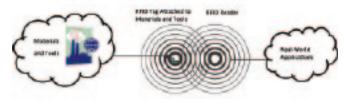
This article aims to introduce the potential of RFID-based technologies in today's industries. Although we limit the discussion to a few representative examples, the scope of their potential is self-evident (and some emerging applications are briefly addressed). A simple Internet search will suffice to identify most of the related products and services available in this area. Let us begin by first reviewing the basics of RFID technology.

Basics of RFID technology

Radio frequency identification (RFID) is a generic term for technologies that use radio waves for the purpose of identifying and tracking objects or people. RFID has been in use since 1970 and serves the same purpose as a bar code or a magnetic strip on the back of smart cards—which is to provide a unique identifier for that object.

RFID provides a more efficient way of identifying objects, since RFID tags can be read if passed within close enough proximity to an RFID reader. It is not necessary to have line-of-sight between the tag and the reader device, as with a bar code. In other words, it does not require line-of-sight to "see" an RFID tag; the tag can be read inside a case, carton, box or other container. And unlike barcodes, RFID tags can be read at the rate of hundreds per second. Bar codes can only be read one at a time.

There are several methods of identification, but the most common is to store a serial number that identifies a person or object, and perhaps other information, on a microchip and power supply packaged with an antenna. The chip, power supply and antenna together are called RFID tag. The antenna transfers the identification information to an RFID reader. The reader, while in the reading range, receives and converts the radio waves transmitted from the RFID tag into digital information that can then be used in different applications. With wireless network availability, information can be related to a tag number via a database and does not need to be stored on the tag.



Schematic RFID-based system framework

RFID technology can be used for location identification in conjunction with other technologies, such as GPS. If a moving RFID reader is equipped with GPS technology, then the position of the reader can be detected at any time. If an RFID tag fixed at an unknown location is tracked by the reader, the RF communications connectivity that is created between the reader and the tag results in a proximity constraint that will lead to the identification of the location of the tag. As the reader and



RFID TAGS

the tag come into communication range, another proximity constraint is read. The combination of these proximity constraints narrows down the feasible region, and where the regions intersect, the RFID tag will be located. The figure below clearly demonstrates the proximity method.

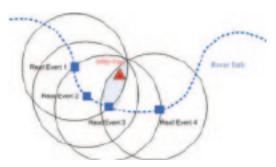


Illustration of the functioning of proximity methods

RFID applications

RFID is popular in many industries and is used for a multitude of purposes, ranging from tracking animals to triggering equipment located down oil wells. The most common applications are retail and payment systems, security and access control, and industrial and medical asset tracking. RFID tags are being used to track goods in warehouses, luggage at airports and vehicles in Intelligent Transportation Systems. In most implementations, tags are read as they pass through portals at key locations. Increasingly, companies want to use RFID to track goods in their supply chain, to monitor work in process and for other applications.

RFID in construction

RFID is a very promising technology for many applications in construction. Project participants, from owners to constructors, are beginning to use RFID tags and readers throughout the construction and also post-construction lifecycle. RFID tags have been put into place in concrete, piping, tools, machinery and personnel to track their location through the construction process and even through the supply chain. The most common and practical uses of RFID in construction include tracking materials through the supply chain and in the construction zones.

An emerging and related area of application in construction is the use of remote sensing and actuating technologies such as RFID, ultra-wideband (UWB) and imaging technologies for construction work zone safety and mobility improvement. Such technologies can improve construction safety by warning or alerting workers on-foot and/or equipment operators in real-time when a too-close proximity to unknown or other construction recourses can cause hazards.

Location-aware computing in construction is another emerging area where the location of materials and equipment can be used to derive knowledge about the state of the project. Recent advances in sensing technologies have enabled the deployment of a range of simple to complex sets of sensors for identification, location sensing and tracking the movements of targets.

RFID has been recognized as one of the most cost-effective and easy-toimplement technologies for location awareness. Many location-sensing systems have also been developed in construction for resource and asset tracking, earthmoving operations, surveying, safety hazards predicting and context aware construction.

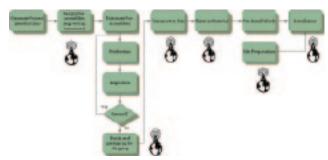
RFID for supply chain management of materials

Lean construction principles include the minimization of materials buffers within the supply chain. In contrast with these lean principles, accumulation of material buffers is traditionally viewed as an effective means of shielding a project from the risks associated with uncertainty in the supply network. We like to know that we have enough bulk and fabricated materials on-site to respond to any eventuality once construction has started. While some advanced on-site automated bulk materials ordering systems that partially address this problem have been available for over a decade, these systems have not been extended to fabricated materials.

Much of the uncertainty experienced at the site arises out of a lack of "visibility" throughout the construction supply network. Visibility is the level of awareness of the overall state of the supply network. The integration of RFID tagging with a networked materials management system, and the cooperation of key suppliers within the construction supply network, presents a viable solution to this problem. Companies such as SNC-Lavalin have already begun to implement such systems for mechanical and electrical materials for which their loss or delay would represent significant risk to the project.

In addition, research by the authors has examined the potential for such systems to increase work opportunities at the site level as a result of increased supply-network visibility and, in turn, reduce the dependency on material buffers. The investigation was completed for a pipe spool and valve supply chain illustrated in Figure X by using a modelling and simulation approach grounded on a solid foundation of field data and experience. Significant schedule acceleration was predicted as the result.

Applications of such RFID-based systems for supply chain management exist in other industries such as aircraft manufacturing, shipping and military logistics. They may also be required for certification of nuclear construction for future builds.



