Incident Summary #II-1420747-2022 (#29291) (FINAL)

SUPPORTING INFORMATION	Incident Date		August 13, 2022
	Location		Vancouver
	Regulated industry sector		Elevating devices - Lifts for the physically disabled
	Impact – Injury	Qty injuries	1
		Injury description	The passenger sustained a sprained ankle as per incident report
		Injury rating	Minor
	Impact – Damage	Damage description	The lift sustained significant amount of damage.
		Damage rating	Major
	Incident rating		Major
	Incident overview		As the lift and passenger descended in the lift, the lift stopped approximately 6” from the floor level (second landing). A loud banging noise was heard, and then the lift dropped approximately 6’ to the pit floor.
INVESTIGATION CONCLUSIONS	Site, system and components		Chained hydraulic lifts use a combination of a hydraulic jack and chains to lift and lower the platform. The hydraulic jack resides in the hoistway between the rails. Two pulleys are attached to the top of the jack. Two chains tie together the system. One end is attached to the platform. The other end is tied to a fixed point at the base of the rails. The controller and hydraulic pump reside in a machine room next to the hoistway. The chained hydraulic system uses the pulleys to give it a 2:1 movement ratio. There are two safety devices (knurled rollers) that ride along with the platform of the lift (Photo 4). These rollers will engage the guiderails if the suspension means (chains) goes slack/fail, thus preventing the platform from freefalling. A slack chain safety switch is the another means of detection of a slack chain which would indicate that the platform is hung up on the guiding means (guiderails). When a chain goes slack, this switch would cause power to be removed from the driving machine (power unit) which would result in closing the down direction valve and stop the cylinder from retracting into the cylinder.
	Failure scenario(s)		One of the safety rollers on the lift was covered in paint and both rollers had severely worn knurling. Due to the intermittent contact with the guide rail, the knurling had worn down. As the unit traveled to the second landing, it is highly probable that one of the rollers was dragging on the guide rail. When the unit was near the second landing, the unit stopped. This would be an indication that one or both safety rollers engaged causing the unit to stop. At this time the slack chain safety switch would have tripped, causing the controls to close the down valve. As the platform traveled down to the second landing it was noticed by the passenger that the platform was travelling slower than normal. When the platform came just short of the second landing, the platform safety device engaged, resulting in the platform stopping. The hydraulic piston continued to retract, causing the suspension chain to become slack. The slack chain safety rollers failed which caused the platform to fall to the pit.

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Facts and evidence	The unit was registered in 1980s. Upon inspecting the guiderail, it was noticed that there are sections of the guiderail that showed the slack chain safeties intermittently engaged during normal operation that did not cause the platform to stop (Photo 2 & Photo 3). Upon examining the safety rollers, it was noticed that one of the rollers was covered in paint (Photo 5). Both rollers appeared to have severely worn knurling. The elevating maintenance contractor stated that regular maintenance had been performed. Hydraulic down valve was not closed (the normal function of the slack chain safety switch would trip the valve to close), and hydraulic piston had fully retracted into the cylinder. Worn packing gland at the piston head was observed.
Causes and contributing factors	Debris in the hydraulic system may have caused particles to inhibit the down valve to close thus allowing the hydraulic piston to fully retract into the cylinder. Due to the additional weight of the passenger weight/movement, one of the safety rollers failed to hold the platform in position, resulting in the platform plunging down to the pit floor. One of the safety rollers had dislodged from its installed position and the other roller due to paint on it, was unable to support the platform in the stopped position when the safety rollers engaged.

