

## Incident Summary #II-1013256-2020 (#17432) (FINAL)

SUPPORTING INFORMATION	Incident Date		May 8, 2020	
	Location		Langley	
	Regulated industry sector		Electrical - Low voltage electrical system (30V to 750V)	
	Impact	Injury	Qty injuries	0
			Injury description	Not applicable
			Injury rating	None
	Damage	Damage	Damage description	The armoured cable protective sheathing was damaged as well as the insulation on the live conductors were damaged causing an electrical fault which resulted in the circuit breaker opening. The fire pump circuit was out of service for 48hrs
			Damage rating	Moderate
	Incident rating		Moderate	
Incident overview		<p>A construction worker was drilling holes into a concrete parkade of a residential multi family dwelling for replacement of expansion joints and drilled into an energized 600 volt fire pump cable beneath the concrete surface.</p> <p>An electrical fault between the energized conductors and the metal drill bit occurred and the fire pump circuit breaker opened causing a loss of power to a critical fire pump circuit.</p>		
INVESTIGATION CONCLUSIONS	Site, system and components	<p>The fire pump maintains water pressure in a fire sprinkler suppression system throughout the building.</p> <p>The 600 volt fire pump is fed from an armoured cable encased in the parkade concrete slab and is protected by a circuit breaker. The armoured cable is a 3 conductor # 2/0 aluminum ACWU cable 1.5inches in outside diameter.</p> <p>The fire pump cable is considered fire and life safety equipment and is required by the BC electrical and the BC building code to be protected against fire to provide continued operation of not less than 1 hr. The fire pump cable is required to be embedded in not less than 2 inches of concrete or installed in a shaft enclosure of at least 1 hour fire resistance construction.</p> <p>There is no requirement for low voltage conductors (30-750 volts) to be identified in concrete slabs.</p> <p>Drilling or cutting into energized electrical cables or conductors presents a major electrical shock and fire hazard as well as the potential to damage important fire and life safety features within a building.</p> <p>Best practice for newly constructed or renovated buildings is to provide “as built” drawings to identify the routing of concealed electrical systems within the building that can be referenced to determine areas to avoid when cutting or drilling into the structure</p> <p>In the absence of, or in addition to as built drawings the best practice is X-raying concrete slabs to ensure electrical systems will not be damaged</p>		

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Failure scenario(s)	<ul style="list-style-type: none"> <li>- A construction worker was installing steel flanged expansion joints in a parkade as part of warranty work. See Figure 2</li> <li>- The construction worker did not confirm if there was any electrical cables in the slab prior to drilling.</li> <li>- The construction worker was drilling ¼ inch holes in the concrete slab with a 6 inch long drill bit in a 8 inch slab when they hit the energized armoured fire pump cable.</li> <li>- When the cable was hit while drilling the concrete slab an electrical fault occurred causing an arc and the circuit breaker to trip</li> </ul>
Facts and evidence	<p><b><u>Electrical Contractor Statement:</u></b></p> <ul style="list-style-type: none"> <li>- The construction worker was drilling 6 inches deep holes in the 8 inch thick concrete slab.</li> <li>- The concrete was not X-rayed to confirm any source of energy is present in the area prior to drilling.</li> <li>- The concrete drill bit was drilled into a live armoured cable in the concrete causing an arc and loss of power to the fire pump circuit.</li> <li>- The low voltage armoured cable was not marked in the concrete slab.</li> <li>- As built drawings were not available for the construction worker.</li> </ul>
Causes and contributing factors	<p>It is highly likely that the construction worker not taking the appropriate steps to determine if the concrete slab was free of any electrical cables prior to drilling the hole was the cause of the incident.</p>



**Figure 1** 1/4inch hole drilled 6inches deep into the fire pump armoured cable in the concrete slab



**Figure 2 :** Rubber expansion joint with steel flanges installed