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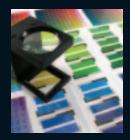


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RFID for locating materials on outdoor sites: Portlands Energy Centre

In 2006-2008, a 550-megawatt, natural gas-fired, combined cycle, power generation facility in Toronto was used as a host platform for the experiment and trials that occurred. The site is located on the Toronto waterfront and one mile away from the port of Toronto.



Portlands Energy Centre progress photo as of November 2007

The project consisted of two identical sets of materials to support the construction of the two identical units, which consisted of boilers, turbines and pipelines in an effort to supply the 550 megawatts of energy.

The contractors were provided with well-defined field materials management guidelines.

Warehouse personnel were responsible for receiving, storing, tracking and releasing requested materials to subcontractors. They also worked closely with a work packaging and expediting team. Several on-site areas were chosen to store materials, such as laydown yards, staging areas and a nearby port area warehouse.

Three subsets of critical components with long procurement lead times, known to have caused crew delays and negatively impacted previous projects in the past, were equipped with the automated materials tracking technology.

Four hundred components of one boiler were tagged and tracked during the field trial. The data would then be used to compare with the materials handling process at the other unit. The tagged materials included 24 pipe spools for the Unit 2 generator, 22 safety valves and about 150 pipe supports. RFID tags were used on the materials that were received and stored at the port. The image below shows some of the pipes spools tagged at the port of Toronto.



Tagged pipe spools at the receiving point

It was noted that during the trials, several pipe spools were misplaced, and after spending considerable time searching for them, the identification and localization technology was used to locate them. In some cases, the materials expected on-site were still at the port, resulting in substantial additional costs. In all cases, the materials were immediately located using the RFID technology, resulting in cost avoidance as well as efficient usage of skilled craft workers on an industrial construction site.

A summary of the results from the case studies during the trial follows:

- Overall feedback from the main subcontractor was very positive after the first successful local retrieval.
- Contractor A was able to reduce initial crew size, knowing that
 he would not have to dedicate resources to locating materials; the
 resulting labour savings to the contractor were significant,
- Overall feedback from the contractor regarding the level of information provided was positive.
- Six-to-one reduction in search time
- · a reduction of lost numbers

The construction manager on this project has since implemented RFID materials management and tracking as a departmental function within the company.

RFID for locating resources in indoor sites

Location sensing for infrastructure management and construction operations has been mostly limited to outdoor environments, where satellites for positioning information (GPS) for the RFID tag readers are in view. Recent studies on indoor location-sensing systems are now overcoming this limitation and offering significant potential on construction practices. Applications of indoor location-sensing in construction comprise, but are not limited to, critical decision-making, safety, materials management and productivity tracking.

Indoor tracking and location estimation in construction offers useful tools for supporting decisions on job sites. Several projects have incorporated location information based on RFID technology for safety improvement in indoor and underground environments like



Source: National Institute for Occupational Safety and Health (NIOSH), Centers for Disease Control and Prevention, Technology News, September 2011

construction work zones. One of the examples of such implementations is the system developed by the National Institute for Occupational Safety and Health in the United States, which uses active RFID tags on equipment and a wearable reader on workers. The system proactively generates alarms when a tag is within the reader's receiving area.

Tools and materials tracking in construction is another application area of indoor location-sensing for construction. An example of such a system is an ongoing project being developed by the University of Waterloo on the use of UWB technology to determine resource locations and to track the progress based on the location of the crew.

In another project on the construction site of the Centre for Structural and Functional Genomics at Concordia University in 2010, passive RFID technology was utilized for capturing spatial data indoors, where the use of GPS would no longer be feasible. Each passive RFID tag was used as a reference point with a known location within a predefined zone. The indoor construction work-active area was divided into exclusive small zones for tracking, and each zone was spatially covered by a subset of low-cost passive RFID tags. The main objective of this project was to determine the location of the mobile person (foreman or site superintendent) carrying the RFID reader, which can assist in real-time information retrieval, decision support and status reporting. Knowing the location of the reader, we can identify the location of other tagged items on the job site.

Future applications

Emerging applications of RFID-based technology for tracking and locating materials include:

Automated progress and earned value tracking — integration with

BIM (Building Information Modeling in 3-D) and proper application can enable automated earned value tracking.

- Positive verification of connections By pairing tags, proper connections for high-voltage wire harnesses could be ensured.
- Safety improvements By wearing tags, access to dangerous or restricted areas can be denied automatically, or proximity to dangerous locations can set off alarms automatically.
- Security improvements —By wearing tags, access to secure areas
 can be denied automatically, or proximity to vulnerable installations
 can set off alarms automatically.
- Logistics improvements Tracking tags on construction lifts for high rises, for example, can develop the data necessary to identify and minimize logistics bottlenecks on-site; or fitting crew vans with GPS can facilitate optimization of deployment.
- Context-sensitive information delivery —Using RFID tags, BIM and wireless communications, context-sensitive information can be delivered to notepad computers (for example, materials, punch lists or work status automatically by area for a walkthrough).

Conclusions

RFID technology for the tracking and location of tools and materials is a "game changer." Today, it reduces losses in time and materials, but tomorrow, this technology will enable functionality and applications that have not yet been imagined. The future may not be foreseeable, but once achieved, it will be "trackable."





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Update from the Electrical Safety Authority's Plan Review Team

The plan review service is an important component of the Electrical Safety Authority's (ESA) efforts to ensure compliance to the Ontario Electrical Safety Code (OESC) and the safety of complex and higher-risk projects, such as high-voltage installations, hazardous locations and patient care areas. The requirements for plan review can be found in OESC Rule 2-010.

