Incident Summary #II-888381-2019 (#14685) (FINAL)

SUPPORTING INFORMATION	Incident Date		August 5, 2019
	Location		Vancouver, BC
	Regulated industry sector		Amusement Devices - Amusement ride
	Impact – Injury	Qty injuries	0
		Injury description	None
		Injury rating	None
	Impact – Damage	Damage description	Damage to the wooden track, approximately 30 metres in length, and abrasions on the passengers right pilot car wheel.
		Damage rating	Moderate
	Incident rating		Moderate
	Incident overview		On August 5, 2019, while in motion, the pilot car of a wooden roller coaster came out of its pre-determined path of travel and derailed, skidding to a stop by abrasion against the wooden coaster track. The coaster was evacuated safely, with no injury.
INVESTIGATION CONCLUSIONS	Site, system and components		Wooden coaster travels along a wooden track, the wooden track is topped with a steel plate upon which the coaster cars ride with steel wheels. The coaster is conveyed to the top of the track using a driven chain, and from that point on is gravity powered. Wooden track consists of a lattice work of wooden beams and planks, interconnected using steel fasteners and concrete foundations. Elevated sections of the wooden track are attached to the ground using tensioned guy lines that limit flex and sway of the elevated track sections. A water sprinkler system is used to control shrinkage of the wooden track which in turn controls the spacing between the steel rail plates, or “gauge width” of the track. The wooden roller coaster is loaded and unloaded at a pre-determined location on the track where operators bring the coaster to stop, to safely load and unload passengers.
	Failure scenario(s)		On August 5, 2019, while in operation for the public, a track misalignment caused the pilot car (1st car) of the purple train, to disengage from the steel track as it travelled through the upper south horseshoe of the coaster track. The right wheel (North) of the pilot car came off the steel rail and dropped 1.5 inches on to the wooden layer of the track causing the left wheel flange (South) to ride up on to the south steel rail plate and eventually skidding to a stop with the steel wheel flange resting on the steel plate. When the pilot car derailed it caused the steel brake fin (upstop) of the left (North) side of the pilot car to dig into the north face of the wooden uplift (upstop) opening causing the purple train to come to a stop in approximately 30 metres.

Incident Summary #II-888381-2019 (#14685) (FINAL)

Facts and evidence	• The spacing between the tracks steel rails (gauge width) was measured after the incident and found to be over tolerance in the area where the train had derailed. • Pre-season track width measurements, were confirmed during interview with maintenance staff, as having not been conducted prior to the incident. • Guy lines from ground level to the upper south horseshoe, were confirmed during interview of maintenance staff, as having been loose and requiring significant tightening, immediately following the incident. • A water sprinkler system is used to maintain moisture content of the wooden roller coaster structure to control shrinkage. Excessive shrinkage can cause the spacing between the track rails to increase. • An interview with the maintenance staff confirmed that the sprinkler system for the upper south horseshoe was inoperable prior to the incident for an unknown period of time. • The weather was very hot and dry prior to and during the time of the incident.
Causes and contributing factors	The pilot car disengaged from its pre-determined path of travel due to track misalignment at the upper southern horseshoe. It is highly likely that a combination of factors contributed to this incident including: lack of track inspection/maintenance, lack of guy line inspection/maintenance, and drying and shrinking of wooden track due to an inoperable sprinkler system.