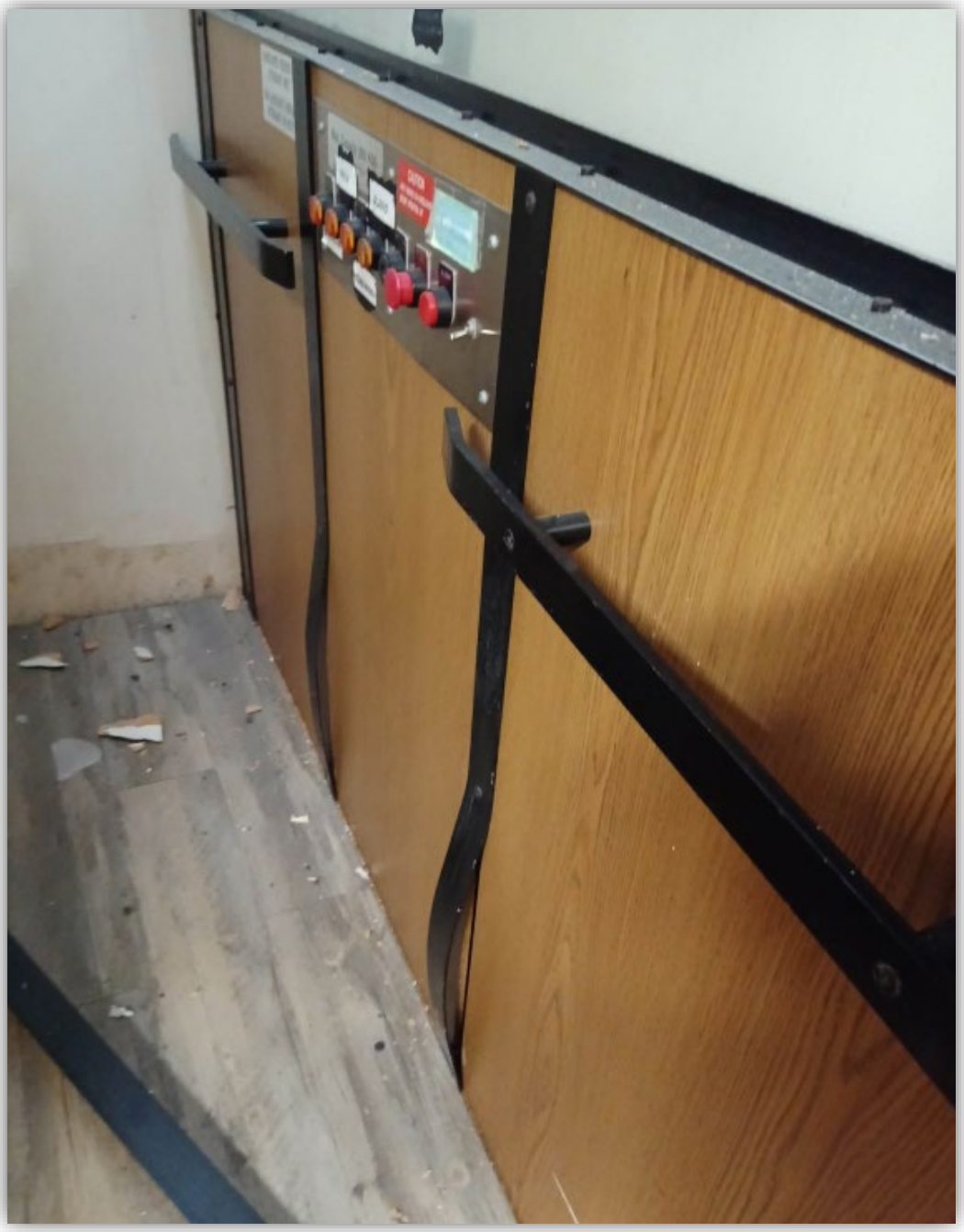

Photo 1 – Lift showing damage from drop into pit.