Identification of non-compliance issues at the planning stage helps customers avoid costly changes after installation has begun. Some of the most common issues identified through ESA's plan review process include:

- undersized service entrance conductors;
- improper overcurrent protection and conductor sizes for transformers;
- ground fault protection not provided on main distribution equipment required by Rule 14-102;
- underground conductors not installed in compliance with 12-012 and 4-004; and

• improper grounding of high-voltage equipment.

Better process, reducing backlog

ESA's plan review department has been working to streamline its processes and reduce the backlog of plans in its system. It identified that the key problem was too many plans submitted without all the required information, which clogged the system with pending and unfinished submissions.

To eliminate that problem and make it easy for customers to submit plans, ESA developed new processes for submitting plan reviews. Now all plans must be submitted together with the *Plan Review Submission Form* and *Checklist*. Both forms have been simplified to assist customers in understanding the plan review requirements and ensure that the minimum information required is included with each submission. Customers can access plan review information and submittal forms on ESA's corporate website under the Plan Review at: www.esasafe.com/Contractors/.

This new process has made a significant contribution in reducing the backlog of plans from 552 in August 2010 to 42 by November 2011.

The plan review team is continuing to identify improvement opportunities to ensure we deliver an efficient, timely, customer-friendly plan review service. ESA invites feedback on how it can better respond to your needs — please email your feedback to plan.review@electricalsafety.on.ca.

Checking plans against permits

ESA has been conducting audits to compare wiring notifications with the devices and equipment noted on the submitted plans. The results were shared with our wiring inspectors, who contacted customers to resolve any discrepancies. ESA has identified a number of cases where permits did not match plans and additional invoices were required. To avoid receiving this defect, please ensure all items installed are detailed on the notification submitted to ESA. ESA has also refunded money in cases where the fee schedule had been misapplied, resulting in over-billing.

Upon request, ESA can provide an inspection fee estimate based on the submitted drawings to assist you in submitting your wiring permit accurately. Please contact the plan review department for details on associated fees and timing.

Ensuring that wiring notifications match the actual work being done is key to fair treatment of everyone.

Frequently Asked Questions

1. How long does it take to get a plan review?

Our goal is to complete a plan review within 10 to 20 business days. The Electrical Safety Authority will accept rush plan reviews. Rush requests are reviewed by the plan review supervisor to determine the validity of the request. Please note that there is a minimum five-hour charge for a rush plan review.

2. Why do I have to use the submittal form?

The submittal form has been designed to ensure you have included all necessary information in your submission. By confirming this up-front, we are able to turn around reviews more quickly. Incomplete submissions will not be reviewed.

3. What happens if I submit a request for a plan review without all of the required information?

If information is missing, the submission will not be registered. ESA will contact you to flag that information is missing. If the information is not provided within 10 business days, the submission will be discarded and you will be required to resubmit the entire package with all of the required information.

4. Do I need to contact the plan review department when I make changes based on the comments I receive?

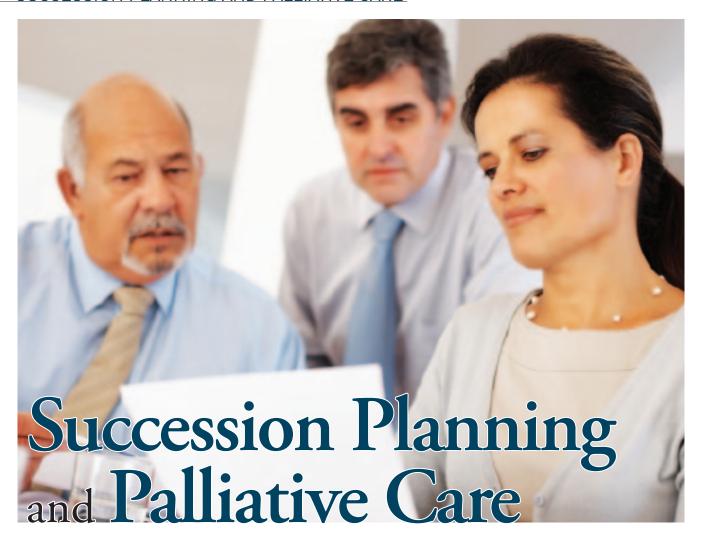
Once the plan review is complete, up until the time the project is underway, you may still contact the plan review department for clarification on issues regarding the project. Once the project is underway, you are required to contact the local field inspector, as they have the authority to accept or reject your changes.

5. What if there is a major change in the project after I submitted the plan?

If there is a major change in the scope

of the project, you would be required to resubmit your plans for review. Some examples of a major change include: changing the service size, changing the main feeder size and quantity, or changing from tamper-resistant equipment to non-tamper-resistant high-voltage equipment, etc.





Our first article — "The Immortal CEO" — told the story of a client who had decided his succession plan would be that he would live forever and, therefore, he did not need a succession plan. While this was said in jest, most of us feel immortal. Unfortunately, we know that is not the case, and the following client situation cut it too close.

We had worked with this client — we'll call him Bill — for five years to develop a strategic plan and then a succession plan. Bill had four children and, as a third-generation family business, he desperately wanted one of the children to assume control of the business and maintain the legacy. None were interested, either because they had good careers elsewhere or they knew they could not work with their father.

After struggling with this reality for two

years, Bill admitted the business would have to be sold; however, the business had experienced two poor years financially. In our work together and upon valuing the business, Bill, who was about 70, decided that the sale of the business would not generate sufficient wealth for his retirement because of the valuation and financial results.

It was decided to grow the business for the next three years and then attempt to sell it with improved financial results.

Two years ago, however, Bill was diagnosed with terminal cancer. In addition to his business, he had some personal issues — a brother who was a minority partner (but with whom there was no shareholders' agreement after 40 years); a wife from whom Bill had separated for a number of years but had never completed the divorce papers; and

a new partner for whom he wanted to provide. There was not a current will because of this outstanding divorce and there were no powers of attorney in place.