Photographs

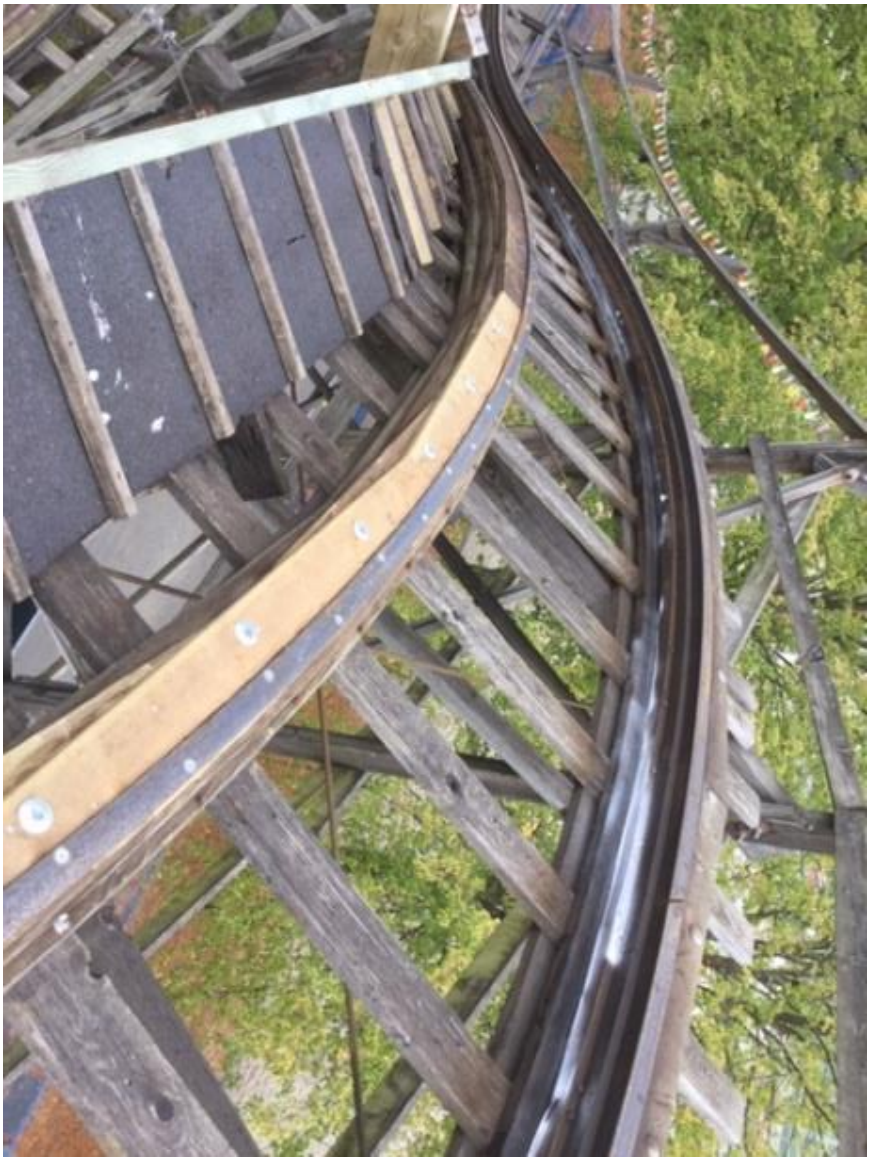

Photo 1: Post incident, area where pilot car disengaged. This entire area should be regularly watered, weather depending, to inhibit drying and shrinking of wood

Note: bright wood indicates repaired area.