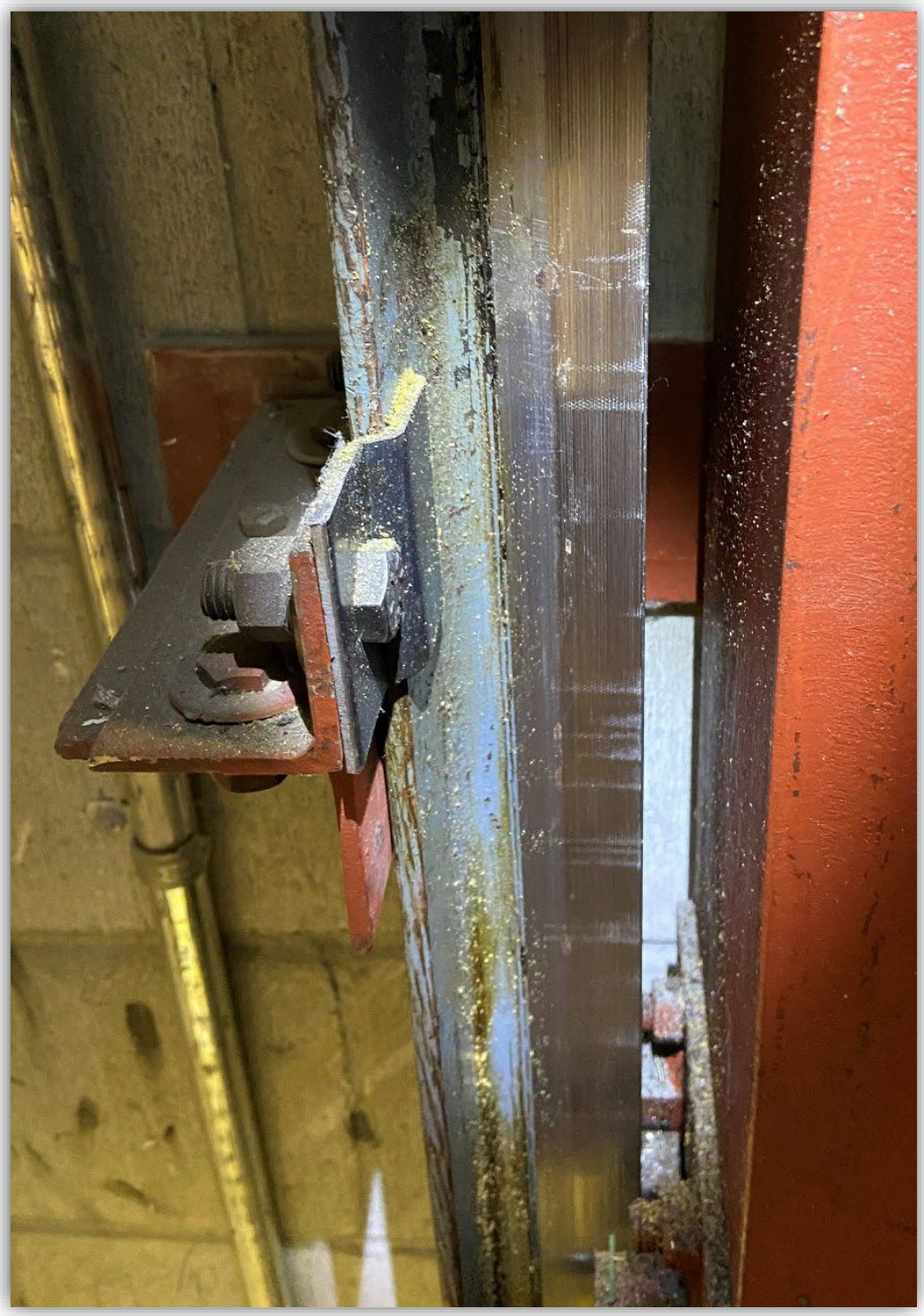

Photo 2 – Multiple contacts on guide rails by safety roller(s)

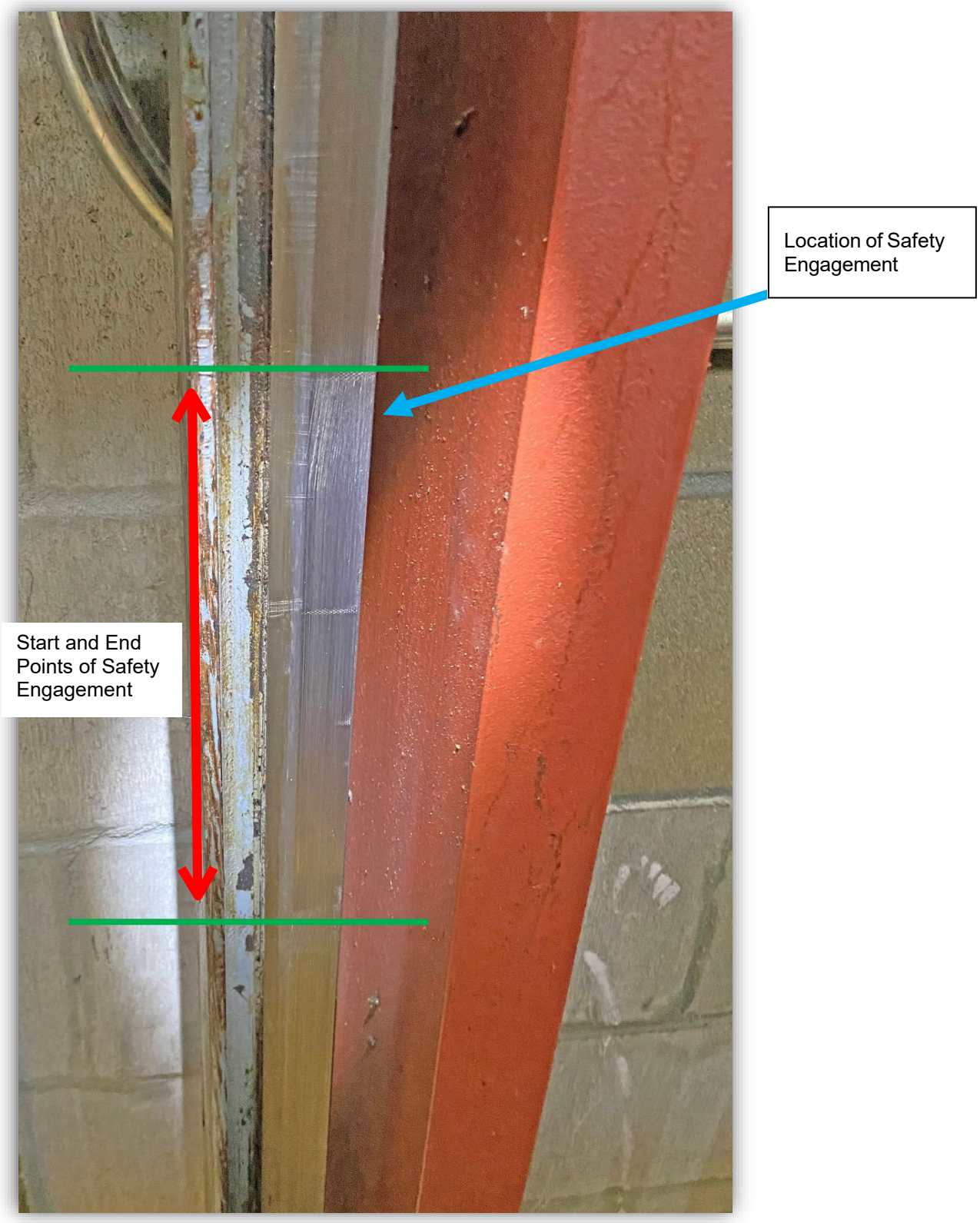

Photo 3 - Safety slide

Photo 4 – Safety roller

Photo 5 – Safety roller with paint