After the diagnosis, Bill began chemotherapy and radiation, and one son, Adam, stepped in to manage the business while his dad was receiving treatment and was unable to work.

Bill's cancer went into remission, but he never fully regained his health after his treatments. He did come back to work, however, to keep his mind off his illness. Bill also had the strongest relationship with the business's largest customer, so there was concern this customer could take their business elsewhere without Bill at least present.

Adam began to build a relationship with the customer and gradually took over the day-to-day operations of the business, leaving Bill, his lawyer and his accountant to start to put his personal life in order — a shareholders' agreement with his brother, a divorce settlement, a will and powers of attorney.

While Bill's cancer was in remission for over a year, no agreements were reached with his brother or separated wife, nor was a will completed. Many hours of legal and accounting time were spent making offers, revising offers and attempting to bring these issues to a conclusion.

Meanwhile, the business continued to grow and had its best quarter early last year - all because of the one customer that Bill continued to manage.

Bill got sick again in May 2011 and went through another round of treatments. His tenacity through all of this was unbelievable, as he tried to keep working and bring resolution to his personal life's issues.

After mid-July, Bill was not strong enough to leave the house; however, efforts were ongoing to put an acceptable plan into place for both his own life and the recognition that his son, Adam, would take over the business.

Bill was in and out of hospital for the remainder of the summer.

In late August, Bill was admitted to palliative care. Bill had his family around, as well as his lawyer and his accountant. Four days before Bill died, while he was still of sound mind but physically very weak, he was presented with a shareholder's agreement with his brother, a divorce settlement and a will. Over the course of the next two days, Bill signed each document, bringing closure to each issue, one at a time.

Bill died 36 hours after he signed the last document. The business, on the other hand, now had to cope with an inexperienced son running the operations and the risk of losing its one profitable client. The value of the business will — in all likelihood — crash, and long-time loyal employees will be put out of work, everything that Bill would have wanted to avoid.

While Bill should have made some of these decisions earlier, he was in denial that he was really sick and that he needed to wrap up a number of issues.

A good succession plan will often take three to five years to complete so good decisions can be made and put in place.

Bill's situation left the family and his trusted advisors holding their breath.

The moral of the story is that, yes, the plan did get done and documents were signed, but there are less stressful ways to do succession planning, and now the jury is still out.













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Planning a Vacation – or Your Retirement?

By John Grinton, Senior Vice-President, National Bank Financial

There is an expression in our industry that most people spend more time planning for a vacation than they do for their retirement — yet they spend one to two weeks on a vacation and hopefully decades in retirement.

Why is that? First, it is probably easier to plan a vacation and the benefit is much more immediate, whereas planning for retirement can be much more difficult and full of unknowns. And where do you go for advice on this? (At least when you plan a vacation, you can go to a travel agent.)

According to Wikipedia, a financial planner or personal financial planner is a practicing professional who helps deal with various financial issues through proper planning, which includes cash flow management, education planning, retirement planning, investment planning, risk management and insurance planning, tax planning, estate planning and business succession planning (for business owners).

Possibly, the above definition is exactly why people do not spend time preparing for retirement — it appears far too complicated. And I believe it can be, but I also believe it can be much simpler than that. Most of the folks I manage money for want one question answered: "Do I have enough money to live on for the rest of my life?"

Of course, the answer is: "It depends." It depends on how much you want to spend, on how many trips you want to take, on how many new cars you want to buy, on how much you want to give to charity (and your children), on how much you want to leave to your children,

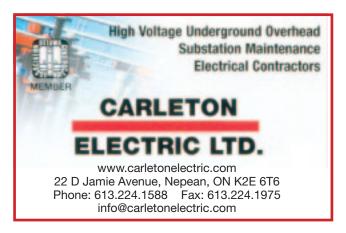
and so on. Interestingly, many folks find that they do not need as much money in retirement as they thought — possibly because their business expenses may drop (e.g., commuting), and possibly because of their CPP and OAS payments.

Many financial planners use some pretty sophisticated software to assist with personal financial plans, with many of the plans produced being very helpful, especially for the more complicated situations. For example, if you are in a fairly high tax bracket and are going to start receiving some additional income from your RRIF and/or pension plan, it might be worth discussing options to reduce taxes. If your goal is to leave a decent estate without reducing your after-tax income, then some planning might be helpful. The bottom line is—the more of the issues mentioned in the definition of a financial planner that apply to you, the more your need for planning.

At the other end of the spectrum — or perhaps just as a starting point for everyone — a simple spreadsheet might work. I have used a number of these spreadsheets that simply list all of the different income streams (e.g., CPP, survivor's pension, OAS, pension income, RRIF income, annuity income, dividend income). I adjust the numbers for inflation, subtract income taxes and — voilà! This may not be considered an official financial plan, but it can certainly give you a fairly accurate picture of how much you can spend. In most cases, it really helps answer that question — do I have enough to live on?

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Salary Increase Notification and Disability Insurance Limits: The Consequences of Being Under-Insured

Disability insurance can help create financial security for your employees and their families. It can be used to:

- · pay monthly expenses;
- · provide an income for your family;
- ensure your family has the resources to maintain a comfortable standard of living; and
- protect your RSP and savings.

As a business owner, you want to protect both your independence and your profitability, while ensuring that your employees are fully covered by their plan. The following details characteristics of both short-term and long-term disability.

Short-term disability (STD)

 Typical qualifying periods for STD are seven days for illness or the first day if due to an accident or hospitalization. These short qualifying periods help reduce administration for claims of really short duration.