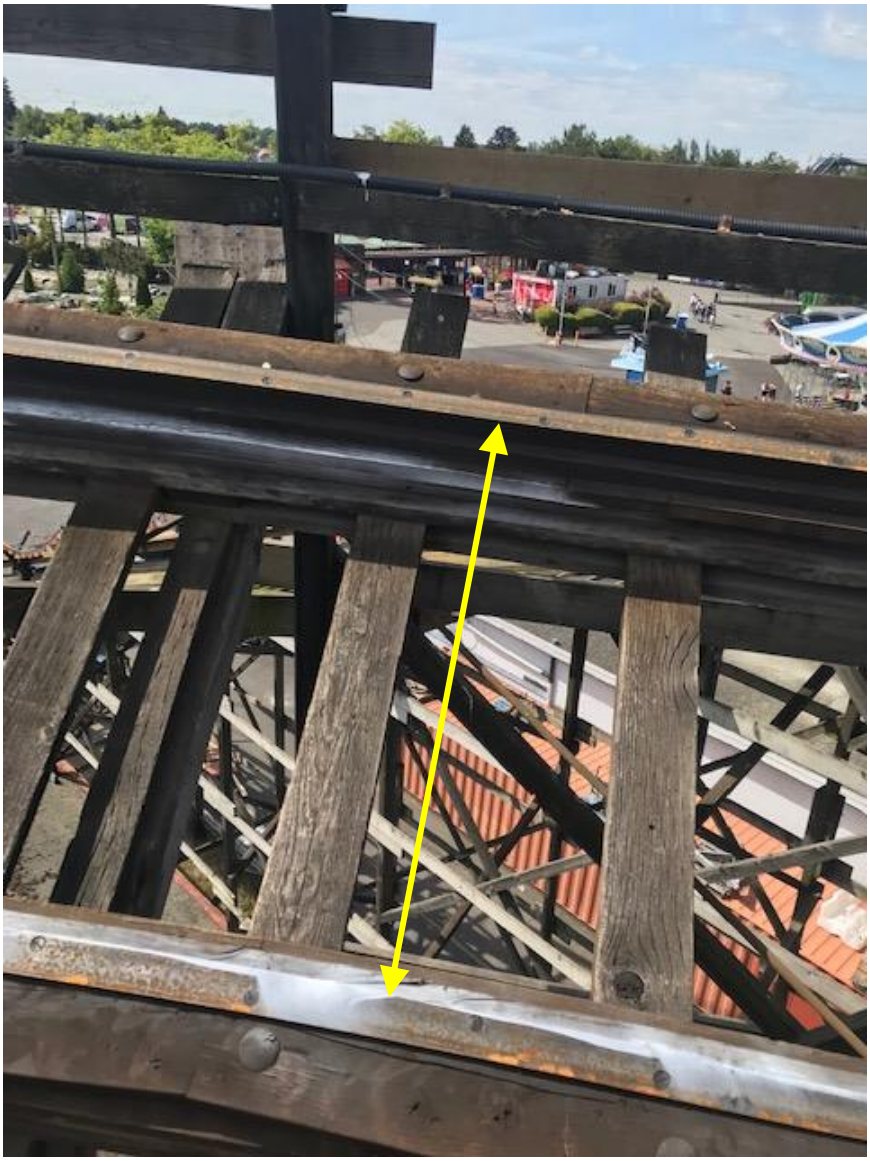

Photo 2: Track gauge width is the distance between the track steel rail plates, as shown above.