Long-term disability (LTD)

Benefits typically contain the following characteristics:

- Benefits are payable after the expiration of a qualifying period, in which the employee is typically receiving benefits under a salary continuance plan, short-term disability plan or employment insurance.
- Definitions of disability are tied to the employee's ability to perform their own job or any job.
- The benefit period can be set in terms (i.e., two years, five years or to age 65).
- The monthly disability benefit is a percentage of pre-disability earnings

Benefit maximums - Key for employers to understand

Benefit maximums affect the cost of the plan. There are two types of maximums that apply to a long-term disability benefit: a

non-evidence maximum and an overall maximum.

The non-evidence maximum is the amount of insurance that the insurance carrier will provide without requiring the employee to submit medical evidence of good health at the time of enrollment. If the employee is entitled to an amount higher than the non-evidence maximum (because of earnings or the benefit schedule), then medical evidence is required to qualify for the higher amount. The medical evidence is reviewed by the medical underwriting staff at the insurance company to determine the employee's health and what level of risk the employee represents to the insurance company.

The overall maximum is the maximum insurance amount that the insurance company is willing to insure. The benefit formula usually includes a rounding element to the next-highest hundred dollars.

Key Message: Employers ensure the maximum eligible has been offered to their employees. This is done by updating the salary information.

As an employer, the consequences of your employees being underinsured are:

Loss of coverage – An employee who does not apply for additional insurance while healthy runs the risk of being unable to obtain additional coverage in the future, should personal health circumstances change. Timely updating of salary information is critical.

Lower benefits than expected – An employee claiming long-term disability benefits will most certainly expect that their income is insured. Imagine the stress that will be created should the employee find that only a fraction of their benefit is payable.

Possible litigation by employee – Similar to the above item, what action might these parties take? Where will they point the finger for this oversight?

These situations often arise when a new employee is added to an existing plan, or when an employee receives a salary increase and the administrator neglects to complete the appropriate paperwork.

Protect your business and your employees. Ensure salary increases are recorded in a timely manner with the administrator of your benefit plan.

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Innovation

Our extensive R&D department constantly review product design and performance to ensure compliance with the ever changing cable constructions and industry standards. This process has enabled CMP Products to boast many industry 'firsts' for product features and approvals. Examples of these "firsts" are deluge proof cable glands, Bi-Code approvals and our revolutionary 'CDS' Flame proof sealing system.



The very latest innovation from CMP Products is RAPID Ex

Traditional explosion proof (Class I, Div 1, Zone 1 Ex d) seals employing a clay based sealing compound, have been used in our industry for many years to provide effective explosion proof protection. However, a certain degree of risk is associated with this traditional installation process and this risk increases with the number of cable cores. Multi core cables require the highest degree of competence and a long installation time to ensure a void free, safe installation. Not to recognise this will lead to rework, or failure of the seal.

is a Liquid Pour, Fast Curing, Liquid Resin Seal that installs in seconds and cures in minutes. Its unique formula begins with a low viscosity liquid that flows into the cable interstices completely surrounding the cable conductors, displacing the air from the connectors in the process ensuring the "perfect seal". The viscosity then increases and completely cures in less than 40 minutes.





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A Driver's Guide to Understanding Cold Weather Conditions

By Rudy Penner, Loss Prevention Program Coordinator, www.federated.ca

We have all listened to weather reports and perhaps wondered exactly what was meant by what was said. If you drive for a living or are on the road a lot, it is important to know what you may encounter. Because you can't usually choose the weather that you will be travelling in, knowing the conditions in advance can help you prepare and may provide the warning you need to avoid a dangerous situation. The following cold weather terms from Environment Canada should help you determine the meaning of the reported weather when travelling in Canada.

Cold weather conditions

Blizzard warnings occur when winds of 40 km/h or greater are expected to cause widespread reductions in visibility to 400 metres or less, due to blowing snow, or blowing snow in combination with falling snow, for at least four hours.

Blowing snow warnings occur when blowing snow, caused by winds of at least 30 km/h, is expected to reduce visibility to 800 metres or less for at least three hours.

Freezing drizzle warnings occur when a period of freezing drizzle is expected for at least eight hours.

Freezing rain warnings either occur:

- when freezing rain is expected to pose a hazard to transportation or property; or
- when freezing rain is expected for at least two hours (nationally, except Maritime provinces) or at least four hours (Maritimes).

Flash freeze warnings occur when significant ice is expected to form on roads, sidewalks or other surfaces over much of a region because of the freezing of residual water from either melted snow or falling/fallen rain due to a rapid drop in temperature.

Snowfall warnings either occur:

- when 15 cm or more of snow falls within 12 hours or less (Eastern Canada and parts of British Columbia); or
- when 10 cm or more of snow falls within 12 hours or less (Prairie provinces, Northwest Territories, Nunavut and parts of B.C.).

Winter storm watches occur when conditions are favourable for the development of severe and potentially dangerous winter weather, including:

a blizzard;

- a major snowfall (25 cm or more within a 24-hour period); and
- a significant snowfall (snowfall warning criteria amounts) combined with other winter weather hazards, such as freezing rain, rainfall (over coastal B.C. only), strong winds, blowing snow and/or extreme wind chill.

Winter storm warnings occur when severe and potentially dangerous winter weather conditions are expected, including:

- a major snowfall (25 cm or more within a 24-hour period); and
- a significant snowfall (snowfall warning criteria amounts) combined with other cold weather precipitation types, such as freezing rain, strong winds, blowing snow and/or extreme wind chill.

Blizzard conditions may be part of an intense winter storm, in which case a blizzard warning is issued instead of a winter storm warning.

Weather warning

A generic weather warning may be issued for extreme weather events for which there is no suitable warning type because they rarely occur (for example: a major fog event).

A generic weather warning may also be issued for other weather events, during situations where the environment is vulnerable due

to pre-existing conditions and any further weather could result in a significant hazard (for example: 50 km/h winds following an ice storm, which could cause structural wind damage).

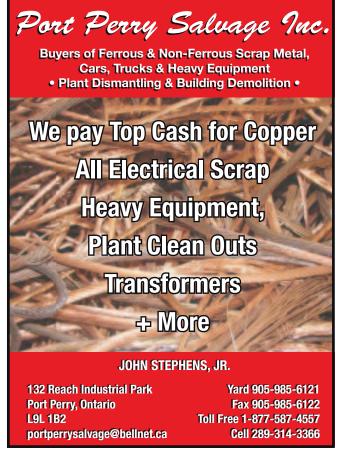
A generic weather warning may also be issued for situations where the event is not expected to reach warning criteria values, but there is a special reason for the warning (for example: the first event of the season or an off-season event).

For more information on all weather terms and definitions, visit the Environment Canada website at: http://www.ec.gc.ca/meteo-weather/default.asp?lang=En&n=D9553AB5-1

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The information provided is intended to be general in nature, and may not apply in your province. The advice of independent legal or other business advisors should be obtained in developing forms and procedures for your business. The recommendations are designed to reduce the risk of loss, but should not be construed as eliminating any risk or loss.





Getting Organized By Norb Slowikowski

Organizing is the ability to systematically arrange all necessary pieces in the work process so that desired results can be achieved in a timely, efficient manner. Organization for any construction job requires:

- dividing up work among crew members;
- assigning work and providing clear instructions for implementing the assigned activities;
- linking up the field with a support system;
- defining the project manager's role in supporting the job site foreman; and
- planning and anticipating ongoing needs for job site productivity.

To effectively execute any kind of organization, there needs to be a unity of purpose, which means all players in the construction process must understand the following key components:

- the skill requirements for labour
- · expected results of each person on the job
- · level of authority and clearly defined reporting relationships
- · feedback system
- · support from office to the field and how this support will occur
- access to other necessary information, including:
 - o scope of work
 - o budgets
 - o blueprints, specs
 - o schedule
 - o procedures/paperwork requirements
 - o job site meetings
 - o access to office support staff

- o proper materials (and the correct amount of those materials)
- o job site working conditions
- o training, if skill deficiencies exist

To complete the organization process, it is essential that the following job controls be put into place to ensure that the job site work process flows smoothly from beginning to end:

1. Pre-job planning meeting/pre-job review

These are usually the responsibility of the project manager(s), and the size of the project usually dictates the amount of planning required. When considering such a meeting, you should consider:

- issuing a policy statement;
- · deciding who will attend;
- using a pre-job planning checklist with key items for job success;
 and
- preparing written minutes of items discussed and distributing them to appropriate personnel.

2. Post-job review

The purpose of the post-job review is to review how the job turned out and to provide feedback to all key parties (project manager, general superintendent, foreman and estimator). This "lessons learned" exercise helps to improve productivity on future projects.

3. Tool and equipment inventory/maintenance

Tools and equipment are often sent to jobs without a process for inventory control. It's important to maintain an inventory control of tools and equipment and to have an M&R program in place to repair defective tools and equipment. To accomplish this, you should consider implementing these three controls:

- tool and equipment inventory checklist
- job site tagging procedures for defective tools and equipment
- procedure for moving materials from warehouse to field, from field to warehouse, and from job to job

4. Job site safety program

Implementing and maintaining an effective job site safety program is a must. You can ensure that safety becomes a way of life on the job site by putting the following controls into place:

- · safety rules checklist
- job site inspection checklist
- · weekly toolbox safety talk
- · hazard communication program
- job site safety program that includes:
 - o job site safety inspection report
 - o company's safety policy and safety rules
 - o format for toolbox safety meetings
 - o accident reporting procedures

5. Job site paperwork

The foreman needs to complete paperwork on the job site to track productivity for the overall project, and the office needs information from the field to determine the profitability of the job as it progresses. If the foreman fails to maintain and report job site data to the project manager, then the company cannot properly determine how it performed on a specific project. An effective job site reporting system should include:

- · a daily log
- · a weekly job progress report
- · a daily job site report
- · an expense report for job site material purchases
- · a field work order for handling extra work requests

Labour tracking process with key labour codes broken out by specific areas on the job site

Start using these key job controls to improve overall productivity on the job site. Getting organized isn't always easy, but it's a necessary skill for achieving desired results.

Norb Slowikowski is a Productivity Consultant and professional trainer who works on all aspects of Management Development. He may be contacted at norbslow1@aol.com.



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Tracking changes in Microsoft Word

Wouldn't it be great if you could quickly see what changes have been made to a document? Such a feature would be great for anyone in charge of maintaining corporate bylaws, legal documents, records about investments in failed savings and loans, congressional testimony and so on.

With Microsoft Word's Track Changes feature, you can. Track Changes lets you indicate what changes have been made to a document. Any deleted text is shown with a line running through it (strikethrough); inserted text is underlined. Any line that contains a change is marked with a vertical line in the margin, so you can quickly scan through a document to find changes. Figure 1 shows an example of a document with revision marks. To find out how to create revision marks like these, read on.

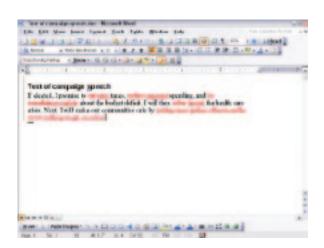


Figure 1: A document with tracked revisions.

To track changes while editing a document, turn on the Track Changes feature before you begin editing and Word will then keep track of revisions as you make them. You can then print the document with or without the changes, and you (or someone else) can later accept or reject the changes.