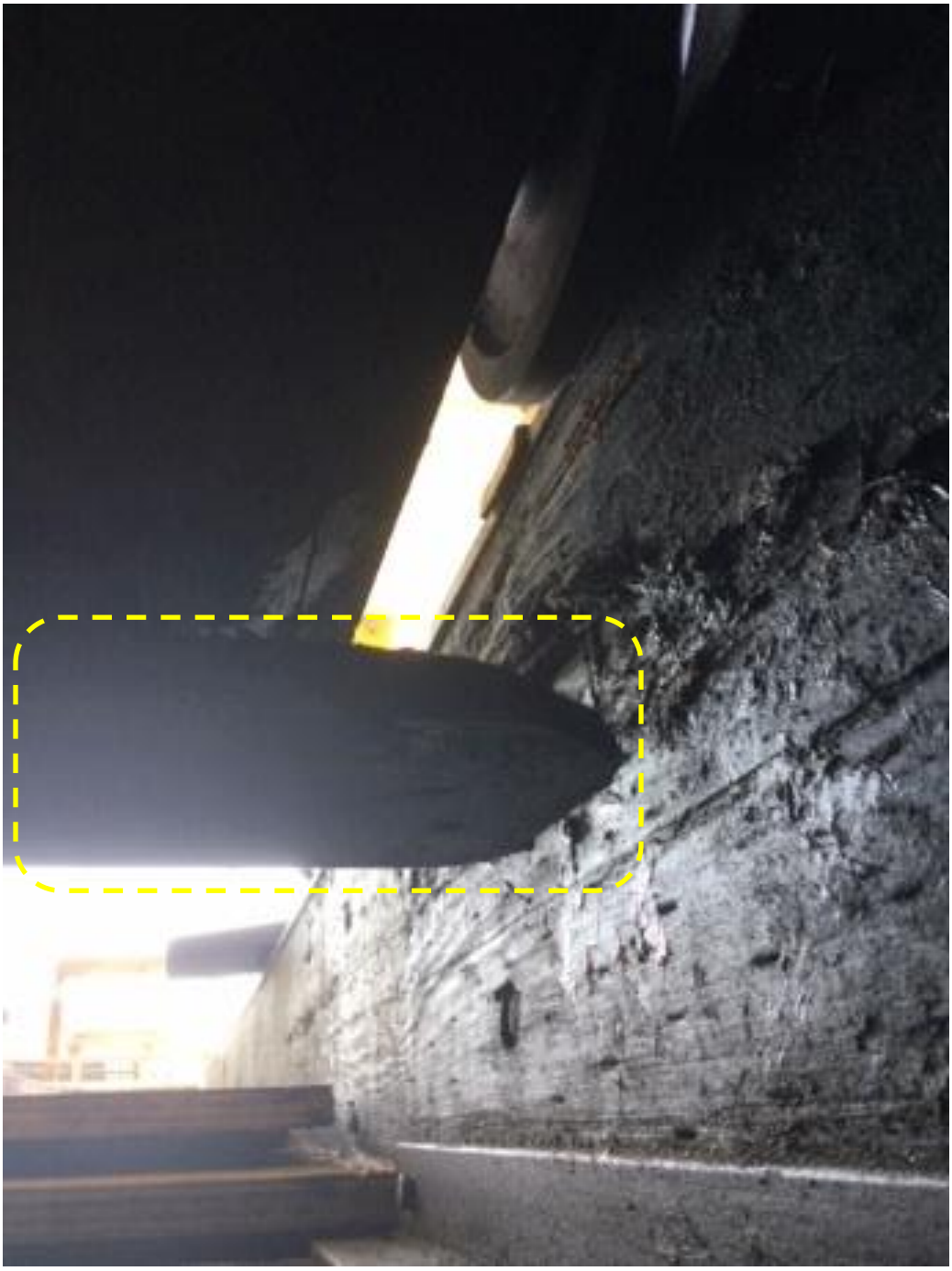

Photo 3: Pilot car brake fin (upstop). Taken from underneath car.