Turning on Track Changes

Follow these steps to track changes:

1. Choose Tools --> Track Changes.

The Reviewing toolbar appears and Word begins tracking your changes.

If you do not want the change marks to appear onscreen while you edit the document, choose "Final" in the "Display for Review" drop-down list.

Normally, change marks appear onscreen as you type, which can be confusing, so you may want to switch to Final display. As long as Track Changes is still turned on, Word continues to track your changes, even though it doesn't display the revision marks.

- 3. Proceed! Now you can feel free to edit the document to pieces.
 - To disable the tracking of changes, click the Track Changes button on the Reviewing toolbar. Think about turning off Track Changes to correct a simple and obvious typographical error that doesn't need to be highlighted by a revision mark. Then turn revision marking back on again.

- You can quickly activate Track Changes by double-clicking the letters TRK in the status bar.
- You can change the way to display changes by choosing Tools

 Options and clicking the Track Changes tab. The dialog box
 that appears enables you to set the colours to display insertions,
 deletions, formatting changes and the vertical bar displayed
 next to changed lines. You can also control whether balloons
 highlight comments and editing.

Accepting or rejecting changes

When you have accumulated a bunch of tracked changes, sooner or later you have to accept or reject the revisions. If you accept the changes, the revisions are permanently incorporated into the document and the change marks are removed. If you reject the changes, the document reverts to its previous state and the revisions are deleted along with the change marks.

To accept or reject all of the changes to a document in one swift stroke, follow these steps:

1. Summon the Reviewing toolbar.

Choose View --> Toolbars --> Reviewing to display this toolbar.

2. Click the arrow next to the "Accept Change" button, and then choose "Accept All Changes in Document."

The changes are accepted. Skim through your document to confirm that changes have indeed been accepted or rejected as you intended. It should be obvious. If you have second thoughts, press Ctrl+Z. The revision marks are restored.

If you prefer to work your way through the changes one at a time, accepting or rejecting each one on its own merits, use the "Next Change" or "Previous Change" buttons on the Reviewing toolbar to move to the next or previous change, and then click the "Accept Change" or "Reject Change" button, depending on what you think of the change.

Change marks accumulate in a document until you either accept or reject them. You can collect a set of revision marks over a period of days or weeks and then deal with them all at once by accepting or rejecting them.





000: INTRODUCTION AND INSTRUCTIONS FOR DISCUSSION LEADERS

Key concepts

- Safety is cost-effective. Unsafe work practices cost companies money and can easily result in the loss of a contract.
- The investment in wages for a crew to meet for safety training is significant. Your preparation for that training will determine the return on your company's investment, and may just save the life of someone present at your meeting.
- Don't think of this as a lecture. Think of this as a way to help others work more safely. Invite participation and comment as time permits.
- Safety is everybody's job.
- Many safety concepts are similar to, or even repetitious of, other concepts.
- Safety is a way of being, not a set of rules.
 One of your goals is to develop this way of being in your crew.

Communication

Communication will be good if you:

- understand that each session requires preparation. Going in cold or quickly looking at the material at the last minute cheats your crew. Do your best.
- start on the discussion leader duties several days before the session.
- If you can't get materials for the demonstrations, use examples to help fill the void. Cite short examples from your own experience, or ask for examples from other foremen or crew members, as appropriate.
- Be confident. You don't need to rehearse your presentation, be a polished speaker or provide overhead slides. Anyone whose job involves instructing or directing

- others can do a good job of giving one of these talks.
- Involve crew members in demonstrations and in answering questions that other crew members may have.
- Reinforce the training by noticing unsafe work practices on the job and asking people to think of how they might do the job more safely.
- Reinforce the training by noticing safe work practices among your crew on the job. At the next toolbox talk, mention a practice you observed and why it was safe. Then, thank the person for doing the job that way.
- Consider assigning one of the toolbox talks to each crew member or maybe to the journeymen (if there are several journeymen). People can learn by teaching.

Important: Treat this as a project deliverable. The following procedure will help you do that.

Procedure

If you apply the following steps to each toolbox talk, you'll have good results. These steps assume you are conducting a weekly meeting.

- Review the upcoming toolbox talk ahead
 of time. Allow a few days for this, so you
 can start preparing. If you wait until the
 last minute, you'll send the wrong message about your attitude toward your
 crew's safety.
- Complete the "Discussion Leader Duties" by the preceding workday, if not sooner. This includes ensuring you have enough evaluation forms for each participant.
- Start on time.

- Begin with a quick recap of the previous topic, unless this is the first meeting.
- When presenting, you can choose to read through the safety talk, or you can use it as a reference while covering the topic.
- Pause after covering the bullet points under each heading and ask, "Are there any questions?"
- Pass the evaluation sheets out after the meeting. You do not want people distracted by writing on a sheet when they should be listening and participating in the discussion and demonstrations.
- Stop the presentation (and the demonstration, if giving one) a few minutes before
 the scheduled ending time. This way,
 people can ask questions without making
 the meeting run over. If people still have
 questions when time's up, ask them to
 write the questions on their evaluation
 form or to contact you later that day.
- Allow a minute or two at the end of the meeting for people to fill in the evaluation form.
- Review the evaluation forms within a day or two of the meeting, so you can take any necessary actions in a timely manner.
- File the evaluation forms per your company safety training policy.

Answering "overflow" questions

You may have more questions than time, and there may be new questions on the evaluation forms. You should provide the answers to the entire group. If one person asks, others also probably want to know. But, don't crowd the topic of one toolbox talk with questions from the last one. Here are some ways to

answer "overflow" questions, such as those on evaluation forms:

- Do a "part two" of the same topic as your next meeting.
- Hold a short interim meeting specifically for addressing questions.
- Provide workers with photocopies of relevant articles, policies, procedures or other reference materials that answer the questions.