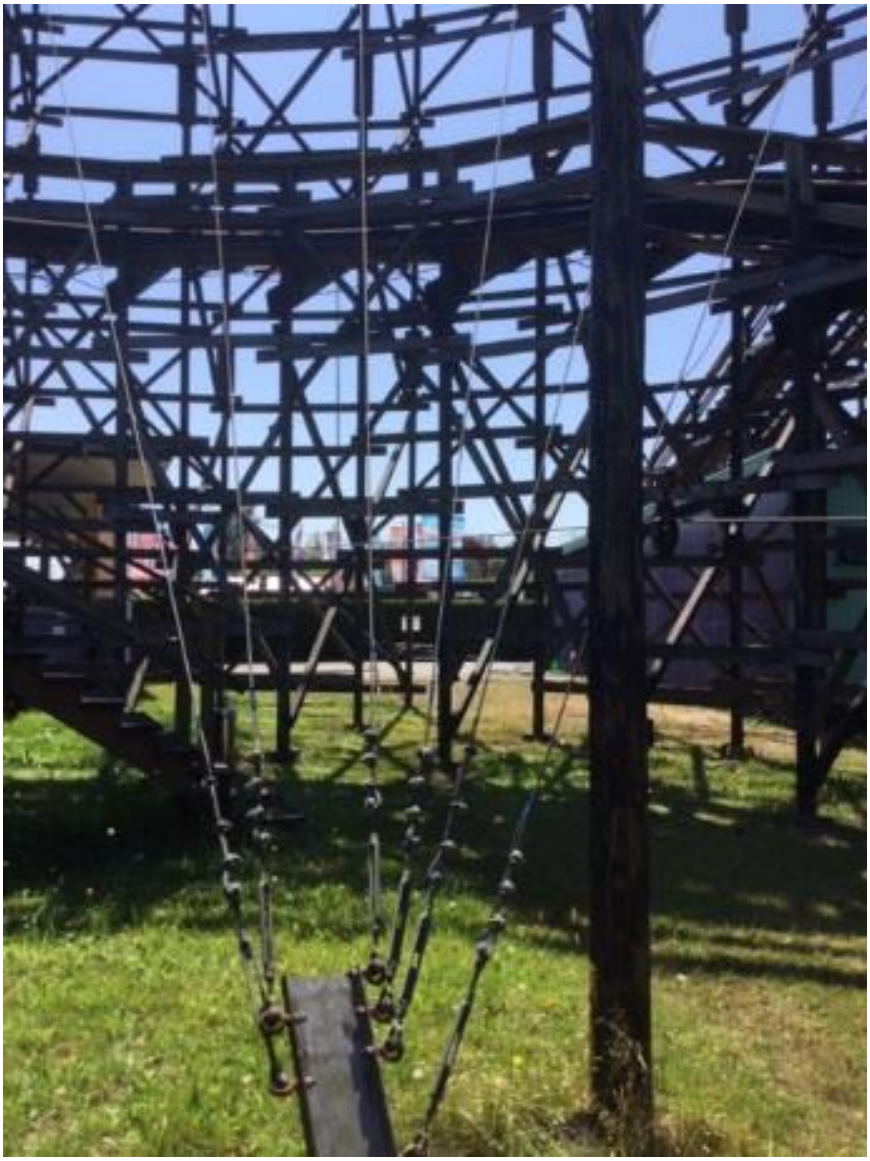

Photo 4: East guy lines connected to southern upper horseshoe.

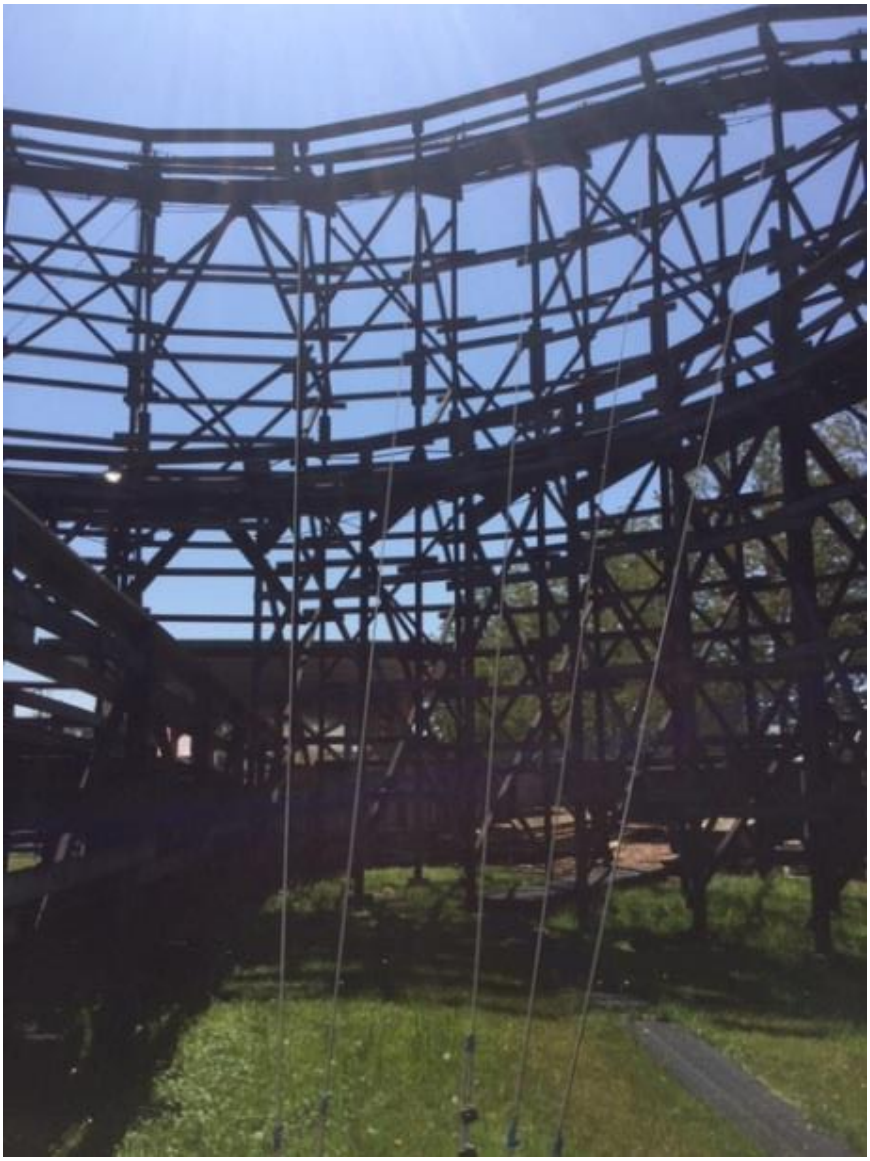

Photo 5: West guy lines connected to southern upper horseshoe.