This Toolbox Talks article is reprinted with permission from Toolbox Talks 2 - 100 Safety

Training Talks for Electrical Construction Work, 2007, National Electrical Contractors Association (US). The complete set is available in Canada through the Canadian Electrical Contractors Association (CECA). Visit the CECA website at www.ceca.org to place your order or call 1-800-387-3226.

QUARTERLY FINANCIAL STATISTICS

Quarterly Financial Statistics for Enterprises – Construction

	3rd quarter 2010	4th quarter 2010	1st quarter 2011	2nd quarter 2011	3rd quarter 2011
Selected financial ratios					
Profit margin (%)	4.8	5.1	3.9	3.7	4.1
Return on equity (%)	18.2	18.7	15.3	15.0	15.7
Debt to equity (ratio)	1.460	1.397	1.439	1.529	1.517
Return on capital employed (%)	8.3	8.5	7.4	7.2	7.3

 $Source:\ Statistics\ Canada-Quarterly\ Financial\ Statistics\ for\ Enterprises-Construction-Table\ 8-2$

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Injury Prevention Tips – Cold Stress

Hand Protection

Manual dexterity is essential to safety and production.

Fine work performed with bare hands for more than 10-20 minutes in an environment below 16°C (60.8°F) requires special measures to keep workers' hands warm. These measures may include warm air jets, radiant heaters (fuel burning or electric) or contact warm plates.

Metal handles of tools and control bars should be covered by thermal insulating material for temperatures below -1°C (30.2°F).

Workers should wear gloves where fine manual dexterity is not required and the air temperature falls below 16°C (60.8°F) for sedentary, 4°C (39.2°F) for light and -7°C (19.4°F) for moderate work.

To prevent contact frostbite, workers should wear insulated gloves when surfaces within reach (especially metallic surfaces) are colder than -7°C (19.4°F). Warn workers to avoid skin contact with these surfaces.

Tools and machine controls to be used in cold conditions should be designed for operation by gloved hands.



CONTROLS

The best protection against cold-related health risks is to be aware and be prepared. Workers should recognize the signs and symptoms of overexposure in themselves and others. Pain in the extremities may be the first warning sign. Any worker shivering severely should come out of the cold.

General

- Ensure that the wind-chill factor is understood by workers, especially those working on bridges or out in the open on high buildings.
- Ensure that workers are medically fit to work in excessive cold.
- Make sure that workers understand the importance of high-caloric foods when working in the cold. Warm, sweet drinks and soups should be arranged at the work site to maintain caloric intake and fluid volume. Coffee should be discouraged because it increases water loss and blood flow to extremities.

- Personnel working in isolated cold environments, whether indoors or outdoors, should have back-up.
- Provide hot drinks and regular breaks under extremely cold working conditions.

Clothing

Select protective clothing to suit the cold, the job and the level of physical activity.

- Wear several layers of clothing rather than one thick layer. The air captured between layers is an insulator.
- Wear synthetic fabrics such as polypropylene next to the skin, because these wick away sweat. Clothing should not restrict flexibility.
- If conditions are wet as well as cold, ensure that the outer clothing is waterproof or at least water-repellent. Windresistant fabrics may also be required under some conditions.
- At air temperatures of 2°C (35.6°F) or less, workers whose clothing gets wet for any reason must be immediately given a change of clothing and be treated for hypothermia.
- Encourage the use of hats and hoods to prevent heat loss from the head and to protect ears. Balaclavas or other face covers may also be necessary under certain conditions.
- Tight-fitting footwear restricts blood flow. Footwear should be large enough to

allow wearing either one thick pair or two thin pairs of socks. Wearing too many socks can tighten the fit of footwear and harm rather than help.

 Workers who get hot while working should open their jackets but keep hats and gloves on.

Shelter

For work performed continuously in the cold, allow rest and warm-up breaks. Heated shelters such as trailers should be available nearby. Encourage workers to use these shelters at regular intervals depending on the wind-chill factor. Workers showing signs of shivering, frostbite, fatigue, drowsiness, irritability or euphoria should immediately return to the shelter. Workers entering the shelter should remove their outer layer of clothing and loosen other clothing to let sweat evaporate. In some cases, a change of clothing may be necessary.

Training

Before working in extreme cold, workers should be instructed in safety and health procedures.

Training should cover:

- proper clothing and equipment;
- safe work practices;
- guidelines for eating and drinking;
- risk factors that increase the health effects of cold exposure;
- how to recognize signs and symptoms of frostbite;
- how to recognize signs and symptoms of hypothermia; and
- appropriate first aid treatment, including rewarming procedures.

This excerpt is taken from Chapter 7 – Cold Stress – of the Construction Health and Safety Manual produced by the Infrastructure Health and Safety Association (IHSA), the full text of which is available on the Resource Downloads section of the IHSA website at www.ihsa.ca.

CFAE CORNER

CFAE Corner

Question:

Do you know the codes and standards that apply to the installation and testing of fire alarm systems in Ontario?

Answer

Codes and standards that apply to the installation and testing of fire alarm systems in Ontario include the following:

- Ontario Fire Code (OFC)
- Ontario Electrical Safety Code (OESC)
- Underwriters Laboratories of Canada (ULC)
- Ontario Building Code (OBC)
- National Fire Prevention Association (NFPA)

A complete listing of all applicable codes and standards can be found in the Ontario Building Code (OBC) 1.3.1 (Table 1.3.1.2).



CORPORATE TRAINING

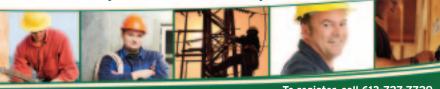
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